HIGH SPEED RAIL (LONDON - WEST MIDLANDS)

Supplementary Environmental Statement and Additional Provision 2 Environmental Statement

Volume 5 | Technical appendices

Water resources (WR-001-000) Annexes

SES and AP2 ES 3.5.6.2

July 2015

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Department for Transport

High Speed Two (HS2) Limited has been tasked by the Department for Transport (DfT) with managing the delivery of a new national high speed rail network. It is a non-departmental public body wholly owned by the DfT.

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Water Framework Directive survey annexes

Annex A

							Risk to Overall Status		
Surface water body name	Waterbody ID	Catchment	CFA	Additional Baseline Survey	No. of AP2 Amendments	Original Assessment	Post-Additonal Baseline survey	Post-AP2 Amendments	Assessment Summary
Canley Bk - source to conf with Finham Bk	GB109054044520	Warwickshire Avon	18	Y	N/A			No AP2 updates	Original scheme + Baseline
Finham Bk - conf Canley Bk to conf R Sowe	GB109054044480	Warwickshire Avon	18	Y	N/A			No AP2 updates	Original scheme + Baseline
R Itchen - source to conf with R Stowe	GB109054044070	Warwickshire Avon	16	Y	N/A		reduced risk	No AP2 updates	Original scheme + Baseline
Cherwell (Ashby Brook to Cropredy)	GB106039037350	Cherwell	15,	Y	2		reduced risk		Original scheme + Baseline + AP2
Fleet Marston Brook, Denham Brook, Pitchcott Brook west	GB106039030420	Thame and South Chilterns	11, 12	Y	N/A		reduced risk	No AP2 updates	Original scheme + Baseline
Stoke Brook Aylesbury	GB106039030320	Thame and South Chilterns	10, 11	Y	N/A			No AP2 updates	Original scheme + Baseline
Tetchwick Brook, Source to Ray and tribs	GB106039030070	Cherwell	12	Y	1		reduced risk		Original scheme + Baseline + AP2
Colne and GUC (from confluence with Chess to Ash)	GB106039023090	Colne	7	Y	1		reduced risk		Original scheme + Baseline + AP2
Padbury Brook (The Twins)	GB105033038210	Upper and Bedford Ouse	13, 14	Y	1				Original scheme + Baseline + AP2
Radstone Brook	GB105033037940	Upper and Bedford Ouse	14, 15	Y	N/A			No AP2 updates	Original scheme + Baseline
Ouse	GB105033037880	Upper and Bedford Ouse	14	Y	N/A			No AP2 updates	Original scheme + Baseline
Twin	GB105033030560	Upper and Bedford Ouse	13	Y	N/A		reduced risk	No AP2 updates	Original scheme + Baseline
East Litchfield catchment - trib of Tame	GB104028047020	Tame Anker and Mease	22	Y	N/A			No AP2 updates	Original scheme + Baseline
R Blythe from Patrick Bridge to R Tame	GB104028042572	Tame Anker and Mease	23, 24	Y	2				Original scheme + Baseline + AP2
R Blythe from Temple Balsall Brook to Patrick Bridge	GB104028042571	Tame Anker and Mease	23	Y	N/A			No AP2 updates	Original scheme + Baseline
Coventry and Ashby Canals	GB70910212	N/A	22	N	1				Original scheme + AP2
Grand Union Canal, Uxbridge to Hanwell Locks, Slough Arm, Paddington A	GB70610078	N/A	1, 2, 3, 4, 5	N	1				Original scheme + AP2
Trent & Mersey Canal, summit to Alrewas	GB70410142	N/A	22	N	2				Original scheme + AP2
River Leam - conf R Itchen to conf R Avon	GB109054044140	Warwickshire Avon	17	N	1				Original scheme + AP2
Ray and tributaries NorthEast of Grendon Underwood	GB106039030100	Cherwell	12	N	1				Original scheme + AP2
Bourne-Bilson Brook Catchment (trib of Trent)	GB104028047270	Staffordshire Trent Valley	22	N	1			increased risk	Original scheme + AP2
Pyford Brook Catchment (trib of Trent)	GB104028047250	Staffordshire Trent Valley	22	N	2				Original scheme + AP2
River Tame from River Anker to River Trent	GB104028047050	Tame Anker and Mease	22	N	7			increased risk	Original scheme + AP2
Black-Bourne Bk from source (confluence) to R Tame	GB104028047000	Tame Anker and Mease	21	N	2				Original scheme + AP2
Langley Brook from Middleton Hall Catch to R Tame	GB104028046900	Tame Anker and Mease	20, 21	N	2				Original scheme + AP2
Langley Brook from Source to Middleton Hall Catch	GB104028046890	Tame Anker and Mease	20	N	2				Original scheme + AP2
Horton Brook	GB106039023040	Colne	N/A	N	3	Not previously assessed	No baseline survey	New AP2 Scheme Element. Precautionary assessment	AP2 only

WFD Surface Water Survey Location Details

Key to Survey ID
- EF Electro Fishing Survey
- HM Hydromorphology Survey
- MI Macroinvertabrate Survey
- MP Macrophyte Survey
- PA Preliminary Aquatic Survey

CFA	Upstream Easting	Upstream Northing	Downstream Easting	Downstream Northing	Survey ID	Map Reference	Surface Water Body Survey Name	Surface Water Body WFD ID	Surface Water Body WFD Name
7	504214	188883	504321	188721	WFD-PA1-0001a	0001	Colne at South Harefield	GB106039023090	Colne and GUC (from confluence with Chess to Ash)
7	503487	189732	503680	189785	WFD-PA1-0001b				
7	504199	188910	504274	188806	WFD-MP1-0001				
7	504482	188323	-	-	WFD-MI1-0001				
7	504199	188910	504274	188806	WFD-EF1-0001				
7	504274	188806	-	-	WFD-HM1-0001a				
7	503583	189759	-	-	WFD-HM1-0001b				
7	505760	187747	505579	187748	WFD-PA1-0002	0002	New Years Green Bourne at South Harefield		
7	505664	187731	-	-	WFD-HM1-0002				
11	479708	212842	479872	212952	WFD-PA1-0003a	0003	Hartwell Ditches at Lower Hartwell	GB106039030320	Stoke Brook Aylesbury
11	479607	212972	479768	213081	WFD-PA1-0003b				
11	479567	213031	479738	213129	WFD-PA1-0003c				
11	479786	212902	-	-	WFD-HM1-0003a				
11	479690	213026	-	-	WFD-HM1-0003b				
11	479652	213079	-	-	WFD-HM1-0003c				
11	481103	211581	480974	211482	WFD-PA1-0004a	0004	Sedrup Ditches at Aylesbury		
11	480672	211649	480685	211846	WFD-PA1-0004b				
11	481053	211542	-	-	WFD-HM1-0004a				
11	480704	211749	-	-	WFD-HM1-0004b				
11	483799	209511	483711	209551	WFD-PA1-0005	0005	Unnamed tributary of Stoke Brook east of North Lee		
11	483706	209482	-	-	WFD-HM1-0005				
11	483746	209494	483691	209597	WFD-PA1-0006a	0006	Unnamed tributary of Stoke Brook (parallel to main water body), east of North Lee		
11	483831	209490	483686	209526	WFD-PA1-0006b				
11	483960	209332	483835	209487	WFD-PA1-0006c				
11	483715	209563	483676	209619	WFD-MP1-0006				
11	483678	209623	-	-	WFD-MI1-0006				
11	483690	209525	-	-	WFD-HM1-0006a				
11	483744	209496	-	-	WFD-HM1-0006b				
11	483897	209409	-	-	WFD-HM1-0006c				
11	484015	209289	483905	209441	WFD-PA1-0007a	0007	Stoke Brook at North Lee		
11	484407	209146	484215	209178	WFD-PA1-0007b				
11	483805	209593	483746	209701	WFD-MP1-0007				
11	483751	209704	-	-	WFD-MI1-0007				
11	483972	209363	-	-	WFD-HM1-0007a				
11	484308	209145	-	-	WFD-HM1-0007b				
11	484261	209081	484293	209147	WFD-PA1-0008	0008	Unnamed tributary of Stoke Brook near Nash Lee		
10	484340	208399	484343	208495	WFD-MP1-0008				
10	484403	208546	-	-	WFD-MI1-0008				
11	484347	209125	-	-	WFD-HM1-0008				
12	474046	218315	474223	218375	WFD-PA1-0009	0009	Fleet Marston Brook upper reaches north of Waddesdon	GB106039030420	Fleet Marston Brook, Denham Brook, Pitchcott Brook
12	474139	218324	-	-	WFD-HM1-0009				
11	477191	215832	477125	216012	WFD-PA1-0010a	0010	Unnamed tributary of Fleet Marston Brook, near Fleet Marston Farm		
11	477014	215930	477108	216068	WFD-PA1-0010b				
11	477158	215927	-	-	WFD-HM1-0010a				
11	477098	215990	-	-	WFD-HM1-0010b				
11	478012	214991	478111	214999	WFD-PA1-0011a	0011	Unnamed tributary of Fleet Marston Brook, near Aylesbury Vale Parkway		
11	478265	214593	478454	214565	WFD-PA1-0011b				
11	478010	214988			WFD-HM1-0011a				
11	478365	214591	-	-	WFD-HM1-0011b				
12	472275	220620	472220	220459	WFD-PA1-0012a	0012	Doddershall Brook west of Quainton	GB106039030070	Tetchwick Brook, Source to Ray and tribs
12	472279	220421	472330	220284	WFD-PA1-0012b				
12	472508	220186	472410	220173	WFD-PA1-0012c				
12	472215	220543	-	-	WFD-HM1-0012a				
12	472358	220375	-	-	WFD-HM1-0012b				
12	472511	220189	-	-	WFD-HM1-0012c				
12	473601	219009	473437	218940	WFD-PA1-0013a	0013	Unnamed tributary of Tetchwick Brook, near Upper South Farm		
12	473577	219007	473428	218917	WFD-PA1-0013b				
12	473502	219000	-	-	WFD-HM1-0013a				
12	473433	219041	-	-	WFD-HM1-0013b				
13	469007	226185	469097	226363	WFD-PA1-0014	0014	Unnamed tributary of the Twin, near Shepherds Furze Farm	GB105033030560	Twin
13	468518	225246	-	-	WFD-HM1-0014				
13	470105	226213	469965	226335	WFD-PA1-0015	0015	Unnamed tributary of the Twin, south of Steeple Claydon		
13	470060	226295	-	-	WFD-HM1-0015				
13	464731	228278	464929	228283	WFD-PA1-0016a	0016	Padbury Brook, south of Chetwode	GB105033038210	Padbury Brook (The Twins)
13	465070	228160	465061	227970	WFD-PA1-0016b				
13	464844	228283	464934	228283	WFD-MP1-0016a				
13	466208	226772	466292	226828	WFD-MP1-0016b				
13	464850	228287	-	-	WFD-MI1-0016A				
13	466294	226826	-	-	WFD-MI1-0016b				
13	464844	228283	464934	228283	WFD-EF1-0016A				
13	466208	226772	466292	226828	WFD-EF1-0016B				
13	464829	228284	-	-	WFD-HM1-0016a				
13	465060	228063	-	-	WFD-HM1-0016b				
13	466451	226943	466578	227023	WFD-PA1-0016c		Padbury Brook, north of Twyford		
13	466501	226996	-	-	WFD-HM1-0016c				
14	462940	231341	462922	231155	WFD-PA1-0017a	0017	Unnamed tributary of Padbuiry Brook, near Barton Hartshorn		
13	463373	230457	463228	230341	WFD-PA1-0017b				
13	463343	230459	-	-	WFD-MI1-0017				
14	462911	231245	-	-	WFD-HM1-0017a				
13	463269	230398	-	-	WFD-HM1-0017b (d/s)				
13	463304	230427	-	-	WFD-HM1-0017b (u/s)				
13	467570	226090	467664	226266	WFD-PA1-0018	0018	Unnamed tributary of Padbury Brook, east of Portway Farm		
13	467617	226178	-	-	WFD-HM1-0018				
13	466916	226655	467115	226657	WFD-PA1-0019	0019	Unnamed tributary of Padbury Brook, west of Portway Farm		
13	467011	226666	-	-	WFD-HM1-0019				
13	466372	227178	466410	227023	WFD-PA1-0020a	0020	Unnamed tributary of Padbury Brook, near Cowley Lodge		
13	466361	226987	466539	227055	WFD-PA1-0020b				
13	466362	227083	-	-	WFD-HM1-0020a				
13	466448	227029	-	-	WFD-HM1-0020b				
13	465177	228069	465123	227895	WFD-PA1-0021	0021	Unnamed tributary of Padbury Brook, parallel to main water body		
13	465138	227989	-	-	WFD-HM1-0021				
13	464621	228359	464778	228398	WFD-PA1-0022	0022	Unnamed tributary of Padbury Brook, near Rosehill Farm		
13	464699	228422	-	-	WFD-HM1-0022				
14	460209	238465	460102	238324	WFD-PA1-0023	0023	River Ouse, north of Turweston	GB105033037880	Ouse
14	459550	237562	459576	237405	WFD-PA1-0024	0024	Unnamed tributary of River Ouse near Brackley		
14	458671	240116	458817	240242	WFD-PA1-0025	0025	Radstone Brook at Radstone	GB105033037940	Radstone Brook
14	458749	240172	-	-	WFD-HM1-0025				
14	457955	240813	458130	240884	WFD-PA1-0026	0026	Unnamed tributary of Radstone Brook, north of Radstone		
14	458041	240839	-	-	WFD-HM1-0026				
15	457596	241145	457732	241274	WFD-PA1-0027a	0027	Radstone Brook upper reaches, near Radstone		
15	458081	241691	458216	241604	WFD-PA1-0027b				
15	457666	241207	-	-	WFD-HM1-0027				
15	451698	247916	451587	248004	WFD-PA1-0028a	0028	River Cherwell, east of Edgcote	GB106039037350	Cherwell (Ashby Brook to Cropredy)
15	451596	248048	451440	248095	WFD-PA1-0028b				
15	451877	247977	451806	247973	WFD-MP1-0028				
15	451887	247975	-	-	WFD-MI1-0028				
15	451877	247977	451803	247981	WFD-EF1-0028				
15	451631	247941	-	-	WFD-HM1-0028a				
15	451518	248073	-	-	WFD-HM1-0028b				
15	451855	247647	451800	247790	WFD-PA1-0029	0029	Unnamed tributary of River Cherwell, near Danes Moor		
15	451814	247711	-	-	WFD-HM1-0029				
15	454149	244695	454033	244712	WFD-PA1-0030a	0030	River Cherwell upper reaches and tributaries, east of Thorpe Mandeville		
15	453759	245149	453652	245303	WFD-PA1-0030b				
15	453638	245381	453534	245509	WFD-PA1-0030c				
15	453420	245397	453525	245507	WFD-PA1-0030d				
15	453687	244888	-	-	WFD-MI1-0030				
15	454132	244701	-	-	WFD-HM1-0030a				
15	453709	245231	-	-	WFD-HM1-0030b				
15	453562	245426	-	-	WFD-HM1-0030c				
15	453513	245425	-	-	WFD-HM1-0030d				
15	451440	248285	451438	248098	WFD-PA1-0031	0031	Osierbed Spinney, tributary of River Cherwell, east of Edgcote		
15	451413	248192	-	-	WFD-HM1-0031				
16	443136	258630	443086	258471	WFD-PA1-0033	0033	Unnamed Tributary of River Itchen, east of Ladbroke	GB109054044070	Itchen
16	443062	258565	-	-	WFD-HM1-0033				
18	430974	273198	431120	273328	WFD-PA1-0034	0034	Finham Brook, west of Stoneleigh	GB109054044480	Finham Brook - conf Canley Brook to conf River Sowe
18	431025	273254	-	-	WFD-MI1-0034				
18	431038	273261	431103	273306	WFD-EF1-0034				
18	431045	273267	-	-	WFD-HM1-0034				
18	429117	274375	429280	274413	WFD-PA1-0035a	0035	Canley Brook, east of Crackley Lane	GB109054044520	Canley Brook - source to conf with Finham Brook
18	430089	274024	430011	273878	WFD-PA1-0035b				
18	429993	273723	430047	273649	WFD-MP1-0035				
18	430025	273683	-	-	WFD-MI1-0035				
18	429993	273723	430047	273649	WFD-EF1-0035				
18	429204	274421	-	-	WFD-HM1-0035a				
18	430082	273947	-	-	WFD-HM1-0035b				
18	427022	275679	427180	275801	WFD-PA1-0036a	0036	Unnamed tributary of Canley Brook, near Hurst Farm		
18	427842	275125	427995	275129	WFD-PA1-0036b				
18	427102	275739	-	-	WFD-HM1-0036a				
18	427911	275141	-	-	WFD-HM1-0036b				
23	421938	280889	421755	280840	WFD-PA1-0037	0037	Horn Brook, tributary of River Blythe, west of Kenilworth Road	GB104028042572	River Blythe from Temple Balsall to Patrick Bridge
23	421845	280866	-	-	WFD-HM1-0037				
23	424507	277711	424428	277887	WFD-PA1-0038a	0038	Bayleys Brook, north of Truggist Lane		
23	425379	277184	425241	277056	WFD-PA1-0038b				
23	424475	277800	-	-	WFD-HM1-0038a				
23	425322	277103	-	-	WFD-HM1-0038b				
23	422365	280155	422215	280147	WFD-PA1-0039	0039	Bayleys Brook, near Marsh Farm		
23	422243	280133	-	-	WFD-MI1-0039				
23	422170	280160	422186	280155	WFD-EF1-0039				
23	422294	280138	-	-	WFD-HM1-0039				
23	421342	281715	421514	281739	WFD-PA1-0040	0040	River Blythe, north of Meriden Road		
23	421791	281727	421853	281759	WFD-MP1-0040				
23	421795	281761	-	-	WFD-MI1-0040				
23	421791	281727	421853	281759	WFD-EF1-0040				
23	421433	281720	-	-	WFD-HM1-0040				
23	421041	282385	421219	282355	WFD-PA1-0041	0041	Shadow Brook, west of Didington Lane		
23	421133	282371	-	-	WFD-HM1-0041				
24	420458	283654	420615	283618	WFD-PA1-0042a	0042	Hollywell Brook, east of Middle Bickenhill Lane		
24	420123	284380	420296	284350	WFD-PA1-0042b				
24	420543	283643	-	-	WFD-HM1-0042a				
24	420202	284373	-	-	WFD-HM1-0042b				
22	414672	308982	414840	309060	WFD-PA1-0043	0043	Fisherwick Brook, west of Cappers Lane		
22	414770	308997	-	-	WFD-HM1-0043				
23	422116	280483	421952	280598	WFD-PA1-0044	0044	Bayleys Brook, east of Kenilworth Road	GB104028042571	River Blythe from Temple Balsall to Patrick Bridge
23	422032	280539	-	-	WFD-HM1-0044				

Surface water body name	Waterbody ID	Catchment	CFA	Additional Baseline Survey	No. of AP2 Amendments	Original Assessment	Risk to Overall Status		
							Post-Additonal Baseline survey	Post-AP2 Amendments	Assessment Summary
Horton Brook	GB106039023040	Colne	N/A	N	3	Not previously assessed	No baseline survey	New AP2 Scheme Element	AP2 only

Key for Baseline Assessment Changes:

	In audit trail, this cell indicates where the impact of a particular scheme element on a WFD sub-element has been changed as a result of baseline surveys
Red text	In assessment tab, where new text has been added describing why the assessment has changed
~~Strikethrough text~~	In assessment tab, where text from the previous assessment is no longer relevant/has been superseded and therefore has been removed (but is still visible to the reader).

Key for AP2 Assessment Changes:

	In AP2 Summary sheet, this cell indicates where assessment is required for the Scheme Element.
Red text	In assessment tab, where new assessment has been undertaken
	In assessment tab, where Main ES Scheme element has been removed or replaced by AP2 change

WFD Surface Water Survey Location Details **CFA 1-5**

Key to Survey ID
- EF Electro Fishing Survey
- HM Hydromorphology Survey
- MI Macroinvertabrate Survey
- MP Macrophyte Survey
- PA Preliminary Aquatic Survey

CFA	Upstream Easting	Upstream Northing	Downstream Easting	Downstream Northing	Survey ID	Map Reference	Surface Water Body Survey Name	Surface Water Body WFD ID	Surface Water Body WFD Name

Water Body ID	GB106039023040
Surface Water Body Name	Horton Brook
CFAs covered by Waterbody	N/A

CFA	New		
AP2 ID	AP2-000-001		
AP2 Name	Proposed Heathrow Express Depot, Langley		
AP2 Location	Hex Depot, Berkshire		
New/Replacement Scheme Element	NEW	NEW	NEW
AP2 Scheme Element Type	Horton Brook Diversion	Horton Brook Culverts	Cutting
Original Scheme	None New Relocation of the Heathrow Express depot to Langley.		
AP2 Description	A section of Horton Brook and another small adjacent waterway will be diverted across the area to be used for flood compensation	A section of Horton Brook and another small adjacent waterway will be placed in culverts where these waterways cross under the revised scheme trackwork	To the east of Hollow Hill Lane, the Hex Depot East Connection trackwork will be built on embankment for approximately 130m and then in shallow cutting (exact depth unknown at this stage) for approximately 700m.
Changes to Previously assessed elements	NA	NA	NA
AP2 Assessment Requirements	Brook diversion to be assessed	Culverts to be assessed	Cutting presence to be assessed

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water Body	Current status	Status objective	Scheme Elements	HORTON BROOK CULVERT - Proposed Heathrow Express Depot, Langley - AP2-000-001					HORTON BROOK DIVERSIONS - Proposed Heathrow Express Depot, Langley - AP2-000-001			LANGLEY CUTTING - Proposed Heathrow Express Depot, Langley - AP2-000-001		Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB106039023040			Description of scheme element impact	Drawings show length of Horton Brook culvert underneath the scheme trackwork to be approximately 50m.					Drawings show diversion of Horton Brook (Main River) to be approximately 350m and diversion of Horton Brook tributary/drain to be approximately 100m.			To the east of Hollow Hill Lane, the Hex Depot East Connection trackwork will be built in a shallow cutting (exact depth unknown at this stage) for approximately 700m.				Construction	Operation		
Horton Brook	Moderate	Good ecological status by 2027	Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms		Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	2. Macrophytes and phytobenthos - macrophytes	-		Receptor is insensitive to impact.	Likely to lead to the permanent loss of approximately 50 m of habitat. By default, potential adverse effect.	No additional effect, shading already considered within "Landtake"	Potential flow pattern and channel morphology homogenisation, increased velocities and reduced habitat continuity. No baseline data available. By default, potential adverse effect.	Potential minor adverse effect on concentrations of dissolved oxygen and pollutants. No baseline data available. By default, potential adverse effect.	There will be loss of 350m of habitat within the Horton Brook that lies within the diverted section while the new channels re-establish. No baseline data available for Horton Brook. Potential temporary adverse effect.	The new channels will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a substrate suitable for colonisation by submerged species. No macrophyte data available. The effect on this quality element is considered to be minor beneficial and localised.	Potential increase in flow velocities and scour downstream of the diversion. No baseline available. Potential adverse effect.	Only minor and localised effects anticipated as a worst case scenario.	Only minor and localised effects anticipated as a worst case scenario.	No scheme elements on upstream waterbodies.	Scheme elements were identified as having temporary and/or localised minor adverse effects (culvert, river diversion) but would be balanced by creation of new habitat through river diversion. As no baseline is available for the watercourse, overall effect considered adverse but with no potential of compromising the achievement of this element status objectives for this waterbody.	Surveys are recommended in order to assess the value of the watercourse for macrophytes.	None required	Minor adverse effects anticipated.	
	3. Macroinvertebrates	Moderate		Receptor is insensitive to impact.	Likely to lead to the permanent loss of approximately 50 m of habitat. By default, potential localised adverse effect.	No additional effect, loss of habitat through shading already considered within "Landtake" impact	Potential flow pattern and channel morphology homogenisation, increased velocities and reduced habitat continuity. No baseline data available. By default, potential adverse effect.	Potential minor adverse effect on concentrations of dissolved oxygen and pollutants. No baseline data available. By default, potential adverse effect.	There will be loss of 350m of habitat within the Horton Brook that lies within the diverted section while the new channels re-establish. No baseline data available for Horton Brook. Potential temporary adverse effect.	The river diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach. No baseline data available. Locally beneficial effect anticipated.	Potential increase in flow velocities and scour downstream of the diversion. No baseline available. Potential adverse effect.	Only minor and localised effects anticipated as a worst case scenario.	Only minor and localised effects anticipated as a worst case scenario.	No scheme elements on upstream waterbodies.	Scheme elements were identified as having temporary and/or localised minor adverse effects (culvert, river diversion) but would be balanced by creation of new habitat through river diversion. As no baseline is available for the watercourse, overall effect considered adverse but with no potential of degrading the current status or compromising the achievement of this element status objectives for this waterbody.	Surveys are recommended in order to assess the value of the watercourse for macroinvertebrates.	None required	Minor adverse effects anticipated.	-
	4. Fish	-		No data available on fish for any of the tributaries. By default, localised and temporary adverse effect during construction, with no effect anticipated at the scale of the water body.	Likely to lead to the permanent loss of approximately 50 m of habitat. In addition, culvert would potentially constitute an obstacle to fish movements. Although Horton brook is not a designated fisheries, the downstream waterbody (Endon Brook - GB104028052710) is a Freshwater Fish Directive Waterbody. Therefore, in the absence of baseline data, effect considered to be potentially adverse on the WFD status of this quality element.	No additional effect, loss of habitat through shading already considered within "Landtake" impact	Potential flow pattern and channel morphology homogenisation, increased velocities and reduced habitat continuity. Although Horton brook is not a designated fisheries, the downstream waterbody (Endon Brook - GB104028052710) is a Freshwater Fish Directive Waterbody. Therefore, in the absence of baseline data, effect considered to be potentially adverse on the WFD status of this quality element.	Potential minor adverse effect on concentrations of dissolved oxygen and pollutants. No baseline data available. By default, potential adverse effect.	There will be loss of 350m of habitat within the Horton Brook that lies within the diverted section while the new channels re-establish. No baseline data available for Horton Brook. Potential temporary adverse effect.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities. No baseline data available. New channels likely to provide, when re-established, similar habitats for fish. Locally beneficial effect anticipated.	Potential increase in flow velocities and scour downstream of the diversion. No baseline available. Potential adverse effect.	Only minor and localised effects anticipated as a worst case scenario.	Only minor and localised effects anticipated as a worst case scenario.	No scheme elements on upstream waterbodies.	Although the river diversion was identified as having a temporary adverse effect on this quality element, the culvert is considered to have the potential for an adverse effect at the scale of the waterbody. In the absence in the absence of baseline data allowing to assess the value of Horton brook for fish and as the downstream waterbody is a Freshwater Fish Directive designated waterbody, overall effect considered to have the potential for compromising the achievement of the WFD status objectives for this quality element.	Surveys are recommended in order to assess the value of the watercourse for fish. In addition, the culvert should be designed in order to allow for fish passage.	The culvert should be maintained in a good state in order to allow for fish passage.	Risk of deterioration remains until further baseline data becomes available and/or before detailed design and construction programming are complete.	
Physico-Chemical status																			
WFD classification elements	5. Dissolved Oxygen	Good	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• The 50m length of the proposed AP2 culvert will increase the amount of shaded watercourse. Despite this, it is predicted to result in no more than a minor impact on this sub-element. • This impact is likely to have a minor, local effect in relation to the overall water body.	• The construction of the proposed AP2 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	• The construction of the proposed AP2 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	N/A	• The construction of the proposed AP2 river diversions is predicted to result in no more than a temporary, minor impact on this sub-element. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	• The construction of the proposed AP2 river diversions is predicted to result in no more than a temporary, minor impact on this sub-element. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	• During the construction and operation of the proposed AP2 cutting, abstracted groundwater will be returned to ground via SuDS at the upstream end of the catchment. • Therefore, this impact is likely to have a minor, local effect on this sub-element in relation to the overall waterbody.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	No scheme elements on upstream waterbodies.	Potential minor and localised effects on sub-element. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required	None required	Minor and localised effects	
	6. pH	High	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No scheme elements on upstream waterbodies.	Receptor is insensitive to impact			Receptor is insensitive to impact
	7. Phosphate	Good	-		N/A	N/A	Receptor is insensitive to impact	• The construction of the proposed AP2 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	• The construction of the proposed AP2 river diversions is predicted to result in no more than a temporary, minor impact on this sub-element. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	• During the construction and operation of the proposed AP2 cutting, abstracted groundwater will be returned to ground via SuDS at the upstream end of the catchment. • Therefore, this impact is likely to have a minor, local effect on this sub-element in relation to the overall waterbody.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	No scheme elements on upstream waterbodies.	Potential minor and localised effects on sub-elements. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.			Minor and localised effects	
	8. Ammonia	High	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	• During the construction and operation of the proposed AP2 cutting, abstracted groundwater will be returned to ground via SuDS at the upstream end of the catchment. • Therefore, this impact is likely to have a minor, local effect on this sub-element in relation to the overall waterbody.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	No scheme elements on upstream waterbodies.				
	9. Temperature	-	-		N/A	N/A	• The 50m length of the proposed AP2 culvert will increase the amount of shaded watercourse. Despite this, it is predicted to result in no more than a minor impact on this sub-element. • This impact is likely to have a minor, local effect in relation to the overall water body.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No scheme elements on upstream waterbodies.				
	10. Specific Pollutants (Annex VIII)	-	-		N/A	N/A	Receptor is insensitive to impact	• The construction of the proposed AP2 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	• The construction of the proposed AP2 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	N/A	Receptor is insensitive to impact	• The construction of the proposed AP2 river diversions is predicted to result in no more than a temporary, minor impact on this sub-element. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in specific pollutants. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	• During the construction and operation of the proposed AP2 cutting, abstracted groundwater will be returned to ground via SuDS at the upstream end of the catchment. • Therefore, this impact is likely to have a minor, local effect on this sub-element in relation to the overall waterbody.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	No scheme elements on upstream waterbodies.				
Hydromorphological status																			Hydromorphology Baseline
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• From review of aerial imagery, Horton Brook appears to be 2-3m wide and could be hydromorphologically diverse, but appears to have been straightened historically. However the channel cannot be assessed as it is obscured in online imagery due to dense vegetation. It is therefore not possible to judge flow conditions from the information available. • Culverts typically mean that out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • Overall, the impacts on flow dynamics are not possible to ascertain at present, but the effect of a lengthy culvert (approximately 50m) is a risk that needs to be flagged for further investigation. The risk is likely to be minor detrimental, given that the waterbody is over 18 km in length.	N/A	N/A	• The diversion represents a significant opportunity to implement improved hydromorphology. • The proposed diversion and drainage area would be confined between existing infrastructure in an area that is presently Flood Zone 3, so while local waterbody enhancements would clearly be beneficial, this should not be considered a large scale opportunity that would affect waterbody status	• From review of aerial imagery, Horton Brook appears to be 2-3m wide and could be hydromorphologically diverse, but appears to have been straightened historically. However the channel cannot be assessed as it is obscured in online imagery due to dense vegetation. It is therefore not possible to judge flow conditions from the information available. • The proposed diversion is close to the existing brook course, but appears to shorten the channel slightly, which could increase flow rates. and lower water levels. • Overall, the impacts on flow dynamics are not possible to ascertain at present, but the effect of a lengthy culvert (approximately 50m) is a risk that needs to be flagged for further investigation. The risk is likely to be minor detrimental, given that the waterbody is over 18 km in length.	Abstracted water in Horton Brook catchment would be returned to ground via SuDS at upstream end, so no significant impacts on flow dynamics are anticipated, assuming suitable mitigation measures are implemented.	N/A	Upstream water bodies not impacted by scheme	• Given the current hydromorphological status of the Horton Brook, impacts from the proposed diversion, culvert and cutting could potentially lead to degradation of waterbody status. However, there are also significant opportunity to improve morphology and riparian structures as a result of the proposed diversion and floodplain storage area. Therefore, detrimental impacts to waterbody status are not anticipated but the new AP updates will have an impact if mitigation measures are not implemented	Hydromorphological surveys are recommend to inform baseline, design and mitigation measures, it is recommended that hydromorphological measures should be incorporated into the detailed designs where practicable. Mitigation measures may include: • Bank reprofiling (rehabilitation) • Introduce riparian vegetation/green corridors • Creation of shallow margin in front of hard defence • Install silt, sand or gravel traps • Recreate a sinuous river channel (re-meandering) where space allows • Recreation of gravel bars and riffles using permanent and/or temporary bed structures (increase morphological diversity) • Creation of shallow margin in front of hard defence • Retain marginal vegetation • Use of engineering techniques to assist natural recovery • Use soft engineering techniques		Minor and localised effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	Abstracted water in Horton Brook catchment would be returned to ground via SuDS at upstream end, so no significant impacts on flow dynamics are anticipated, assuming suitable mitigation measures are implemented.	N/A	Upstream water bodies not impacted by scheme					
	13. River continuity	-	-		N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing fish and habitat continuity within and adjacent to both sides of the channel. However, at waterbody scale, this is unlikely to have an impact on deterioration of the overall waterbody status	N/A	N/A	• The proposed diversion is close to the existing brook course, but appears to shorten the channel slightly, which can increase flow rates and lower water levels and overbank spillage (floodplain connectivity). • The proposed diversion and drainage area would be confined between existing infrastructure in an area that is presently Flood Zone 3, so the diversions are unlikely to have significant impact	Abstracted water in Horton Brook catchment would be returned to ground via SuDS at upstream end, so no significant impacts on continuity are anticipated, assuming suitable mitigation measures are implemented.	N/A	Upstream water bodies not impacted by scheme					
	14. River depth and width variation bed	-	-		N/A	N/A	N/A	• Out-of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events. • The culvert would homogenise channel morphology, so no-sigh the channel appears to have been straightened historically. • Scour adjacent to the structure upstream and downstream could result in sharp changes in channel geometry and a stepped channel / perched culvert base	N/A	N/A	• The diversion represents a significant opportunity to implement improved hydromorphology. • The proposed diversion and drainage area would be confined between existing infrastructure in an area that is presently Flood Zone 3, so while local waterbody enhancements would clearly be beneficial, this should not be considered a large scale opportunity that would affect waterbody width and depth during 'normal' or flooding hydrological conditions.	• The proposed diversion is close to the existing brook course, and would presumably replicate existing channel geometry. • The proposed diversion and drainage area would be confined between existing infrastructure in an area that is presently Flood Zone 3, so the diversions are unlikely to have significant impact	Abstracted water in Horton Brook catchment would be returned to ground via SuDS at upstream end, so no significant impacts on flow geometry are anticipated, assuming suitable mitigation measures are implemented.	N/A	Upstream water bodies not impacted by scheme					
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• Culverts can interrupt downstream substrate transport, and can affect local scour and deposition of bed forms. • If the culvert base is set below the channel bed, the impacts on the bed can be minimised, but this is not clear form the available indicative design information.	N/A	N/A	• Bed conditions are presently unknown, and this is an opportunity to design bed substrates that represent pre-modified channel conditions and are advantageous to target habitats and species.	• Bed conditions are unknown, but likely to be downcasted due to historic channel realignment and the culverts adjacent to the site. This could be an opportunity to design and implement improved bed conditions. • However, the proposed diversion and drainage area would be confined between existing infrastructure, so the diversions are unlikely to have significant impact on substrate conveyance through the site	Abstracted water in Horton Brook catchment would be returned to ground via SuDS at upstream end, so no significant impacts on the bed are anticipated, assuming suitable mitigation measures are implemented.	N/A	Upstream water bodies not impacted by scheme					
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this would probably not be a significant affect at waterbody scale	N/A	N/A	• The diversion represents a significant opportunity to implement improved hydromorphology, including riparian conditions.	• Indicative plans suggest that existing riparian conditions would be replicated or improved, although the scale of opportunity would probably not be significant at waterbody level.	Abstracted water in Horton Brook catchment would be returned to ground via SuDS at upstream end, so no significant impacts on riparian zones are anticipated, assuming suitable mitigation measures are implemented.	N/A	Upstream water bodies not impacted by scheme					

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	Predicted change to status elements (green = none, amber = possibly, red = likely)																

							Risk to Overall Status		
Surface water body name	**Waterbody ID**	**Catchment**	**CFA**	**Additional Baseline Survey**	**No. of AP2 Amendments**	**Original Assessment**	**Post-Additonal Baseline survey**	**Post-AP2 Amendments**	**Assessment Summary**
Cherwell (Ashby Brook to Cropredy)	GB106039037350	Cherwell	15,	Y	2		reduced risk		Original scheme + Baseline + AP2
Colne and GUC (from confluence with Chess to Ash)	GB106039023090	Colne	7	Y	1		reduced risk		Original scheme + Baseline + AP2
Padbury Brook (The Twins)	GB105033038210	Upper and Bedford Ouse	13, 14,	Y	1				Original scheme + Baseline + AP2
Tetchwick Brook, Source to Ray and tribs	GB106039030070	Cherwell	12	Y	1		reduced risk		Original scheme + Baseline + AP2
Ray and tributaries NorthEast of Grendon Underwood	GB106039030100	Cherwell	12,	N	1				Original scheme + AP2
Fleet Marston Brook, Denham Brook, Pitchcott Brook west	GB106039030420	Thame and South Chilterns	11, 12,	Y	N/A		reduced risk	No AP2 updates	Original scheme + Baseline
Ouse	GB105033037880	Upper and Bedford Ouse	14,	Y	N/A			No AP2 updates	Original scheme + Baseline
Radstone Brook	GB105033037940	Upper and Bedford Ouse	14, 15,	Y	N/A			No AP2 updates	Original scheme + Baseline
Stoke Brook Aylesbury	GB106039030320	Thame and South Chilterns	10, 11,	Y	N/A			No AP2 updates	Original scheme + Baseline
Twin	GB105033030560	Upper and Bedford Ouse	13,	Y	N/A		reduced risk	No AP2 updates	Original scheme + Baseline

Key for Baseline Assessment Changes:

	In audit trail, this cell indicates where the impact of a particular scheme element on a WFD sub-element has been changed as a result of baseline surveys
Red text	In assessment tab, where new text has been added describing why the assessment has changed
~~Strikethrough text~~	In assessment tab, where text from the previous assessment is no longer relevant/has been superseded and therefore has been removed (but is still visible to the reader).

Key for AP2 Assessment Changes:

	In AP2 Summary sheet, this cell indicates where assessment is required for the Scheme Element.
Red text	In assessment tab, where new assessment has been undertaken
	In assessment tab, where Main ES Scheme element has been removed or replaced by AP2 change

WFD Surface Water Survey Location Details **CFA 7-15**

Key to Survey ID
- EF Electro Fishing Survey
- HM Hydromorphology Survey
- MI Macroinvertabrate Survey
- MP Macrophyte Survey
- PA Preliminary Aquatic Survey

CFA	Upstream Easting	Upstream Northing	Downstream Easting	Downstream Northing	Survey ID	Map Reference	Surface Water Body Survey Name	Surface Water Body WFD ID	Surface Water Body WFD Name
7	504214	188883	504321	188721	WFD-PA1-0001a	0001	Colne at South Harefield	GB106039023090	Colne and GUC (from confluence with Chess to Ash)
7	503487	189732	503680	189785	WFD-PA1-0001b				
7	504199	188910	504274	188806	WFD-MP1-0001				
7	504482	188323	-	-	WFD-MI1-0001				
7	504199	188910	504274	188806	WFD-EF1-0001				
7	504274	188806	-	-	WFD-HM1-0001a				
7	503583	189759	-	-	WFD-HM1-0001b				
7	505760	187747	505579	187748	WFD-PA1-0002	0002	New Years Green Bourne at South Harefield		
7	505664	187731	-	-	WFD-HM1-0002				
11	479708	212842	479872	212952	WFD-PA1-0003a	0003	Hartwell Ditches at Lower Hartwell	GB106039030320	Stoke Brook Aylesbury
11	479607	212972	479768	213081	WFD-PA1-0003b				
11	479567	213031	479738	213129	WFD-PA1-0003c				
11	479786	212902	-	-	WFD-HM1-0003a				
11	479690	213026	-	-	WFD-HM1-0003b				
11	479652	213079	-	-	WFD-HM1-0003c				
11	481103	211581	480974	211482	WFD-PA1-0004a	0004	Sedrup Ditches at Aylesbury		
11	480672	211649	480685	211846	WFD-PA1-0004b				
11	481053	211542	-	-	WFD-HM1-0004a				
11	480704	211749	-	-	WFD-HM1-0004b				
11	483799	209511	483711	209551	WFD-PA1-0005	0005	Unnamed tributary of Stoke Brook east of North Lee		
11	483706	209482	-	-	WFD-HM1-0005				
11	483746	209494	483691	209597	WFD-PA1-0006a	0006	Unnamed tributary of Stoke Brook (parallel to main water body), east of North Lee		
11	483831	209490	483686	209526	WFD-PA1-0006b				
11	483960	209332	483835	209487	WFD-PA1-0006c				
11	483715	209563	483676	209619	WFD-MP1-0006				
11	483678	209623	-	-	WFD-MI1-0006				
11	483690	209525	-	-	WFD-HM1-0006a				
11	483744	209496	-	-	WFD-HM1-0006b				
11	483897	209409	-	-	WFD-HM1-0006c				
11	484015	209289	483905	209441	WFD-PA1-0007a	0007	Stoke Brook at North Lee		
11	484407	209146	484215	209178	WFD-PA1-0007b				
11	483805	209593	483746	209701	WFD-MP1-0007				
11	483751	209704	-	-	WFD-MI1-0007				
11	483972	209363	-	-	WFD-HM1-0007a				
11	484308	209145	-	-	WFD-HM1-0007b				
11	484261	209081	484293	209147	WFD-PA1-0008	0008	Unnamed tributary of Stoke Brook near Nash Lee		
10	484340	208399	484343	208495	WFD-MP1-0008				
10	484403	208546	-	-	WFD-MI1-0008				
11	484347	209125	-	-	WFD-HM1-0008				
12	474046	218315	474223	218375	WFD-PA1-0009	0009	Fleet Marston Brook upper reaches north of Waddesdon	GB106039030420	Fleet Marston Brook, Denham Brook, Pitchcott Brook
12	474139	218324	-	-	WFD-HM1-0009				
11	477191	215832	477125	216012	WFD-PA1-0010a	0010	Unnamed tributary of Fleet Marston Brook, near Fleet Marston Farm		
11	477014	215930	477108	216068	WFD-PA1-0010b				
11	477158	215927	-	-	WFD-HM1-0010a				
11	477098	215990	-	-	WFD-HM1-0010b				
11	478012	214991	478111	214999	WFD-PA1-0011a	0011	Unnamed tributary of Fleet Marston Brook, near Aylesbury Vale Parkway		
11	478265	214593	478454	214565	WFD-PA1-0011b				
11	478010	214988	-	-	WFD-HM1-0011a				
11	478365	214591	-	-	WFD-HM1-0011b				
12	472275	220620	472220	220459	WFD-PA1-0012a	0012	Doddershall Brook west of Quainton	GB106039030070	Tetchwick Brook, Source to Ray and tribs
12	472279	220421	472330	220284	WFD-PA1-0012b				
12	472508	220186	472410	220173	WFD-PA1-0012c				
12	472215	220543	-	-	WFD-HM1-0012a				
12	472358	220375	-	-	WFD-HM1-0012b				
12	472511	220189	-	-	WFD-HM1-0012c				
12	473601	219009	473437	218940	WFD-PA1-0013a	0013	Unnamed tributary of Tetchwick Brook, near Upper South Farm		
12	473577	219007	473428	218917	WFD-PA1-0013b				
12	473502	219000	-	-	WFD-HM1-0013a				
12	473433	219041	-	-	WFD-HM1-0013b				
13	469007	226185	469097	226363	WFD-PA1-0014	0014	Unnamed tributary of the Twin, near Shepherds Furze Farm	GB105033030560	Twin
13	468518	225246	-	-	WFD-HM1-0014				
13	470105	226213	469965	226335	WFD-PA1-0015	0015	Unnamed tributary of the Twin, south of Steeple Claydon		
13	470060	226295	-	-	WFD-HM1-0015				
13	464731	228278	464929	228283	WFD-PA1-0016a	0016	Padbury Brook, south of Chetwode	GB105033038210	Padbury Brook (The Twins)
13	465070	228160	465061	227970	WFD-PA1-0016b				
13	464844	228283	464934	228283	WFD-MP1-0016a				
13	466208	226772	466292	226828	WFD-MP1-0016b				
13	464850	228287	-	-	WFD-MI1-0016A				
13	466294	226826	-	-	WFD-MI1-0016b				
13	464844	228283	464934	228283	WFD-EF1-0016A				
13	466208	226772	466292	226828	WFD-EF1-0016B				
13	464829	228284	-	-	WFD-HM1-0016a				
13	465060	228063	-	-	WFD-HM1-0016b				
13	466451	226943	466578	227023	WFD-PA1-0016c		Padbury Brook, north of Twyford		
13	466501	226996	-	-	WFD-HM1-0016c				
14	462940	231341	462922	231155	WFD-PA1-0017a	0017	Unnamed tributary of Padbuiry Brook, near Barton Hartshorn		
13	463373	230457	463228	230341	WFD-PA1-0017b				
13	463343	230459	-	-	WFD-MI1-0017				
14	462911	231245	-	-	WFD-HM1-0017a				
13	463269	230398	-	-	WFD-HM1-0017b (d/s)				
13	463304	230427	-	-	WFD-HM1-0017b (u/s)				
13	467570	226090	467664	226266	WFD-PA1-0018	0018	Unnamed tributary of Padbury Brook, east of Portway Farm		
13	467617	226178	-	-	WFD-HM1-0018				
13	466916	226655	467115	226657	WFD-PA1-0019	0019	Unnamed tributary of Padbury Brook, west of Portway Farm		
13	467011	226666	-	-	WFD-HM1-0019				
13	466372	227178	466410	227023	WFD-PA1-0020a	0020	Unnamed tributary of Padbury Brook, near Cowley Lodge		
13	466361	226987	466539	227055	WFD-PA1-0020b				
13	466362	227083	-	-	WFD-HM1-0020a				
13	466448	227029	-	-	WFD-HM1-0020b				
13	465177	228069	465123	227895	WFD-PA1-0021	0021	Unnamed tributary of Padbury Brook, parallel to main water body		
13	465138	227989	-	-	WFD-HM1-0021				
13	464621	228359	464778	228398	WFD-PA1-0022	0022	Unnamed tributary of Padbury Brook, near Rosehill Farm		
13	464699	228422	-	-	WFD-HM1-0022				
14	460209	238465	460102	238324	WFD-PA1-0023	0023	River Ouse, north of Turweston	GB105033037880	Ouse
14	459550	237562	459576	237405	WFD-PA1-0024	0024	Unnamed tributary of River Ouse near Brackley		
14	458671	240116	458817	240242	WFD-PA1-0025	0025	Radstone Brook at Radstone	GB105033037940	Radstone Brook
14	458749	240172	-	-	WFD-HM1-0025				
14	457955	240813	458130	240884	WFD-PA1-0026	0026	Unnamed tributary of Radstone Brook, north of Radstone		
14	458041	240839	-	-	WFD-HM1-0026				
15	457596	241145	457732	241274	WFD-PA1-0027a	0027	Radstone Brook upper reaches, near Radstone		
15	458081	241691	458216	241604	WFD-PA1-0027b				
15	457666	241207	-	-	WFD-HM1-0027				
15	451698	247916	451587	248004	WFD-PA1-0028a	0028	River Cherwell, east of Edgcote	GB106039037350	Cherwell (Ashby Brook to Cropredy)
15	451596	248048	451440	248095	WFD-PA1-0028b				
15	451877	247977	451806	247973	WFD-MP1-0028				
15	451887	247975	-	-	WFD-MI1-0028				
15	451877	247977	451803	247981	WFD-EF1-0028				
15	451631	247941	-	-	WFD-HM1-0028a				
15	451518	248073	-	-	WFD-HM1-0028b				
15	451855	247647	451800	247790	WFD-PA1-0029	0029	Unnamed tributary of River Cherwell, near Danes Moor		
15	451814	247711	-	-	WFD-HM1-0029				
15	454149	244695	454033	244712	WFD-PA1-0030a	0030	River Cherwell upper reaches and tributaries, east of Thorpe Mandeville		
15	453759	245149	453652	245303	WFD-PA1-0030b				
15	453638	245381	453534	245509	WFD-PA1-0030c				
15	453420	245397	453525	245507	WFD-PA1-0030d				
15	453687	244888	-	-	WFD-MI1-0030				
15	454132	244701	-	-	WFD-HM1-0030a				
15	453709	245231	-	-	WFD-HM1-0030b				
15	453562	245426	-	-	WFD-HM1-0030c				
15	453513	245425	-	-	WFD-HM1-0030d				
15	451440	248285	451438	248098	WFD-PA1-0031	0031	Osierbed Spinney, tributary of River Cherwell, east of Edgcote		
15	451413	248192	-	-	WFD-HM1-0031				

GB106090037350

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective
GB106090037350	Moderate	Good status by 2027
Cherwell (Ashby Brook to Cropredy)		

Scheme Elements	Description of scheme element impact
Viaduct	River Cherwell: The 13 span viaduct has a deck length of 540m and the spans would have an average height (ground to soffit) of 2 - 2.5m. The viaduct is located to the north-east of Edgcote and crosses the River Cherwell and Mill Lane. The viaduct would not cross the watercourse but would be close enough to its banks to potentially exert impacts - CFA15-SWCT (10B+620)
River Diversion	River Cherwell: Edgcote viaduct, 150 m - CFA15-SWC21 (10B+440) and 70 m - CFA15-SWC7 (10B+620)
Viaduct	Lower Thorpe Brook and Unnamed Tributary: Lower Thorpe viaduct, Unnamed Tributary: Edgcote viaduct
River Diversion	Unnamed tributary of the River Cherwell (Lower Thorpe Embankment) at Culvert South culvert and Lower Thorpe Brook - Thorpe Mandeville Embankment - 281 m - (UMC-CFA15-19)
River Diversion	Tributary of the River Cherwell: Edgcote viaduct - 50 m - CFA15-SWC6 (10B+330)
Culvert	Multiple Culverts - Two channel diversions and five culverts on tributaries of the River Cherwell (upper reaches): Culverts South culvert - 50 m - CFA15-SWC5 (10B+825), Disorbed Spinney culvert - 45 m - CFA15-SWC8 (10B+870), Thorpe Mandeville culvert - 80 m - CFA15-SWC1 (10A+400)
Culvert	Edgcote Roman Villa cutting - Approximately 108×000
Cutting	Thorpe Mandeville cutting, Lower Thorpe South cutting, Lower Thorpe North cutting - Approximately 105×000
Cutting	Grotsworth Green Tunnel - Approximately 105×000
Green Tunnel	

Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	N/A	N/A
1.Macrophytes and phytobenthos - Lotic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2. Macrophytes and phytobenthos - Macrophytes	Receptor not sensitive to impact. No likely effect anticipated	The river diversion should avoid impacts to the channel. The watercourse supports locally frequent aquatic vegetation (including bankside vegetation). No likely effect anticipated	Likely to lead to localised loss of aquatic vegetation (including bankside vegetation). The watercourse supports locally frequent aquatic vegetation, with EU conservation species recorded (ecology baseline survey). Very localised adverse effect	No significant hydromorphological impacts anticipated, therefore no effects on macrophytes.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed viaduct. There is no anticipated change in water quality	Temporary loss of approximately 220 m of habitats of the Unnamed Tributary of the River Cherwell that lies within the diverted section while the new channel is established. The Unnamed Tributary is a small watercourse and supports a locally frequent aquatic vegetation community with a bankside edge to it of patches of species of the river diversion. The watercourse supports locally frequent aquatic vegetation, with EU conservation species recorded (ecology baseline survey). Temporary but localised adverse effect. Long-term channel re-establishment	The new channels will incorporate marginal berms and shallow gradients to encourage the growth of marginal aquatic vegetation. The new channel will include a range of habitats suitable for colonisation by submerged species. The watercourse supports locally frequent aquatic vegetation (including bankside species). The effect on this quality element is considered to be minor beneficial and localised.	Potential increase in flow velocities and increase in sediment transport rates, that may increase morphological and channel diversity. The watercourse supports locally frequent aquatic vegetation (including bankside species). Potential beneficial effect	There will be no viaduct footings within river channel. Lower Thorpe Brook supports locally frequent aquatic vegetation (including bankside vegetation). Very localised adverse effect anticipated.	Likely to lead to very localised loss of macrophytes, due to the relocation of photosynthetic activity. Lower Thorpe Brook supports locally frequent aquatic vegetation (including bankside vegetation). Very localised adverse effect anticipated. No data for the stream running underneath Edgcote viaduct. The unnamed tributary underneath Lower Thorpe viaduct is heavily shaded and supports no aquatic vegetation. Very localised adverse effect anticipated.	No significant hydromorphological impacts anticipated, therefore no effects on macrophytes.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed viaduct. There is no anticipated change in water quality.	Temporary loss of approximately 500 m of habitats of the existing Lower Thorpe Brook and Unnamed tributary that lie within the diversion section while the new channels re-establish. Lower Thorpe Brook supports locally frequent aquatic vegetation (including bankside species). Temporary but localised adverse effect anticipated.	The new channel will incorporate marginal berms and shallow gradients to encourage the growth of marginal aquatic vegetation. The new channel will include a range of habitats suitable for colonisation by submerged species. Lower Thorpe Brook supports locally frequent aquatic vegetation (including bankside species). Potential beneficial effect anticipated.	Existing channel of Lower Thorpe Brook appears modified, over-deepened and straightened locally (baseline survey). No hydromorphological effects anticipated, therefore no effects on macrophytes.	YELLOW TO GREEN - Temporary loss of approximately 50 m of habitats of the existing tributary that lies within the diversion section while the new channel is established. The watercourse supports locally frequent aquatic vegetation. Temporary but localised adverse effect, with no degradation of the current status anticipated at the scale of the water body. Tributary assessed to be of poor value for macroinvertebrates. Potential localised adverse effect.	The new channel will incorporate marginal berms and shallow gradients to encourage the growth of marginal aquatic vegetation. The new channel will include a range of habitats suitable for colonisation by submerged species. Lower Thorpe Brook supports locally frequent aquatic vegetation (including bankside species). Potential beneficial effect anticipated.	Potential increase in flow velocities and increase in sediment transport rates, that may increase morphological and channel diversity. No data available for fish. Tributary assessed to be of poor value for macroinvertebrates. Potentially localised beneficial effect anticipated.	YELLOW TO GREEN - Likely to lead to the permanent loss of a total of approximately 200 m of habitat. No data available for fish. Tributary assessed to be of poor value for macroinvertebrates. Potentially localised adverse effect, with no degradation of the current status anticipated at the scale of the water body. Tributary assessed to be of poor value for macroinvertebrates. Potentially localised adverse effect.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed viaduct. There is no anticipated change in water quality.	YELLOW TO GREEN - Likely to lead to the permanent loss of a total of approximately 100 m of habitat. No data available for fish. Tributary assessed to be of poor value for macroinvertebrates. Potentially localised adverse effect, with no degradation of the current status anticipated at the scale of the water body. Tributary assessed to be of poor value for macroinvertebrates. Potentially localised adverse effect.	Receptor not sensitive to impact. No likely effect anticipated	Receptor not sensitive to impact. No likely effect anticipated	YELLOW TO GREEN - Likely to lead to the permanent loss of a total of approximately 100 m of habitat. No data available for fish. Tributary assessed to be of poor value for macroinvertebrates. Potentially localised adverse effect, with no degradation of the current status anticipated at the scale of the water body. Tributary assessed to be of poor value for macroinvertebrates. Potentially localised adverse effect.	YELLOW TO GREEN - No significant hydromorphological impacts anticipated. Potentially localised beneficial effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed viaduct. No significant change in water quality.	Potential to affect lower flows and silting flows in tributaries of the River Cherwell. Tributaries will gain approximately 100 m of macroinvertebrate habitat, although the River Cherwell supports locally frequent aquatic vegetation. Potential adverse effect anticipated.	Potential increase in flow velocities and increase in sediment transport rates, that may increase morphological and channel diversity. No data available for fish. Tributary assessed to be of poor value for macroinvertebrates. Potentially localised beneficial effect anticipated.	Potential increase in flow velocities and increase in sediment transport rates, that may increase morphological and channel diversity. No data available for fish. Tributary assessed to be of poor value for macroinvertebrates. Potentially localised beneficial effect anticipated.	Potential increase in flow velocities and increase in sediment transport rates, that may increase morphological and channel diversity. No data available for fish. Tributary assessed to be of poor value for macroinvertebrates

A. Risk screening of potential to cause deterioration of current WFD Ecologica

	Surface Water body	Current status	Status objective	Scheme Elements	Impacts from other WFD water bodies (assessed separately)	OVERALL impact on element	Proposed Mitigation Measures		Residual impact	
	GB106039037350			Description of scheme element impact						
	Cherwell (Ashby Brook to Cropredy)	Moderate	Good status by 2027	Identified biological impacts			Construction	Operation		
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to statue elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	-	-		No impact on upstream water bodies	Scheme elements present on the River Cherwell and its main tributary, Lower Thorpe Brook, which support frequent aquatic vegetation are identified as having the potential for very localised adverse effects (viaducts) or temporary adverse effects (river diversions) that would be balanced by the creation of new habitats. In addition to a river diversion and a viaduct, smaller tributaries, which are heavily shaded and do not support any aquatic vegetation, are also impacted by several culverts (200 m in total). Given these elements and the relative low contribution of the smaller tributaries (drainage ditches) to the River Cherwell, the overall effect of the scheme on this quality element, which currently does not have a status. is considered to be negligible.	No additional mitigation required	No additional mitigation required	This quality element currently does not have a WFD status. No adverse effect anticipated at the scale of the water body.	
	3. Macroinvertebrates	High	High		No impact on upstream water bodies	AMBER TO YELLOW - TO REFLECT THE FACT THAT ADDITIONAL BASELINE SHOWED THAT THE RIVER CHERWELL IS ONLY OF MODERATE MACROINVERTERATE QUALITY WITHIN THE STRETCH IMPACTED AND COMMUNITIES ARE UNLIKELY TO BE HIGHLY SENSITIVE TO REDUCED FLOWS Scheme elements present on the River Cherwell and its main tributary are identified as having the potential for very localised adverse effects (viaducts) or temporary adverse effects (river diversion) that would be balanced by the creation of new habitats. In addition to a short river diversion and viaducts, smaller tributaries are also impacted by several culverts (200 m in total). Base flows within the tributary watercourses may be affected by dewatering of two cuttings. Given the relatively low contribution of the smaller tributaries (drainage ditches) to the River Cherwell, their cumulative effect is however likely to be low at the scale of the water body. ~~However, no data is available for the River Cherwell on the impacted stretch.~~ The River Cherwell supports moderately good macroinvertebrate quality within the reach impacted, with communities unlikely to be highly sensitive to flow reductions. ~~Given the high status of the water body for macroinvertebrates and the potential for minor adverse effects, there is a risk of deterioration of the WFD status for this quality element.~~ Therefore, overall effect considered to be potentially adverse locally with no risk of deterioration of the WFD status of this element.	~~Baseline surveys of tributaries and stretch of main Cherwell water body to be impacted by the scheme to be undertaken prior to construction to establish macroinvertebrate baseline, and monitoring to be undertaken during the construction period.~~ No additional mitigation required	No additional mitigation required	~~Risk of deterioration will depend on the outcome of baseline surveys.~~ AMBER TO YELLOW - Potential localised adverse effect, with no deterioration of the WFD status of this element anticipated.	
	4. Fish	Good	Good		No impact on upstream water bodies	AMBER TO YELLOW - TO REFLECT THE FACT THAT ADDITIONAL BASELINE SHOWED THAT THE RIVER CHERWELL SUPPORTS ONLY A FEW FISH SPECIES AND NO SALMONIDS WITHIN THE STRETCH IMPACTED AND THAT ITS TRIBUTARIES IMPACTED BY CULVERTS ARE OF POOR VALUE FOR FISH Scheme elements present on the River Cherwell and its main tributary are identified as having the potential for very localised adverse effects (viaducts) or temporary adverse effects (river diversion) that would be balanced by the creation of new habitats. The culverts present on the smaller tributaries (drainage ditches) are considered of having the potential for adverse effects, by very locally reducing habitat available to fish and limiting access to potential habitat of interest for fish (spawning). ~~Despite~~ Although the River Cherwell is a designated watercourse under the Freshwater Fish Directive, additional baseline confirmed the fact that it does only support ~~currently poor fish habitat and communities~~ only a few fish species within the reach impacted ~~and that~~ no migratory species ~~were recorded within the area impacted.~~ In addition, additional baseline on the tributaries impacted by the presence of several culverts (200 m in total) indicated that they are of poor value for fish. ~~on the tributaries, for which no ecology baseline data is available but which are potentially of interest for fish (spawning),~~ . Therefore, the scheme is considered as having a potential localised adverse effect on this biological element. ~~Given the good status of the fish community and the predicted minor adverse effects, there is a~~ , with low risk of status deterioration ~~for this element~~.	~~Baseline surveys of tributaries to be undertaken prior to construction to establish fish baseline, and monitoring to be undertaken during the construction period.~~ No additional mitigation required	No additional mitigation required	~~Risk of deterioration will depend on the outcome of baseline surveys.~~ AMBER TO YELLOW - Potential localised adverse effect, with no deterioration of the WFD status of this element anticipated.	
	Physico-Chemical status									
WFD classification elements	5. Dissolved Oxygen	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	No impact on upstream water bodies	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	No additional mitigation required	No additional mitigation required	Minor and localised effects	-
	6. pH	-	-		No impact on upstream water bodies					
	7. Phosphate	-	-		No impact on upstream water bodies					
	8. Ammonia	-	-		No impact on upstream water bodies					
	9. Temperature	-	-		No impact on upstream water bodies					
	10. Specific Pollutants (Annex VIII)	-	-		No impact on upstream water bodies					
	Hydromorphological status									**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	No impact on upstream water bodies	• The river diversion of the River Cherwell could increase gradients and flow velocities, and the tendency scour of the bed and bank, diversion extends over approximately 100m, but there would actually only be a minor change to channel planform • The channel appears to have an equilibrium, stable form, and the diversion would probably disrupt the natural balance of channel processes. However, further investigation and careful design is required to mitigate any potential impacts • Edgcote Viaduct and Lower Thorpe Viaduct have pillars in the floodplain and therefore may cause impacts to river dynamics at time of flood, however effects likely to be local. • The culverts on the upper reaches are extensive (5 in total), however due to the size of the watercourses and the location of the culverts in the upper reaches, the effect is likely to be local.	• The channel appears to have a natural, equilibrium form, so efforts to engineer new habitats are likely to be counter productive • The scale of the diversion is likely to mean there are no major morphological responses, and only gradual bed and bank scour and deposition downstream would occur, resulting in habitat diversity, so it is likely that the best approach would be to allow the channel space to adjust its form locally • This MUST be investigated in detail: an appropriate level of analysis is beyond the scope of this study • Bank reinforcements would certainly be required on the viaduct side of the channel to maintain the channel course after diversion • It is possible that this could be achieved with soft engineering techniques, but this requires further investigation • Drawing show that a floodplain compensation area will be provided as mitigation to off-set the loss of floodplain as a result of the Osierbed Spinney Culvert		Minor and localised effects following mitigation	**upper reaches and tributaries** Survey report that the tributaries were completely shaded, arable drainage channels. The channel was observed as dry in parts, with trickle of flow observed in other areas. Little flow diversity was observed, and the bed is reported as sand and fine sediment dominated with organic debris. No in-channel macrophytes are present, and the channel is culverted under a farm access track. Overall the watercourse is reported as being an arable drainage ditch character with poor quality riverine habitat. **River Cherwell** The survey indicates that the channel has been resectioned and informally embanked, and has little flow (and likely, substrate) diversity. The banks appeared to be cohesive, and the water was turbid so bed material was not identifiable. • Channel meanders within a wide floodplain • Channel is crossed upstream of the proposed viaduct by Welsh Road, and appears to have bank reinforcements for a short distance to prevent scour and undercutting of Edgcote Road. This may well affect floodplain flows. • Map from the mid 1990s show that channel planform has not changed significantly for at least ca. 20 years. • Some palaeo features can be observed from aerial images in floodplain areas, but these are not immediately apparent, possible because of arable agriculture and ploughing. This does indicate though that the channel has migrated 10s of metres across the valley floor historically • Contemporary OS map shows that a Civil parish boundary follows the channel centreline upstream of the site, constituting further evidence that channel planform is stable • Flows may be regulated to a minor degree by partial diversion to 'The Pool', which appears to be an artificial water body at Edgcote House, which appears to be an artificial water body
	12. Connection to Groundwater	-	-		No impact on upstream water bodies					• There are numerous springs on the shallow valley sides, but in the context of the proposed viaduct this is not significant to hydromorphology
	13. River continuity	-	-		No impact on upstream water bodies					• Channel is set in well developed floodplain with good connectivity • Channel is crossed by Welsh Road a short distance upstream, so continuity could be sensitive in this area
	14. River depth and width variation bed	-	-		No impact on upstream water bodies					• Channel width is generally consistent for most of the reach, as would be expected for a meandering channel that regulates its own form • Channel width does vary upstream and downstream of Welsh Road and Edgcote Road, and a small bar or island appears to have formed immediately downstream of the existing crossing. The apparent discontinuity in morphology indicates a channel response to the structures • Bed variations and bed substrate formations cannot be observed from available information
	15. Structure and substrate of river bed	-	-		No impact on upstream water bodies					• Low, small, calcareous RBMP channel type • Channel is developed in alluvium over mudstone. No faults mapped at the site that would suggest an influence on channel form • Channel sediments cannot be determined from available information
	16. Structure of riparian zone	-	-		No impact on upstream water bodies					• Well developed and vegetated. • Good riparian and floodplain connectivity

B. Risk screening of potential to prevent future attainment of good Ecological

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen						
NONE	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-

GB1000390327350 Audit Trail

WFD Baseline Survey Details

Water Body ID	GB103039027350
Surface Water Body Name	Clwyd (Aled) (Aled to Clwyd)
Scheme Element	**River Diversion and Culvert - Thorpe Mandeville cutting**	**River Diversion and Culvert - Tributary of the River Cherwell Culvert**	**Lower Thorpe Stadium - Lower Thorpe Brook/ Tributary of the River Cherwell**	**Culvert - Tributary of the River Cherwell access road crossing**	**2 x Culverts - Lower Thorpe Drop Inlet Culvert and access road culvert**	**River Diversion, Culvert and Culvert Extension - Cotsworth South culvert**	**Edgcote Viaduct and River Diversion - Tributary of the River Cherwell**	**Edgcote Viaduct and 2 x River Diversions - River Cherwell**	**River Diversion and Culvert - Overland Spinney culvert**	**Thorpe Mandeville cutting**	**Lower Thorpe South cutting**	**Lower Thorpe North cutting**	**Edgcote Roman Villa cutting**	**Grimsworth Green Tunnel**	**OVERALL EFFECT**	**DESIGNAL EFFECT**
Surface Water Crossing ID	CFW26-SWC7	CFW26-SWC8 and 9	CFW26-SWC10 and 11	CFW26-SWC12	N/A	CFW26-SWC13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Survey Site	River Cherwell upper reaches and tributaries, east of Thorpe Mandeville	River Cherwell upper reaches and tributaries, east of Thorpe Mandeville	River Cherwell upper reaches and tributaries, east of Thorpe Mandeville	River Cherwell upper reaches and tributaries, east of Thorpe Mandeville	N/A	Not identified in HS2 Surface Water Baseline	No surveys proposed or undertaken	Unnamed tributary of River Cherwell, near Danes Moor	River Cherwell, east of Edgcote	Overland Spinney, Tributary of River Cherwell, east of Edgcote	River Cherwell upper reaches and tributaries, east of Thorpe Mandeville	River Cherwell upper reaches and tributaries, east of Thorpe Mandeville	Overland Spinney, Tributary of River Cherwell, east of Edgcote	Overland Spinney, Tributary of River Cherwell, east of Edgcote		
Survey ID	WFD-PH1-0003b, WFD-PH1-0001-0003a, WFD-GM1-0005b	WFD-PH1-0004b	WFD-PH1-0005b	WFD-PH1-0006b	N/A	N/A	WFD-PH1-0007	WFD-GM1-0009	WFD-GM1-0008, WFD-MF1-0028, WFD-MF1-0029, WFD-PF1-0028	No Groundwater Survey	WFD-PH1-0003b, WFD-PH1-0001-0003a, WFD-GM1-0005b	No Groundwater Survey	WFD-PH1-0004b, WFD-PH1-0006b	WFD-GM1-0009		
Objectives of the Survey	• Assess ecological habitat type • Establish Macroinvertebrate baseline • Assess the local hydromorphology • Establish baseline fish survey (including temporal / seasonal variation)	• Assess ecological habitat type • Establish Macroinvertebrate baseline • Assess the local hydromorphology	• Assess ecological habitat type • Assess the local hydromorphology	• Assess ecological habitat type • Assess the local hydromorphology	N/A	N/A	• Assess ecological habitat type • Assess the local hydromorphology	• Assess ecological habitat type • Assess the local hydromorphology	• Assess ecological habitat type • Assess the local hydromorphology	• Assessment of spring flows (including temporal / seasonal variation)	No Groundwater Survey	No Groundwater Survey	• Assessment of spring flows (including temporal / seasonal variation)	• Assessment of spring flows (including temporal / seasonal variation)		
Survey Scope	Ecological Walkover Survey Hydromorphological Survey Groundwater Survey Hydrological survey of flows/levels in springs / tributaries feeding Cotsworth Brook catchment to assess proportional contribution of each spring	Ecological Walkover Survey Hydromorphological Survey	Ecological Walkover Survey Hydromorphological Survey	Ecological Walkover Survey Hydromorphological Survey	N/A	N/A	Ecological Walkover Survey Hydromorphological Survey	Ecological Walkover Survey Hydromorphological Survey Fish Survey Groundwater Survey Hydrological survey of flows/levels in springs / tributaries feeding Cotsworth Brook catchment to assess proportional contribution of each spring Tributary of River Cherwell is inaccessible within the return timeframe, and surveys employed were the flow diversion.	Ecological Walkover Survey Hydromorphological Survey Fish Survey	Hydrological survey of flows/levels in springs / tributaries feeding Cotsworth Brook catchment to assess proportional contribution of each spring	No Groundwater Survey	No Groundwater Survey	Hydrological survey of flows/levels in springs	Hydrological survey of flows/levels in springs		
Medium Term Survey Results Summary	**Bio**	Tributary is an heavily shaded arable drainage ditch at WFD-PH1-0003b. Dry in some parts, and with very little flow when present. Assessed as be of poor potential for macroinvertebrate and fish.	Although there was no access at crossing point, survey undertaken upstream at WFD-PH1-0004b showed that tributary is a naturalising woodland stream. Heavily shaded but with good flow and substrate diversity. Moderate to Good macroinvertebrate quality (RICT Class Good at WFD-MF1-0028), with a few pollution sensitive macroinvertebrates recorded, including Mayfly and Caddisfly. Moderate to Poor macroinvertebrate quality (RICT Class Poor at WFD-MF1-0029), indicative of communities adapted to moderate flows and PSI score indicative of "Moderate" sedimentation.	Although there was no access at crossing point, assessment from upstream observation showed that the tributary at Thorpe Mandeville Stadium (WFD-PH1-0005b) was a small arable drainage watercourse, straightened and realigned with no flow diversity. Heavily shaded with low potential for macrophytes, macroinvertebrates and fish.	Although there was no access at crossing point, assessment from upstream observation showed that the tributary at Lower Thorpe Brook (WFD-PH1-0006b) was a small arable drainage watercourse, straightened and realigned with no flow diversity. Heavily shaded with low potential for macrophytes, macroinvertebrates and fish.	TBC FOLLOWING AFD DESIGN UPDATE	No detailed surveys or photos were possible.	Tributary is an arable drainage ditch, heavily shaded, straightened and realigned with no flow or substrate diversity. Poor potential for macrophytes, fish and macroinvertebrates.	Tributary of Lower Thorpe Brook is an heavily shaded arable drainage ditch. Dry in some parts, and with very little flow when present. Poor Macroinvertebrate quality (RICT Class Poor), indicative of communities adapted to moderate flows and PSI score indicative of "Moderate" sedimentation.	Although there was no access at crossing point, assessment from upstream observation showed that the tributary at Lower Thorpe Stadium (WFD-PH1-0003b) was a small arable drainage watercourse, with low to no flow diversity. They were heavily shaded, and considered to be of poor potential for fish, macrophytes and macroinvertebrates.	No Groundwater Survey undertaken.	Although there was no access at crossing point, assessment from upstream observation showed that the tributary at Lower North Stadium (WFD-PH1-0004b) was a small arable drainage watercourse, with low to no flow diversity. They were heavily shaded, and considered to be of poor potential for fish, macrophytes and macroinvertebrates.	Tributary is an arable drainage ditch, heavily shaded, straightened and realigned with no flow or substrate diversity. Poor potential for macrophytes, fish and macroinvertebrates.	Tributary is an arable drainage ditch, heavily shaded, straightened and realigned with no flow or substrate diversity. Poor potential for macrophytes, fish and macroinvertebrates.		
	Phys	The watercourse observed was a completely shaded (>70%) arable drainage ditch. Channel dry in parts, with trickle of flow observed in others. Physico-chemical parameters measured at survey point WFD-GM1-0005b: pH = 7.4 Temp = 13.4 deg C Conductivity = 637 µS	The watercourse observed was a heavily shaded (>70%) naturalising woodland stream. Medium flow and moderate turbidity. Sewage treatment works located approx. 250m upstream	The watercourse branches into two channels at this crossing. At survey point WFD-PH1-0005b, a small stream was observed that goes under a culvert through Banbury Road to the south of the proposed crossing. Heavily shaded (>70%)and of low flow. Survey identified sewage as an impact to this watercourse. At survey point WFD-PH1-0006b, a small trapezoidal arable drainage watercourse was observed that goes under a culvert through Banbury Road to the north of the proposed crossing. Moderately shaded (30%- 70%) and highly turbid.	TBC FOLLOWING AFD DESIGN UPDATE	No detailed surveys or photos were possible.	The watercourse at survey point WFD-PH1-0007 (limited access) was observed to be heavily shaded (>70%) of low flow, but good water clarity. Physico-chemical parameters measured upstream at survey point WFD-GM1-0009: pH = 7.4 Temp = 14.9 deg C Conductivity = 588	The watercourse observed at survey point WFD-PH1-0011 (limited access) was an arable drainage ditch moderately shaded (30-70%) of low flow and slightly turbid.	At survey point WFD-GM1-0008b it is reported that the stream is fed by springs and runs intermittently around 1 km to the north east of Thorpe Mandeville. A spring discharge was noted at SE 53835 44400, and flow is described as fast flowing but overgrown with vegetation (no measurement was possible) observed on 02/07/2014 14:00. The stream feature was reported as shallow, c. 5cm deep, cool, with the swamp appearing to be groundwater dependent (a spring line). Flow was reported as very low, and overgrown with vegetation. Flow from the springs appears to be small in comparison to the flow from the surrounding valley slopes is likely to support water inputs to the stream. Groundwater flow is an element of groundwater dependency could be present in this area of the headwaters of the River Cherwell.	No groundwater survey undertaken.	The watercourse branches into two channels at this crossing. At survey point WFD-PH1-0003b, a small stream was observed that goes under a culvert through Banbury Road to the south of the proposed crossing. Heavily shaded (>70%)and of low flow. Survey identified sewage as an impact to this watercourse. At survey point WFD-PH1-0004b, a small trapezoidal arable drainage watercourse was observed that goes under a culvert through Banbury Road to the north of the proposed crossing. Moderately shaded (30%- 70%) and highly turbid.	No groundwater survey undertaken.	At survey point WFD-GM1-0009b visited on 02/07/2014 09:30 the site was reported as a shallow, cool, overgrown stream with very little flow. Flow was described as very low at <20% of its length and essentially dry with minimal occasional ponded areas. The ponded area was described as being 125cm depth. The pond is described as being likely to be groundwater dependent, with runoff from the surrounding arable land contributing during wet seasons as there does not appear to be significant surface water inflow to the pond.	At survey point WFD-GM1-0009 visited on 02/07/2014 09:30 the site was reported as a shallow, cool, overgrown stream with very little flow. Flow was described as very low at <20% of its length and essentially dry with minimal occasional ponded areas. The ponded area was described as being 125cm depth. The pond is described as being likely to be groundwater dependent, with runoff from the surrounding arable land contributing during wet seasons as there does not appear to be significant surface water inflow to the pond.		
	Hydro	Watkiver surveys describe the channels at the proposed crossing points as arable drainage channels. The channel is dry in parts, with a trickle of flow observed in places. Little flow diversity was observed and the bed is dominated bed by sand and fine sediment with organic debris. Overall the channel is described as a drainage ditch with poor quality riparian habitat.	The crossing point was inaccessible and the surveys assessment was recorded at the nearest accessible point. The channel is described as a naturalising woodland stream, straightened, meandered with over deep banks, but with evidence of natural recovery and morphological diversity. At this point there is significant flow and substrate diversity, and also channel narrowing to large bluely Debris (LWD).	The watercourse branches into two channels at this crossing. At survey point WFD-PH1-0005b, a small trapezoidal arable drainage watercourse was observed that goes under a culvert through Banbury Road to the south of the proposed crossing. Heavily shaded (>70%)and of low flow. Survey identified sewage as an impact to this watercourse. At survey point WFD-PH1-0006b, a small trapezoidal arable drainage watercourse was observed that goes under a culvert through Banbury Road to the north of the proposed crossing. Moderately shaded (30%- 70%) and highly turbid. WFD-PH1-0006b: The channel is a small trapezoidal arable drainage watercourse that goes under culvert through Banbury Road. Reaccloimed and realigned with no flow diversity.	Survey WFD-PH1-0010b: reports that the crossing point was inaccessible, with access denied and no suitable alternative observation points. The survey is based on a spot observation from Banbury Lane. The channel flows through a culvert at Banbury Lane and is reaccloimed and realigned with limited flow diversity but slightly flow apparent dominant at this location. WFD-PH1-0006b: The channel is a small trapezoidal arable drainage watercourse that goes under culvert through Banbury Road. Reaccloimed and realigned with no flow diversity.	TBC FOLLOWING AFD DESIGN UPDATE	No detailed surveys or photos were possible.	The walkover survey indicates that the channel was reaccloimed and informally embedded with minor flow (and flow), substrate diversity. Banks appeared to be cohesive, however the watercourse was turbid and bed material was not identifiable.	Survey WFD-GM1-0009b indicates that the stream is fed by springs and runs approximately 1 km to the north east of Thorpe Mandeville. Flow was described as fast flowing but overgrown with vegetation. The stream feature was reported as shallow, c. 5cm deep, with saturated ground in hydraulic connectivity with the channel appearing to be fed by springs. Surface water flow from the surrounding valley slopes is reported as being likely to support water inputs to the stream.	Survey surveys limited access and watercourse observation. The riparian buffer is a modernised ground with no riparian arable landscape. However, the watercourse appears to be reaccloimed with a cohesive bed and bank material with low substrate and flow diversity.	Survey access was limited, so spot observations obtained from 'drive-by' surveys. No detailed survey or photos were possible.	No Groundwater Survey undertaken at this location	No Groundwater Survey undertaken at this location	No Groundwater Survey undertaken at this location	Survey point WFD-GM1-0008 reports a recently reaccloimed drainage ditch, connecting 2 areas of arable land, cutented for 20% of its length and essentially dry with minimal occasional ponded areas. 25cm depth. The pond is described as being likely to be groundwater dependent, with runoff from the surrounding arable land contributing during wet seasons as there does not appear to be significant surface water inflow to the pond.	Survey point WFD-GM1-0008 reports a recently reaccloimed drainage ditch, connecting 2 areas of arable land, cutented for 20% of its length and essentially dry with minimal occasional ponded areas. 25cm depth. The pond is described as being likely to be groundwater dependent, with runoff from the surrounding arable land contributing during wet seasons as there does not appear to be significant surface water inflow to the pond.		

Audit Trail for the Update of the WFD Water Body Assessment with Baseline Data

	WFD Classification Elements Changed	River Diversion and Culvert - Thorpe Mandeville cutting	River Diversion and Culvert - Tributary of the River Cherwell Culvert	Lower Thorpe Stadiad - Lower Thorpe Brook/ Tributary of the River Cherwell	Culvert - Tributary of the River Cherwell access road crossing	2 x Culverts - Lower Thorpe Drop Inlet Culvert and access road culvert	River Diversion, Culvert and Culvert Extension - Cotsworth South culvert	Edgcote Viaduct and River Diversion - Tributary of the River Cherwell	Edgcote Viaduct and 2 x River Diversions - River Cherwell	River Diversion and Culvert - Overland Spinney culvert	Thorpe Mandeville cutting	Lower Thorpe South cutting	Lower Thorpe North cutting	Edgcote Roman Villa cutting	Grimsworth Green Tunnel	OVERALL IMPACT	DESIGNAL EFFECT
						Nature of the Assessment Update and Justification											
Biological	2. Macrophytes and phytobenthos - Macrophytes	Diversions on the several tributaries of the River Cherwell were assessed together, and as were the culverts. Where necessary, and where additional baseline showed that watercourse were heavily shaded and support no macrophytes, "Shading", "Landtake" and "Changes to hydromorphology" effects were downgraded from yellow to green. Elsewhere, assessments remained unchanged.	Diversions on the several tributaries of the River Cherwell were assessed together, and as were the culverts. Where necessary, and where additional baseline showed that watercourse were heavily shaded and support no macrophytes, "Shading", "Landtake" and "Changes to hydromorphology" effects were downgraded from yellow to green. Elsewhere, assessments remained unchanged.	No significant change in baseline, assessment remains unchanged.	Culverts on the several tributaries of the River Cherwell were assessed together. Where necessary, and where additional baseline showed that watercourse were heavily shaded and support no macrophytes, "Shading", "Landtake" and "Changes to hydromorphology" effects were downgraded from yellow to green. Elsewhere, assessments remained unchanged.	n/a	As baseline shows that tributary supports no macrophytes, "Landtake" effect changed from yellow to green.	No significant change in the baseline. Assessment remains unchanged.	Diversions on the several tributaries of the River Cherwell were assessed together, and as were the culverts. Where necessary, and where additional baseline showed that watercourse were heavily shaded and support no macrophytes, "Shading", "Landtake" and "Changes to hydromorphology" effects were downgraded from yellow to green. Elsewhere, assessments remained unchanged.	Tributaries are heavily shaded and support no macrophytes, although the River Cherwell supports good macrophyte diversity. Assessment remains unchanged, potentially adverse locally.	Tributaries are heavily shaded and support no macrophytes, although the River Cherwell supports good macrophyte diversity. Assessment remains unchanged, potentially adverse locally.	Tributaries are heavily shaded and support no macrophytes, although the River Cherwell supports good macrophyte diversity. Assessment remains unchanged, potentially adverse locally.	Tributaries are heavily shaded and support no macrophytes, although the River Cherwell supports good macrophyte diversity. Assessment remains unchanged, potentially adverse locally.	Tributaries are heavily shaded and support no macrophytes, although the River Cherwell supports good macrophyte diversity. Assessment remains unchanged, potentially adverse locally.	Tributaries are heavily shaded and support no macrophytes, although the River Cherwell supports good macrophyte diversity. Assessment remains unchanged, potentially adverse locally.		
	3. Macroinvertebrates	Diversions on tributaries of the River Cherwell were assessed together, and as were the culverts. No significant change in baseline, assessments remained unchanged.	Diversions on tributaries of the River Cherwell were assessed together, and as were the culverts. No significant change in baseline, assessments remained unchanged.	No significant change in baseline, assessment remains unchanged.	Culverts on the several tributaries of the River Cherwell were assessed together. No significant change in baseline, assessments remained unchanged.	n/a	n/a	No additional information. Assessment remains unchanged.	Assessment not updated. Adverse effects likely to be minor, localised and / or temporary.	Diversions on tributaries of the River Cherwell were assessed together, and as were the culverts. No significant change in baseline, assessments remained unchanged.	Tributaries with poor macroinvertebrate potential, although the River Cherwell is of moderately good macroinvertebrate quality in the stretch surveyed. Assessment remains unchanged, potentially adverse locally.	Tributaries with poor macroinvertebrate potential, although the River Cherwell is of moderately good macroinvertebrate quality in the stretch surveyed. Assessment remains unchanged, potentially adverse locally.	Tributaries with poor macroinvertebrate potential, although the River Cherwell is of moderately good macroinvertebrate quality in the stretch surveyed. Assessment remains unchanged, potentially adverse locally.	Tributaries with poor macroinvertebrate potential, although the River Cherwell is of moderately good macroinvertebrate quality in the stretch surveyed. Assessment remains unchanged, potentially adverse locally.	Tributaries with poor macroinvertebrate potential, although the River Cherwell is of moderately good macroinvertebrate quality in the stretch surveyed. Assessment remains unchanged, potentially adverse locally.	Tributaries with poor macroinvertebrate potential, although the River Cherwell is of moderately good macroinvertebrate quality in the stretch surveyed. Assessment remains unchanged, potentially adverse locally.	AMBER TO YELLOW - To reflect the fact that additional baseline showed that the river showed a variety of moderate macroinvertebrate quality within the stretch inspected and connectivities to adjacent waterbodies are not considered to be significantly adverse.	No change in overall impact.
	4. Fish	Diversions on tributaries of the River Cherwell were assessed together, and as were the culverts. No significant change in baseline, assessments remained unchanged.	Diversions on tributaries of the River Cherwell were assessed together, and as were the culverts. No significant change in baseline, assessments remained unchanged.	No significant change in baseline, assessment remains unchanged.	Culverts on the several tributaries of the River Cherwell were assessed together. No significant change in baseline, assessments remained unchanged.	n/a	n/a	No additional information. Assessment remains unchanged.	Assessment not updated. Adverse effects likely to be minor, localised and / or temporary.	Diversions on tributaries of the River Cherwell were assessed together, and as were the culverts. No significant change in baseline, assessments remained unchanged.	Tributaries with poor macroinvertebrate potential, although River Cherwell supports few fish species. Assessment remains unchanged, potentially adverse locally.	Tributaries with poor macroinvertebrate potential, although River Cherwell supports few fish species. Assessment remains unchanged, potentially adverse locally.	Tributaries with poor macroinvertebrate potential, although River Cherwell supports few fish species. Assessment remains unchanged, potentially adverse locally.	Tributaries with poor macroinvertebrate potential, although River Cherwell supports few fish species. Assessment remains unchanged, potentially adverse locally.	Tributaries with poor macroinvertebrate potential, although River Cherwell supports few fish species. Assessment remains unchanged, potentially adverse locally.	Tributaries with poor macroinvertebrate potential, although River Cherwell supports few fish species. Assessment remains unchanged, potentially adverse locally.	AMBER TO YELLOW - To reflect the fact that additional baseline showed that the river supports only a few fish species and no salmonids within the stretch inspected and that its tributaries inspected by culverts are of poor value for fish.	No change in overall impact.
Physico-Chemical	5. Dissolved Oxygen	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	n/a	n/a	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	The effect of this Scheme Element (Cutting) on the Dissolved Oxygen WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the survey. The impact of dewatering associated with the cutting remains unchanged. Dewatering may affect springs and the spring fed watercourse, leading to depleted reaches of river flow, and thus reducing concentrations of resident contaminants, including phosphate.	The effect of this Scheme Element (Cutting) on the Dissolved Oxygen WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the survey. The impact of dewatering associated with the cutting remains unchanged. Dewatering may affect springs and the spring fed watercourse, leading to depleted reaches of river flow, and thus reducing concentrations of resident contaminants, including phosphate.	No change in overall impact.	No change in overall impact.
	6. pH	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	n/a	n/a	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	The effect of this Scheme Element (Cutting) on the Phosphate WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the survey. The impact of dewatering associated with the cutting remains unchanged. Dewatering may affect springs and the spring fed watercourse, leading to depleted reaches of river flow, and thus increasing concentrations of resident contaminants, including phosphate.	The effect of this Scheme Element (Cutting) on the Phosphate WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the survey. The impact of dewatering associated with the cutting remains unchanged. Dewatering may affect base flows within the tributaries of the River Cherwell, leading to depleted reaches of river flow, and thus increasing concentrations of resident contaminants, including phosphate.	No change in overall impact.	No change in overall impact.
	7. Phosphate	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	n/a	n/a	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	The effect of this Scheme Element (Cutting) on the Phosphate WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the survey. The impact of dewatering associated with the cutting remains unchanged. Dewatering may affect springs and the spring fed watercourse, leading to depleted reaches of river flow, and thus increasing concentrations of resident contaminants, including phosphate.	The effect of this Scheme Element (Cutting) on the Phosphate WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the survey. The impact of dewatering associated with the cutting remains unchanged. Dewatering may affect base flows within the tributaries of the River Cherwell, leading to depleted reaches of river flow, and thus increasing concentrations of resident contaminants, including phosphate.	No change in overall impact.	No change in overall impact.
	8. Ammonia	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	n/a	n/a	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	The effect of this Scheme Element (Cutting) on the Ammonia WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the survey. The impact of dewatering associated with the cutting remains unchanged. Dewatering may affect springs and the spring fed watercourse, leading to depleted reaches of river flow, and thus increasing concentrations of resident contaminants, including ammonia.	The effect of this Scheme Element (Cutting) on the Ammonia WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the survey. The impact of dewatering associated with the cutting remains unchanged. Dewatering may affect base flows within the tributaries of the River Cherwell, leading to depleted reaches of river flow, and thus increasing concentrations of resident contaminants, including ammonia.	No change in overall impact.	No change in overall impact.
	9. Temperature	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	n/a	n/a	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in overall impact.
	10. Specific Pollutants (Annex VIII)	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	n/a	n/a	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	The effect of this Scheme Element (Cutting) on the Specific Pollutant WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the survey. The impact of dewatering associated with the cutting remains unchanged. Dewatering may affect springs and the spring fed watercourse, leading to depleted reaches of river flow, and thus increasing concentrations of resident contaminants, including specific pollutants.	The effect of this Scheme Element (Cutting) on the Specific Pollutant WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the survey. The impact of dewatering associated with the cutting remains unchanged. Dewatering may affect base flows within the tributaries of the River Cherwell, leading to depleted reaches of river flow, and thus increasing concentrations of resident contaminants, including specific pollutants.	No change in overall impact.	No change in overall impact.
Hydromorphological	11. Quantity and dynamics of river flow	No assessment update required. Temporary minor impacts remain unchanged. Minor level changes to clarify assessment in light of survey results.	No assessment update required. Temporary minor impacts remain unchanged. Minor level changes to clarify assessment in light of survey results.	No assessment update required. Temporary minor impacts remain unchanged. Minor level changes to clarify assessment in light of survey results.	No assessment update and risk of minor impacts remain unchanged. The survey reports are insufficient to improve confidence in the previous assessment.	n/a	n/a	No assessment update and risk of minor impacts remain unchanged. The survey reports are insufficient to improve confidence in the previous assessment.	No assessment update and risk of minor impacts remain unchanged. The survey reports are insufficient to improve confidence in the previous assessment.	No assessment update and risk of minor impacts remain unchanged. The survey reports are insufficient to improve confidence in the previous assessment.	No assessment update required. Assessment of minor impacts remain unchanged	No assessment update required. Assessment of minor impacts remain unchanged	No assessment update required. Assessment of minor impacts remain unchanged	No assessment update required. Assessment of minor impacts remain unchanged	No assessment update required. Assessment of minor impacts remain unchanged	No change in overall impact.	No change in overall impact.
	12. Connection to Groundwater	No assessment update required. Temporary minor impacts remain unchanged. Minor level changes to clarify assessment in light of survey results.	No assessment update required. Temporary minor impacts remain unchanged. Minor level changes to clarify assessment in light of survey results.	No assessment update required. Temporary minor impacts remain unchanged. Minor level changes to clarify assessment in light of survey results.	No assessment update and risk of minor impacts remain unchanged. The survey reports are insufficient to improve confidence in the previous assessment.	n/a	n/a	No assessment update and risk of minor impacts remain unchanged. The survey reports are insufficient to improve confidence in the previous assessment.	No assessment update and risk of minor impacts remain unchanged. The survey reports are insufficient to improve confidence in the previous assessment.	No assessment update and risk of minor impacts remain unchanged. The survey reports are insufficient to improve confidence in the previous assessment.						No change in overall impact.	No change in overall impact.
	13. River depth and width variation bed	No assessment update required. Temporary minor impacts remain unchanged. Minor level changes to clarify assessment in light of survey results.	No assessment update required. Temporary minor impacts remain unchanged. Minor level changes to clarify assessment in light of survey results.	No assessment update required. Temporary minor impacts remain unchanged. Minor level changes to clarify assessment in light of survey results.	No assessment update and risk of minor impacts remain unchanged. The survey reports are insufficient to improve confidence in the previous assessment.	n/a	n/a	No assessment update and risk of minor impacts remain unchanged. The survey reports are insufficient to improve confidence in the previous assessment.	No assessment update and risk of minor impacts remain unchanged. The survey reports are insufficient to improve confidence in the previous assessment.	No assessment update and risk of minor impacts remain unchanged. The survey reports are insufficient to improve confidence in the previous assessment.						No change in overall impact.	No change in overall impact.
	14. Structure and substrate of river bed	No assessment update required. Temporary minor impacts remain unchanged. Minor level changes to clarify assessment in light of survey results.	No assessment update required. Temporary minor impacts remain unchanged. Minor level changes to clarify assessment in light of survey results.	No assessment update required. Temporary minor impacts remain unchanged. Minor level changes to clarify assessment in light of survey results.	No assessment update and risk of minor impacts remain unchanged. The survey reports are insufficient to improve confidence in the previous assessment.	n/a	n/a	No assessment update and risk of minor impacts remain unchanged. The survey reports are insufficient to improve confidence in the previous assessment.	No assessment update and risk of minor impacts remain unchanged. The survey reports are insufficient to improve confidence in the previous assessment.	No assessment update and risk of minor impacts remain unchanged. The survey reports are insufficient to improve confidence in the previous assessment.						No change in overall impact.	No change in overall impact.
	15. Structure of riparian zone	No assessment update required. Temporary minor impacts remain unchanged. Minor level changes to clarify assessment in light of survey results.	No assessment update required. Temporary minor impacts remain unchanged. Minor level changes to clarify assessment in light of survey results.	No assessment update required. Temporary minor impacts remain unchanged. Minor level changes to clarify assessment in light of survey results.	No assessment update and risk of minor impacts remain unchanged. The survey reports are insufficient to improve confidence in the previous assessment.	n/a	n/a	No assessment update and risk of minor impacts remain unchanged. The survey reports are insufficient to improve confidence in the previous assessment.	No assessment update and risk of minor impacts remain unchanged. The survey reports are insufficient to improve confidence in the previous assessment.	No assessment update and risk of minor impacts remain unchanged. The survey reports are insufficient to improve confidence in the previous assessment.						No change in overall impact.	No change in overall impact.

Water Body ID	GB106039037350
Surface Waterbody Name	Cherwell (Ashby Brook to Cropredy)
CFAs covered by Waterbody	15

CFA	15	
AP2 ID	AP2-015-005	AP-C222-204
AP2 Location	Lower Thorpe	Northamptonshire
New/Replacement Scheme Element	REPLACEMENT	NEW
AP2 Scheme Element Type	Construction Access Road	Road works for turning heads
Original Scheme	The Bill provides for the use of Banbury Lane to service the Lower Thorpe Viaduct Satellite Construction Compound. In addition, the access would be required for the purpose of constructing the maintenance access to the balancing pond located south of Banbury Lane and west of the HS2 route	The Bill provides for temporary closure of Banbury Lane with a temporary alternative route via Banbury Road, for a period of approximately one to two months during construction. This will allow construction associated with the Lower Thorpe viaduct. Banbury Lane will then be permanently reinstated along its existing alignment
AP2 Description	A new temporary 300 m long construction access road will be constructed adjacent to the route of the original scheme from Banbury Lane to the Lower Thorpe Viaduct Satellite Construction Compound, to reduce traffic levels on Banbury Lane. **No change to viaduct design. Only change to construction access road. Drawings show relocation of temporary construction access road from east to west side of Scheme. Construction access road would cross the ponds rather than the watercourse itself, although still in close proximity to watercourse.**	the need to add turning heads to Banbury Lane when it is closed during construction has been identified, east and west of the route of the Proposed Scheme. The turning heads will allow vehicles to turn safely at the end of the stopped up Banbury Lane **Drawings show the turning heads to be situated over the Main River channel, suggesting the watercourse will be culverted in these locations.**
Changes to Previously assessed elements	Landtake associated with access road	None
AP2 Assessment Requirements	None	Culverting of Main River

GB103060903700-AP2 Assessment

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective
GB106039037350		
Cherwell (Ashby Brook to Cropredy)	Moderate	Good status by 2027

Description of scheme element impact	Identified biological impacts

Viaduct

River Cherwell: The 13 span viaduct has a deck length of 540m and the spans would have an average height (ground to soffit) of 2 - 2.5m. The viaduct is located to the north-east of Eligiste and crosses the River Cherwell and Mill Lane. The viaduct would not cross the watercourse but would be close enough to its banks to potentially exert impacts - CFA15-SWC7 (108+620)

River Diversion

River Cherwell: Eligiste viaduct, 150 m - CFA15-SWC21 (108+440) and 70 m - CFA15-SWC7 (108+620)

Viaduct

Lower Thorpe Brook and Unnamed tributary: Lower Thorpe viaduct, Unnamed Tributary: Eligiste viaduct

LOWER THORPE VIADUCT - Construction Access Road - AP2-015-005

No change to viaduct design. Only change to construction access road. Drainage show reduction of temporary construction access road from east to west side of Scheme. Construction access road would cross the ponds rather than the watercourse itself, although still in close proximity to watercourse.

River Diversion

Unnamed Tributary of the River Cherwell (Lower Thorpe Embankment) - Unnamed South culvert and Lower Thorpe Brook - Thorpe Mandeville Embankment - 285 m (SWC-CFA15-19)

River Diversion

Tributary of the River Cherwell: Eligiste viaduct - 50 m - CFA15-SWC6 (108+330)

Culvert

Multiple Culverts - Two channel diversions and five culverts on tributaries of the River Cherwell (upper reaches): Culvert3 South culvert - 50 m - CFA15-SWC5 (105+825), Overland Spinney culvert - 45 m - CFA15-SWC8 (108+870), Thorpe Mandeville cutting - 80 m - CFA15-SWC1 (104+400)

	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
WFD Classification elements / Predicted change to status elements (green = status, yellow = potential, red = failure)																														
1. Macrophytes and phytobenthos - Diatoms	N/A	N/A																												
2. Macrophytes and phytobenthos - Macrophytes	-	-				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Receptor not sensitive to impact. No likely effect anticipated	No footings in channel therefore no effect anticipated	Likely to lead to very localised loss of macrophytes, due to footprint of embankment, but Thorpe Brook supports locally frequent aquatic vegetation (ecology baseline survey). Very localised adverse effect.	No significant hydromorphological impacts anticipated, therefore no effects on macrophytes.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Temporary loss of approximately 220 m of habitats of the existing River Cherwell with lies within the diverted section while the new channels re-establish. It is anticipated that the new channel will include a range of habitats suitable for colonisation by submerged species. The watercourse supports locally frequent aquatic vegetation, with 15 macrophyte species recorded (ecology baseline survey). Temporary localised adverse effect while new channel re-establishes.	The new channels will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. The watercourse supports locally frequent aquatic vegetation (ecology baseline survey). The effect on this quality element is considered to be minor beneficial and localised.	Potential increase in flow velocities and increase in sediment transport rates, that may increase morphological and channel diversity. The watercourse supports locally frequent aquatic vegetation (ecology baseline survey). Negligible effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Temporary loss of approximately 220 m of habitats of the existing River Cherwell with lies within the diverted section while the new channels re-establish. It is anticipated that the new channel will include a range of habitats suitable for colonisation by submerged species. The watercourse supports locally frequent aquatic vegetation, with 15 macrophyte species recorded (ecology baseline survey). Temporary localised adverse effect while new channel re-establishes.	The new channels will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. The watercourse supports locally frequent aquatic vegetation (ecology baseline survey). The effect on this quality element is considered to be minor beneficial and localised.	Potential increase in flow velocities and increase in sediment transport rates, that may increase morphological and channel diversity. The watercourse supports locally frequent aquatic vegetation (ecology baseline survey). Negligible effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	N/A	N/A	N/A	N/A	N/A	Receptor not sensitive to impact. No likely effect anticipated.	There will be no viaduct footings within river channel. Lower Thorpe Brook supports locally frequent aquatic vegetation (ecology baseline survey). Tributary of the River Cherwell under Eligiste viaduct and Lower Thorpe viaduct is heavily shaded and supports no aquatic vegetation. Very localised adverse effect anticipated.	Lower Thorpe Brook and Unnamed Tributary: Lower Thorpe viaduct, Unnamed Tributary: Eligiste viaduct supports locally frequent aquatic vegetation (ecology baseline survey). Tributary of the River Cherwell under Eligiste viaduct and Lower Thorpe viaduct is heavily shaded and supports no aquatic vegetation. Very localised adverse effect anticipated.	No significant hydromorphological impacts anticipated, therefore no effects on macrophytes.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor not sensitive to impact. No likely effect anticipated.	No footings in channel therefore no effect anticipated.	Likely to lead to very localised loss of macrophytes, due to footprint of embankment, but Thorpe Brook supports locally frequent aquatic vegetation (ecology baseline survey). Very localised adverse effect anticipated.	No significant hydromorphological impacts anticipated, therefore no effects on macrophytes.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Temporary loss of approximately 300 m of habitats of the existing River Cherwell and Thorpe Brook which lies within the diverted section while the new channels re-establish. Lower Thorpe Brook supports poor fish habitat and low fish abundances and diversity (baseline survey). Temporary and minor adverse effect anticipated.	The new channel will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. Lower Thorpe Brook supports locally frequent aquatic vegetation (ecology baseline survey) and unnamed tributary heavily shaded. Localised beneficial effect anticipated.	Potential increase in flow velocities and increase in sediment transport rates, that may increase morphological and channel diversity. Lower Thorpe Brook supports locally frequent aquatic vegetation (ecology baseline survey). Localised beneficial effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Existing channel of Lower Thorpe Brook appears realtively over-deepened and straightened (baseline survey). No significant hydromorphological impacts anticipated therefore no effects on fish.	Temporary loss of approximately 50 m of habitats of the existing tributary that lies within the diverted section while the new channel re-establishes. Tributary supports no or marginal aquatic vegetation. Very localised adverse effect anticipated.	Existing channel of Lower Thorpe Brook appears realtively over-deepened and straightened (baseline survey). No significant hydromorphological impacts anticipated therefore no effects on fish.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Temporary loss of approximately 50 m of habitats of the existing tributary that lies within the diverted section while the new channel re-establishes. Tributary supports no or marginal aquatic vegetation. Very localised adverse effect anticipated.	The new channel will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. Tributary supports no macrophyte or crossing point. Potentially localised beneficial effect anticipated.	Potential increase in flow velocities and increase in sediment transport rates, that may increase morphological and channel diversity. Tributary supports no macrophyte or crossing point. Potentially localised beneficial effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Tributaries do not support macrophytes. No likely effect anticipated	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to the permanent loss of a total of approximately 200 m of Tributary at Thorpe Mandeville cutting heavily shaded and therefore not suitable for macrophytes. Tributary supports no or marginal aquatic vegetation. No likely effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
3. Macroinvertebrates	High	High				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Receptor not sensitive to impact. No likely effect anticipated.	There will be no viaduct footings in river channel. Lower Thorpe Brook supports locally moderate macroinvertebrate quality (ecology baseline survey). Tributary of the River Cherwell under Eligiste viaduct and Lower Thorpe viaduct is heavily shaded and supports no aquatic vegetation. Very localised adverse effect anticipated.	The river diversions should avoid viaduct footings to be within river channel. Lower Thorpe Brook supports locally moderate macroinvertebrate quality (ecology baseline survey). Tributary under Eligiste viaduct and Lower Thorpe viaduct assessed to be of poor potential for macroinvertebrates as crossing points. Very localised adverse effect anticipated.	No significant hydromorphological impacts anticipated, therefore no effects on macroinvertebrates.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor not sensitive to impact. No likely effect anticipated.	No footings in channel therefore no effect anticipated.	Increase in shade likely to lead to very localised but permanent reduction of habitat available (i.e. aquatic vegetation, riparian vegetation). Lower Thorpe Brook supports locally moderate macroinvertebrate quality (ecology baseline survey). Tributary under Eligiste viaduct and Lower Thorpe viaduct assessed to be of poor potential for macroinvertebrates as crossing points. Very localised adverse effect anticipated.	No significant hydromorphological impacts anticipated, therefore no effects on macroinvertebrates.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Temporary loss of approximately 300 m of habitats of the existing River Cherwell and Thorpe Brook which lies within the diverted section while the new channels re-establish. Lower Thorpe Brook supports poor fish habitat and low fish abundances and diversity (baseline survey). Temporary and minor adverse effect anticipated.	The river diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs to aid in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach. Tributary supports no invertebrates. Potentially localised beneficial effect anticipated. No degradation of the status of this element expected at the water body scale.	Potential increase in flow velocities and increase in sediment transport rates, that may increase morphological and channel diversity. Tributary supports no invertebrates. Potentially localised beneficial effect anticipated. No degradation of the status of this element expected at the water body scale.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Existing channel of Lower Thorpe Brook appears realtively over-deepened and straightened (baseline survey). No significant hydromorphological impacts anticipated therefore no effects on fish.	Temporary loss of approximately 50 m of habitats of the existing tributary that lies within the diverted section while the new channel re-establishes. Tributary supports no or marginal aquatic vegetation. Very localised adverse effect anticipated.	Existing channel of Lower Thorpe Brook appears realtively over-deepened and straightened (baseline survey). No significant hydromorphological impacts anticipated therefore no effects on fish.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Temporary loss of approximately 50 m of habitats of the existing tributary that lies within the diverted section while the new channel re-establishes. Tributary supports no or marginal aquatic vegetation. Very localised adverse effect anticipated.	The new channel will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. Lower Thorpe Brook supports locally frequent aquatic vegetation (ecology baseline survey) and unnamed tributary heavily shaded. Localised beneficial effect anticipated.	Potential increase in flow velocities and increase in sediment transport rates, that may increase morphological and channel diversity. Lower Thorpe Brook supports locally frequent aquatic vegetation (ecology baseline survey). Localised beneficial effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Existing channel of Lower Thorpe Brook appears realtively over-deepened and straightened (baseline survey). No significant hydromorphological impacts anticipated therefore no effects on fish.	Temporary loss of approximately 50 m of habitats of the existing tributary that lies within the diverted section while the new channel re-establishes. Tributary supports no or marginal aquatic vegetation. Very localised adverse effect anticipated.	Existing channel of Lower Thorpe Brook appears realtively over-deepened and straightened (baseline survey). No significant hydromorphological impacts anticipated therefore no effects on fish.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Temporary loss of approximately 50 m of habitats of the existing tributary that lies within the diverted section while the new channel re-establishes. Tributary supports no or marginal aquatic vegetation. Very localised adverse effect anticipated.	The new channel will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. Tributary supports no macrophyte or crossing point. Potentially localised beneficial effect anticipated.	Potential increase in flow velocities and increase in sediment transport rates, that may increase morphological and channel diversity. Tributary supports no macrophyte or crossing point. Potentially localised beneficial effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Tributaries do not support macrophytes. No likely effect anticipated	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to the permanent loss of a total of approximately 200 m of Tributary at Thorpe Mandeville cutting heavily shaded and therefore not suitable for macrophytes. Tributary supports no or marginal aquatic vegetation. No likely effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
4. Fish	Good	Good				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Receptor not sensitive to impact. No likely effect anticipated.	The river diversions should avoid viaduct footings to be within river channel. Lower Thorpe Brook supports locally moderate macroinvertebrate quality (ecology baseline survey). Tributary under Eligiste viaduct and Lower Thorpe viaduct assessed to be of poor potential for macroinvertebrates as crossing points. Very localised adverse effect anticipated.	No significant hydromorphological impacts anticipated, therefore no effects on fish.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Localised and temporary effect during construction. No deterioration of the water body status of the element is however expected.	Temporary loss of approximately 220 m of habitats of the existing River Cherwell that lies within the diverted section while the new channels re-establish. Baseline data showed presence of Fish species (chub, gudgeon, roach and perch), with no salmonids. Localised and temporary adverse effect anticipated while new channel re-establishes.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities. No local data available for fish, but Environment Agency fisheries officer (Ms Sarah Ellis, personal communication with report) Locally beneficial effect anticipated, with no degradation of the status of this element expected at the water body scale.	Potential increase in flow velocities and increase in sediment transport rates, that may increase morphological and channel diversity. Baseline data showed presence of Fish species (chub, gudgeon, roach and perch), with no salmonids. Localised beneficial effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Localised and temporary effect during construction. No deterioration of the water body status of the element is however expected.	The river diversions should avoid viaduct footings to be within river channel. Lower Thorpe Brook supports poor fish habitat and low fish abundances and diversity (baseline survey). Tributaries under Eligiste viaduct and Lower Thorpe viaduct assessed to be of poor potential for fish as crossing points. Very localised adverse effect anticipated.	Increase in shade likely to lead to very localised but permanent reduction of habitat available (i.e. aquatic vegetation). Lower Thorpe Brook supports poor fish habitat and low fish abundances and diversity (baseline survey). Tributaries under Eligiste viaduct and Lower Thorpe viaduct assessed to be of poor potential for fish as crossing points. Very localised adverse effect anticipated.	No significant hydromorphological impacts anticipated, therefore no effects on fish.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Localised and temporary effect during construction. No deterioration of the water body status of the element is however expected.	No footings in channel therefore no effect anticipated.	Likely to lead to very localised but permanent reduction of habitat available (i.e. aquatic vegetation, riparian vegetation). Lower Thorpe Brook supports poor fish habitat and low fish abundances and diversity (baseline survey). Very localised adverse effect anticipated.	No significant hydromorphological impacts anticipated, therefore no effects on fish.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Temporary loss of approximately 300 m of habitats of the existing River Cherwell and Thorpe Brook which lies within the diverted section while the new channels re-establish. Lower Thorpe Brook supports poor fish habitat and low fish abundances and diversity (baseline survey). Temporary and minor adverse effect anticipated.	The new channel will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. Lower Thorpe Brook supports locally frequent aquatic vegetation (ecology baseline survey) and unnamed tributary heavily shaded. Localised beneficial effect anticipated.	Potential increase in flow velocities and increase in sediment transport rates, that may increase morphological and channel diversity. Lower Thorpe Brook supports locally frequent aquatic vegetation (ecology baseline survey). Localised beneficial effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Existing channel of Lower Thorpe Brook appears realtively over-deepened and straightened (baseline survey). No significant hydromorphological impacts anticipated therefore no effects on fish.	Temporary loss of approximately 50 m of habitats of the existing tributary that lies within the diverted section while the new channel re-establishes. Tributary supports no or marginal aquatic vegetation. Very localised adverse effect anticipated.	Existing channel of Lower Thorpe Brook appears realtively over-deepened and straightened (baseline survey). No significant hydromorphological impacts anticipated therefore no effects on fish.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Temporary loss of approximately 50 m of habitats of the existing tributary that lies within the diverted section while the new channel re-establishes. Tributary supports no or marginal aquatic vegetation. Very localised adverse effect anticipated.	The new channel will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. Tributary supports no macrophyte or crossing point. Potentially localised beneficial effect anticipated.	Potential increase in flow velocities and increase in sediment transport rates, that may increase morphological and channel diversity. Tributary supports no macrophyte or crossing point. Potentially localised beneficial effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	No data available on fish for any of the tributaries. By default, localised and temporary adverse effect during construction, with no effect anticipated at the scale of the water body.	Likely to lead to a localised but permanent loss of a total of approximately 200 m of fish habitat, and constitute obstructions to fish movements. Tributary supports poor fish habitat and low fish abundances. However, the River Cherwell is a designated Freshwater Fish Directive water body. Likely to lead to a localised but permanent loss of 50m of the Brook (lowest and which signifies the drainage ditches, only minor volume and flow) anticipated, with no further effect anticipated at the scale of the water body.	Culverts will result in localised changes to hydromorphological regime, and may restrict access to spawnin habitats. Tributaries are designated Freshwater Fish Directive water bodies. Potential for localised and minor adverse effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
Physico-Chemical status																														
WFD Classification elements / Predicted change to status elements (green = status, yellow = potential, red = failure)																														
5. Dissolved Oxygen	-	-				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated. • The new channel can provide refuge in established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor beneficial with no degradation of current status anticipated.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	N/A	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecologica

Surface Water body	Current status	Status objective	Scheme Elements	Cutting		Cutting		Green Tunnel		CULVERTS - Road works for turning heads - AP-C222-204					Impacts from other WFD water bodies (assessed separately)	OVERALL impact on element	Proposed Mitigation Measures		Residual impact	
GB106039037350			Description of scheme element impact	Edgcote Roman Villa cutting - Approximately 108+000		Thorpe Mandeville cutting, Lower Thorpe South cutting, Lower Thorpe North cutting - Approximately 105+000		Greatworth Green Tunnel		Drawings show the turning heads to be situated over the Main River channel, suggesting the watercourse will be culverted in these locations.										
Cherwell (Ashby Brook to Cropredy)	Moderate	Good status by 2027	Identified biological impacts	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage			Coinstruction	Operation		
WFD classification elements																				
1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/A	
2. Macrophytes and phytobenthos - macrophytes	-	-		Potential to affect base flows and spring flows on tributaries of the River Cherwell. Tributaries are heavily shaded and support no macrophytes, although the River Cherwell supports good macrophyte diversity. Potential adverse effect anticipated.	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	Potential to affect springs and tributaries of the River Cherwell. Local effect on flows on upper 800 m of Culworth Brook (tributary of River Cherwell). Tributaries are heavily shaded and support no macrophytes, although the River Cherwell supports good macrophyte diversity. Potential adverse effect anticipated.	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	Potential to temporarily affect base flows on springs and tributaries of the River Cherwell at Thorpe Mandeville. Tributaries are heavily shaded and support no macrophytes, although the River Cherwell supports good macrophyte diversity. Potential minor adverse effect anticipated.	Potential localised and temporary changes in water quality in tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	Receptor not sensitive to impact. No likely effect anticipated.	Culverts will lead to the permanent loss of habitat. The tributary of the River Cherwell is heavily shaded and unlikely to support aquatic vegetation. Effect likely to be negligible.	The tributary of the River Cherwell is heavily shaded and unlikely to support aquatic vegetation. Effect likely to be negligible.	The tributary of the River Cherwell is heavily shaded and unlikely to support aquatic vegetation. Effect likely to be negligible.	The tributary of the River Cherwell is heavily shaded and unlikely to support aquatic vegetation. Effect likely to be negligible.	No impact on upstream water bodies	Scheme elements present on the River Cherwell and its main tributary, Lower Thorpe Brook, which support frequent aquatic vegetation are identified as having the potential for very localised adverse effects (viaducts) or temporary adverse effects (river diversions) that would be balanced by the creation of new habitats. In addition to a river diversion and a viaduct, smaller tributaries, which are heavily shaded and do not support any aquatic vegetation, are also impacted by several culverts (200 m in total). Given these elements and the relative low contribution of the smaller tributaries (drainage ditches) to the River Cherwell, the overall effect of the scheme on this quality element, which currently does not have a status. is considered to be negligible. The change to construction access road to the Lower Thorpe viaduct and addition of a culvert on a tributary of the River Cherwell heavily shaded are unlikely to lead to a change to the overall effect on this quality element. Therefore, overall effect not updated as part of AP2 assessment.	No additional mitigation required	No additional mitigation required	This quality element currently does not have a WFD status. No adverse effect anticipated at the scale of the water body.	
3. Macroinvertebrates	High	High		Potential to affect base flows and spring flows on tributaries of the River Cherwell. Tributaries with poor macroinvertebrate potential, although the River Cherwell is of moderately good macroinvertebrate quality in the stretch surveyed. Potential adverse effect anticipated.	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	Potential to affect springs and tributaries of the River Cherwell. Local effect on flows on upper 800 m of Culworth Brook (tributary of River Cherwell). Tributaries with poor macroinvertebrate potential, although the River Cherwell is of moderately good macroinvertebrate quality in the stretch surveyed. Potential adverse effect anticipated.	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	Potential to temporarily affect base flows on springs and tributaries of the River Cherwell at Thorpe Mandeville. Tributaries with poor macroinvertebrate potential, although the River Cherwell is of moderately good macroinvertebrate quality in the stretch surveyed. Potential minor adverse effect anticipated.	Potential localised and temporary changes in water quality in tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	Receptor not sensitive to impact. No likely effect anticipated.	Culverts will lead to the permanent loss of macroinvertebrate habitat. Tributary of the River Cherwell supports moderately good macroinvertebrate quality, with communities potentially sensitive to pollution. Potential localised adverse effect anticipated.	No additional effect anticipated (loss of habitat already considered in the landtake impact).	Potential homogenisation in flow patterns, increased velocities and reduction of habitat continuity. Tributary of the River Cherwell supports moderately good macroinvertebrate quality, with communities potentially sensitive to pollution. Potential localised adverse effect anticipated.	Potential localised adverse effect on dissolved oxygen and pollutant concentrations. Tributary of the River Cherwell supports moderately good macroinvertebrate quality, with communities potentially sensitive to pollution. Potential localised adverse effect anticipated.	No impact on upstream water bodies	Additional baseline showed that the River Cherwell is only of moderate macroinvertebrate quality within the stretch impacted and communities are unlikely to be highly sensitive to reduced flows. Scheme elements present on the River Cherwell and its main tributary are identified as having the potential for very localised adverse effects (viaducts) or temporary adverse effects (river diversion) that would be balanced by the creation of new habitats. In addition to a short river diversion and viaducts, smaller tributaries are also impacted by several culverts (200 m in total). Base flows within the tributary watercourses may be affected by dewatering of two cuttings. Given the relatively low contribution of the smaller tributaries (drainage ditches) to the River Cherwell, their cumulative effect is however likely to be low at the scale of the water body. The River Cherwell supports moderately good macroinvertebrate quality within the reach impacted, with communities unlikely to be highly sensitive to flow reductions. Therefore, overall effect considered to be potentially adverse locally with no risk of deterioration of the WFD status of this element. The change to construction access road to the Lower Thorpe viaduct and addition of a culvert on a tributary of the River Cherwell of moderate macroinvertebrate quality, even considered in-combination with other scheme elements, to lead to a change to the overall effect on this quality element. Therefore, overall effect not updated as part of AP2 assessment.	No additional mitigation required	No additional mitigation required	Potential localised adverse effect, with no deterioration of the WFD status of this element anticipated.	
4. Fish	Good	Good		Potential to affect base flows and spring flows on tributaries of the River Cherwell. Tributaries with poor macroinvertebrate potential, although River Cherwell supports a few fish species. Potential adverse effect anticipated.	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	Potential to affect springs and tributaries of the River Cherwell. Local effect on flows on upper 800 m of Culworth Brook (tributary of River Cherwell). Tributaries with poor macroinvertebrate potential, although River Cherwell supports a few fish species. Potential adverse effect anticipated.	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	Potential to temporarily affect base flows on springs and tributaries of the River Cherwell at Thorpe Mandeville. Tributaries with poor macroinvertebrate potential, although River Cherwell supports a few fish species. Potential minor adverse effect anticipated.	Potential localised and temporary changes in water quality in tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	Tributary supports poor fish habitat and low fish abundances and diversity (baseline surveys). By default, localised and temporary adverse effect during construction, with no effect anticipated at the scale of the water body.	Culverts will lead to the permanent loss of fish habitat. Tributary supports poor fish habitat and low fish abundances and diversity (baseline surveys). Therefore, potential localised adverse effect with no effect at the scale of the waterbody.	No additional effect anticipated (loss of habitat already considered in the landtake impact).	Culverts will result in localised changes to hydromorphological regime, and may restrict access to upstream habitats. Tributary supports poor fish habitat and low fish abundances and diversity (baseline surveys). Therefore, potential localised adverse effect with no effect at the scale of the waterbody.	Potential localised adverse effect on dissolved oxygen and pollutant concentrations. Tributary supports poor fish habitat and low fish abundances and diversity. (baseline surveys). Therefore, potential localised adverse effect with no effect at the scale of the waterbody.	No impact on upstream water bodies	Minor or loose - to reveal the full additional baseline showed that the River Cherwell supports only a few fish species and no salmonids within the stretch impacted and that its tributaries impacted by culverts are of poor value for fish. Scheme elements present on the River Cherwell and its main tributary are identified as having the potential for very localised adverse effects (viaducts) or temporary adverse effects (river diversion) that would be balanced by the creation of new habitats. The culverts present on the smaller tributaries (drainage ditches) are considered of having the potential for adverse effects, by very locally reducing habitat available to fish and limiting access to potential habitat of interest for fish (spawning). Although the River Cherwell is a designated watercourse under the Freshwater Fish Directive, additional baseline confirmed the fact that it does only support only a few fish species within the reach impacted by migratory species. In addition, additional baseline on the tributaries impacted by the presence of several culverts (200 m in total) indicated that they are of poor value for fish. Therefore, the scheme is considered as having a potential localised adverse effect on this biological element, with low risk of status deterioration. The change to construction access road to the Lower Thorpe viaduct and addition of a culvert on a tributary of the River Cherwell of poor value for fish are unlikely, even considered in-combination with other scheme elements, to lead to a change to the overall effect on this quality element. Therefore, overall effect not updated as	No additional mitigation required	No additional mitigation required	Potential localised adverse effect, with no deterioration of the WFD status of this element anticipated.	
Physico-Chemical status																				
WFD classification elements																				
5. Dissolved Oxygen	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	Receptor is insensitive to impact	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	N/A	N/A	• The additional length of the proposed AP2 culverts will marginally increase the amount of shaded watercourse. Despite this, it is predicted to result in no more than a minor impact on this sub-element. • This impact is likely to have a minor, local effect in relation to the overall water body. Therefore, no change in status from the previous assessment is anticipated.	• The construction of the proposed AP2 culverts is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	• The construction of the proposed AP2 culverts is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	No impact on upstream water bodies	The relocation of the temporary construction access road and addition of the short culverts will contribute slightly to the cumulative impact on this physico-chemical sub-element, however it is not considered to be significant, and subsequently there will be no change in overall impact from the previous assessment. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	No additional mitigation required	No additional mitigation required	Minor and localised effects	
6. pH	-	-		Receptor is insensitive to impact	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No impact on upstream water bodies	Receptor is insensitive to impact			Receptor is insensitive to impact	
7. Phosphate	-	-		Receptor is insensitive to impact	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	• Water quality could be reduced in the depleted reaches due to the relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	N/A	N/A	Receptor is insensitive to impact	• The construction of the proposed AP2 culverts is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	Receptor is insensitive to impact	No impact on upstream water bodies	The relocation of the temporary construction access road and addition of the short culverts will contribute slightly to the cumulative impact on this physico-chemical sub-element, however it is not considered to be significant, and subsequently there will be no change in overall impact from the previous assessment. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	No additional mitigation required	No additional mitigation required	Minor and localised effects	
8. Ammonia	-	-		Receptor is insensitive to impact	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No impact on upstream water bodies					
9. Temperature	-	-		Receptor is insensitive to impact	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	• The additional length of the proposed AP2 culverts will marginally increase the amount of shaded watercourse. Despite this, it is predicted to result in no more than a minor impact on this sub-element. • This impact is likely to have a minor, local effect in relation to the overall water body. Therefore, no change in status from the previous assessment is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	No impact on upstream water bodies					
10. Specific Pollutants (Annex VIII)	-	-		Receptor is insensitive to impact	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	N/A	N/A	Receptor is insensitive to impact	• The construction of the proposed AP2 culverts is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	• The construction of the proposed AP2 culverts is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	No impact on upstream water bodies					
Hydromorphological status																				**Hydromorphology Baseline**
WFD classification elements																				
11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	• Although dewatering from Edgcote Roman Villa cutting may reduce groundwater levels and contribution to surface water flows. However groundwater assessments have identified that the reduction in the contribution to surface water flow will be minor and it follow that it will probably not significantly impact on the hydromorphology of the watercourse. • Any reduction in the groundwater contribution to surface water flow is likely to be localised and only along a proportionately small reach of the River Cherwell compared to the feature length.	N/A	• Although dewatering from Thorpe Mandeville cutting, Lower Thorpe South cutting, Lower Thorpe North cutting may reduce groundwater levels and contribution to surface water flows, it is unlikely that the reduction in the contribution to surface water flow will significantly impact on the hydromorphology of the watercourse.	N/A	• Possible minor effects in terms of reducing flows volumes and diversity, but the effect is unlikely to be measurable or significant. Risk is highlighted as part of the precautionary approach and because any minor impact could have significant implications for habitats	N/A	N/A	N/A	N/A	• Culverts are on small tributaries and upper reaches of the River Cherwell at the Lower Thorpe Viaduct • There is unlikely to be significant diversity of flow dynamics, due to the size of the watercourse • If temporary or permanent culverts are implemented, out of bank flows could be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • The upper reaches of the River Cherwell are effectively drainage ditches, and in practical terms the culvert is unlikely to have any measurable impact on the water body • However, the proposals, the nature of the watercourse, and the potential impacts should be clarified in order to rule out any risks with confidence (if appropriate)	N/A	No impact on upstream water bodies	• The river diversion of the River Cherwell could increase gradients and flow velocities, and the tendency scour of the bed and bank, diversion extends over approximately 100m, but there would actually only be a minor change to channel planform • The channel appears to have an equilibrium, stable form, and the diversion would probably disrupt the natural balance of channel processes. However, further investigation and careful design is required to mitigate any potential impacts • Edgcote Viaduct and Lower Thorpe Viaduct have pillars in the floodplain and therefore may cause impacts to river dynamics at time of flood, however effects likely to be local. • The culverts on the upper reaches are extensive (5 in total), however due to the size of the watercourses and the location of the culverts in the upper reaches, the effect is likely to be local. • The overall impact on the waterbody has not needed to be updated as a result of the AP2 assessments	• The channel appears to have a natural, equilibrium form, so efforts to engineer new habitats are likely to be counter productive • The scale of the diversion is likely to mean there are no major morphological responses, and only gradual bed and bank scour and adjustment downstream would occur, resulting in habitat diversity, so it is likely that the best approach would be to allow the channel space to adjust its form locally • This MUST be investigated in detail: an appropriate level of analysis is beyond the scope of this study • Bank reinforcements would be required on the viaduct side of the channel to maintain the channel course after diversion • It is possible that this could be achieved with soft engineering techniques, but this requires further investigation • Drawing show that a floodplain compensation area will be provided as mitigation to off-set the loss of floodplain as a result of the Overbend Spinney Culvert	Minor and localised effects following mitigation	**upper reaches and tributaries** Survey report that the tributaries were completely shaded, arable drainage channels. The channel was observed as dry in parts, with trickle of flow observed in other areas. Little flow diversity was observed, and the bed is reported as sand and fine sediment dominated with organic debris. No in-channel macrophytes are present, and the channel is culverted under a farm access track. Overall the watercourse is reported as being an arable drainage ditch character with poor quality riverine habitat. **River Cherwell** The survey indicates that the channel has been resectioned and informally embanked, and has little flow (and likely, substrate) diversity. The banks appeared to be cohesive, and the water was turbid so bed material was not identifiable. • Channel meanders within a wide floodplain • Channel is crossed upstream of the proposed viaduct by Welsh Road, and appears to have bank reinforcements for a short distance to prevent scour and undercutting of Edgcote Road. This may well affect floodplain flows. • Map from the mid 1990s show that channel planform has not changed significantly for at least ca. 20 years. • Some palaeo features can be observed from aerial images in floodplain areas, but these are not immediately apparent, possible because of arable agriculture and ploughing. This does indicate though that the channel has migrated 10s of metres across the valley floor historically • Contemporary OS map shows that a Civil parish boundary follows the channel centreline upstream of the site, constituting further evidence that channel planform is stable • Flows may be regulated to a minor degree by partial diversion to 'The Proof', which appears to be an artificial water body at Edgcote House, which appears to be an artificial water body
12. Connection to Groundwater	-	-			N/A		N/A	• Possible minor effects in terms of reducing groundwater base flow	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	No impact on upstream water bodies					• There are numerous springs on the shallow valley sides, but in the context of the proposed viaduct this is not significant to hydromorphology
13. River continuity	-	-			N/A		N/A	• Possible minor effects in terms of reducing flows and increasing sedimentation , but the effect is unlikely to be measurable or significant. Risk is highlighted as part of the precautionary approach and because any minor impact could have significant implications for habitats	N/A	N/A	N/A	N/A	• The culverts would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in water body terms, this is a minor feature and it is unlikely that the culvert would cause deterioration of the overall water body status	N/A	No impact on upstream water bodies					• Channel is set in well developed floodplain with good connectivity • Channel is crossed by Welsh Road a short distance upstream, so continuity could be sensitive in this area
14. River depth and width variation bed	-	-			N/A		N/A	• Possible minor effects in terms of reducing flows on decreasing river depths and widths, but the effect is unlikely to be measurable or significant. Risk is highlighted as part of the precautionary approach and because any minor impact could have significant implications for habitats	N/A	N/A	N/A	N/A	• Out-of bank flows could be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The culvert would homogenise channel geometry • The size of the channel suggests there is unlikely to be significant loss of diversity in river depth and width • However, in water body terms, this is a minor feature and it is unlikely that the culvert would cause deterioration of the overall water body status	N/A	No impact on upstream water bodies					• Channel width is generally consistent for most of the reach, as would be expected for a meandering channel that regulates its own form • Channel width does vary upstream and downstream of Welsh Road and Edgcote Road, and a small bar or island appears to have formed immediately downstream of the existing crossing. The apparent discontinuity in morphology indicates a channel response to the structures • Bed variations and bed substrate formations cannot be observed from available information
15. Structure and substrate of river bed	-	-			N/A		N/A	• Possible minor effects in terms of reducing flows and increasing sedimentation , but the effect is unlikely to be measurable or significant. Risk is highlighted as part of the precautionary approach and because any minor impact could have significant implications for habitats	N/A	N/A	N/A	N/A	• The size of the channel suggests that there are unlikely to be valuable bed structures • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk • In water body terms, this is a minor feature and it is unlikely that the culvert would cause deterioration of the overall water body status	N/A	No impact on upstream water bodies					• Low, small, calcareous RBMP channel type • Channel is developed in alluvium over mudstone. No faults mapped at the site that would suggest an influence on channel form • Channel sediments cannot be determined from available information
16. Structure of riparian zone	-	-			N/A		N/A	• Possible minor effects in terms of reducing flows and riparian connectivity, but the effect is unlikely to be measurable or significant. Risk is highlighted as part of the precautionary approach and because any minor impact could have significant implications for habitats	N/A	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not affect deterioration of waterbody status	N/A	No impact on upstream water bodies					• Well developed and vegetated. • Good riparian and floodplain connectivity

B. Risk screening of potential to prevent future attainment of good Ecological

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen																	
NONE	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

GB104030902000

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water Body	Current status	Status objective	Potential changes to status (mainly geomorphic, chemical, biological, water quality, water quantity, and / or flow)	Colne Valley Viaduct CFA7-SWC3 - River Colne crossing					River Diversion of River Colne			Colne Valley Viaduct CFA7-SWC3 - Newyears Green Bourne crossing					River Diversion – Newyears Green Bourne			Culvert - tributaries				Colne Valley Viaduct – Grand Union Canal crossing					Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)
GB104030902000				Approximately 3.4km long viaduct of up to 15.1m high with piers close to banks edge. Minor narrowing of channel where viaduct crosses river.					Diversion of approximately 160m to the River Colne to avoid a viaduct pier being located in the river.			Approximately 2.8km long viaduct of up to 15.1m high with piers close to banks edge crossing Newyears Green Bourne, a tributary of the River Colne.					Culvert and Crossing CFA7-SWC 5 will incorporate two meandering bends (approximately 10m either side of existing channel)			Culvert on tributary of the River Colne near Wraybands Cottage				Approximately 3.4km long viaduct of up to 15.1m high with piers close to banks edge crossing Grand Union Canal. The viaduct span was increased to prevent the need for a viaduct pier in the canal.							Construction	Operation		
			Receptor	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Habitat creation	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage						
WFD classification elements	Identified biological impacts	Potential changes to status (mainly geomorphic, chemical, biological, water quality, water quantity, and / or flow)																														
1. Macrophytes and phytobenthos combined	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2. Macrophytes and phytobenthos: Macrophytes	-	-	Receptor is insensitive to impact	Vehicle footings will be close to river bank, and may result in the permanent loss of macrophytes in the section beneath the viaduct. The River Colne is approximately 15m wide at this location. Loss of riparian habitat (scrub/woodland) and wetland (marshy grassland) will reduce the extent of bankside cover. Effect considered to be minor and localised.	Vehicle will be 15.1m above water body. There may be minor changes in the cover and composition of macrophyte communities in the section beneath the viaduct. Effect considered to be minor and localised.	Minor element surveying for a short stretch (annually until completion) of the viaduct is likely to increase flow velocities and may lead to some emission of mobilised macrophyte fragments. Increased flow velocities are unlikely to adversely affect the flow and habitat of the River Colne. Effect considered ANTICIPATED CHANGED YELLOW TO GREEN	No impact. Runoff will be collected by drainage to balancing pond.	There will be loss of marginal and channel macrophytes over the 160m section of River Colne affected by the diversion section. The River Colne supports a diverse non-native community, with the notable exception of Water Fern (Azolla filiculoides). Loss of existing macrophyte community will re-establish within 1 to 2 years of completion of the new diversion. Effect is considered to be minor.	The new channel will incorporate marginal berms to provide shallow water habitat. Marginal vegetation will include a range of habitats suitable for colonisation by submerged species. In addition, design measures should be incorporated into the new channel to provide habitat for a diverse range of aquatic species. The effect on this quality element is considered to be minor positive.	Diversion would reflect or improve upon the existing sinuosity of the channel. No negative or positive impacts anticipated on hydromorphology and therefore no adverse effects on macrophyte communities.	Receptor insensitive to impact	Vehicle footings will be close to river bank, and may result in the permanent loss of macrophytes in the section beneath the viaduct. The River Colne is approximately 15m wide at this location. Loss of riparian habitat (scrub/woodland) and wetland (marshy grassland) will reduce the extent of bankside cover. Effect considered to be minor and localised.	Vehicle will be 15.1m above water body. There may be minor changes in the cover and composition of macrophyte communities in the section beneath the viaduct. Effect considered to be minor and localised.	Channel is currently heavily shaded by terrestrial vegetation. No effect anticipated.	Channel is currently heavily shaded by terrestrial vegetation. No effect anticipated.	No effect anticipated as macrophytes likely to be absent. Heavily shaded channel (CFA7-SWC 5) will be re-established. No effect anticipated.	No effect anticipated as macrophytes likely to be absent. Heavily shaded channel (CFA7-SWC 5) will be re-established. No effect anticipated.	Replacement flood storage will be provided at the single Newyears Green Bourne floodplain which will ensure that downstream flows within the Bourne are not affected by the culvert. No adverse effects on hydromorphological impacts are not predicted to form effects on macrophytes.	The diversion will incorporate features such as meanders and marginal berms, and will be lined to shaded, offering increased opportunities for marginal vegetation establishment. Effect considered to be positive.	Replacement flood storage will be provided at the single Newyears Green Bourne floodplain which will ensure that downstream flows within the Bourne are not affected by the culvert. No adverse effects on hydromorphological impacts are not predicted to form effects on macrophytes.	Receptor insensitive to impact	There would be temporary loss of macrophytes/marginal habitat during construction. Given that culvert is approximately 1.5m wide, construction is unlikely to allow an extent of exclusion to be extended within 30m downstream of the culvert. Effect considered to be minor and localised.	Channel is currently heavily shaded by terrestrial vegetation. No effect anticipated.	No effect anticipated. Culvert will be designed to ensure continuity of hydromorphology. Channel is currently heavily shaded by terrestrial vegetation. No effect anticipated.	No effect anticipated. Culvert will be designed to ensure continuity of hydromorphology. Channel is currently heavily shaded by terrestrial vegetation. No effect anticipated.	Upstream water bodies not impacted by scheme	Upstream water bodies not impacted by scheme	There will be temporary loss of Phragmites australis (Common Reed) and other marginal vegetation. Effect considered to be minor and localised.	Temporary loss of marginal macrophyte cover may have minor, localised effects on the local macrophyte community.	Receptor insensitive to impact	Receptor insensitive to impact	Channel is currently heavily shaded by terrestrial vegetation. No effect anticipated.	Upstream water bodies not impacted by scheme	Minor and localised effects	Minor and localised effects.	
3. Macroinvertebrates	Good	-	Receptor is insensitive to impact	Vehicle footings will be close to river bank, and will result in the loss of marginal or channel habitats which may be important for macroinvertebrates. The River Colne is approximately 15m wide at this location. Loss of riparian habitat (scrub/woodland) and wetland (marshy grassland) will reduce the extent of bankside cover.	Vehicle will be 15.1m above water body. There may be minor changes in the cover and composition of macroinvertebrate communities. Effect considered to be minor and localised.	Macroinvertebrate community benefits from shade. Shade may be slightly altered due to shading effects on macrophyte communities. Effect considered to be localised and minor.	Increase in flow velocity may improve one-ground habitats which are currently at risk of sedimentation. Increased flow velocities are unlikely to adversely affect habitat. Minimal adverse effect anticipated may be caused by increased cover with potential negative impacts on macroinvertebrate communities. Increased cover may potentially be a minor positive impact. Effect considered to be minor negative. ANTICIPATED CHANGED YELLOW TO GREEN	No impact. Runoff will be collected by drainage to balancing pond.	Diversion would reflect or improve upon the existing sinuosity of the channel. No negative or positive impacts anticipated on hydromorphology and therefore no adverse effects on macroinvertebrate communities.	No hydromorphological effects anticipated and therefore no effect on macroinvertebrate communities.	Receptor insensitive to impact	Vehicle footings will be close to river bank, and will result in the loss of marginal or channel habitats which may be important for macroinvertebrates. Loss of existing macroinvertebrate habitat will be re-established. Effect considered to be minor and localised.	The river diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs. Effect considered to be minor positive. Macroinvertebrate loss that currently characterise the reach.	Channel is currently heavily shaded by terrestrial vegetation. No effect anticipated.	Channel is currently heavily shaded by terrestrial vegetation. No effect anticipated.	Existing flow regime likely to be highly variable and strongly influenced by rainfall events. No changes anticipated or negative footings are outside channel.	Existing flow regime likely to be highly variable and strongly influenced by rainfall events. No changes anticipated or negative footings are outside channel.	CIAT measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality within the ditch.	CIAT measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality within the ditch.	Hydromorphological impacts are not predicted to form effects on fish.	Hydromorphological impacts are not predicted to form effects on fish.	Receptor insensitive to impact	There would be temporary loss of macroinvertebrate habitat during construction. Given that culvert is approximately 1.5m wide, construction is unlikely to allow an extent of exclusion to be extended within 30m downstream of the culvert. Effect considered to be minor and localised.	Channel is currently heavily shaded by terrestrial vegetation. No effect anticipated.	No effect anticipated. Culvert will be designed to ensure continuity of hydromorphology. Channel is currently heavily shaded by terrestrial vegetation. No effect anticipated.	No effect anticipated. Culvert will be designed to ensure continuity of hydromorphology. Channel is currently heavily shaded by terrestrial vegetation. No effect anticipated.	Upstream water bodies not impacted by scheme	Upstream water bodies not impacted by scheme	Temporary loss of macroinvertebrate cover may have minor effects on the local macroinvertebrate community.	Temporary loss of macroinvertebrate cover may have minor, localised effects on the local macroinvertebrate community.	Receptor insensitive to impact	Receptor insensitive to impact	Channel is currently heavily shaded by terrestrial vegetation. No effect anticipated.	Upstream water bodies not impacted by scheme	ANTICIPATED CHANGED YELLOW TO GREEN. There will be temporary loss of macroinvertebrates as a result of the culvert. Given that culvert is approximately 1.5m wide, construction is unlikely to allow an extent of exclusion to be extended within 30m downstream of the culvert. Effect considered to be minor and localised.	Baseline scores of fit Colne water body to be improved by the scheme to be undertaken prior to the commencement of the viaduct construction. Baseline, and therefore by 1 to be undertaken during the construction period. Priority will be given to the section of the River Colne affected by the viaduct to provide the maximum opportunity for establishment of vegetation prior to removal of existing reed beds.	ANTICIPATED CHANGED YELLOW TO GREEN. Minor and localised effects. First of all bioinvasive will depend on the existing macrophyte community. Minor and localised effects.	
4. Fish	Poor	-	Noise and vibration may cause minor, localised disturbance to fish. Fish are mobile and should avoid direct great footprints, though that suggests that clear gravel habitats are not present. Effects are thus considered to be minor.	Vehicle footings will be close to river bank, and will result in the loss of marginal or channel habitats which may be important for fish. Effect considered to be minor and localised.	Vehicle will be 15.1m above water body. There may be minor changes in the cover and composition of macrophyte and macroinvertebrate communities, but this is considered to be localised and minor.	Fish foraging habitat beneath the viaduct may be slightly altered due to shading effects on macrophyte and macroinvertebrate communities, but this is considered to be localised and minor.	Increase in flow velocity may improve one-ground habitats which are currently at risk of sedimentation. Increased flow velocities are unlikely to adversely affect habitat. Minimal adverse effect anticipated may be caused by increased cover with potential negative impacts on fish communities. Increased cover may potentially be a minor positive impact. Effect considered to be minor negative. ANTICIPATED CHANGED YELLOW TO GREEN	No impact. Runoff will be collected by drainage to balancing pond.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities.	No hydromorphological effects anticipated and therefore no effect on fish community.	There will be loss of fish habitat within the existing R Colne channel. Gravel fish were recorded within the survey area (the species mapped comprise minnow, stickleback, bullhead and salmon fry). Loss of existing fish habitat will be re-established and replace the temporary loss of habitat or fish communities. Balance effect that is to be localised and temporary.	No effect anticipated as piers will not be located in the channel. Channel is currently heavily shaded by terrestrial vegetation. No effect anticipated.	Channel is currently heavily shaded by terrestrial vegetation. No effect anticipated.	Existing flow regime likely to be highly variable and strongly influenced by rainfall events. No changes anticipated or negative footings are outside channel.	Existing flow regime likely to be highly variable and strongly influenced by rainfall events. No changes anticipated or negative footings are outside channel.	CIAT measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality within the ditch.	CIAT measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality within the ditch.	Hydromorphological impacts are not predicted to form effects on fish.	Hydromorphological impacts are not predicted to form effects on fish.	FOLLOW TO GREEN. Note that culvert is approximately 1.5m wide, construction is unlikely to allow an extent of exclusion to be extended within 30m downstream of the culvert. Effect considered to be minor and localised.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities.	No impact. Channel is currently heavily shaded by terrestrial vegetation. No effect anticipated.	No effect anticipated. Culvert will be designed to ensure continuity of hydromorphology. Channel is currently heavily shaded by terrestrial vegetation. No effect anticipated.	No effect anticipated. Culvert will be designed to ensure continuity of hydromorphology. Channel is currently heavily shaded by terrestrial vegetation. No effect anticipated.	Minor redistribution of fish communities may occur during construction	Minor redistribution of fish communities may occur during construction	Receptor insensitive to impact	CIAT measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality within the ditch.	No impact	No impact	Channel is currently heavily shaded by terrestrial vegetation. No effect anticipated.	Upstream water bodies not impacted by scheme	Minor and localised effects.	Minor and localised effects.	
Physico-Chemical status																																
5. Dissolved Oxygen	High	-		N/A	N/A	Some shading with negligible/no effect.	CIAT measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	CIAT measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. CIAT measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor/temporary impacts with negligible effect.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. CIAT measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor/temporary impacts with negligible effect.	N/A	N/A	Some shading with negligible/no effect.	CIAT measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	CIAT measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. CIAT measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor/temporary impacts with negligible effect.	Receptor is insensitive to impact.	There is likely to be a minor impact on temperature. The impact is likely to have a minor/localised effect in terms of dissolved oxygen. Therefore, no change in status is anticipated. ANTICIPATED CHANGED YELLOW TO GREEN.	Receptor is insensitive to impact. No anticipated impact. Therefore no change.	Receptor is insensitive to impact. No anticipated impact. Therefore no change.	CIAT measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	N/A	Some shading with negligible/no effects.	Receptor is insensitive to impact	CIAT measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	Upstream water bodies not impacted by scheme	Upstream water bodies not impacted by scheme	Implementation of CIAT measures (Section 16) and Best Practice Measures will ensure that potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of pollution is not achievable. Therefore, in the worst case, impacts would be temporary, localised and minor.	No additional mitigation required	No additional mitigation required	No significant impacts predicted	
6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact. No anticipated impact. Therefore no change.	Receptor is insensitive to impact. No anticipated impact. Therefore no change.	Receptor is insensitive to impact. No anticipated impact. Therefore no change.	Receptor is insensitive to impact. No anticipated impact. Therefore no change.	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream water bodies not impacted by scheme				
7. Phosphate	Poor	-		N/A	N/A	N/A	Effectively an open span bridge, so there would be no impact.	Effectively an open span bridge, so there would be no impact.	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Effectively an open span bridge, so there would be no impact.	Effectively an open span bridge, so there would be no impact.	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact. No anticipated impact. Therefore no change.	Receptor is insensitive to impact. No anticipated impact. Therefore no change.	Receptor is insensitive to impact. No anticipated impact. Therefore no change.	Receptor is insensitive to impact. No anticipated impact. Therefore no change.	N/A	N/A	N/A	As an open span bridge, so there would be no impact.	CIAT measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	Upstream water bodies not impacted by scheme	Upstream water bodies not impacted by scheme				
8. Ammonia	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact. No anticipated impact. Therefore no change.	Receptor is insensitive to impact. No anticipated impact. Therefore no change.	Receptor is insensitive to impact. No anticipated impact. Therefore no change.	Receptor is insensitive to impact. No anticipated impact. Therefore no change.	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream water bodies not impacted by scheme				
9. Temperature	High	-		N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	There is likely to be a minor impact on temperature. The impact is likely to have a minor/localised effect in terms of dissolved oxygen. Therefore, no change in status is anticipated. ANTICIPATED CHANGED YELLOW TO GREEN.	Receptor is insensitive to impact. No anticipated impact. Therefore no change.	Receptor is insensitive to impact. No anticipated impact. Therefore no change.	Receptor is insensitive to impact. No anticipated impact. Therefore no change.	Receptor is insensitive to impact. No anticipated impact. Therefore no change.	N/A	N/A	N/A	Some shading with negligible/no effects.	Receptor is insensitive to impact	Upstream water bodies not impacted by scheme				
10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	CIAT measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	CIAT measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	Receptor is insensitive to impact	CIAT measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects.	N/A	N/A	N/A	CIAT measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	CIAT measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact. No anticipated impact. Therefore no change.	Receptor is insensitive to impact. No anticipated impact. Therefore no change.	CIAT measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	N/A	CIAT measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	Upstream water bodies not impacted by scheme	Upstream water bodies not impacted by scheme				
Hydromorphological status																																
11. Quantity and dynamics of river flow				N/A	N/A	N/A	• Footings would be close to the watercourse and could cause local turbulence in riparian zone during peak flow events. • This is unlikely to significantly affect hydromorphology.	N/A	N/A	N/A	• Proposed realignment would be short and would replicate sinuosity along the 160m reach immediately upstream of the existing channel. Flow velocities would be altered slightly from small increase morphological diversity. Flow velocities are unlikely to significantly change. • It is difficult to judge how beneficial the diversion would be. The new channel incorporates features such as meanders and berms to aid bank stabilisation to define the new flow path. The diversion is not considered with confidence to have beneficial or detrimental effects.	N/A	N/A	N/A	• Footings would be close to the watercourse and could cause local turbulence in riparian zone during peak flow events. • This is unlikely to significantly affect hydromorphology.	N/A	N/A	N/A	• Channel width (to less than 5m) as there is unlikely to be significant diversity of flow dynamics. Newyears Green Bourne is a minor tributary of the River Colne and has a small catchment area (small proportion of the water body). • Lengthening the channel may reduce flow rates although the significance of this effect is unclear. Overall, it is considered that the impacts on flow rates are minor and localised. However, the effect of lengthening the watercourse still needs to be flagged as a risk.	The extent of new watercourse that would be created, and its possible negative effects if altering existing channel conditions, mean that there would be no significant habitat creation.	• Lengthening the channel may result in increased flow velocities and increased sinuosity. Overall, it is considered that the size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected.	• The diversion would replicate existing channel geometry. Out of character flow depths may decrease flow velocities. Overall, it is considered that the practical terms there would be no significant change.	• Lengthening a channel tends to reduce flow rates. Overall, it is considered that the size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected.	• Although channel capacity would increase, there is likely to be no net change in existing bank, riparian and floodplain structure and connectivity with channel.	N/A	N/A	N/A	• Culvert report that the channel rating approximately 0.2 km to the south and that is no significant diversity of flow dynamics. Newyears Green Bourne is a minor tributary of the River Colne and has a small catchment area (small proportion of the water body). • Culvert installation would be unlikely to significantly affect the flow of the channel. Culvert crossing is a short section of the channel (approx. 15m) and would not significantly affect the flow. • Culvert installation would be unlikely to significantly affect the channel's sinuosity. Culvert crossing is a short section of the channel (approx. 15m) and would not significantly affect the channel's sinuosity.	N/A	N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that the bridge would not significantly affect the flow of the channel. Flow velocities in the bridge would mean that the river would not be significantly affected by the bridge. Overall, there would be no significant hydromorphological impact.	N/A	N/A	N/A	N/A	Upstream water bodies not impacted by scheme	Upstream water bodies not impacted by scheme	• The existing water body is a HMWB and is constrained in a narrow corridor by adjacent railway and A40. • The Channel is sinuous, and the proposed short diversion to ensure there is no bridge piers in the channel appears to replicate sinuosity immediately upstream. • There are considered to be no significant morphological effects.	No additional mitigation required	• Artificial natural recovery • Potentially (at one point only) 160m if any is cleared from the crossing location.	No significant impacts predicted	
12. Connection to Groundwater				N/A	N/A	N/A	• Not significant to hydromorphology	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	• Not significant to hydromorphology	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Upstream water bodies not impacted by scheme	Upstream water bodies not impacted by scheme	• Viaduct not significant to hydromorphology				
13. River continuity				N/A	N/A	N/A	• Viaduct piers could interrupt riparian zone continuity, but not considered to be a significant risk	N/A	N/A	N/A	• Proposed realignment would be short and would replicate sinuosity in 160m reach immediately upstream. • No significant impacts anticipated	N/A	N/A	N/A	• Viaduct piers could interrupt riparian zone continuity, but not considered to be a significant risk	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Upstream water bodies not impacted by scheme	Upstream water bodies not impacted by scheme					
14. River depth and width variation bed				N/A	N/A	N/A	• Channel width and depth appears to be diverse, and the viaduct would have no significant effect.	N/A	N/A	N/A	• Channel width and depth appears to be diverse, and the viaduct would have no significant effect.	N/A	N/A	N/A	• Channel width and depth appears to be diverse, and the viaduct would have no significant effect.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Upstream water bodies not impacted by scheme	Upstream water bodies not impacted by scheme					
15. Structure and substrate of river bed				N/A	N/A	N/A	• Bed forms are unlikely to be significantly affected by the viaduct	N/A	N/A	N/A	• Some diversity of bed forms can be observed from aerial imagery, and replicating the upstream channel form is likely to sustain this.	N/A	N/A	N/A	• Bed forms are unlikely to be significantly affected by the viaduct	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Upstream water bodies not impacted by scheme	Upstream water bodies not impacted by scheme					
16. Structure of riparian zone				N/A	N/A	N/A	• Footings in the riparian zones would cause some loss and obstruction in riparian zone, but relative to the area of open space this would probably be insignificant.	N/A	N/A	N/A	• No net change to existing bank, riparian and floodplain structure and connectivity with channel	N/A	N/A	N/A	• Footings in the riparian zones would cause some loss and obstruction in riparian zone, but relative to the area of open space this would probably be insignificant.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Upstream water bodies not impacted by scheme	Upstream water bodies not impacted by scheme					

B. Risk screening of potential to prevent future attainment of good Ecological status

DEMP measures to achieve Environmental Objectives (as outlined in or implemented)	Effects DEMP measures will impact	When DEMP measures will happen	Potential changes to status (mainly geomorphic, chemical, biological, water quality, water quantity, and / or flow)																													
Reduce sediment resuspension	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Construction of the viaduct footing adjacent to the R Colne, and diversion of the channel and Newyears Green Bourne, will result in some temporary, yet much resuspension. Construction of the culvert on the unnamed tributary will result in temporary increase in sediment and turbidity in the watercourse downstream. Harvesting of the R Colne may result in additional erosion, although this is considered to be minor for hydromorphological sub-elements. Overall, effect on hydromorphological status is considered to be minor, albeit during the construction stage of the project.
Bank rehabilitation / reprofiling	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	The construction of viaduct footings close to the bank edge on the R Colne will result in some rehabilitation in this section. Overall, this is a short stretch of bank and is not expected to prevent the overall water body from achieving GEP.
Flood bunds (earth banks, in place of flood walls)	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect
Set back embankments	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	The construction of viaduct footings close to the bank edge on the R Colne will result in some rehabilitation in this section. Overall, this is a short stretch of bank and is not expected to prevent the overall water body from achieving GEP.
Avoid the need to dredge (e.g. remove under bed clearance, and fixed mud navigation flow channels) (Water Framework Directive)	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect
Reduce impact of dredging	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect
Alter timing of dredging / disposal	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect
Alter method of dredging / disposal	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect
Sediment management	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Minor surveying of the R Colne will increase flow velocities and may lead to sediments to be dislodged.
Site selection (dredged material disposal) (e.g. avoid sensitive sites)	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect
Physical de-watering and other techniques	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect
Selective vegetation control regime	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect
Appropriate vegetation control regime	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect
Appropriate tuning (vegetation control)	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect
Appropriate techniques (invasive species)	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	The invasive macrophyte species Nagarwal (Azolla filiculoides) is widespread throughout the reach. Disturbance to the bed and banks of the R Colne may result in the spread of this species, as widespread throughout the R Colne system. Increased flow velocities as a result of narrowing the river through the viaduct may help reduce the distribution of Azolla.
Awareness raising / information events (boat week / courses of free boating)	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect
Storage (Emergency)	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect
Prepare a dredging / disposal plan	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect
Facility visual design	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect
Facility landscape design	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect
Reserve areas where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	-	Not In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	The river diversions on the R Colne and Newyears Green Brook will offer the opportunity for new habitat creation within the channel and riparian zone.
Removal of hard bank reinforcement / revetment, or replacement with engineering solution	-	Not In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Placement of R Colne viaduct footing will prevent removal of hard bank reinforcement in this location, but river diversion will offer opportunity for the removal of hard bank reinforcement. Overall, this is a short section of bank and is not expected to prevent the overall water body from achieving GEP.
Preserve and, where possible, restore historic aquatic habitats	-	Not In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Placement of viaduct footing will prevent restoration of historic bank (but one channel) habitats in this location. Overall, this is a short section of bank and is not expected to prevent the overall water body from achieving GEP.
Re-opening existing culverts	-	Not In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Culvert installation will prevent restoration of historic bank (but one channel) habitats in this location. Overall, this is a short section of bank and is not expected to prevent the overall water body from achieving GEP.
Alteration of channel bed (within channel)	-	Not In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	The diversion of the R Colne and Newyears Green Brook will offer the opportunity for new habitat creation within the channel and riparian zone. Flat natural substrate can be incorporated within the channel, and the channel can be designed with a natural bed shape and flow conditions. Given these design measures and the small section of a tributary watercourse that will be affected, the overall effect is considered to be minor.
Alteration or other mechanisms in place and managed to enable fish to pass through the site and downstream of the impounding structure	-	Not In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect
Mechanical and structural changes to locks, sluices, weirs, beach groynes	-	Not In Place	

WFD Baseline Survey Details

Water Body ID		GB106039023090				
Surface Water Body Name		Colne and GUC (from confluence with Chess to Ash)				
Scheme Element		**Colne Valley Viaduct and River Diversion - River Colne**	**Colne Valley Viaduct and River Diversion - New Years Green Bourne**	**Culvert - tributaries**	**OVERALL EFFECT**	**RESIDUAL EFFECT**
Surface Water Crossing ID		**CFA7-SWC3**	**CFA7-SWC2**	**CFA7-SWC4**		
Survey Site		Colne at South Harefield	New Years Green Bourne at South Harefield	Colne at South Harefield - side channel		
Survey ID		WFD-PA1-0001a, WFD-MP1-0001, WFD-MI1-0001, WFD-EF1-0001	WFD-PA1-0002	WFD-PA1-0001b		
Objectives of the Survey		• Assess ecological habitat type. • Assess the local hydromorphology. • Update baseline for Macroinvertebrates • Update baseline for Macrophytes • Update baseline for Fish	• Assess ecological habitat type. • Assess the local hydromorphology.	• Assess ecological habitat type. • Assess the local hydromorphology.		
Survey Scope		Ecological Walkover Survey Hydromorphological Survey Macrophyte Survey Macroinvertebrate Survey Fish Survey	Ecological Walkover Survey Hydromorphological Survey	Ecological Walkover Survey Hydromorphological Survey		
Medium Term Survey Results Summary	**Bio**	The River Colne is a wide and flowing river at WFD-PA1-0001a, however constrained by historical management and gravel pitslakes. It supports good habitat diversity and is considered suitable for limnophilic fish, macrophytes and macro-invertebrates. At WFD-MP1-0001 diverse macrophyte community (18 species recorded) with mostly common species, except *Callitriche hamatula* and *Callitriche obtusangula* . Presence of invasive non native *Hydrocotyle ranunculoides* with the potential of reducing macrophyte diversity in medium / long term. Good macroinvertebrate quality (RICT Class Good) recorded at WFD-MI1-0001, with high biotic scores and presence of several pollution sensitive taxa (Ephemeridae, Leptoceridae, Lepidostomatidae, Glossossomatidae). Relatively high LIFE score, indicative of communities adapted to relatively fast flows. PSI score indicative of Moderate sedimentation. Four fish species recorded at WFD-EF1-0001(pike, roach, perch, gudgeon) and minor fish species (minnow, bullhead, three-spines stickleback, sotneloach) in moderate abundances. No salmonid species recorded.	New Years Green Bourne is an historically realigned drainage ditch. It is highly sedimented and heavily shaded at WFD-PA1-0002. Assessed as to be of poor potential for macroinvertebrates and macrophytes, and not suitable for fish. Invasive Himalayan balsam was recorded.	No channel was observed at the time of the survey (NGR TQ 03583 89758). The watercourse was observed at four locations along the suggested route and no watercourse was present.		
	Phys	At survey point WFD-PA1-0001a, the Main River was lightly shaded (<30%) and was observed to have a medium flow and moderate turbidity. Physico-chemical parameters measured at survey point WFD-EF1-0001: Dissolved Oxygen = 10.9 mg/l pH = 7.3 Temp = 16.9 °C Conductivity = 751 uS	At survey point WFD-PA1-0002 a heavily shaded watercourse (>70%) of low flow and with moderate turbidity was observed.			
	Hydro	The channel planform is constrained by the adjacent lakes/nature reserve (historic gravel extraction works) affecting the overall quantity and dynamics of flow and morphology. However, large woody debris creates some flow diversity and the river does possess complex and continuous riparian/marginal vegetation.	The quantity and dynamics of flow and morphology appear to be significantly altered by historic land drainage activities, as well as existing structures. The structure and substrate of the river bed was poor, and the structure of the riparian zone was uniform, overgrown and provided little habitat variation.			

Audit Trail for the Update of the WFD Water Body Assessment with Baseline Data

		Nature of the Assessment Update and Justification				
	WFD Classification Elements Changed	**Colne Valley Viaduct and River Diversion - River Colne**	**New Years Green Bourne Diversion**	**Culvert - tributaries**	**OVERALL IMPACT**	**RESIDUAL EFFECT**
Biological	**2. Macrophytes and phytobenthos - macrophytes**	Although macrophyte community is diverse, effect from viaduct is likely to be minor and localised. Assessment not updated and remains yellow. Some errors and inconsistencies between hydromorph and biological assessments removed and text/colours changed.	No change in the baseline, except records of Himalayan balsam. No change in the assessment.	No watercourse present. This Scheme Element will not be considered further in the assessment update.	No change in overall impact.	No change in residual effect.
	3. Macroinvertebrates	No significant change in baseline and therefore no change in assessment. Some errors and inconsistencies between hydromorph and biological assessments removed and text/colours changed.	No change in the assessment for impacts from viaduct. "Landtake" element of the river diversion was downgraded from Yellow to Green, as baseline suggests New Years Green Bourne as of poor potential for macroinvertebrates.		AMBER TO YELLOW - Temporary adverse effects on the River Colne due to river diversion would be balanced through beneficial effects of habitat creation measures.	AMBER TO YELLOW - Temporary adverse effects on the River Colne due to river diversion would be balanced through beneficial effects of habitat creation measures.
	4. Fish	No significant change in baseline and therefore no change in assessment. Some errors and inconsistencies between hydromorph and biological assessments removed and text/colours changed.	No change in the assessment for impacts from viaduct. "Landtake" element of the river diversion was downgraded from Yellow to Green, as baseline suggests New Years Green Bourne is unsuitable for fish.		No change in overall impact.	No change in residual effect.
Physico-Chemical	**5. Dissolved Oxygen**	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No watercourse present. This Scheme Element will not be considered further in the assessment update.	No change in overall impact.	No change in residual effect.
	6. pH	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.		No change in overall impact.	No change in residual effect.
	7. Phosphate	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.		No change in overall impact.	No change in residual effect.
	8. Ammonia	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.		No change in overall impact.	No change in residual effect.
	9. Temperature	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.		No change in overall impact.	No change in residual effect.
	10. Specific Pollutants (Annex VIII)	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.		No change in overall impact.	No change in residual effect.
Hydromorphological	**11. Quantity and dynamics of river flow**	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No watercourse present. This Scheme Element will not be considered further in the assessment update.	No change in overall impact.	No change in residual effect.
	12. Connection to Groundwater	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.		No change in overall impact.	No change in residual effect.
	13. River continuity	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.		No change in overall impact.	No change in residual effect.
	14. River depth and width variation bed	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.		No change in overall impact.	No change in residual effect.
	15. Structure and substrate of river bed	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.		No change in overall impact.	No change in residual effect.
	16. Structure of riparian zone	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.		No change in overall impact.	No change in residual effect.

Water Body ID	GB106039023090
Surface Water Body Name	River Colne & GUC
CFAs covered by Waterbody	7

CFA	7
AP2 ID	AP2-007-003
AP2 Name	Rerouting construction access to avoid Buckinghamshire Golf Club
AP2 Location	Colne Valley
New/Replacement Scheme Element	NEW
Scheme Element Type	Bridge
Original Scheme	Original scheme provides a temporary access/utilities construction zone along Denham Court Drive, past the Bucks Golf Course club house, along the west bank of the River Colne and across the River Colne via a temporary bridge to the location of the National Grid overhead cable diversion works on the east side of the River Colne. In AP1 the scheme was revised to use the existing access to the golf club car park to access the land required for the powerline diversion.
AP2 Description	Revised scheme - Re-routing of the temporary access in order to avoid disruption to the Bucks Golf Course club house. The new temporary access leaves Denham Court Drive via an existing car park, crosses a minor water course, crosses the River Colne via a temporary or permanent (to be determined) bridge, and runs around the boundary of the driving range to reach the location of the National Grid overhead cable diversion works.
AP2 Changes to Previously Assessed Elements	None
AP2 Additional Elements Assessment Requirement	New Access Road realignment resulting in a Bridge

GB106039023090 APZ Assessment

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements
GB106039023090			
Description of scheme element (impact)			
Colne and GLIC (from confluence with Chess to Ash)	Poor	Good Ecological Potential by 2027	
Identified biological impacts	N/A	N/A	

Colne Valley Viaduct CFA7-SWC3 - River Colne crossing						
Approximately 3-4km long viaduct of up to 15.5m high with piers close to banks edge. Minor narrowing of channel where viaduct crosses river.						
Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage		
N/A	N/A	N/A	N/A	N/A	WFD Quality elements	1. Macrophytes and phytobenthos - Rivers
Receptor is insensitive to impact	Viaduct footings will be close to river bank, and may result in the permanent loss of macrophytes in the section beneath the viaduct. The River Colne supports a diverse macrophyte community, with the notable Callitriche hamulata and Callitriche obtusangula. Effect considered to be minor and localised.	Viaduct will be 15.5m above water body. There may be minor changes in the cover and composition of macrophyte communities beneath the viaduct. This is considered to be greater than a minor localised change.	No effects anticipated.	No impact. Runoff will be collected by drainage to balancing pond.		2. Macrophytes and phytobenthos - macrophytes
Receptor is insensitive to impact	Viaduct footings will be close to river bank, and will result in the loss of marginal or channel habitats which may be important for macroinvertebrates. The River Colne was assessed as to be of good macroinvertebrate quality. Potential minor and localised effect.	Macroinvertebrate community beneath viaducts may be slightly affected due to shading effects on macrophyte communities, but this is considered to be localised and minor.	No effects anticipated.	No impact. Runoff will be collected by drainage to balancing pond.		3. Macroinvertebrates
Noise and vibration may cause minor, localised disturbance to fish. Any resuspension of sediment could affect gravel habitats, though RHS suggests there are no significant areas of gravel. Effects are thus considered to be minor.	Viaduct footings will be close to river bank, and will result in the loss of marginal or channel habitats, which may be important for fish. Effect considered to be minor and localised.	Fish foraging habitat beneath the viaducts may be reduced due to shading effects on macrophyte and macroinvertebrate communities. This is considered to be localised and minor.	No effects anticipated.	No impact. Runoff will be collected by drainage to balancing pond.		4. Fish
Physico-Chemical status						
N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	WFD Quality elements	5. Dissolved Oxygen
N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact		6. pH
N/A	N/A	N/A	effectively an open span bridge, so there would be no impact.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.		7. Phosphate
N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact		8. Ammonia
N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact		9. Temperature
N/A	N/A	N/A	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.		10. Specific Pollutants (Annex VIII)
Hydromorphological status						
N/A	N/A	N/A	• Footings would be close to the watercourse and could cause local turbulence in riparian zones during peak flow events. • This is unlikely to significantly affect hydromorphology.	N/A	WFD Quality elements	11. Quantity and dynamics of river flow
N/A	N/A	N/A	• Not significant to hydromorphology	N/A		12. Connection to Groundwater
N/A	N/A	N/A	• Viaduct piers could interrupt riparian zone continuity, but not considered to be a significant risk	N/A		13. River continuity
N/A	N/A	N/A	• Channel width and depth appears to be diverse, and the viaduct would have no significant effect	N/A		14. River depth and width variation - bed
N/A	N/A	N/A	• Bed forms are unlikely to be significantly affected by the viaduct	N/A		15. Structure and substrate of river bed
N/A	N/A	N/A	• Footings in the riparian zones would cause some loss of and obstruction in riparian zone, but relative to the area of open space this would probably be insignificant	N/A		16. Structure of riparian zone

River Diversion of River Colne					
Diversion of approximately 160m to the River Colne to avoid a viaduct pier being located in the river.					
Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage		
N/A	N/A	N/A	N/A	N/A	WFD Quality elements
There will be loss of marginal and channel macrophytes over the 160m length of the existing R Colne that lies within the new River Colne channel. The River Colne supports a diverse macrophyte community, with the notable Callitriche hamulata and Callitriche obtusangula. It is anticipated that the macrophyte community will re-establish within 1 to 3 years of completion of the new diversion. Effect is considered to be minor.	• The new channel will incorporate marginal berms to encourage emergent macrophyte species and the channel will be left to naturally develop macrophyte communities in subsequent years. In addition, design measures should be put in place in order to limit extent / clear site from invasive Rhododendron ponticum. The effect on this quality element is considered to be minor positive.	Diversion would reflect or improve upon the existing sinuosity of the channel. No negative or positive impacts anticipated on hydromorphological quality elements and therefore no effects on macrophyte communities.	2. Macrophytes and phytobenthos - macrophytes
There will be a loss of the macroinvertebrate community within the existing R Colne channel, although the new channel will have established prior to filling the existing. The existing community includes an assemblage characteristic aligned water body. The new channel will incorporate berms to encourage localised and temporary adverse effect while the new channel re-establishes.	The River diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrates seen that currently characterise the reach.	No hydromorphological effects anticipated and therefore no effect on macroinvertebrate communities.	3. Macroinvertebrates
There will be loss of fish habitats within the existing R Colne channel, including marginal habitats such as gravel, pools, pools, reach, gudgeon, minnow, whitebait, bullhead. The range of habitats incorporated into the diverted channel will balance this temporary loss of habitat in fish communities. Adverse effect likely to be localised and temporary.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities.	No hydromorphological effects anticipated and therefore no effect on fish community.	4. Fish
Physico-Chemical status					
N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary rise in dissolved oxygen. CoCP measures (Section 10) implemented during construction will ensure potential impacts to water quality are reduced to minor/temporary impacts with negligible effect.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary rise in dissolved oxygen. CoCP measures (Section 10) implemented during construction will ensure potential impacts to water quality are reduced to minor/temporary impacts with negligible effect.	5. Dissolved Oxygen
N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	6. pH
N/A	Receptor is insensitive to impact	• Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. CoCP measures (Section 10) implemented during construction will ensure potential impacts to water quality are reduced to minor/temporary impacts with negligible effect.	7. Phosphate
N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	8. Ammonia
N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	9. Temperature
N/A	Receptor is insensitive to impact	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	10. Specific Pollutants (Annex VIII)
Hydromorphological status					
N/A	N/A	• Proposed realignment would be short and would replicate sinuosity along the 500m reach immediately upstream. Channel would be constructed with berms to encourage straight form would increase morphological diversity. • No detrimental impacts anticipated • It is unlikely that the new channel form would be lost on the balance of increased sinuosity against the likely need for bank stabilisation to define the new flow path, the diversion is not considered with confidence to have beneficial or detrimental effects	11. Quantity and dynamics of river flow
N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	12. Connection to Groundwater
N/A	N/A	• Proposed realignment would be short and would replicate sinuosity along the 500m reach immediately upstream. • No significant impacts anticipated	13. River continuity
N/A	N/A	• Channel width and depth appears to be diverse, and a minor diversion is likely to improve morphological diversity or have no significant effect on the existing. • Some localised scour of the bed and banks is likely, although this would promote morphological diversity rather than causing adverse effects. Bank protection may be necessary to protect near channel assets, which could instigate further loss of bank habitat and offset to the equilibrium of the sediment regime • On balance, the effects cannot be classified as detrimental or beneficial	14. River depth and width variation - bed
N/A	N/A	• Some diversity of bed forms can be observed from aerial imagery, and realigning the upstream channel form is likely to sustain this	15. Structure and substrate of river bed
N/A	N/A	• No net change to existing bank, riparian and floodplain structure and connectivity with channel	16. Structure of riparian zone

ACCESS BRIDGE - River Colne AP2-007-003					
New access route to avoid Bucks Golf Course. New access leaves Denham Court Drive via existing car park crossing a minor watercourse and River Colne via a temporary or permanent (to be determined) bridge					
Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	
N/A	N/A	N/A	N/A	N/A	WFD Quality elements
Receptor is insensitive to impact	Viaduct footings in the watercourse will result in the loss of marginal or channel habitats which may be important for macroinvertebrates. The River Colne supports a diverse macrophyte community, with the notable Callitriche hamulata and Callitriche obtusangula. Effect considered to be minor and localised.	Viaduct shading may lead to very localised loss of macrophyte and macroinvertebrate communities. The River Colne supports a diverse macrophyte community, with the notable Callitriche hamulata and Callitriche obtusangula. Effect considered to be minor and localised.	Potential detrimental effect on hydromorphology, with footings in the watercourse likely to narrow channel, increase flows and reduce habitat continuity. The River Colne supports a diverse macrophyte community, with the notable Callitriche hamulata and Callitriche obtusangula. Effect considered to be minor and localised.	Potential localised and temporary adverse effect on dissolved oxygen levels and other contaminants. The River Colne supports a diverse macrophyte community, with the notable Callitriche hamulata and Callitriche obtusangula. Effect considered to be minor and localised.	2. Macrophytes and phytobenthos - macrophytes
Receptor is insensitive to impact	"Viaduct footings in the watercourse will result in the loss of marginal or channel habitats which may be important for macroinvertebrates. The River Colne was assessed as to be of good macroinvertebrate quality. Potential minor and localised effect.	No detectable effects anticipated due to the the very localised extent of loss of macrophytes from shading.	Potential detrimental effect on hydromorphology, with footings in the watercourse likely to narrow channel, increase flows and reduce habitat continuity. The River Colne was assessed as to be of good macroinvertebrate quality. Potential minor and localised effect.	Potential localised and temporary adverse effect on dissolved oxygen levels and other contaminants. The River Colne was assessed as to be of good macroinvertebrate quality, with community adapted to fast flows. Potential minor and localised effect.	3. Macroinvertebrates
Noise and vibration may cause minor, localised disturbance to fish. In addition, River Colne of moderate fish quality, with only four species recorded. Potential adverse effects considered to be minor and localised.	Viaduct footings in the watercourse will result result in the loss of marginal or channel habitats which may be important for fish. In addition, River Colne of moderate fish quality, with only four species recorded. Potential adverse effect considered to be minor and localised.	No detectable effects anticipated due to the the very localised extent of loss of macrophytes from shading.	Potential detrimental effect on hydromorphology, with footings in the watercourse likely to narrow channel, increase flows and reduce habitat continuity. In addition, River Colne is of moderate fish quality, with only four species recorded. Potential adverse effect considered to be minor and localised.	Potential localised and temporary adverse effect on dissolved oxygen levels and other contaminants. The River Colne is of moderate fish quality, with only four species recorded. Potential adverse effect considered to be minor and localised.	4. Fish
Physico-Chemical status					
N/A	N/A	• The construction of the proposed AP2 bridge is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	• The construction of the proposed AP2 bridge is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	5. Dissolved Oxygen
N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	6. pH
N/A	N/A	N/A	• The proposed AP2 bridge crossing is effectively an open span bridge, so there would be no impact on this sub-element, and therefore no change in status from the previous assessment is anticipated.	• The construction of the proposed AP2 bridge is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	7. Phosphate
N/A	N/A	• The additional width of the proposed AP2 bridge will marginally increase the amount of shaded watercourse. Despite this, it is predicted to result in no more than a temporary, minor impact on this sub-element. This impact is likely to have a minor, local effect in relation to the overall water body. Therefore, no change in status from the previous assessment is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	8. Ammonia
N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	9. Temperature
N/A	N/A	N/A	• The construction of the proposed AP2 bridge is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	• The construction of the proposed AP2 bridge is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	10. Specific Pollutants (Annex VIII)
Hydromorphological status					
N/A	N/A	N/A	• Footings in the watercourse would narrow the channel and could cause local turbulence in riparian zones during peak flow events. • Floodplain cover of peat flows could create dead zones or low flows. • Minor structure impacts on channel would promote, some hydraulic habitat diversity. • Overall, flow constraints would be detrimental to hydromorphology	N/A	WFD Quality elements	11. Quantity and dynamics of river flow
N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A		12. Connection to Groundwater
N/A	N/A	N/A	• Footings in the watercourse would decrease natural continuity as the presence of physical obstacles and locally increased flow velocity would occur. • Local increases in flow velocity and turbulence would reduce continuity and may be inhibitive to species passage	N/A		13. River continuity
N/A	N/A	N/A	• Some localised scour of the bed and banks is likely, although this would promote morphological diversity rather than causing adverse effects. Bank protection may be necessary to protect near channel assets, which could necessitate further loss of natural bank habitat and offset the equilibrium of the sediment regime • Bank protection may be necessary to protect near channel assets, which could trigger further loss of bank habitat and offset to the equilibrium of the sediment regime • On balance, the effects cannot be classified as detrimental or beneficial	N/A		14. River depth and width variation - bed
N/A	N/A	N/A	• Some localised scour of the bed and banks is likely, although this would promote morphological diversity rather than causing adverse effects. Bank protection may be necessary to protect near channel assets, which could necessitate further loss of natural bank habitat and offset the equilibrium of the sediment regime • Bank protection may be necessary to protect near channel assets, which could trigger further loss of bank habitat and offset to the equilibrium of the sediment regime • On balance, the effects cannot be classified as detrimental or beneficial	N/A		15. Structure and substrate of river bed
N/A	N/A	N/A	• Footings in the riparian zones would cause some loss of and obstruction in riparian zone, but relative to the area of open space this would probably be insignificant	N/A		16. Structure of riparian zone

Colne Valley Viaduct CFA7-SWC3 - Newyears Green Bourne crossing					
Approximately 3-4km long viaduct of up to 15.5m high with piers close to banks edge crossing Newyears Green Bourne, a tributary of the River Colne.					
Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	
N/A	N/A	N/A	N/A	N/A	WFD Quality elements
Receptor insensitive to impact	Heavily shaded drainage ditch, with no macrophytes. No effect anticipated.	Channel is currently heavily shaded by terrestrial vegetation. No effect anticipated.	Heavily shaded drainage ditch, with no macrophytes. No effect anticipated.	Heavily shaded drainage ditch, with no macrophytes. No effect anticipated.	2. Macrophytes and phytobenthos - macrophytes
Receptor insensitive to impact	Bridge footings will not be located in the diverted channel. New Years Green Bourne assessed as of poor macroinvertebrate quality. Effect likely to be neutral.	Channel is currently heavily shaded by terrestrial vegetation. No effect anticipated.	Existing flow regime likely to be highly variable and strongly influenced by rainfall events. No changes anticipated as viaduct footings are outside channel.	CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality within the ditch.	3. Macroinvertebrates
New Years Green Bourne is a heavily shaded and sedimented realigned drainage ditch, considered as being unsuitable for fish. No effect anticipated.	No effect anticipated as piers will not be located within the channel and watercourse assessed to be unsuitable for fish.	Channel is currently heavily shaded by terrestrial vegetation. No effect anticipated.	Existing flow regime likely to be highly variable and strongly influenced by rainfall events. No changes anticipated as viaduct footings are outside channel.	CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality within the ditch.	4. Fish
Physico-Chemical status					
N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	5. Dissolved Oxygen
N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	6. pH
N/A	N/A	N/A	Effectively an open span bridge, so there would be no impact.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	7. Phosphate
N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	8. Ammonia
N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	9. Temperature
N/A	N/A	N/A	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	10. Specific Pollutants (Annex VIII)
Hydromorphological status					
N/A	N/A	N/A	• Footings would be close to the watercourse and could cause local turbulence in riparian zones during peak flow events. • This is unlikely to significantly affect hydromorphology	N/A	WFD Quality elements	11. Quantity and dynamics of river flow
N/A	N/A	N/A	• Not significant to hydromorphology	N/A		12. Connection to Groundwater
N/A	N/A	N/A	• Viaduct piers could interrupt riparian zone continuity, but not considered to be a significant risk	N/A		13. River continuity
N/A	N/A	N/A	• Channel width and depth appears to be diverse and the viaduct would have no significant effect	N/A		14. River depth and width variation - bed
N/A	N/A	N/A	• Bed forms are unlikely to be significantly affected by the viaduct	N/A		15. Structure and substrate of river bed
N/A	N/A	N/A	• Footings in the riparian zone would cause some loss and obstruction in riparian zone, but relative to the area of open space this would probably be insignificant	N/A		16. Structure of riparian zone

River Diversion - Newyears Green Bourne					
Road Crossing (CFA7-SWC 9) will incorporate two meandering berms (approximately 15m either side of existing channel)					
Landtake	Habitat creation	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage		
N/A	N/A	N/A	N/A	N/A	WFD Quality elements
Loss of existing watercourse is considered to neutral for macrophytes since they are unlikely to be present.	The diversion will incorporate features such as meanders and marginal berms, and will be laid out to allow, offering increased opportunities for macrophyte colonisation. In addition, design measures should be put in place in order to limit extent / clear site from invasive Himalayan balsam.	Mitigation flood storage will be provided at the edge of the floodplain to ensure that there is no risk of flooding that downstream flows within the Bourne are not changed significantly from the existing watercourse. Hydromorphological impacts are not predicted to have effects on macrophytes.	2. Macrophytes and phytobenthos - macrophytes
New Years Green Bourne assessed as of poor quality for macroinvertebrates. Effect likely to be minor and localised.	The river diversion will offer a greater diversity of macroinvertebrate habitats than the existing channel.	Hydromorphological impacts are not predicted to have effects on macroinvertebrates	3. Macroinvertebrates
New Years Green Bourne is a heavily shaded and sedimented realigned drainage ditch, considered as being unsuitable for fish. No effect anticipated.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities.	Hydromorphological impacts are not predicted to have effects on fish.	4. Fish
Physico-Chemical status					
N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary rise in dissolved oxygen. CoCP measures (Section 10) implemented during construction will ensure potential impacts to water quality are reduced to minor/temporary impacts with negligible effect.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary rise in dissolved oxygen. CoCP measures (Section 10) implemented during construction will ensure potential impacts to water quality are reduced to minor/temporary impacts with negligible effect.	5. Dissolved Oxygen
N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	6. pH
N/A	Receptor is insensitive to impact	• Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. CoCP measures (Section 10) implemented during construction will ensure potential impacts to water quality are reduced to minor/temporary impacts with negligible effect.	7. Phosphate
N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	8. Ammonia
N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	9. Temperature
N/A	Receptor is insensitive to impact	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	10. Specific Pollutants (Annex VIII)
Hydromorphological status					
N/A	• The extent of new watercourse that would be created, and the possible negative effects of altering existing channel conditions, mean that there would be no significant habitat creation	• Channel width is less than 1m, so there is unlikely to be significant diversity in flow dynamics. • Newyears Green Bourne is a minor tributary of the River Colne, and in practical terms representing small proportion of the water body. • Lengthening the channel may result in increased channel storage and reduced floodplain connectivity, but the size of the watercourse and the extent of the diversion that continuity is unlikely to be significantly affected	11. Quantity and dynamics of river flow
N/A		No watercourse present, therefore no impact	12. Connection to Groundwater
N/A		• Lengthening the channel may result in increased channel storage and reduced floodplain connectivity, but the size of the watercourse and the extent of the diversion that continuity is unlikely to be significantly affected	13. River continuity
N/A		• The diversion would replicate existing channel characteristics. Use of separate flow shallow riffle is deemed as a result of lengthening the channel, but in practical terms flow would be no significant change	14. River depth and width variation - bed
N/A		• Lengthening a channel tends to reduce flow rates and increase sediment deposition. However, in this case the size of the watercourse there would probably be no measurable impact	15. Structure and substrate of river bed
N/A		• Although channel capacity would increase, there is likely to be no net change to existing bank, riparian and floodplain structure and connectivity with channel	16. Structure of riparian zone

Culvert - Tributaries						
Culvert on tributary of the River Colne near Wraybeards Cottage						
Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage		
N/A	N/A	N/A	N/A	N/A	WFD Quality elements	1. Macrophytes and phytobenthos - Rivers
No watercourse is actually present at crossing. No impact anticipated.	No watercourse is actually present at crossing. No impact anticipated.	No watercourse is actually present at crossing. No impact anticipated.	No watercourse is actually present at crossing. No impact anticipated.	No watercourse is actually present at crossing. No impact anticipated.		2. Macrophytes and phytobenthos - macrophytes
No watercourse is actually present at crossing. No impact anticipated.	No watercourse is actually present at crossing. No impact anticipated.	No watercourse is actually present at crossing. No impact anticipated.	No watercourse is actually present at crossing. No impact anticipated.	No watercourse is actually present at crossing. No impact anticipated.		3. Macroinvertebrates
No watercourse is actually present at crossing. No impact anticipated.	No watercourse is actually present at crossing. No impact anticipated.	No watercourse is actually present at crossing. No impact anticipated.	No watercourse is actually present at crossing. No impact anticipated.	No watercourse is actually present at crossing. No impact anticipated.		4. Fish
Physico-Chemical status						
N/A	N/A	N/A	No watercourse present, therefore no impact.	No watercourse present, therefore no impact.	WFD Quality elements	5. Dissolved Oxygen
N/A	N/A	N/A	No watercourse present, therefore no impact.	No watercourse present, therefore no impact.		6. pH
N/A	N/A	No watercourse present, therefore no impact.	No watercourse present, therefore no impact.	No watercourse present, therefore no impact.		7. Phosphate
N/A	N/A	No watercourse present, therefore no impact.	No watercourse present, therefore no impact.	No watercourse present, therefore no impact.		8. Ammonia
N/A	N/A	No watercourse present, therefore no impact. (To DS&D)	No watercourse present, therefore no impact.	No watercourse present, therefore no impact.		9. Temperature
N/A	N/A	No watercourse present, therefore no impact.	No watercourse present, therefore no impact.	No watercourse present, therefore no impact.		10. Specific Pollutants (Annex VIII)
Hydromorphological status						
N/A	N/A	N/A	No watercourse present, therefore no impact	N/A	WFD Quality elements	11. Quantity and dynamics of river flow
N/A	N/A	N/A	No watercourse present, therefore no impact	N/A		12. Connection to Groundwater
N/A	N/A	N/A	No watercourse present, therefore no impact	N/A		13. River continuity
N/A	N/A	N/A	No watercourse present, therefore no impact	N/A		14. River depth and width variation - bed
N/A	N/A	N/A	No watercourse present, therefore no impact	N/A		15. Structure and substrate of river bed
N/A	N/A	N/A	No watercourse present, therefore no impact	N/A		16. Structure of riparian zone

Culvert - Tributaries						
Approximately 3-4km long viaduct of up to 15.5m high with pi						
Noise and vibration	Landtake					
N/A	N/A				WFD Quality elements	1. Macrophytes and phytobenthos - Rivers
Receptor insensitive to impact	Viaduct footings will be close to canal bank edge and therefore temporary, minor loss of marginal vegetation may occur during construction.					2. Macrophytes and phytobenthos - macrophytes
No macroinvertebrate data available. Temporary loss of marginal macrophyte cover may have minor, localised impact on macroinvertebrate community.						3. Macroinvertebrates
Minor redistribution of fish communities may occur during construction						4. Fish
Physico-Chemical status						
N/A	N/A				WFD Quality elements	5. Dissolved Oxygen
N/A	N/A					6. pH
N/A	N/A					7. Phosphate
N/A	N/A					8. Ammonia
N/A	N/A					9. Temperature
N/A	N/A					10. Specific Pollutants (Annex VIII)
Hydromorphological status						
N/A	N/A				WFD Quality elements	11. Quantity and dynamics of river flow
N/A	N/A					12. Connection to Groundwater
N/A	N/A					13. River continuity
N/A	N/A					14. River depth and width variation - bed
N/A	N/A					15. Structure and substrate of river bed
N/A	N/A					16. Structure of riparian zone

B. Risk screening of potential to prevent future attainment of good Ecological status

WRAP measures to achieve Good Ecological Potential (if confirmed as implemented)	Where WRAP measure will happen	When WRAP measure will happen	
Reduce sediment resuspension	-	In place	Preferred change to status elements (green = core, amber = possible, red = false)
Bank rehabilitation / reprofiling	-	In place	
Fund levels (earth banks, in place of floodwalls)	-	In place	
Set back embankments	-	In place	
Avoid the need to dredge (e.g. minimise undersheet clearance; use of low-tech methods for bank rehabilitation or control works)	-	In place	
Reduce impact of dredging	-	In place	
Alter timing of dredging / disposal	-	In place	
Sediment management	-	In place	
Site selection (dredged material disposal) (e.g. avoid sensitive sites)	-	In place	
Phased de-watering and other techniques	-	In place	
Selective vegetation control regime	-	In place	
Appropriate vegetation control technique	-	In place	
Appropriate timing (vegetation control)	-	In place	
Appropriate techniques (invasive species)	-	In place	
Awareness raising / information boards (boat wash / sources of litter addressed)	-	In place	
Improve litter collection	-	In place	
Prepare a dredging / disposal strategy	-	In place	
Control of illegal drugs	-	In place	
Asset Management	-	In place	
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and floodplain	-	Not In Place	
Removal of hard bank reinforcement / treatment, or replacement with soft engineering or natural	-	Not In Place	
Protection and, where possible, restore historic aquatic habitats	-	Not In Place	
Re-opening existing culverts	-	Not In Place	
Alteration of channel bed (within channel)	-	Not In Place	
Structures or other mechanisms in place and managed to enable fish to access spawning grounds and downstream of the impounding weir	-	Not In Place	
Additional and structural changes to weirs, sluices, weirs, beach control, etc.	-	Not In Place	
Fish pass / fish passes structure	-	Not In Place	
Provide embayments on sensitive management practices.	-	Not In Place	
Establishing / improve floodplain connectivity	-	Not In Place	

A. Risk screening of potential to cause deterioration of current WFD Ecolog

Surface Water body	Current status	Status objective	Scheme Elements	ne Valley Viaduct - Grand Union Canal crossing			Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB106039023090			Description of scheme element impact	*s close to banks edge crossing Grand Union Canal. The viaduct span was increased to prevent the need for a viaduct pier in the canal.*					Construction	Operation		
Colne and GUC (from confluence with Chess to Ash)	Poor	Good Ecological Potential by 2027	Identified biological impacts	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage						
WFD classification elements												
1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
2. Macrophytes and phytobenthos - macrophytes	-	-		Viaduct will be 15.5m above water body. There may be minor changes in the cover and composition of macrophyte communities beneath the viaduct, but this is not considered to be greater than a minor localised change.	Receptor insensitive to impact	CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality within the ditch.	Upstream water bodies not impacted by scheme	There will be temporary loss of macrophyte cover on the R Colne whilst vegetation in the river diversion establishes. Net loss will be minimised if the diversion can be established before the existing channel is cut off. There will be permanent loss of macrophytes within the culverted sections of the River Colne and some of its tributaries due to loss of bank habitat and shading. However, this limited in extent and is not considered to affect overall status class for this quality element. Additional effects from the culvert on the River Colne will be only minor and localised. As other effects from scheme elements on the River Colne are also considered to be minor and very localised, cumulative effects are unlikely to lead to any deterioration of the WFD status of this quality element. Therefore, the overall effect remains unchanged as part of this AP2 assessment.	No additional mitigation required Mitigation measures could be put in place in order to clear sites or limit the extent of invasive species recorded in New Years Green Bourne and the River Colne	No additional mitigation required	Minor and localised effects	
3. Macroinvertebrates	Good	-			Receptor insensitive to impact	CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality within the ditch.	Upstream water bodies not impacted by scheme	There will be temporary (river diversion) and permanent (culvert) loss of macroinvertebrates and macroinvertebrate habitat from the existing River Colne channel. The river diversions will be designed to ensure there is no net loss of macroinvertebrate habitat and would balance temporary loss of habitats. ~~However, temporary adverse effects on the River Colne due to river diversion would be balanced through beneficial effects of habitat creation measures.~~ Adverse effects therefore considered to be only localised and / or temporary and, overall, would not affect the WFD status of this element. Additional effects from the culvert on the River Colne will be only minor and localised. As other effects from scheme elements on the River Colne are also considered to be minor and very localised, cumulative effects are unlikely to lead to any deterioration of the WFD status of this quality element. Therefore, the overall effect remains unchanged as part of this AP2 assessment.	Monitoring to be undertaken during the construction period. Priority will be given to early creation of river diversion to allow maximum opportunity for establishment of vegetation prior to removal of existing river reach.		Minor and localised effects.	
4. Fish	Poor	-			Receptor insensitive to impact	CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality within the ditch.	Upstream water bodies not impacted by scheme	There will be temporary (river diversion) and permanent (culvert) loss of fish foraging habitat on the R Colne whilst the river diversions establish. Migratory routes for fish will be maintained by retaining the existing channel whilst the river diversions are created, and therefore fish populations in upstream tributaries are likely to be unaffected. Given the relatively low sensitivity of the existing population the overall effect on this quality element is considered to be minor and localised. Additional effects from the culvert on the River Colne will be only minor and localised. As other effects from scheme elements on the River Colne are also considered to be minor and very localised, cumulative effects are unlikely to lead to any deterioration of the WFD status of this quality element. Therefore, the overall effect remains unchanged as part of this AP2 assessment.	No additional mitigation required It would be advisable to electric fish prior to dewatering the stretches that are going to be lost for river diversion	No additional mitigation required	Minor and localised effects	
Physico-Chemical status												
WFD classification elements												
5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	Upstream water bodies not impacted by scheme	GREEN TO YELLOW. The additional bridge crossing of the minor tributary will contribute slightly to the cumulative impact on this physico-chemical sub-element. A minor overall impact is anticipated, however, will not result in a change in WFD status of this sub-element. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	No additional mitigation required	No additional mitigation required	GREEN TO YELLOW. Minor and localised effects	-
6. pH	High	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream water bodies not impacted by scheme	Receptor is insensitive to impac			Receptor is insensitive to impac	
7. Phosphate	Poor	-		N/A	y an open span bridge, so there would	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	Upstream water bodies not impacted by scheme	GREEN TO YELLOW. The additional bridge crossing of the minor tributary will contribute slightly to the cumulative impact on this physico-chemical sub-element. A minor overall impact is anticipated, however, will not result in a change in WFD status of this sub-element. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.			GREEN TO YELLOW. Minor and localised effects	
8. Ammonia	High	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream water bodies not impacted by scheme	Receptor is insensitive to impac			Receptor is insensitive to impac	
9. Temperature	High	-		Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream water bodies not impacted by scheme	GREEN TO YELLOW. The additional bridge crossing of the minor tributary will contribute slightly to the cumulative impact on these physico-chemical sub-elements. A minor overall impact is anticipated, however, will not result in a change in WFD status of these sub-elements. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.			GREEN TO YELLOW. Minor and localised effects	
10. Specific Pollutants (Annex VIII)	High	-		N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	Upstream water bodies not impacted by scheme					
Hydromorphological status												Hydromorphology Baseline
WFD classification elements												
11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	Upstream water bodies not impacted by scheme	• The existing water body is a HMWB and is constrained in a narrow corridor due to gravel lakes • The channel is sinuous, and the proposed short diversion to ensure there are no bridge piers in the channel appears to replicate sinuosity immediately upstream • There are considered to be no significant morphological effects, only potentially minor impacts from a new access bridge from Denham Court Drive • The overall impact on the waterbody has not needed to be updated as a result of the AP2 assessments	No additional mitigation required	•Allow natural recovery • Potentially fell new woody debris if any is cleared from the crossing locations	No significant impacts predicted	• Waterbody is a designated HMWB • Channel is immediately adjacent to Broadwater Lake Nature Reserve, so space for mitigation is very limited, unless options to connect the river and lakes are considered feasible • Some space may be available in woodland areas to the west of the channel (and to the east of the A412) • Channel is sinuous but its form is likely to be controlled because of its proximity to the lake • Map from the mid 1990s shows that channel planform has not changed significantly for at least ca. 20 years • From the walkover survey report some local diversity of bed forms have been observed • Vegetated islands appear to be present in the channel aligned with bridge piers for the Moorland Road crossing • Survey WFD-UM1-0001 shows that the channel has been historically straightened with evidence of bank protection in areas. The channel planform is also constrained by the adjacent lakes/nature reserve (historic gravel extraction works) affecting the overall quantity and dynamics of flow and morphology. However, large woody debris creates some flow diversity in spots and the river does possess complex and continuous riparian/marginal vegetation • Baseline survey WFD-HM1-0002 photos showed that the channel was impounded/slow-flowing with high amounts of sediment and leaf litter, and no in-stream vegetation at limited access points along the drainage ditch. The quantity and dynamics of flow and morphology appear to be significantly altered by historic land drainage activities, as well as existing structures. developing poor river bed structure resulting from fine sediment deposition, poor structure of the riparian zone was uniform, overgrown and provided little habitat variation
12. Connection to Groundwater	-	-		N/A		N/A	Upstream water bodies not impacted by scheme					• Viaduct not significant to hydromorphology
13. River continuity	-	-		N/A		N/A	Upstream water bodies not impacted by scheme					• No structures visible in the channel from aerial imagery in the local area • Riparian zones appear to well established mature vegetation • Floodplain is presumably disconnected or heavily regulated by water level management for lakes, but this is not clear from initial observations
14. River depth and width variation bed	-	-		N/A		N/A	Upstream water bodies not impacted by scheme					• Channel depth generally heterogeneous due to sinuosity, meanders and bars • Width is also variable (approximately 10-12 m in width), and riffles are apparent in wide channel reaches.
15. Structure and substrate of river bed	-	-		N/A		N/A	Upstream water bodies not impacted by scheme					• Low, medium, calcareous RBMP channel type • Developed in alluvium (clay, silt, sand, gravel) and Shepperton Gravel river terrace deposits over Newhaven Chalk and Seahaven Chalk. No faults mapped at the site that would suggest an influence on channel form • Channel sediments likely to be gravel matrix with sands silts and clays
16. Structure of riparian zone	-	-		N/A		N/A	Upstream water bodies not impacted by scheme					• Well developed and vegetated. • Good riparian connectivity

B. Risk screening of potential to prevent future attainment of good Ecologi

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen										
Reduce sediment resuspension	-	In place	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	Construction of the viaduct footing adjacent to the R Colne, and diversions of the Colne and Newyears Green Bourne will result in minor, temporary sediment resuspension. Construction of the culvert on the unnamed tributary of the Colne near Waybeards Cottage may also cause some minor sediment resuspension. Narrowing of the R Colne may result in additional erosion, although this is considered to be minor for hydromorphological sub elements. Overall, the effect is considered to be minor given that most effects would occur during the construction stage of the project.	-	-		
Bank rehabilitation / reprofiling	-	In place		-	-	-	-	The construction of viaduct footings close to the bank edge on the R Colne would prevent bank rehabilitation in this section. Overall, this is a short section of bank and is not expected to prevent the overall water body from achieving GEP.	-	-		
Flood bunds (earth banks, in place of floodwalls)	-	In place		-	-	-	-	No effect	-	-		
Set-back embankments	-	In place		-	-	-	-	The construction of viaduct footings close to the bank edge on the R Colne would prevent set back of embankments in this section. Overall, this is a short section of bank and is not expected to prevent the overall water body from achieving GEP.	-	-		
Avoid the need to dredge (e.g. minimise under-keel clearance; use fluid mud navigation; flow manipulation or training works)	-	In place		-	-	-	-	No effect	-	-		
Reduce impact of dredging	-	In place		-	-	-	-	No effect	-	-		
Alter timing of dredging / disposal	-	In place		-	-	-	-	No effect	-	-		
Sediment management	-	In place		-	-	-	-	Minor narrowing of the R Colne will increase flow velocities and may assist in measures to de-silt channel	-	-		
Site selection (dredged material disposal) (e.g. avoid sensitive sites)	-	In place		-	-	-	-	No effect	-	-		
Phased de-watering and other techniques	-	In place		-	-	-	-	No effect	-	-		
Selective vegetation control regime	-	In place		-	-	-	-	No effect	-	-		
Appropriate vegetation control technique	-	In place		-	-	-	-	No effect	-	-		
Appropriate timing (vegetation control)	-	In place		-	-	-	-	No effect	-	-		
Appropriate techniques (invasive species)	-	In place		-	-	-	-	The invasive macrophyte species floating pennywort (*Hydrocotyle ranunculoides*) Is widespread throughout this reach. Disturbance to the bed has the potential to cause the spread of this species. However, the plant is widespread throughout the R Colne system. Increased flow velocities as a result of narrowing the river through the viaduct may help reduce the abundance of pennywort.	-	-		
Awareness raising / information boards (boat wash / sources of fine sediment)	-	In place		-	-	-	-	No effect	-	-		
Manage disturbance	-	In place		-	-	-	-	No effect	-	-		
Prepare a dredging / disposal strategy	-	In place		-	-	-	-	No effect	-	-		
Modify vessel design	-	In place		-	-	-	-	No effect	-	-		
Vessel Management	-	In place		-	-	-	-	No effect	-	-		
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	-	Not In Place		-	-	-	-	The river diversions on the R Colne and Newyears Green Brook will offer the opportunity for new habitat creation within the channel and riparian zone.	-	-		
Removal of hard bank reinforcement / revetment, or replacement with soft engineering solution	-	Not In Place		-	-	-	-	Placement of R Colne viaduct footing will prevent removal of hard bank reinforcement in this location, but river diversion will offer opportunity for new habitat creation. Overall, this is a short section of bank and is not expected to prevent the overall water body from achieving GEP.	-	-		
Preserve and, where possible, restore historic aquatic habitats	-	Not In Place		-	-	-	-	Placement of viaduct footing will prevent restoration of historic bank (but not channel) habitats in this location. Overall, this is a short section of bank and is not expected to prevent the overall water body from achieving GEP.	-	-		
Re-opening existing culverts	-	Not In Place		-	-	-	-	A new culvert will be constructed on the un named tributary of the R Colne near Waybeards Cottage. Culverts will be designed with a reduced bed level so that natural substrate can be incorporated within the culvert, and the hydromorphological regime through the culvert will replicate current conditions. Given these design measures and the small section of a tributary watercourse that will be affected, the overall effect is considered to be minor.	-	-		
Alteration of channel bed (within culvert)	-	Not In Place		-	-	-	-	No effect	-	-		
Structures or other mechanisms in place and managed to enable fish to access waters upstream and downstream of the impounding works	-	Not In Place		-	-	-	-	No effect	-	-		
Operational and structural changes to locks, sluices, weirs, beach control, etc.	-	Not In Place		-	-	-	-	No effect	-	-		
Remove obsolete structure	-	Not In Place		-	-	-	-	No effect	-	-		
Educate landowners on sensitive management practices (urbanisation)	-	Not In Place		-	-	-	-	No effect	-	-		
Improve floodplain connectivity	-	Not In Place		-	-	-	-	No effect	-	-		

GB105033038210

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective
GB105033038210	Moderate	Good Ecological Potential by 2015
Padbury Brook (The Twins)	-	-

Description of scheme element taken: *Culvert - S75 (tributary of Padbury Brook) near Portway Farm*: *Construction on S75 (tributary of Padbury Brook) near Portway Farm (SWC-CFA13-2, SWC-CFA13-17, SWC-CFA13-18, SWC-CFA13-20). Extension of existing railway culvert. New culvert on the access road south of the Portway Farm. Perry Road HE2 overbridge foundation works. Realignment and widening of bridge. New Culvert and diversion under route north of Portway Farm including access roads (SWC-CFA13-2). Drainage water discharge from balancing ponds. Length of culverts = 57m + 28m + 8m + 34m.*

Scheme elements	Culvert - S75 (tributary of Padbury Brook) near Portway Farm					River Diversion - S75 (tributary of Padbury Brook) near Portway Farm				
	Realignment of watercourse during widening of bridge and new culvert and diversion under route north of Portway Farm including access roads (SWC-CFA13-2, SWC-CFA13-17, SWC-CFA13-18 and SWC-CFA13-20). Creation of new habitats									
Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
1. Macrophytes and phytobenthos - Mixtures	N/A	N/A								
2. Macrophytes and phytobenthos - Macrophytes	Receptor is insensitive to impact	Receptor is insensitive to impact	Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities. Although access was limited, walkover surveys indicate that the direct area this will is of low value to macrophytes. • The Baseline data available, does appear to show a man-made drainage ditch with limited value to macrophytes. However, the surrounding semi-natural and grazed pasture is anticipated as a worst case scenario, if, for example there are isolated pockets areas with higher potential for macrophytes.	Receptor is insensitive to impact	Receptor is insensitive to impact	There will be loss of marginal and channel macrophytes over the c. 50m length of the existing culvert. • No baseline data are available, but it will only be a very short section. Although access was limited, walkover surveys indicate that the direct area this will is of low value to macrophytes. • The Baseline data available, does appear to show a man-made drainage ditch with limited value to macrophytes. However, the surrounding semi-natural and grazed pasture is anticipated as a worst case scenario, if, for example there are isolated pockets areas with higher potential for macrophytes.	The new channel will replicate existing habitat and where possible incorporate marginal features to encourage emergent macrophyte species and the channel will include a riffle feature to promote reoxygenation. • No effect on this quality element is considered to be minor position. Although access was limited, walkover surveys indicate that the direct area this will is of low value to macrophytes. • The Baseline data available, does appear to show a man-made drainage ditch with limited value to macrophytes. However, the surrounding semi-natural and grazed pasture is anticipated as a worst case scenario, if, for example there are isolated pockets areas with higher potential for macrophytes.	No hydromorphological effects on macrophytes anticipated	Receptor is insensitive to impact
3. Macroinvertebrates	Good	Good	Possible indirect effects on macroinvertebrates if macrophytes are lost and degraded habitat. Although access was limited, walkover surveys indicate that the direct area this will is of low value to macroinvertebrates. • The Baseline data available, does appear to show a man-made drainage ditch with no effect on the WFD status of the channel. (as a worst case scenario, if, for example there are isolated pockets areas with higher potential for macroinvertebrates)	Receptor is insensitive to impact	Receptor is insensitive to impact	There will be temporary loss of macroinvertebrate habitats within the c. 50m length of the existing culvert. • No baseline data are available, but it will only be a very short section. Although access was limited, walkover surveys indicate that the direct area this will is of low value to macroinvertebrates. • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status.	The diversion will replicate existing habitat and where possible will be designed to include a range of channel habitats, including where possible pools, riffles and runs. • No baseline data are available, but it will only be a very short section. Although access was limited, walkover surveys indicate that the direct area this will is of low value to macroinvertebrates and therefore there is no likely beneficial effect on this WFD element CHANGED FROM LIGHT BLUE TO GREEN	No hydromorphological effects anticipated on macroinvertebrate communities	Receptor is insensitive to impact
4. Fish	High	High	• Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). • Possible temporary sub lethal effects on fish (e.g. disturbance to feeding or spawning). Although access was limited, walkover surveys indicate that the direct area this will is of low value to fish. • The Baseline data available, but given that this is a minor drain, only minor species will be present. • Embedded measures that are part of the scheme design and mitigation will ensure there is no improvements along watercourse which would result in a change to the WFD status. • No effects anticipated. CHANGED TO GREEN.	Shading will only have negligible or no effects on fish.	Receptor is insensitive to impact	There will be temporary loss of habitat over the c.50m length of the existing drain that lies within the diverted section. • No baseline data are available, but given that this is a minor drain, only minor species will be present. • Embedded measures that are part of the scheme design and mitigation will ensure there is no improvements along watercourse which would result in a change to the WFD status. • No effects anticipated. CHANGED TO GREEN.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	The diversion will replicate existing channel geometry. Out of channel flow depths may decrease as a result of lengthening the channel, but in practical terms there would be no significant change	No hydromorphological effects anticipated and therefore no effect on fish communities.

Scheme elements	Culvert - on Watercourse S76					Viaduct - Padbury Brook and trib north-east of Twyford				
	New Culvert under Twyford Embankment on Watercourse S76 (SWC-CFA13-3) named Twyford East Embankment culvert. Length of watercourse covered by construction = 50m					*Viaduct crossing Padbury Brook (SWC-CFA13-4) and a small (drain) trib (SWC-CFA13-5) north East of Twyford. No footings in channel of either watercourse, but the small drain will require a short diversion (c 30 m), assessed separately*				
Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
1. Macrophytes and phytobenthos - Mixtures										
2. Macrophytes and phytobenthos - Macrophytes	• Receptor is insensitive to impact	Landtake will lead to direct loss of macrophytes and reduce the availability of suitable habitats within the culvert. • There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. • Baseline invertebrate data from the adjacent watercourse (Ditch 1) indicates that the channel supports a mixture of macrophyte species, and the channel will include a riffle feature to promote re-oxygenation. • No effect on this quality element is considered to be minor position. Although access was limited, walkover surveys indicate that the direct area this will is of low value to macrophytes. • The Baseline data available, but given that this is a short culvert and a minor tributary only minor and localised effects are anticipated.	Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. • No baseline data available, but given that this is a short culvert and a minor tributary only minor and localised effects are anticipated.	Localised changes in flow dynamics may result in changes in macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). Changes in flow dynamics may also have a localised effect on the channel and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	• Receptor is insensitive to impact	The viaduct will not constrict flow and piers will be located outside of the main channel. The footings may be near to the bank but will not result in the loss of any macrophyte habitat. The impact of the diversion is considered separately.	Baseline surveys indicate rich and abundant channel and marginal macrophyte communities in the area. There may be some changes in the cover and composition of macrophyte communities, but this is not considered to be greater than a minor localised change.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from construction do not have a negative effect on water quality.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
3. Macroinvertebrates	• Receptor is insensitive to impact	Landtake will lead to direct loss of macroinvertebrate habitats within the culvert. • There also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. • Baseline invertebrate data from the adjacent watercourse (Ditch 1) indicates that the channel supports a mixture of macroinvertebrate species present. • This a short culvert near to the edge of the railway and will not result in a change to the roads and other structures at ground level. Therefore, only minor, short term impacts are anticipated. • No effect on this quality element is considered to be minor position. Although access was limited, walkover surveys indicate that the direct area this will is of low value to macroinvertebrates. • The Baseline data available, but given that this is a short culvert and a minor tributary only minor and localised effects are anticipated.	Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macroinvertebrate communities present.	Localised changes in flow dynamics may result in changes in macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediate downstream area). Changes in flow dynamics may also have a localised effect on the channel and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	• Receptor is insensitive to impact	The viaduct will not constrict flow and piers will be located outside of the main channel. The footings may be near to the bank but will not result in the loss of any macroinvertebrate habitat. The impact of the diversion is considered separately.	Macroinvertebrate community may be slightly altered due to shading effects on macrophyte communities. However, as macroinvertebrate habitat is this area, following baseline survey data, but this is considered to be localised and minor.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from construction do not have a negative effect on water quality.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
4. Fish	• Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). • Possible temporary sub lethal effects on fish (e.g. disturbance to feeding or spawning). • Effects are likely to be temporary and localised. Although access was limited, walkover surveys indicate that the direct area this will is of low value to fish. No effects anticipated. CHANGED TO GREEN	• Landtake will reduce size of channel. • Channel is a small drain with limited value to fish. • Baseline survey indicates that channel supports a mixture of suspended solids, which will be managed by best practice measures and the CoCP. • Baseline invertebrate data from the adjacent watercourse (Ditch 1) indicates that the channel supports a mixture of macroinvertebrate species present. • This a short culvert near to the edge of the railway and will not result in a change to the roads and other structures at ground level. Therefore, only minor, short term impacts are anticipated. • No effect on this quality element is considered to be minor position. Although access was limited, walkover surveys indicate that the direct area this will is of low value to fish. No effects anticipated. CHANGED TO GREEN	Shading will only have negligible or no effects on fish. Although access was limited, walkover surveys indicate that the direct area this will is of low value to fish. No effects anticipated. CHANGED TO GREEN	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream. Although access was limited, walkover surveys indicate that the direct area this will is of low value to fish. No effects anticipated. CHANGED TO GREEN	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	• Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). • Possible temporary sub lethal effects on fish (e.g. disturbance to feeding or spawning). • Effects are likely to be temporary and localised. The footings may be near to the bank but will not result in the loss of any macroinvertebrate habitat. The impact of the diversion is considered separately.	The viaduct will not constrict flow and piers will be located outside of the main channel. The footings may be near to the bank but will not result in the loss of any macrophyte habitat. The impact of the diversion is considered separately.	Possible minor and localised effects on fish, as macrophyte communities are rich and abundant in the area and are likely to provide locally important habitats for fish.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from construction do not have a negative effect on water quality.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.

Scheme elements	Culvert - on tributary to Padbury Brook north of Twyford					Culvert - on unnamed drain running parallel to Padbury Brook				
	New Culvert access road at Twyford Viaduct (SWC-CFA13-5) - approximately 40m of watercourse covered by construction.					*New Culvert for access road at Twyford Viaduct (SWC-CFA13-5) - approximately 80m of watercourse covered by construction.*				
Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
1. Macrophytes and phytobenthos - Mixtures										
2. Macrophytes and phytobenthos - Macrophytes	• Receptor is insensitive to impact	Landtake will lead to direct loss of macrophytes and reduce the availability of suitable habitats within the culvert. • There also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. • Baseline invertebrate data from the adjacent watercourse (Ditch 1) indicates that the channel supports a mixture of macrophyte species, and the channel will include a riffle feature to promote re-oxygenation. • No effect on this quality element is considered to be minor position. Although access was limited, walkover surveys indicate that the direct area this will is of low value to macrophytes. • This is only a small drain that is already modified and culverted, therefore will be no significant effects on macrophytes. However, the surrounding semi-natural and grazed pasture is anticipated as a worst case scenario, if, for example there are isolated pockets areas with higher potential for macrophytes.	Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. • Although access was limited, walkover surveys indicate that the direct area this will is of low value to macrophytes. • This is only a small drain that is already modified and culverted, therefore, effects on macrophytes are anticipated to be minor. (as a worst case scenario, if, for example there are isolated pockets areas with higher potential for macrophytes)	Localised changes in flow dynamics (potential increased flow and velocities due to the straightened channel in the culverted culvert) may result in changes in macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). Changes in flow dynamics may also have a localised effect on the channel and potential effects are considered to be minimal. • Although access was limited, walkover surveys indicate that the direct area this will is of low value to macrophytes. • This is only a small drain that is already modified and culverted, therefore, effects on macrophytes are anticipated to be minor. (as a worst case scenario, if, for example there are isolated pockets areas with higher potential for macrophytes)	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	• Receptor is insensitive to impact	Landtake will lead to direct loss of macrophytes and reduce the availability of suitable habitats within the culvert. • There also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. • Baseline invertebrate data from the adjacent watercourse (Ditch 1) indicates that the channel supports a mixture of macrophyte species, and the channel will include a riffle feature to promote re-oxygenation. • No effect on this quality element is considered to be minor position. Although access was limited, walkover surveys indicate that the direct area this will is of low value to macrophytes. • The Baseline data available. • This is only a small drain that is already modified and culverted, therefore, effects on macrophytes are anticipated.	Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. • No baseline data available, but given that this is a small drain that is already modified and culverted, therefore, effects on macrophytes are anticipated.	Localised changes in flow dynamics (potential increased flow and velocities due to the straightened channel in the culverted culvert) may result in changes in macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). Changes in flow dynamics may also have a localised effect on the channel and potential effects are considered to be minimal. • Although access was limited, walkover surveys indicate that the direct area this will is of low value to macrophytes. • This would only be effect a limited area of a small drain that is already modified and culverted, therefore, effects on macrophytes are anticipated to be minor. (as a worst case scenario, if, for example there are isolated pockets areas with higher potential for macrophytes)	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
3. Macroinvertebrates	• Receptor is insensitive to impact	Landtake will lead to direct loss of macroinvertebrate habitats within the culvert. • There also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. • Baseline invertebrate data from the adjacent watercourse (Ditch 1) indicates that the channel supports a mixture of macroinvertebrate species present. • This a short culvert near to the edge of the railway and will not result in a change to the roads and other structures at ground level. Therefore, only minor, short term impacts are anticipated. • No effect on this quality element is considered to be minor position. Although access was limited, walkover surveys indicate that the direct area this will is of low value to macroinvertebrates. • The Baseline data available, but given that this is a short culvert and a minor tributary only minor and localised effects are anticipated.	Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macroinvertebrate communities present.	Localised changes in flow dynamics may result in changes in macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediate downstream area). Changes in flow dynamics may also have a localised effect on the channel and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	• Receptor is insensitive to impact	Landtake will lead to direct loss of macroinvertebrate habitats within the culvert. • There also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. • Baseline invertebrate data from the adjacent watercourse (Ditch 1) indicates that the channel supports a mixture of macroinvertebrate species present. • This a short culvert near to the edge of the railway and will not result in a change to the roads and other structures at ground level. Therefore, only minor, short term impacts are anticipated. • No effect on this quality element is considered to be minor position. Although access was limited, walkover surveys indicate that the direct area this will is of low value to macroinvertebrates. • The Baseline data available. • This is only a small drain that is already modified and culverted, therefore, effects on macroinvertebrates are anticipated to be minor.	Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macroinvertebrate communities present.	Macroinvertebrate community may be slightly altered due to shading effects on macrophyte communities. However, as macroinvertebrate habitat is this area, following baseline survey data, but this is considered to be localised and minor.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from construction do not have a negative effect on water quality.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
4. Fish	• Receptor is insensitive to impact	• Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). • Possible temporary sub lethal effects on fish (e.g. disturbance to feeding or spawning). • Effects are likely to be temporary and localised. Although access was limited, walkover surveys indicate that the direct area this will is of low value to fish. No effects anticipated. CHANGED FROM YELLOW TO GREEN	• Landtake will reduce size of channel. • Channel is a small drain with limited value to fish. • Baseline survey indicates that channel supports a mixture of suspended solids, which will be managed by best practice measures and the CoCP. • Baseline invertebrate data from the adjacent watercourse (Ditch 1) indicates that the channel supports a mixture of macroinvertebrate species present. • Possible minor and localised effects on fish, as macrophyte communities are rich and abundant in the area and are likely to provide locally important habitats for fish. • Embedded mitigation measures such as the use of a temporary bridge will ensure that there will be no significant effects on the fish community present. • Embedded mitigation measures such as the use of a temporary bridge will ensure that there will be no significant effects on the fish community present. • Although access was limited, walkover surveys indicate that the direct area this will is of low value to fish. No effects anticipated. CHANGED FROM YELLOW TO GREEN	Shading will only have negligible or no effects on fish. Although access was limited, walkover surveys indicate that the direct area this will is of low value to fish. No effects anticipated. CHANGED FROM YELLOW TO GREEN	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream. Although access was limited, walkover surveys indicate that the direct area this will is of low value to fish. No effects anticipated. CHANGED FROM YELLOW TO GREEN	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	• Receptor is insensitive to impact	• Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). • Possible temporary sub lethal effects on fish (e.g. disturbance to feeding or spawning). • Effects are likely to be temporary and localised. Although access was limited, walkover surveys indicate that the direct area this will is of low value to fish. No effects anticipated. CHANGED FROM YELLOW TO GREEN	• Landtake will reduce size of channel. • Channel is a small drain with limited value to fish. • Baseline survey indicates that channel supports a mixture of suspended solids, which will be managed by best practice measures and the CoCP. • Baseline invertebrate data from the adjacent watercourse (Ditch 1) indicates that the channel supports a mixture of macroinvertebrate species present. • There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. • Although access was limited, walkover surveys indicate that the direct area this will is of low value to fish. No effects anticipated. CHANGED FROM YELLOW TO GREEN	Shading will only have negligible or no effects on fish. Although access was limited, walkover surveys indicate that the direct area this will is of low value to fish. No effects anticipated. CHANGED FROM YELLOW TO GREEN	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream. Although access was limited, walkover surveys indicate that the direct area this will is of low value to fish. No effects anticipated. CHANGED FROM YELLOW TO GREEN	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.

Scheme elements	River Diversion - unnamed drain running parallel to Padbury Brook					River Diversion - Tributary of Padbury Brook near Three Bridge Mill				
	Diversion works on unknown drain running parallel to Padbury Brook (SWC-CFA13-5).					*Diversion of tributary of Padbury Brook near Three Bridge Mill (SWC-CFA13-6) at Cowley embankment and stockpile*				
Identified biological impacts	Landtake	Creation of new habitats	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
1. Macrophytes and phytobenthos - Mixtures										
2. Macrophytes and phytobenthos - Macrophytes	• There will be loss of marginal and channel macrophytes over the c. 50m length of the existing drain that lies within the diverted section. • No baseline data are available, but it will only be a very short section.	The new channel will replicate existing habitat and where possible incorporate marginal features to encourage emergent macrophyte species and the channel will include a riffle feature to promote reoxygenation. • No effect on this quality element is considered to be minor position.	Localised changes in flow dynamics (potential increased flow and velocities due to the straightened channel in the culverted culvert) may result in changes in macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). Changes in flow dynamics may also have a localised effect on the channel and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	No hydromorphological effects on macrophytes anticipated	There will be loss of marginal and channel macrophytes over the c. 50m length of the existing drain. • No baseline data are available, but it will only be a very short section.	The new channel will replicate existing habitat and where possible incorporate marginal features to encourage emergent macrophyte species and the channel will include a riffle feature to promote reoxygenation. • No effect on this quality element is considered to be minor position.	Localised changes in flow dynamics (potential increased flow and velocities due to the straightened channel in the culverted culvert) may result in changes in macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). Changes in flow dynamics may also have a localised effect on the channel and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	No hydromorphological effects on macrophytes anticipated	Receptor is insensitive to impact
3. Macroinvertebrates	• Receptor is insensitive to impact	Landtake will lead to direct loss of macroinvertebrate habitats within the culvert. • There also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. • No effect on this quality element is considered to be minor position. Although access was limited, walkover surveys indicate that the direct area this will is of low value to macroinvertebrates. • The Baseline data available. • This is only a small drain that is already modified and culverted, therefore, effects on macroinvertebrates are anticipated to be minor. (as a worst case scenario, if, for example there are isolated pockets areas with higher potential for macroinvertebrates)	Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macroinvertebrate communities present. • No baseline data available, but given that this is a small drain that is already modified and culverted, therefore, effects on macroinvertebrates are anticipated to be minor.	Macroinvertebrate community may be slightly altered due to shading effects on macrophyte communities. However, as macroinvertebrate habitat is this area, following baseline survey data, but this is considered to be localised and minor.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from construction do not have a negative effect on water quality.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	• Receptor is insensitive to impact	• The extent of new watercourse that would be created, and the possible negative effects of altering existing channel conditions, mean that there would be no significant habitat creation	• Lengthening the channel may result in increased channel storage and reduced floodplain connectivity, but the size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected	No hydromorphological effects anticipated on macroinvertebrate communities	Receptor is insensitive to impact
4. Fish	• Receptor is insensitive to impact	• Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). • Possible temporary sub lethal effects on fish (e.g. disturbance to feeding or spawning). • Effects are likely to be temporary and localised. Although access was limited, walkover surveys indicate that the direct area this will is of low value to fish. No effects anticipated. CHANGED FROM YELLOW TO GREEN	• Landtake will reduce size of channel. • Channel is a small drain with limited value to fish. • Baseline survey indicates that channel supports a mixture of suspended solids, which will be managed by best practice measures and the CoCP. • Baseline invertebrate data from the adjacent watercourse (Ditch 1) indicates that the channel supports a mixture of macroinvertebrate species present. • There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. • Although access was limited, walkover surveys indicate that the direct area this will is of low value to fish. No effects anticipated. CHANGED FROM YELLOW TO GREEN	Shading will only have negligible or no effects on fish. Although access was limited, walkover surveys indicate that the direct area this will is of low value to fish. No effects anticipated. CHANGED FROM YELLOW TO GREEN	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream. Although access was limited, walkover surveys indicate that the direct area this will is of low value to fish. No effects anticipated. CHANGED FROM YELLOW TO GREEN	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	• Receptor is insensitive to impact	• There will be temporary loss of habitat over the c.50m length of the existing drain that lies within the diverted section. • No baseline data are available, but given that this is a minor drain, only minor species will be present. • Embedded measures that are part of the scheme design and mitigation will ensure there is no improvements along watercourse which would result in a change to the WFD status. • No effects anticipated. CHANGED FROM YELLOW TO GREEN	• The diversion will replicate existing habitat and where possible will be designed to include a range of channel habitats, including where possible pools, riffles and runs. • No baseline data are available, but it will only be a very short section. Although access was limited, walkover surveys indicate that the direct area this will is of low value to fish and therefore there is no likely beneficial effect on this WFD element CHANGED FROM LIGHT BLUE TO GREEN	No hydromorphological effects anticipated and therefore no effect on fish communities.	Receptor is insensitive to impact

Scheme elements	Viaduct - P				
Identified biological impacts	Vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
1. Macrophytes and phytobenthos - Mixtures					
2. Macrophytes and phytobenthos - Macrophytes	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
3. Macroinvertebrates	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
4. Fish	Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). Possible temporary sub lethal effects on fish (e.g. disturbance to feeding or spawning). Effects are likely to be temporary and localised.	Possible minor and localised effects on fish, as macrophyte communities are rich and abundant in the area and are likely to provide locally important habitats for fish.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from construction do not have a negative effect on water quality.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.

Physico-Chemical status

Scheme elements	Culvert - S75 (tributary of Padbury Brook) near Portway Farm					River Diversion - S75 (tributary of Padbury Brook) near Portway Farm				
1. Dissolved Oxygen	N/A	N/A	Due to the length of the proposed culverts, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated. Overall effect likely to be minor locally, with no degradation of the element status anticipated at the scale of the water body.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
2. pH	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
3. Phosphate	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects.	Receptor is insensitive to impact
4. Ammonia	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
5. Temperature	N/A	N/A	Due to the length of the culverts, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culverts, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact
10. Specific Pollutants (Annex VIII)	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects.	Receptor is insensitive to impact

Scheme elements	Culvert - on Watercourse S76					Viaduct - Padbury Brook and trib north-east of Twyford				
1. Dissolved Oxygen	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects.	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects.
2. pH	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
3. Phosphate	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects.	Receptor is insensitive to impact
4. Ammonia	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
5. Temperature	N/A	N/A	Due to the length of the culverts, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact
10. Specific Pollutants (Annex VIII)	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects.

Scheme elements	Culvert - on tributary to Padbury Brook north of Twyford					Culvert - on unnamed drain running parallel to Padbury Brook				
1. Dissolved Oxygen	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to

GB105033038210

A. Risk screening of potential to cause deterioration of current WFD Ecolog

Surface Water body	Current status	Status objective	Scheme Elements
GB105033038210	Moderate	Good Ecological Potential by 2015	
Padbury Brook (The Twins)	-	-	

Description of scheme element risks

Identified biological impacts	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
Padbury Brook east of Godington/(footings in or within riparian zone of watercourse)				
Diversion of watercourse with construction of viaduct (SWC-CYA13-B)				
1. Macrophytes and phytobenthos: diatoms	N/A	N/A	N/A	N/A
2. Macrophytes and phytobenthos: macrophytes	The Godington East Viaduct at SWC-CYA13-B will not control flow and piers will be located outside of the main channel. The footings may be near to the bank but will not result in the loss of marginal or channel habitats. The Godington West Viaduct at SWC-CYA13-B will require a short diversion but no footings will be present in the diverted channel. The impact of the diversion is considered separately.	Baseline survey indicate nth and abundant channel and marginal macrophyte communities in the area. There may be some changes in the cover and composition of macrophyte communities, but this is not considered to be more than a minor localised change. **No anticipated effects due to macrophyte changes** as Godington West Viaduct is a short span bridge, so there would be no impact on dissolved oxygen.	• CoP measures (Section 56) to ensure that any discharge arising from viaduct construction do not have a negative effect on water quality.	• CoP measures will be used to ensure that any discharge arising from viaduct construction do not have a negative effect on water quality.
3. Macroinvertebrates	Good	Good	There will be a temporary loss of macroinvertebrates and habitat over the 1.0km length of the existing Padbury Brook that lies within the footprint. A relatively diverse macroinvertebrate community is recorded, which is likely to require less than 1 year to re-establish pre-the short distance affected. Effects will be temporary and localised	• CoP measures (Section 56) to ensure that any discharge arising from viaduct construction do not have a negative effect on water quality.
4. Fish	High	High	There will be temporary loss of the habitat over the 1.0km length of the existing Padbury Brook that lies within the footprint. A relatively diverse community is recorded, which is likely to require less than 1 year to re-establish pre-the short distance affected. Effects will be temporary and localised	• CoP measures (Section 56) to ensure that any discharge arising from viaduct construction do not have a negative effect on water quality.
Physico-Chemical status				
5. Dissolved Oxygen	High	-	N/A	• Some shading with negligible/no effect.
6. pH	High	-	N/A	Receptor is insensitive to impact
7. Phosphate	Moderate	-	N/A	N/A
8. Ammonia	High	-	N/A	Receptor is insensitive to impact
9. Temperature	-	-	N/A	Some shading with negligible/no effect.
10. Specific Pollutants (Annex VIII)	High	-	N/A	N/A
Hydromorphological status				
11. Quantity and dynamics of river flow	-	-	N/A	N/A
12. Connection to Groundwater	-	-	N/A	N/A
13. River continuity	-	-	N/A	N/A
14. River depth and width variation bed	-	-	N/A	N/A
15. Structure and substrate of river bed	-	-	N/A	N/A
16. Structure of riparian zone	-	-	N/A	N/A

Identified biological impacts	River Diversion - Padbury Brook east of Godington: Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Culvert - on unnamed watercourse east of Godington: Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
Diversion of watercourse with construction of viaduct (SWC-CYA13-B)				**New Culvert (SWC-CYA13-7): approximately 50m of watercourse covered by construction.**				
1. Macrophytes and phytobenthos: diatoms	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2. Macrophytes and phytobenthos: macrophytes	There will be loss of marginal and emergent macrophytes over the 1.0km length of the existing Padbury Brook that lies within the diverted section. Only limited baseline data are available, but it is likely that these communities will re-establish within 1 to 2 years of completion of the new channel. There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoP. Effects will be temporary and localised	The new channel will replicate existing habitat and where possible incorporate marginal habitat to encourage emergent macrophyte species and diversity. The new channel will be designed to be suitable for colonisation by submergent species. The effect on this quality element is considered to be minor positive.	Minor hydromorphological effects anticipated with no likely effect on macroinvertebrate communities of small drain.	Receptor is insensitive to impact	• Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoP. No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	• Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	• Localised changes in flow dynamics may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
3. Macroinvertebrates	There will be temporary loss of macroinvertebrates and habitat over the 1.0km length of the existing Padbury Brook that lies within the footprint. A relatively diverse macroinvertebrate community is recorded, which is likely to require less than 1 year to re-establish pre-the short distance affected. Effects will be temporary and localised	The river diversion will replicate existing habitat and where possible will be designed to include a range of habitats that are suitable for the flora and fauna that are currently characterise the reach.	Minor hydromorphological effects anticipated with no likely effect on macroinvertebrate communities of small drain.	Receptor is insensitive to impact	Landtake will lead to direct loss of macroinvertebrate habitats within the culvert. No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Macroinvertebrate community may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor. No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Localised changes in flow dynamics may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediate downstream area). No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
4. Fish	Possible temporary sub-lethal effects on fish (e.g. displacement from impacted area). No baseline data available, but this is a life drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Shading will only have negligible or no effects on fish.	Minor hydromorphological effects anticipated with no likely effect on fish communities of small drain.	Receptor is insensitive to impact	Landtake will reduce the availability of fish habitats within the culvert. There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoP. Fish in tributary poor, only minor species present. No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Shading will only have negligible or no effects on fish.	Fish in tributary poor, only minor species present. Localised changes in flow dynamics likely to be minimal as there is already several existing culverts and therefore fish are likely to be tolerant of flow variations. No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
Physico-Chemical status								
5. Dissolved Oxygen	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel will be designed, when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor locally, and not significant at the scale of the receiving water body.	• CoP measures (Section 56) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	• CoP measures (Section 56) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to be temporary/local in relation to the overall water body. Therefore, no change in status is anticipated.	• CoP measures (Section 56) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoP measures (Section 56) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
6. pH	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
7. Phosphate	N/A	Receptor is insensitive to impact	• CoP measures (Section 56) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	N/A	Receptor is insensitive to impact	• CoP measures (Section 56) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact
8. Ammonia	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
9. Temperature	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to be a local effect in relation to the overall water body. Therefore, no change in status is anticipated	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
10. Specific Pollutants (Annex VIII)	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
Hydromorphological status								
11. Quantity and dynamics of river flow	N/A	N/A	• The watercourse will be realigned to avoid footing in the watercourse if it not realigned. footings may narrow the channel and cause local increase in velocity, turbulence and turbulence. • Resultant scour at pier footings could cause local loss of bed material. • Survey WFD-PA1-0010b reports some existing variability in flow and morphology within the channel, suggesting that the channel is resisting and healing of anthropogenic aggrading forces as a result of impact of new structures as located in the channel. This suggests that the channel adjusts itself so that the footings increase further into the channel than anticipated at this stage. • Minor structure impacts on the channel would promote some hydraulic habitat diversity. • Overall, flow constraints would be determined to 'hydromorphology	N/A	N/A	N/A	N/A	N/A	N/A	N/A	• The survey reports that the channel width varies from approximately 0.5m - 3.5m with limited bed and flow diversity, so there is likely to be significant impact from the culvert on hydromorphology. • Culvert on small unnamed drain which is a tributary to Padbury Brook. • The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a small drain, so the impact in terms may not impact on deterioration of water body status	N/A	N/A	N/A	N/A	N/A	• Surveys report that the channel width varied from approximately 0.5m to 3.4m with limited bed and flow diversity, so there is likely to be significant impact from the culvert on hydromorphology. • Culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • Unnamed drain near Barton Hardsharn is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	N/A	N/A	N/A	N/A	• The survey reports that the channel width varied from approximately 0.5m - 3.5m with limited bed and flow diversity, so there is likely to be significant impact from the culvert on hydromorphology. • Culvert on small unnamed drain which is a tributary to Padbury Brook. • The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a small drain, so the impact in terms may not impact on deterioration of water body status	N/A	N/A	N/A	N/A	N/A	• The survey reports that the channel width varied from approximately 0.5m - 3.5m with limited bed and flow diversity, so there is likely to be significant impact from the culvert on hydromorphology. • Culvert on small unnamed drain near Barton Hardsharn. • The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a small drain, so the impact in terms may not impact on deterioration of water body status	N/A
12. Connection to Groundwater	N/A	N/A	• Not significant to hydromorphology	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A
13. River continuity	N/A	N/A	• The watercourse will be realigned to avoid footing in the watercourse if not realigned. Footings may narrow the channel and cause local increase in velocity, turbulence and turbulence. Resultant scour at pier footings could cause local loss of bed material. Localised increases in flow velocity and turbulence would reduce continuity and may be a barrier to salmonid passage. • Survey WFD-PA1-0010b reports some existing variability in flow and morphology within the channel, suggesting that the channel is resisting and healing of anthropogenic aggrading forces as a result of impact of new structures as located in the channel. This suggests that the channel adjusts itself so that the footings increase further into the channel than anticipated at this stage.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	• Survey indicate that the culvert is effectively a fish pass with no morphological impact. **The culvert would disconnect the floodplain and out-of-bank flow. Floodplain and out-of-bank flow would sever existing flow and habitat continuity within and adjacent to the channel.** • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A	N/A	N/A	N/A	N/A	• Surveys report that the channel width varied from approximately 0.5m to 3.4m with limited bed and flow diversity, so there is likely to be significant impact from the culvert on hydromorphology. • Culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • Unnamed drain near Barton Hardsharn is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	N/A	N/A	N/A	N/A	• The survey reports that the channel width varied from approximately 0.5m - 3.5m with limited bed and flow diversity, so there is likely to be significant impact from the culvert on hydromorphology. • Culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • Unnamed drain near Barton Hardsharn is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	N/A	N/A	N/A	N/A	• The survey reports that the channel width varied from approximately 0.5m - 3.5m with limited bed and flow diversity, so there is likely to be significant impact from the culvert on hydromorphology. • Culvert on small unnamed drain near Barton Hardsharn. • The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a small drain, so the impact in terms may not impact on deterioration of water body status	N/A
14. River depth and width variation bed	N/A	N/A	• Some localised bed scour is likely due to local increases in flow velocity and turbulence. However, bed is unlikely to cause major deterioration. • Could promote some local diversity in hydraulic, bed and bank habitats, which could ultimately be beneficial, as bar formations immediately downstream. • On balance, this effect would be beneficial, but could also change habitat conditions beyond the tolerance of local species, so it is not possible to rule this effect with certainty. • Survey WFD-PA1-0010b reports some existing variability in flow and morphology within the channel, which appear to be influenced by aggrading and historical incisions, suggesting that the channel is resisting and healing of anthropogenic scour forces. or if the channel adjusts itself so that the footings increase further into the channel than anticipated at this stage.	N/A	N/A	• Survey WFD-PA1-0010b reports a wide channel with some flow diversity, and bed substrates that are an assortment of pebbles and gravels to cobbles. This suggests that the channel is resisting and healing of anthropogenic aggrading forces. • There is opportunity here to enhance morphological diversity and for habitat creation	N/A	N/A	N/A	• Out-of-bank flows would be severed by the culvert, and in-channel flows may become fragmented, which may lead to some local scour and may even surcharge in extreme events. • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A	N/A	N/A	N/A	N/A	• Out-of-bank flows would be severed by the culvert, and in-channel flows may become fragmented, which may lead to some local scour and may even surcharge in extreme events. • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A	N/A	N/A	N/A	N/A	• Out-of-bank flows would be severed by the culvert, and in-channel flows may become fragmented, which may lead to some local scour and may even surcharge in extreme events. • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A	N/A	N/A	N/A	N/A	• Out-of-bank flows would be severed by the culvert, and in-channel flows may become fragmented, which may lead to some local scour and may even surcharge in extreme events. • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A
15. Structure and substrate of river bed	N/A	N/A	• Some localised bed scour is likely due to local increases in flow velocity and turbulence. However, bed is unlikely to cause major deterioration. • Could promote some local diversity in hydraulic, bed and bank habitats, which could ultimately be beneficial, as bar formations immediately downstream. • On balance, this effect would be beneficial, but could also change habitat conditions beyond the tolerance of local species, so it is not possible to rule this effect with certainty. • Survey WFD-PA1-0010b reports some existing variability in flow and morphology within the channel, which appear to be influenced by aggrading and historical incisions, suggesting that the channel is resisting and healing of anthropogenic scour forces. or if the channel adjusts itself so that the footings increase further into the channel than anticipated at this stage.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or structure loss. • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	N/A	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or structure loss. • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	N/A	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or structure loss. • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A
16. Structure of riparian zone	N/A	N/A	• Footings in the riparian zones would cause some loss of and disturbance in riparian zone, but relative to the area of open space this is likely to be insignificant	N/A	N/A	N/A	• Although channel capacity would increase, there is likely to be no net change to existing bank, riparian and floodplain structure and connectivity with channel	N/A	N/A	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a small drain, so the impact in terms may not impact on deterioration of water body status	N/A	N/A	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a small drain, so the impact in terms may not impact on deterioration of water body status	N/A	N/A	N/A	N/A	N/A	• The baseline survey indicated that sections of the channel have been artificially modified including the channel width and depth. • The culvert would disconnect the channel from the existing vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a small drain, so the impact in terms to previous bank reinforcements and modifications. But this is a small drain, so the impact in terms may not impact on deterioration of water body status	N/A	N/A	N/A	N/A	N/A	• The baseline survey indicated that sections of the channel have been artificially modified including the channel width and depth. • The culvert would disconnect the channel from the existing vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a small drain, so the impact in terms to previous bank reinforcements and modifications. But this is a small drain, so the impact in terms may not impact on deterioration of water body status	N/A

Identified biological impacts	Culverts - three culverts on unnamed tributary (drain) of Padbury Brook: Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Culvert - Culverted tributary (drain) of Padbury Brook: Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
Erection of 3 culverts and Channel diversion on Unnamed tributary to Padbury Brook (SWC-CYA14-1, SWC-CYA14-10, SWC-CYA14-11, SWC-CYA14-13): Diversion required and culvert of approx. 40m constructed 30m north of unnamed tributary. Surface water flow diverted to drain from north and south. Additional culvert (SWC-CYA14-12) underneath new highway at Barton Parrott						**Culverted tributary (drain) of Padbury Brook (SWC-CYA14-2, SWC-CYA14-12): The drain flows from the north, near Boundary Farm and enters a culvert under Station House and A421. Design will utilise existing culvert underneath proposed route and highway construction to the east.**				
1. Macrophytes and phytobenthos: diatoms	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2. Macrophytes and phytobenthos: macrophytes	Receptor is insensitive to impact	Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoP. Baseline data indicated very low macrophyte cover, therefore only minor and localised effects are anticipated.	Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Localised changes in flow dynamics may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoP. Baseline data indicated very low macrophyte cover, therefore only minor and localised effects are anticipated.	Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Localised changes in flow dynamics may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
3. Macroinvertebrates	Receptor is insensitive to impact	Landtake will lead to direct loss of macroinvertebrate habitats within the culvert. No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Macroinvertebrate community may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor. No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Localised changes in flow dynamics may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediate downstream area). No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	Landtake will lead to direct loss of macroinvertebrate habitats within the culvert. Although macroinvertebrates present this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	As baseline data indicated very low macrophyte cover, and loss of macrophytes due to shading will have no effects or negligible effects on macroinvertebrates.	Localised changes in flow dynamics may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediate downstream area). Although macroinvertebrates present this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
4. Fish	Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). Baseline data indicated moderate fish habitat, but only a few minor species were recorded. The drain is a life drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Shading will only have negligible or no effects on fish.	Fish in tributary poor, only minor species present. Localised changes in flow dynamics likely to be minimal as there is already several existing culverts and therefore fish are likely to be tolerant of flow variations. Baseline data indicated moderate fish habitat, but only a few minor species were recorded. The drain is a life drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). Baseline data indicated moderate fish habitat, but only a few minor species were recorded. The drain is a life drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Shading will only have negligible or no effects on fish.	Fish in tributary poor, only minor species present. Localised changes in flow dynamics likely to be minimal as there is already several existing culverts and therefore fish are likely to be tolerant of flow variations. Baseline data indicated moderate fish habitat, but only a few minor species were recorded. The drain is a life drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
Physico-Chemical status										
5. Dissolved Oxygen	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to be temporary/local in relation to the overall water body. Therefore, no change in status is anticipated.	• CoP measures (Section 56) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoP measures (Section 56) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
6. pH	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
7. Phosphate	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
8. Ammonia	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
9. Temperature	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to be a local effect in relation to the overall water body. Therefore, no change in status is anticipated	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
10. Specific Pollutants (Annex VIII)	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
Hydromorphological status										
11. Quantity and dynamics of river flow	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
12. Connection to Groundwater	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
13. River continuity	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
14. River depth and width variation bed	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
15. Structure and substrate of river bed	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
16. Structure of riparian zone	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

B. Risk screening of potential to prevent future attainment of good Ecolog

WFD measures to achieve objective (yet to be implemented or confirmed as implemented)	Will the WFD measure will impact WFD elements	Will the WFD measure will impact WFD elements	Physical Modifications	Impacts on Flow	Impacts on Sediment	Impacts on Morphology	Impacts on Water Quality
NONE							

GB105033038210

A. Risk screening of potential to cause deterioration of current WFD Ecolog

Surface Water body	Current status	Status objective	Scheme Elements	River Diversion - Culverted tributary (drain) of Padbury Brook.			River Diversion - Unnamed tributary (drain) of Padbury Brook.			Cutting (Chetwode Cutting, Twyford Cutting and Calvert Cutting)		Cutting (Barton to Mixbury)		Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB105033038210			Description of scheme element impact	*River diversion during extension of existing culvert on Culverted tributary (drain) of Padbury Brook (SWC-CFA14-2, SWC-CFA14-12).*			*Surface water will be diverted on unnamed tributary (drain) of Padbury Brook (SWC-CFA14-1, SWC-CFA14-10, SWC-CFA14-11, SWC-CFA14-13). Surface water diverted into drain from both north and south, the drain will also be diverted near Station House and then further south, parallel to the route.*			*No impact on contributions to SW from deep groundwater as nearby cuttings (Chetwode Cutting, Twyford Cutting and Calvert Cutting) on unproductive strata. Potential localised reduction in contribution from shallow groundwater in superficial deposits.*		*Potential influence of groundwater contribution from Barton to Mixbury Cutting to SW tributaries near Newton Purcell as located on Upper Bedford Ouse Oolite Secondary aquifer. Potential localised reduction in contribution from shallow groundwater in superficial deposits.*							
Padbury Brook (The Twins)	Moderate	Good Ecological Potential by 2015	Identified biological impacts	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.			Construction	Operation		
WFD classification elements			Predicted change to status elements (green = none, amber = possibly, red = likely)																
1.Macrophytes and phytobenthos - diatoms	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
2. Macrophytes and phytobenthos - macrophytes	-	-		-There will be loss of marginal and channel macrophytes over the length of the existing drain that lies within the diverted section. - No baseline data are available, but the macrophyte community will re-establish within 1 to 2 years of completion of the diversion. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised and only affect the minor drain.	- The new channel will replicate existing habitat and where possible incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. -The effect on this quality element is considered to be minor positive.	- Minor hydromorphological effects anticipated with no likely effect on macrophyte communities of small drain.	-There will be loss of marginal and channel macrophytes over the length of the existing drain that lies within the diverted section. - No baseline data are available, but the macrophyte community will re-establish within 1 to 2 years of completion of the diversion. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised and only affect the minor drain.	- The new channel will replicate existing habitat and where possible incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. -The effect on this quality element is considered to be minor positive.	- Minor hydromorphological effects anticipated with no likely effect on macrophyte communities of small drain.	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	Possible minor reduction in flow with no significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	Only minor and localised changes anticipated.	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.	- Padbury Brook does not currently have a WFD status for macrophytes, is not known to be monitored for this element, although baseline data collected on this watercourse indicated the presence abundant macrophyte communities. - Although the scheme will lead to a loss of habitat and photosynthetic activity (in shaded areas) due to culverting and viaducts, this is mostly on minor tributaries and drains (most of which are heavily shaded, heavily modified and already crossed by roads and railways) rather than on Padbury Brook itself. - All of the effects identified are minor and localised when considered individually. - Taking into account embedded mitigation (such as the inclusion of habitat creation upstream and downstream of culverts), it is anticipated that cumulative effect of all the different scheme elements be minor and localised (mostly affecting minor tributaries that do not contribute significantly to the wider water body), with no change to the current status of this element.	- impacts on Padbury Brook and its tributaries will be mitigated by constructing temporary diversions in advance (identified in the EIA as 'additional mitigation')	None required.	Only minor and localised effects are anticipated, which will not affect the status of this WFD element.	
3. Macroinvertebrates	Good	-		There will be temporary loss of macroinvertebrates and habitat over the length of the existing drain that lies within the diverted section. - No baseline data are available from this minor ditch, but it will only to require less than 1 year to re-establish give the short distance affected. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised and only affect the minor drain.	- The diversion will replicate existing habitat and where possible will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach.	- Minor hydromorphological effects anticipated with no likely effect on macroinvertebrate communities of small drain.	There will be temporary loss of macroinvertebrates and habitat over the length of the existing drain that lies within the diverted section. - No baseline data are available from this minor ditch, but it will only to require less than 1 year to re-establish give the short distance affected. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised and only affect the minor drain.	- The diversion will replicate existing habitat and where possible will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach.	- Minor hydromorphological effects anticipated with no likely effect on macroinvertebrate communities of small drain.	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	Possible minor reduction in flow with no significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	Only minor and localised changes anticipated.	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.	- Padbury Brook is currently of 'Good' WFD status for macroinvertebrates, which supported by the baseline data collected on the main Padbury Brook watercourse. - Although the scheme will lead to a loss and photosynthetic activity (in shaded areas) due to extensive culverting, this is mostly on minor tributaries and drains rather (most of which are heavily shaded, heavily modified and already crossed by roads and railways) than on Padbury Brook itself. - All of the effects identified are minor and localised when considered individually. - Embedded mitigation (such as the inclusion of habitat creation upstream and downstream of culverts), will help to offset negative effects from culverts and diversions. However, taking into account the number of scheme elements and the sensitivity of the receptor there remains a risk that there could be a deterioration for this element.	- impacts on Padbury Brook and its tributaries will be mitigated by constructing temporary diversions in advance (identified in the EIA as 'additional mitigation')	None required.	Risk of deterioration remains until detailed design and construction programming are complete.	
4. Fish	High	-		There will be temporary loss of habitat over the length of the existing drain that lies within the diverted section. - No baseline data are available, but given that this is a minor drain, only minor species will be present. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised and only affect the minor drain.	- The diversion will replicate existing habitat and where possible be designed to include a range of habitats that are suitable for the fish species present The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities.	- Minor hydromorphological effects anticipated with no likely effect on fish communities of small drain.	There will be temporary loss of habitat over the length of the existing drain that lies within the diverted section. - No baseline data are available, but given that this is a minor drain, only minor species will be present. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised and only affect the minor drain.	- The diversion will replicate existing habitat and where possible be designed to include a range of habitats that are suitable for the fish species present The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities.	- Minor hydromorphological effects anticipated with no likely effect on fish communities of small drain.	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	Possible minor reduction in flow with no significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	Only minor and localised changes anticipated.	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.	- Padbury Brook is currently of 'High' WFD status for fish, which supported by the baseline data collected on the main Padbury Brook watercourse, but not on the tributaries. - Important fish populations, including migratory brown trout, are recorded downstream on the Greater Ouse watercourse, which may use this tributary for spawning - A precautionary approach has been adopted and it is considered that there would be a potential deterioration of this WFD element associated with the culverts on Padbury Brook (but not the minor drains, which do not appear to be of importance for fish) - Embedded mitigation measures (i.e. habitat creation immediately upstream and downstream of culverts) may not be sufficient in negating adverse effects to fish migration or loss of habitat.	- impacts on Padbury Brook and its tributaries will be mitigated by constructing temporary diversions in advance (identified in the EIA as 'additional mitigation')	- An assessment of flows and fish passage within culverts must be assessed to inform detailed design of culverts and stream re-alignments. - The detailed design of the culverts with respect to fish passage and other measures (such as monitoring) will be agreed with the Environment Agency.	Risk of deterioration remains until detailed design and construction programming are complete.	
Physico-Chemical status																			
5. Dissolved Oxygen	High	-		N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor locally, with no degradation of the element status anticipated at the scale of the water body.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor locally, with no degradation of the element status anticipated at the scale of the water body.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	Only minor and localised changes anticipated.	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.	Potential minor and localised effects on element.	Monitoring will be required to confirm that the effectiveness of the identified CoCP measures are adequate and that no further measures are required to control the temporary impact of sediment mobilisation	No additional mitigation required	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	
6. pH	High	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.	Receptor is insensitive to impact				
7. Phosphate	Moderate	-		N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	Only minor and localised changes anticipated.	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.	Depending on how much flow is lost, potential minor and localised effects on element.				
8. Ammonia	High	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Only minor and localised changes anticipated.	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.	Potential minor and localised effects on element.				
9. Temperature	-	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.	Receptor is insensitive to impact				
10. Specific Pollutants (Annex VIII)	High	-		N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Only minor and localised changes anticipated.	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.	Potential minor and localised effects on element.				
Hydromorphological status																			**Hydromorphology**
11. Quantity and dynamics of river flow	-	-		N/A	• The extent of new watercourse that would be created, and the possible negative effects of altering existing channel conditions, mean that there would be no significant habitat creation	• Minor diversion of watercourse (lengthening) during extension of existing culvert • Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics • The unnamed tributary drain of Padbury Brook is in practical terms a drainage ditch and represents a small proportion of the water body • Lengthening the channel may reduce flow rates although the diversion is not far from the existing channel course • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of lengthening the watercourse still needs to be flagged as a risk	N/A	• The extent of new watercourse that would be created, and the possible negative effects of altering existing channel conditions, mean that there would be no significant habitat creation	• Diversion of small drains (lengthening) assumed to divert watercourse around cutting. • Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics • The unnamed tributary drain of Padbury Brook is in practical terms a drainage ditch and represents a small proportion of the water body • Lengthening the channel may reduce flow rates although the diversion is not far from the existing channel course • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of lengthening the watercourse still needs to be flagged as a risk	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	N/A	• Reduction of flows in this tributary could cause a localised reduction in flow volumes, depths and dynamics, and consequent reductions in sediment transport (and increased sediment deposition) and reduced out-of-channel habitat connectivity. The effect could be significant for this tributary, but would be buffered as soon as the tributary connects to the larger downstream watercourse so there would not be severe effects at water body scale	N/A	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.	• Watercourse flagged as potential to have cumulative adverse effect on WFD elements due to diversion of main WFD watercourse and extensive culverting of tributaries to Padbury Brook. • Diversion of main WFD watercourse has potential to impact diversity of flow dynamics. The lengthening of the channel may reduce flow rates (velocity and turbulence / mixing / flow aeration) • Majority of the culverts and associated river diversions are on small tributaries to Padbury Brook and are likely to have local impacts on the diversity of flow dynamics and disconnect floodplains which is likely to have combined impacts at times of high flow. The scheme elements are extensive and therefore in combination may have potential to pose adverse effects on hydromorphological elements	~~Undertake hydromorphological surveys to aid detailed design~~ Incorporate hydromorphological measures into detailed design where practicable. Mitigation measures may include: • Bank reprofiling (rehabilitation) • Create reed fringes • Creation of shallow margin in front of hard defence • Install silt, sand or gravel traps • Introduce riparian vegetation/green corridors where space allows • Recreate a sinuous river channel (re-meandering) where space allows • Recreation of gravel bars and riffles using permanent and/or temporary bed structures (increase morphological diversity) • Creation of shallow margin in front of hard defence • Retain marginal vegetation • Use of engineering techniques to assist natural recovery • Use soft engineering techniques		Risk of deterioration remains until detailed design and construction programming are complete.	**Unnamed tributary of Padbury Brook, east of Portway Farm** Baseline survey WFD-HM1-0019 indicated that the tributary is acting as land drainage and is heavily vegetated and dry in areas at the time of the survey. **Unnamed tributary of Padbury Brook, near Cowley Lodge** The quantity and dynamics of flow and morphology are significantly altered by historic land drainage activities; channel was dry at the time of observation and is thought to only develop flow following precipitation **Unnamed tributary of Padbury Brook, parallel to main water body** Baseline survey WFD-HM1-0021 photos show that the tributary in a drainage ditch with very little flow at the time of survey, the channel widens as it flows downstream reducing flow diversity and promoting the deposition of fine sediments that enter the tributary from adjacent fields. Flow and morphology have likely been altered by historic land drainage activities **Padbury Brook** The river through WFD-PA1-0016b was wide with chiefly smooth laminar flow. Bed substrate was an assortment of pebbles, gravels in isolated areas with sand and silt the dominate bed substrate . The variability in flow and morphology dynamics within the channel is likely influenced by existing and historical structures. ~~• Hydromorphology baseline data is derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.~~
12. Connection to Groundwater	-	-		N/A		• Likely to be no significant relationship between hydromorphology and groundwater	N/A		• Likely to be no significant relationship between hydromorphology and groundwater	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	N/A		N/A	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.					
13. River continuity	-	-		N/A		• Lengthening the channel may result in increased channel storage and reduced floodplain connectivity, but the size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected	N/A		• Lengthening the channel may result in increased channel storage and reduced floodplain connectivity, but the size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	N/A		N/A	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.					
14. River depth and width variation bed	-	-		N/A		• The diversion would replicate existing channel geometry. Out of channel flow depths may decrease as a result of lengthening the channel, but in practical terms there would be no significant change	N/A		• The diversion would replicate existing channel geometry. Out of channel flow depths may decrease as a result of lengthening the channel, but in practical terms there would be no significant change	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	N/A		N/A	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.					
15. Structure and substrate of river bed	-	-		N/A		• Lengthening a channel tends to reduce flow rates and increase deposition of sediment • Given the size of the watercourse there would probably be no measurable impact	N/A		• Lengthening a channel tends to reduce flow rates and increase deposition of sediment • Given the size of the watercourse there would probably be no measurable impact	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	N/A		N/A	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.					
16. Structure of riparian zone	-	-		N/A		• Although channel capacity would increase, there is likely to be no net change to existing bank, riparian and floodplain structure and connectivity with channel	N/A		• Although channel capacity would increase, there is likely to be no net change to existing bank, riparian and floodplain structure and connectivity with channel	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	N/A		N/A	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.					

B. Risk screening of potential to prevent future attainment of good Ecolog

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen																	
NONE	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

GB10503038220 Audit Trail

WFD Baseline Survey Details

Water Body ID	GB10503038220
Surface Water Body Name	Padbury Brook
Scheme Element	River Diversion and 2 x Culvert - Unnamed tributary (drain) of Padbury Brook; River Diversion and 2 x Culvert (extensions) - Cutlerbird tributary (drain) of Padbury Brook
Surface Water Crossing ID	SWC-CFULS 1; SWC-CFULS 15; SWC-CFULS 18 and SWC-CFULS 20
Survey Site	Unnamed Tributary of Padbury Brook, east of Fortney Farm
Survey ID	WFD-PA1-0019
Objectives of the Survey	• Establish ecological baseline for tributaries. • Assess ecological habitat type. • Assess the local hydromorphology
Survey Scope	Ecological Walkover Survey Hydromorphological Survey
Medium Term Survey Results Summary — **Bio**	Tributary is a dry drainage ditch where visited, downstream of crossing point at WFD-PA1-0018. No access at crossing point. Likely to have no macrophytes, fish or macroinvertebrates.
Medium Term Survey Results Summary — **Phys**	A dry, overgrown drainage ditch was observed, with no evidence of recent water.
Medium Term Survey Results Summary — **Hydro**	No surveys were possible at the crossing point. Baseline survey WFD-PA1-0018 indicated that the tributary is acting as land drainage and is heavily vegetated and dry in areas at the time of observation. This part of the channel was not directly accessible for full survey, so with limited survey evidence, a precautionary approach is applied and it is considered that minor risks cannot yet be released with sufficient confidence.
Additional Comments	No access to the crossing point due to no landowner permission.

	River Diversion and 2 x Culvert - Unnamed tributary (drain) of Padbury Brook; River Diversion and 2 x Culvert (extensions) - Cutlerbird tributary (drain) of Padbury Brook	Culvert - on Watercourse ETS	Twyford River Viveket - Padbury Brook and tributary north-east of Twyford	Twyford River Viveket, River Diversion and Culvert - on tributary to Padbury Brook north of Twyford	River Diversion - Tributary of Padbury Brook near Thrup Bridge Mill	Culvert and River Diversion - on unnamed watercourse east of Godington	Viveket - Padbury Brook east of Godington/nothing in or within riparian zone of watercourse	River Diversion and Viveket - Padbury Brook east of Godington	Culvert and River Diversion - on unnamed drain north-east of Godington for main River Viveket	Culvert and River Diversion - on unnamed drain near Barton Hartshorn	Culvert - on unnamed watercourse near Barton Hartshorn for access road	River Diversion and 2 x Culvert - Unnamed tributary (drain) of Padbury Brook.	River Diversion and 2 x Culvert (extensions) - Cutlerbird tributary (drain) of Padbury Brook	Barton to Mixbury Cutting	OVERALL EFFECT	RESIDUAL EFFECT
Water Body ID	GB10503038220															
Surface Water Body Name	Padbury Brook															
Scheme Element	River Diversion and 2 x Culvert - Unnamed tributary (drain) of Padbury Brook; River Diversion and 2 x Culvert (extensions) - Cutlerbird tributary (drain) of Padbury Brook	Culvert - on Watercourse ETS	Twyford River Viveket - Padbury Brook and tributary north-east of Twyford	Twyford River Viveket, River Diversion and Culvert - on tributary to Padbury Brook north of Twyford	River Diversion - Tributary of Padbury Brook near Thrup Bridge Mill	Culvert and River Diversion - on unnamed watercourse east of Godington	Viveket - Padbury Brook east of Godington/nothing in or within riparian zone of watercourse	River Diversion and Viveket - Padbury Brook east of Godington	Culvert and River Diversion - on unnamed drain north-east of Godington for main River Viveket	Culvert and River Diversion - on unnamed drain near Barton Hartshorn	Culvert - on unnamed watercourse near Barton Hartshorn for access road	River Diversion and 2 x Culvert - Unnamed tributary (drain) of Padbury Brook.	River Diversion and 2 x Culvert (extensions) - Cutlerbird tributary (drain) of Padbury Brook	Barton to Mixbury Cutting	OVERALL EFFECT	RESIDUAL EFFECT
Surface Water Crossing ID	SWC-CFULS 1; SWC-CFULS 15; SWC-CFULS 18 and SWC-CFULS 20	SWC-CFULS 3	SWC-CFULS 4	SWC-CFULS 5	SWC-CFULS 6	SWC-CFULS 7	SWC-CFULS 8	SWC-CFULS 9	SWC-CFULS 10	SWC-CFULS 11	SWC-CFULS 12	SWC-CFULS 1; SWC-CFULS 15; SWC-CFULS 18 and SWC-CFULS 20	SWC-CFULS 1; SWC-CFULS 15; SWC-CFULS 18 and SWC-CFULS 20	N/A		
Survey Site	Unnamed Tributary of Padbury Brook, east of Fortney Farm	Unnamed Tributary of Padbury Brook, west of Twyford	Unnamed Tributary of Padbury Brook, near Cowley Lodge	Unnamed Tributary of Padbury Brook, near Cowley Lodge	Unnamed Tributary of Padbury Brook, near Cowley Lodge	Unnamed Tributary of Padbury Brook, parallel to main water body	Padbury Brook, south of Twyford	Padbury Brook, south of Twyford	Unnamed Tributary of Padbury Brook, near Rosehill Farm	Unnamed Tributary of Padbury Brook, near Barton Hartshorn	Unnamed Tributary of Padbury Brook, near Barton Hartshorn	Unnamed Tributary of Padbury Brook, near Barton Hartshorn	Unnamed Tributary of Padbury Brook, near Barton Hartshorn	No Groundwater Survey WFD-PA1-0017a, WFD-PA1-0017b		
Survey ID	WFD-PA1-0019	WFD-PA1-0019	WFD-PA1-0016, WFD-PA1-0016a, WFD-PA1-0016b, WFD-PA1-0016B	WFD-PA1-0020a	WFD-PA1-0020b	WFD-PA1-0021	WFD-PA1-0016c, WFD-PA1-0016d, WFD-PA1-0016e, WFD-PA1-0016f	WFD-PA1-0016c, WFD-PA1-0016d, WFD-PA1-0016e, WFD-PA1-0016f	WFD-PA1-0022	WFD-PA1-0017c, WFD-PA1-0017	WFD-PA1-0017e	WFD-PA1-0017a	WFD-PA1-0017b	WFD-PA1-0017a		
Objectives of the Survey	• Establish ecological baseline for tributaries. • Assess ecological habitat type. • Assess the local hydromorphology	• Establish ecological baseline for tributaries. • Assess ecological habitat type. • Assess the local hydromorphology	• Update ecological baseline for Padbury Brook. • Establish ecological baseline for tributaries. • Assess ecological habitat type. • Assess the local hydromorphology	• Establish ecological baseline for tributaries. • Assess ecological habitat type. • Assess the local hydromorphology	• Establish ecological baseline for tributaries. • Assess ecological habitat type. • Assess the local hydromorphology	• Establish ecological baseline for tributaries. • Assess ecological habitat type. • Assess the local hydromorphology	• Update ecological baseline for Padbury Brook. • Establish ecological baseline for tributaries. • Assess ecological habitat type. • Assess the local hydromorphology	• Update ecological baseline for Padbury Brook. • Establish ecological baseline for tributaries. • Assess ecological habitat type. • Assess the local hydromorphology	• Establish ecological baseline for tributaries. • Assess ecological habitat type. • Assess the local hydromorphology	• Establish ecological baseline for tributaries. • Assess ecological habitat type. • Assess the local hydromorphology	• Establish ecological baseline for tributaries. • Assess ecological habitat type. • Assess the local hydromorphology	• Establish ecological baseline for tributaries. • Assess ecological habitat type. • Assess the local hydromorphology	• Establish ecological baseline for tributaries. • Assess ecological habitat type. • Assess the local hydromorphology			
Survey Scope	Ecological Walkover Survey Hydromorphological Survey	Ecological Walkover Survey Hydromorphological Survey	Ecological Walkover Survey Hydromorphological Survey Macrophyte Survey Macroinvertebrate Survey Fish Survey	Ecological Walkover Survey Hydromorphological Survey	Ecological Walkover Survey Hydromorphological Survey	Ecological Walkover Survey Hydromorphological Survey	Ecological Walkover Survey Hydromorphological Survey Macrophyte Survey Macroinvertebrate Survey Fish Survey	Ecological Walkover Survey Hydromorphological Survey Macrophyte Survey Macroinvertebrate Survey Fish Survey	Ecological Walkover Survey Hydromorphological Survey	Ecological Walkover Survey Hydromorphological Survey Macroinvertebrate Survey	Ecological Walkover Survey Hydromorphological Survey	Ecological Walkover Survey Hydromorphological Survey	Ecological Walkover Survey Hydromorphological Survey			
Medium Term Survey Results Summary — **Bio**	Tributary is a dry drainage ditch where visited, downstream of crossing point at WFD-PA1-0018. No access at crossing point. Likely to have no macrophytes, fish or macroinvertebrates.	Tributary is a field drainage ditch at WFD-PA1-0019, the location of the crossing. It was damp at the time of the survey. Overgrown scrub. Tall aquatics were observed. Potentially suitable habitat for macrophytes and invertebrates but can tolerate drought. Not suitable for fish.	Padbury Brook at WFD-PA1-0016 has a wide flowing channel, which is modified for at least three mill structures. Sand and gravel substrates. Good habitat diversity. Moderate macroinvertebrate quality (Moderate RICT class) at WFD-PA1-0016, with moderate diversity, and presence of a few pollution sensitive taxa (Polycentropodidae, Hydropsychidae), with however relatively high numbers of Chironomidae and very high Baetidae abundance. Moderate life score, indicative of relatively slow flows and PSI score indicative of Sedimented conditions. Relatively high macrophyte diversity (16 species recorded) at WFD-PA1-0016, with only common species. Presence of invasive non-native Elodea canadensis. No salmonid species present in WFD-PA1-0016, trash, pike, gudgeon, chub, dace, perch recorded.	Tributary is a dry drainage ditch where accessible, downstream of crossing point at WFD-PA1-0020b. Heavily vegetated with terrestrial vegetation. No access at crossing point. Likely to be unsuitable for macrophytes, macroinvertebrates and fish.	Tributary is a dry drainage ditch where accessible, downstream of crossing point. Heavily vegetated with terrestrial vegetation. No access at crossing point. Likely to be unsuitable for macrophytes, macroinvertebrates and fish.	Tributary is a drainage ditch with very low flows. Lightly shaded. Some macrophytes observed in channel, and downstream of crossing point, the channel is clean, and support aquatic macrophyte communities. No further baseline data for macroinvertebrate but likely to have potential to support macroinvertebrate communities. No further baseline data for fish but likely to be unsuitable given the low flows.	Baseline survey WFD-PA1-0021 photos show that the tributary is a drainage ditch with very little flow at the time of survey. The channel widens as it flows downstream, promoting deposition of fine sediments that appear to enter the tributary from adjacent fields. Flow and morphology have been altered by historic land drainage activities. Comments have also been added for habitat creation for the river diversion, but given the survey reports of existing field conditions, it is considered unlikely that significant morphological dynamics and diversity could be created in what is effectively a field drain.	Tributary is a drainage ditch with very low flows, lightly shaded. Some macrophytes observed in channel, and downstream of crossing point, the channel is clean, and support aquatic macrophyte communities. No further baseline data for macroinvertebrate but likely to have potential to support macroinvertebrate communities. No further baseline data for fish but likely to be unsuitable given the low flows.	The watercourse observed was lightly shaded (<30%) from marginal vegetation and hedgerows, but is mostly an open field hedgerow ditch. Little water, low flow and stagnant. Temp = 16 deg C pH = 8.3 Conductivity = 478 µS	The watercourse observed was moderately shaded (30 - 70%) in areas from bankside trees and scrub. Medium flow, slightly turbid with numerous small tributaries from field drainage. Physico-chemical parameters measured at survey point WFD-DT1-0016a: Temp = 16 deg C pH = 8.3 Conductivity = 478 µS	The watercourse observed was moderately shaded (30-70%) from bankside vegetation, trees and hedgerows. Low flow, moderately turbid tributary of the main Padbury Brook watercourse.	The watercourse observed was moderately shaded (30%-70%) from bankside vegetation, trees and hedgerows. Low flow, moderately turbid tributary of the main Padbury Brook watercourse. Survey WFD-HM1-0022 describes a modified and straightened channel, and raised banks, resulting in reduced flow and morphology diversity. Channel modifications are considered to have caused excess deposition of fine sediment on the bed, as shown in survey photos.	The watercourse observed was heavily shaded (>70%) of low flow but good water clarity.	The watercourse observed was heavily shaded (>70%) of low flow but good water clarity.	The watercourse observed was moderately shaded (30% - 70%) of low flow and moderate turbidity.	The watercourse observed was moderately shaded (30% - 70%) of low flow and moderate turbidity.	The watercourse observed was moderately shaded (30% - 70%) of low flow and moderate turbidity.	The watercourse observed was moderately shaded (30% - 70%) of low flow and moderate turbidity.			
Medium Term Survey Results Summary — **Phys**	A dry, overgrown drainage ditch was observed, with no evidence of recent water.	A dry (damp) narrow channel, acting primarily as field drainage ditch, was observed.	The watercourse observed was lightly shaded (<30%) in areas from bankside trees and scrub. Low flowing, moderately turbid with numerous small tributaries from field drainage. Physico-chemical parameters measured at survey point WFD-DT1-0016b: Temp = 16 deg C pH = 8.34 Temp = 17.4 deg C Conductivity = 691 µs	A dry drainage ditch with no evidence of recent water, was observed. Channel flow is ephemeral.	A dry drainage ditch with no evidence of recent water, was observed. Channel flow is ephemeral.	The watercourse observed was lightly shaded (<30%) from marginal vegetation and hedgerows, but is mostly an open field hedgerow ditch. Little water, low flow and stagnant. Temp = 16 deg C pH = 8.3 Conductivity = 478 µS	The watercourse observed was moderately shaded (30 - 70%) in areas from bankside trees and scrub. Medium flow, slightly turbid with numerous small tributaries from field drainage. Physico-chemical parameters measured at survey point WFD-DT1-0016a: Temp = 16 deg C pH = 8.3 Temp = 16 deg C Conductivity = 478 µS	The watercourse observed was moderately shaded (30%-70%) from bankside vegetation, trees and hedgerows. Low flow, moderately turbid tributary of the main Padbury Brook watercourse. Survey WFD-PA1-0016b shows a wide channel with smooth laminar flow. Bed substrates are an assortment of pebbles and gravels in isolated areas, but dominated by fine sediment. Flow and morphology have been altered by historic land drainage activities within the channel appears to be influenced by existing and historical structures.	The watercourse observed was heavily shaded (>70%) of low flow but good water clarity.	The watercourse observed was heavily shaded (>70%) of low flow but good water clarity.	The baseline survey indicated that sections of the channel have been artificially modified including bank reinforcement. Although there are discrete short reaches that do have flow and bed diversity, the river has a generally trapezoidal shape with laminar flow and significant fine sediment deposition

Water Body ID	GB105033038210
Surface Water Body Name	Padbury Brook (The Twins)
CFAs covered by Waterbody	13, 14

CFA	14
AP2 ID	AP-C222-209
AP2 Name	Newton Purcell Culvert
AP2 Location	Newton Purcell to Brackley
New/Replacement Scheme Element	REPLACEMENT
Scheme Element Type	Culvert and Diversion
Original Scheme	Erection of 3 culverts and Channel diversion on Unnamed tributary to Padbury Brook (SWC-CFA14-1, SWC-CFA14-10, SWC-CFA14-11, SWC-CFA14-13). Diversion required and culvert of approx. 40m constructed 30m north of unnamed tributary. Surface water flow diverted to drain from north and south. Additional culvert (64m) constructed underneath new highway at Newton Purcell.
AP2 Description	Newton Purcell culvert outfall will be relocated (SWC-CFA14-1) and the ditch which the outfall leads into will have to be deepened (SWC-CFA14-10) to accommodate the crossing beneath the rail drainage. The ditch will tie into the original ditch profile. The other scheme elements (culvets) on this tributary (SWC-CFA14-11 and SWC-CFA14-13) remain unchanged.
AP2 Changes to Previously Assessed Elements	Culvert length increased at crossing SWC-CFA14-1
AP2 Additional Elements Assessment Requirement	New/diverted river channel at SWC-CFA14-10

GB105033038210 WFD Assessment

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements
GB105033038210	Moderate	Good Ecological Potential by 2015	
Description of scheme element impact			
Identified biological impacts			
WFD classification elements	Predicted change to status elements (green = pass, amber = possibly not at risk, red = fail)		
1. Macrophytes and phytobenthos - diatoms	N/A	N/A	
2. Macrophytes and phytobenthos - macrophytes	-	-	
3. Macroinvertebrates	Good	-	
4. Fish	-	-	
Physico-Chemical status			
5. Dissolved Oxygen	High	-	
6. pH	High	-	
7. Phosphate	Moderate	-	
8. Ammonia	High	-	
9. Temperature	-	-	
10. Specific Pollutants (Annex VIII)	High	-	
Hydromorphological status			
11. Quantity and dynamics of river flow	-	-	
12. Connection to Groundwater	-	-	
13. River continuity	-	-	
14. River depth and width variation bed	-	-	
15. Structure and substrate of river bed	-	-	
16. Structure of riparian zone	-	-	

Culvert - S75 [tributary of Padbury Brook] near Portway Farm

Construction on S75 [tributary of Padbury Brook] near Portway Farm (SWC-CFA13-2, SWC-CFA13-17, SWC-CFA13-18, SWC-CFA13-20). Extension of existing railway culvert. New culvert on the access road south of Portway Farm. Perry Road HE overbridge foundation works. Realignment and widening of bridge. New Culvert and diversion under route north of Portway Farm including access roads (SWC-CFA13-2). Drainage water discharge from balancing ponds. Length of culverts = 57m + 28m + 8m + 84m.

Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
1. Macrophytes and phytobenthos - diatoms	N/A	N/A	N/A	N/A	N/A
2. Macrophytes and phytobenthos - macrophytes	Receptor is insensitive to impact	Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. Although access was limited, walkover surveys indicate that the ditch was dry and is of low value to macrophytes. It is a man made feature and the culvert would not impact on deterioration of water body status. Loss of habitat is a small drain that is already modified and culverted, therefore only minor and localised effects on macrophytes, with no effect on the WFD status of this element. (as a worst case scenario, if for example there are isolated pockets of high potential for macroinvertebrates)	Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. Although access was limited, walkover surveys indicate that the ditch was dry and is of low value to macrophytes. As this is only a small drain that is already modified and culverted, the impacts are considered to be minor (as a worst case scenario, if for example there are isolated pockets of high potential for macrophytes)	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream: Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel) to the culvert may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream). Although access was limited, walkover surveys indicate that the ditch was dry and is of low value to macrophytes. This is a small drain that is already modified and culverted, therefore only minor and localised effects are anticipated (as a worst case scenario, if for example there are isolated pockets areas with higher potential for macrophytes)	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
3. Macroinvertebrates	Receptor is insensitive to impact	Landtake will lead to direct loss of macroinvertebrates and reduce the availability of macroinvertebrate habitats within the culvert. Although access was limited, walkover surveys indicate that the ditch was dry and is of low value to invertebrates. It is a man made feature and the culvert would not impact on deterioration of water body status.	Possible indirect effects on macroinvertebrates if macrophytes are lost due to shading. Although access was limited, walkover surveys indicate that the ditch was dry and is of low value to macrophytes. This is a small drain that is already modified and culverted, therefore only minor and localised effects on invertebrates, (modified and culverted, there would be no effects or negligible effects on invertebrates.	Although access was limited, walkover surveys indicate that the ditch was dry and is of low value to invertebrates. This would only be affect a limited length of the minor tributary and potential effects are considered to be minor and localised. (as a worst case scenario, if for example there are isolated pockets areas with higher potential for macroinvertebrates)	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
4. Fish	Dry drainage ditch, with no value for fish. No effects anticipated.	Dry drainage ditch, with no value for fish. No effects anticipated.	Shading will only have negligible or no effects on fish.	Dry drainage ditch, with no value for fish. No effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
5. Dissolved Oxygen	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to be a localised effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoSP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoSP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
6. pH	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
7. Phosphate	N/A	N/A	Receptor is insensitive to impact	• CoSP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact
8. Ammonia	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
9. Temperature	N/A	N/A	Due to the length of the culverts, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact
10. Specific Pollutants (Annex VIII)	N/A	N/A	Receptor is insensitive to impact	• CoSP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoSP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
11. Quantity and dynamics of river flow	N/A	N/A	N/A	• Full survey data is not available, so rates cannot be closed out with any confidence. There could be a potential severity of flow dynamics. • Out of bank flows would be cut off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in increased flow velocities due to increased flow velocities due to increased channel gradients and decreased roughness. • Loss of habitat is a small drain that is already a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A
12. Connection to Groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A
13. River continuity	N/A	N/A	N/A	• Full survey data is not available, so rates cannot be closed out with any confidence. • The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and sediment pathways, within and adjacent to both sides of the channel. • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A
14. River depth and width variation bed	N/A	N/A	N/A	• Full survey data is not available, so rates cannot be closed out with any confidence. • Out of bank flows would be severed by the culvert, and in channel flows may become deeper than natural peak flows, and may even surcharge in extreme events. • This culvert would change channel morphology. • Scour adjacent to the structure upstream and downstream could result in shallowing and increased velocity and depth. Impacts are considered minor. • The size of the channel suggests there could be significant loss of diversity in river depth and width, and this is a risk.	• The extent of new watercourse that would be created, and the possible negative effects of altering existing channel conditions, that there would be no significant habitat creation
15. Structure and substrate of river bed	N/A	N/A	N/A	• Full survey data is not available, so rates cannot be closed out with any confidence. • The size of the channel is effectively a drainage ditch with no suggests that there is a risk of loss of diversity in river depth and transport or scour, but bed structure could be homogenised. • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A
16. Structure of riparian zone	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and effectively sever existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A

River Diversion - S75 [tributary of Padbury Brook] near Portway Farm

Realignment of watercourse during widening of bridge and new culvert and diversion under route north of Portway Farm including access roads (SWC-CFA13-2, SWC-CFA13-17, SWC-CFA13-18 and SWC-CFA13-20).

Identified biological impacts	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
1. Macrophytes and phytobenthos - diatoms	N/A	N/A	N/A	N/A
2. Macrophytes and phytobenthos - macrophytes	There will be loss of marginal and channel macrophytes over the ~100m length of the existing drain that lies within the footprint of the culvert. Although access was limited, walkover surveys indicate that the ditch was dry and is of low value to macrophytes. community will re-establish within 1 to 2 years of completion of the scheme. There is the potential for impacts during construction (e.g. release of suspended solids), which may result in temporary increase in nutrient resources and the CoCP. Effects will be temporary and localised and only affect the minor drain.	The new channel will replicate existing habitat and where possible encourage emergent macrophyte species. This is likely to be a beneficial effect on the WFD element as there is limited potential for improvements to have a measurable effect on macrophytes and therefore there is no likely beneficial effect on this WFD element	No hydromorphological effects on macrophytes anticipated
3. Macroinvertebrates	There will be temporary loss of habitat and reduced availability of habitats for macroinvertebrates within the culvert. Although access was limited, walkover surveys indicate that the ditch was dry and is of low value to invertebrates. This would only be affect a limited length of the minor tributary and potential effects are considered to be minor and localised. (as a worst case scenario, if for example there are isolated pockets areas with higher potential for macroinvertebrates)	The diversion will replicate existing habitat and where possible will be designed to include a range of channel features to create a diverse habitat. This is likely to be a beneficial effect on the WFD element as there is limited potential for improvements to have a measurable effect on macroinvertebrates and therefore there is no likely beneficial effect on this WFD element	No hydromorphological effects anticipated on macroinvertebrates communities
4. Fish	Dry drainage ditch, with no value for fish. No effects anticipated.	Dry drainage ditch, with no value for fish. No effects anticipated.	No hydromorphological effects anticipated and therefore no effect on fish communities
5. Dissolved Oxygen	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to be a localised effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoSP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoSP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
6. pH	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
7. Phosphate	N/A	Receptor is insensitive to impact	• CoSP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoSP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
8. Ammonia	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
9. Temperature	N/A	Due to the length of the culverts, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact
10. Specific Pollutants (Annex VIII)	N/A	Receptor is insensitive to impact	• CoSP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoSP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
11. Quantity and dynamics of river flow	N/A	N/A	• Survey report indicates that the watercourse is realigned through a culvert and weir structure, embankment, and was dry at the time of observation. Channel width appears to be approximately 0.5 m, with significant vegetation growth in the channel, so this is effectively a field drain with no significant diversity of flow dynamics. • 57m of channel length will be lost, but in practical terms represents a small proportion of the water body. • Lengthening the channel may reduce flow rates although the effect is considered to be minor and only affecting a small drain. • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, with flows not present all year round	N/A
12. Connection to Groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A
13. River continuity	N/A	N/A	N/A	• Lengthening the channel may result in increased channel storage and reduced connectivity, but the size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected	N/A
14. River depth and width variation bed	N/A	N/A	N/A	• The diversion would replicate existing channel geometry. Out of channel flow depths may decrease as a result of lengthening the channel, but in practical terms there would be no significant change	N/A
15. Structure and substrate of river bed	N/A	N/A	N/A	• Lengthening a channel tends to reduce flow rates and increase depth and sediment deposition. • Given the size of the watercourse there would probably be no measurable impact	N/A
16. Structure of riparian zone	N/A	N/A	N/A	• Although channel capacity would increase, there is likely to be no net change to existing bank, riparian and floodplain structure and connectivity with channel	N/A

Culvert - on Watercourse S76

New Culvert under Twyford Embankment on Watercourse S76 (SWC-CFA13-3) named Twyford East Embankment culvert. Length of watercourse covered by construction = 50m.

Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
1. Macrophytes and phytobenthos - diatoms	N/A	N/A	N/A	N/A	N/A
2. Macrophytes and phytobenthos - macrophytes	Receptor is insensitive to impact	Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. There is also the potential for impacts during construction (e.g. release of suspended solids), which may result in temporary increase in nutrient resources and the CoCP. Baseline data suggests that this is damp drainage ditch with limited potential for macrophytes and as this is a short culvert on a minor tributary only minor and localised effects are anticipated.	Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities. Baseline data suggests that this is damp drainage ditch with limited potential for macrophytes and as this is a short culvert on a minor tributary only minor and localised effects are anticipated.	Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel) to the culvert may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream). There is also the potential for impacts during construction (e.g. release of suspended solids), which may result in temporary increase in nutrient resources and the CoCP. Baseline data suggests that this is damp drainage ditch with limited potential for macrophytes and as this is a short culvert on a minor tributary only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
3. Macroinvertebrates	Receptor is insensitive to impact	Landtake will lead to direct loss of macroinvertebrates and reduce the availability of macroinvertebrate habitats within the culvert. Baseline data suggests that this is damp drainage ditch with limited potential for macroinvertebrates and as this is a short culvert on a minor tributary and only minor and localised effects are anticipated.	No anticipated effects, due to insignificant changes in hydromorphological regime.	Localised changes in flow dynamics may result in changes in macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediate downstream). This would only be affect a limited distance of the minor tributary and potential effects are considered to be minor and localised.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
4. Fish	Dry drainage ditch, with no value for fish. No effects anticipated.	Dry drainage ditch, with no value for fish. No effects anticipated.	No anticipated effects, due to insignificant changes in hydromorphological regime.	Dry drainage ditch, with no value for fish. No effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
5. Dissolved Oxygen	N/A	N/A	• Some shading with negligible/no effect.	• CoSP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoSP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Cascading design is effectively an open span bridge, so there would be no impact on dissolved oxygen.
6. pH	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
7. Phosphate	N/A	N/A	Receptor is insensitive to impact	• CoSP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact
8. Ammonia	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
9. Temperature	N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact
10. Specific Pollutants (Annex VIII)	N/A	N/A	Receptor is insensitive to impact	• CoSP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoSP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Cascading design is effectively an open span bridge, so there would be no impact on specific pollutants.
11. Quantity and dynamics of river flow	N/A	N/A	N/A	• There was no survey information recorded at the crossing point, but channel was approximately 0.5m wide with no visible flow at the time of the summer survey. • There was no evidence of or potential for severity of flow dynamics. Channel is likely to be ephemeral with flows only occurring during storm events. • Out of bank flows would be cut off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in increased flow velocities due to increased flow velocities due to increased channel gradients and decreased roughness. • 57m is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body. • However, with limited survey evidence, a precautionary approach is applied and it is considered that the minor risk cannot yet be removed with sufficient confidence	N/A
12. Connection to Groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A
13. River continuity	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and sediment pathways, within and adjacent to both sides of the channel. • However, the survey report indicates that the channel was dry at the time of observation and is effectively a drainage ditch. • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status. • However, with limited survey evidence, a precautionary approach is applied and it is considered that the minor risk cannot yet be removed with sufficient confidence	N/A
14. River depth and width variation bed	N/A	N/A	N/A	• The survey reports that the channel was dry at the time of observation and is effectively a small drainage ditch. • In water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status. • However, with limited survey evidence, a precautionary approach is applied and it is considered that the minor risk cannot yet be removed with sufficient confidence	N/A
15. Structure and substrate of river bed	N/A	N/A	N/A	• The survey reports that the channel is effectively a drainage ditch with no significant bed substrate. • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk. • With limited survey evidence, a precautionary approach is applied and it is considered that the minor risk cannot yet be removed with sufficient confidence	N/A
16. Structure of riparian zone	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and effectively sever existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A

Viaduct - Padbury Brook and trib north-east of Twyford

Viaduct crossing Padbury Brook (SWC-CFA13-4) and a small (drain) trib (SWC-CFA13-5) north East of Twyford. No footings in channel of either watercourse, but the small drain will require a short diversion (< 50 m), assessed separately.

Identified biological impacts	Noise and vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
1. Macrophytes and phytobenthos - diatoms	N/A	N/A	N/A	N/A	N/A
2. Macrophytes and phytobenthos - macrophytes	Receptor is insensitive to impact	The viaduct will not constrict flow and piers will be located outside of the main channel. The footings may be near to the bank but will not result in the loss of marginal or channel habitats. The impact of the diversion is considered separately.	Baseline surveys indicate rich and diverse macrophyte communities in the vicinity. Shading will have a significant component of shading from the viaduct structure. Following baseline survey, this is considered to be localised and minor	• CoSP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.
3. Macroinvertebrates	Receptor is insensitive to impact	The viaduct will not constrict flow and piers will be located outside of the main channel. The footings may be near to the bank but will not result in the loss of marginal or channel habitats. The impact of the diversion is considered separately.	Macroinvertebrate community may be slightly altered due to shading from the viaduct structure, which form a significant component of shading. Following baseline survey, this is considered to be localised and minor	• CoSP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.
4. Fish	Dams drainage ditch, with no value for fish. No effects anticipated.	Dams drainage ditch, with no value for fish. No effects anticipated.	Dams drainage ditch, with no value for fish. No effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	• Possible temporary sub lethal effects on fish (e.g. displacement of fish from the site). Baseline survey showed a moderate diversity of mixed fish species and good habitat. Effects are likely to be temporary and localised.
5. Dissolved Oxygen	N/A	N/A	N/A	• CoSP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoSP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Cascading design is effectively an open span bridge, so there would be no impact on dissolved oxygen.
6. pH	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
7. Phosphate	N/A	N/A	Receptor is insensitive to impact	• CoSP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoSP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Cascading design is effectively an open span bridge, so there would be no impact on phosphate.
8. Ammonia	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
9. Temperature	N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact
10. Specific Pollutants (Annex VIII)	N/A	N/A	Receptor is insensitive to impact	• CoSP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoSP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Cascading design is effectively an open span bridge, so there would be no impact on specific pollutants.
11. Quantity and dynamics of river flow	N/A	N/A	N/A	• There was no survey information recorded at the crossing point, but channel was approximately 0.5m wide with no visible flow at the time of the summer survey. • There was no evidence of or potential for severity of flow dynamics. • Out of bank flows would be cut off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in increased flow velocities due to increased flow velocities due to increased channel gradients and decreased roughness. • 57m is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body. • However, with limited survey evidence, a precautionary approach is applied and it is considered that the minor risk cannot yet be removed with sufficient confidence	N/A
12. Connection to Groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A
13. River continuity	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and sediment pathways, within and adjacent to both sides of the channel. • However, the survey report indicates that the channel was dry at the time of observation and is effectively a drainage ditch. • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status. • However, with limited survey evidence, a precautionary approach is applied and it is considered that the minor risk cannot yet be removed with sufficient confidence	N/A
14. River depth and width variation bed	N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant platform change that would have a significant impact on aquatic species/ habitat. • Overall, there would probably be no hydromorphological impact	• The survey reports that this is effectively a drainage ditch with flows only developing following precipitation. • The size of the channel means there is unlikely to be significant loss of diversity in river depth and width. • Out of bank flows would be severed by the culvert, and in channel flows may become deeper than natural peak flows, and may even surcharge in extreme events. However, the culvert is effectively a drainage ditch with flows only developing following precipitation, so it would have no significant morphological value. • The size of the channel suggests there would not be significant loss of diversity in river depth and width
15. Structure and substrate of river bed	N/A	N/A	N/A	• The survey reports that this is effectively a drainage ditch with flows only developing following precipitation. • The size of the channel means there is unlikely to be significant loss of diversity in river depth and width. • The culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour. the survey report indicates that this is a drainage ditch. • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk
16. Structure of riparian zone	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and effectively sever existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	• The culvert would disconnect the channel from the vegetated riparian zones and effectively sever existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status

Culvert - on tributary to Padbury Brook north of Twyford

New Culvert on access road at Twyford Viaduct (SWC-CFA13-5) - approximately 40m of watercourse covered by construction.

Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
1. Macrophytes and phytobenthos - diatoms	N/A	N/A	N/A	N/A	N/A
2. Macrophytes and phytobenthos - macrophytes	Receptor is insensitive to impact	Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. Although access was limited, walkover surveys indicate that the ditch was dry and is of low value to macrophytes. It is a man made feature and the culvert would not impact on deterioration of water body status. Loss of habitat is a small drain that is already modified and culverted, therefore only minor and localised effects on macrophytes, with no effect on the WFD status of this element. (as a worst case scenario, if for example there are isolated pockets of high potential for macrophytes)	Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities. Although access was limited, walkover surveys indicate that the ditch was dry and is of low value to macrophytes. This is a small drain that is already modified and culverted, therefore only minor and localised effects are anticipated (as a worst case scenario, if for example there are isolated pockets areas with higher potential for macrophytes)	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream: Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel) to the culvert may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream). Although access was limited, walkover surveys indicate that the ditch was dry and is of low value to macrophytes. This is a small drain that is already modified and culverted, therefore only minor and localised effects are anticipated (as a worst case scenario, if for example there are isolated pockets areas with higher potential for macrophytes)	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
3. Macroinvertebrates	Receptor is insensitive to impact	Landtake will lead to direct loss of macroinvertebrates and reduce the availability of macroinvertebrate habitats within the culvert. Although access was limited, walkover surveys indicate that the ditch was dry and is of low value to invertebrates. This would only be affect a limited length of the minor tributary and potential effects are considered to be minor and localised. (as a worst case scenario, if for example there are isolated pockets areas with higher potential for macroinvertebrates)	Possible indirect effects on macroinvertebrates if macrophytes are lost due to shading. Although access was limited, walkover surveys indicate that the ditch was dry and is of low value to macrophytes. This is a small drain that is already modified and culverted, therefore only minor and localised effects on invertebrates, with no effect on the WFD status of this element. (as a worst case scenario, if for example there are isolated pockets of high potential for macroinvertebrates)	Although access was limited, walkover surveys indicate that the ditch was dry and is of low value to invertebrates. This would only be affect a limited length of the minor tributary and potential effects are considered to be minor and localised. (as a worst case scenario, if for example there are isolated pockets areas with higher potential for macroinvertebrates)	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
4. Fish	Dry drainage ditch, with no value for fish. No effects anticipated.	Dry drainage ditch, with no value for fish. No effects anticipated.	Dry drainage ditch, with no value for fish. No effects anticipated.	Dry drainage ditch, with no value for fish. No effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
5. Dissolved Oxygen	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to be a localised effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoSP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoSP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
6. pH	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
7. Phosphate	N/A	Receptor is insensitive to impact	• CoSP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact
8. Ammonia	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
9. Temperature	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact
10. Specific Pollutants (Annex VIII)	N/A	Receptor is insensitive to impact	• CoSP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoSP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
11. Quantity and dynamics of river flow	N/A	N/A	N/A	• The survey walkover report indicated that the channel width is approximately 1m with evidence of the wetlands exposition, leading to an aggrading systems with a low potential for severity of flow dynamics. • Out of bank flows would be cut off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in increased flow velocities due to increased channel gradients and decreased roughness. • The unnamed drain in Padbury Brook is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body.
12. Connection to Groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A
13. River continuity	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and sediment pathways, within and adjacent to both sides of the channel. • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A
14. River depth and width variation bed	N/A	N/A	N/A	• Out of bank flows would be severed by the culvert, and in channel flows may become deeper than natural peak flows, and may even surcharge in extreme events. • The culvert base suggests there would not be significant loss of diversity in river depth and width	N/A
15. Structure and substrate of river bed	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour. • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A
16. Structure of riparian zone	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and effectively sever existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A

Culvert - on unnamed drain running parallel to Padbury Brook

New Culvert for access road at Twyford Viaduct (SWC-CFA13-5) - approximately 80m of watercourse covered by construction.

Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
1. Macrophytes and phytobenthos - diatoms	N/A	N/A	N/A	N/A	N/A
2. Macrophytes and phytobenthos - macrophytes	Receptor is insensitive to impact	Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. Although access was limited, walkover surveys indicate that the ditch was dry and is of low value to macrophytes. It is a man made feature and the culvert would not impact on deterioration of water body status. Loss of habitat is a small drain that is already modified and culverted, therefore only minor and localised effects on macrophytes, with no effect on the WFD status of this element. (as a worst case scenario, if for example there are isolated pockets of high potential for macrophytes)	Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. Although access was limited, walkover surveys indicate that the ditch was dry and is of low value to macrophytes. This is a small drain with limited macrophytes and the impacts would not affect the wider water body. Therefore only minor and localised effects are anticipated.	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream: Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel) to the culvert may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream). Although access was limited, walkover surveys indicate that the ditch was dry and is of low value to macrophytes. This is a small drain with limited macrophytes and the impacts would not affect the wider water body. Therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
3. Macroinvertebrates	Receptor is insensitive to impact	Landtake will lead to direct loss of macroinvertebrates and reduce the availability of macroinvertebrate habitats within the culvert. Although access was limited, walkover surveys indicate that the ditch was dry and is of low value to invertebrates. This would only be affect a limited length of the minor tributary and potential effects are considered to be minor and localised. (as a worst case scenario, if for example there are isolated pockets areas with higher potential for macroinvertebrates)	Possible indirect effects on macroinvertebrates if macrophytes are lost due to shading. Although access was limited, walkover surveys indicate that the ditch was dry and is of low value to macrophytes. This is a small drain that is already modified and culverted, therefore only minor and localised effects on invertebrates, with no effect on the WFD status of this element. (as a worst case scenario, if for example there are isolated pockets of high potential for macroinv

GB105030338210 AP2 Assessment

A. Risk screening of potential to cause deterioration of current WFD Ecolog

Surface Water body	Current status	Status objective	Scheme Elements
GB105030338210	Moderate	Good Ecological Potential by 2015	
Description of scheme element impact			
Padbury Brook (The Twins)			

Padbury Brook East of Godington(footings in or within riparian zone of watercourse)

Identified biological impacts	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
1. Macrophytes and phytobenthos: diatoms	N/A	N/A	N/A	N/A
2. Macrophytes and phytobenthos: macrophytes	-	-	-	-
3. Macroinvertebrates	Good	-	-	-
4. Fish	High	-	-	-
Predicted change to status elements (green = none, amber = possible, red = likely)				
5. Dissolved Oxygen	High	N/A	• Some shading with negligible/no effect.	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.
6. pH	High	N/A	N/A	Receptor is insensitive to impact
7. Phosphate	Moderate	N/A	N/A	as open span bridge, so there would
8. Ammonia	High	-	N/A	Receptor is insensitive to impact
9. Temperature	-	-	Some shading with negligible/no effect.	Receptor is insensitive to impact
10. Specific Pollutants (Annex VIII)	-	-	N/A	N/A
WFD classification elements				
11. Quantity and dynamics of river flow	-	-	N/A	N/A
12. Connection to Groundwater	-	-	N/A	N/A
13. River continuity	-	-	N/A	N/A
14. River depth and width variation bed	-	-	N/A	N/A
15. Structure and substrate of river bed	-	-	N/A	N/A
16. Structure of riparian zone	-	-	N/A	N/A
Predicted change to status elements (green = none, amber = possible, red = likely)				
Hydromorphological status				
11. Quantity and dynamics of river flow	-	-	N/A	N/A
12. Connection to Groundwater	-	-	N/A	N/A
13. River continuity	-	-	N/A	N/A
14. River depth and width variation bed	-	-	N/A	N/A
15. Structure and substrate of river bed	-	-	N/A	N/A
16. Structure of riparian zone	-	-	N/A	N/A

River Diversion - Padbury Brook east of Godington

Identified biological impacts	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream
1. Macrophytes and phytobenthos: diatoms	N/A	N/A	N/A
2. Macrophytes and phytobenthos: macrophytes	-	-	-
3. Macroinvertebrates	-	-	-
4. Fish	High	-	-
Predicted change to status elements (green = none, amber = possible, red = likely)			
5. Dissolved Oxygen	N/A	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be localised to within the channel and to be water body scale. • The new channel can provide when re-established, (natural/naturally channed) (dissolved oxygen levels. Overall effect likely to be minor. This is a small stretch of channel in the element status anticipated at the scale of the water body.
6. pH	N/A	N/A	Receptor is insensitive to impact
7. Phosphate	N/A	N/A	Receptor is insensitive to impact
8. Ammonia	N/A	N/A	Receptor is insensitive to impact
9. Temperature	N/A	N/A	Receptor is insensitive to impact
10. Specific Pollutants (Annex VIII)	N/A	N/A	Receptor is insensitive to impact
WFD classification elements			
11. Quantity and dynamics of river flow	N/A	N/A	• This diversion will be a small realignment of Padbury Brook adjacent to existing A1 alignment. • Survey WFD-PAG-00106 shows a wide channel with some flow diversity, and high flow velocity variability. In flow and morphology within the channel, although this appears to be influenced by the A1 and historical structures, suggesting there is a risk of impact if new structures are located in riparian zones, or if the channel adjusts itself so that the footings encroach further into the channel than anticipated at this stage. • Minor structure impacts on the channel would promote some hydraulic habitat diversity. • Overall, flow constraints would be detrimental to hydromorphology.
12. Connection to Groundwater	N/A	N/A	• Not significant to hydromorphology.
13. River continuity	N/A	N/A	• The watercourse will be realigned to avoid footing in the watercourse. The new channel will be longer, but will ensure would decrease natural continuity by the presence of physical obstacles and locally increase flow velocity and turbulence. • Local increases in flow velocity and turbulence would reduce continuity and may hinder aquatic passage. • Survey WFD-PAG-00106 reports a wide channel with some flow diversity, suggesting there is a risk of impact if new structures are located in riparian zones, or if the channel adjusts itself so that the footings encroach further into the channel than anticipated at this stage
14. River depth and width variation bed	N/A	N/A	• Some localised scour of the bed and banks is likely, although this would promote morphological diversity rather than causing ecological deterioration. • Localised protection may be necessary to protect river channel assets, which could necessitate further loss of natural bed and bank habitat and alter equilibrium of the wetted cross section. • On balance, the effects cannot be classified as detrimental or beneficial
15. Structure and substrate of river bed	N/A	N/A	• Some localised bed scour is likely due to local increases in flow velocity. Although this is unlikely to cause major deterioration. • Could promote substrate diversity in hydraulic, bed and bank habitats, especially if substrates are deposited as bar formations immediately downstream. • On balance, the effect could be beneficial, but could also change habitat conditions beyond the tolerances of species, so it is not possible to classify effects with confidence • Survey WFD-PAG-00106 reports some existing variability in flow and morphology within the channel, which appear to be influenced by existing and historical structures, suggesting there is a risk of impact if new structures are located in riparian zones, or if the channel adjusts itself so that the footings encroach further into the channel than anticipated at this stage
16. Structure of riparian zone	N/A	N/A	• Footings in the riparian zones would cause some loss of and fragmentation of habitat, but in relation to the size of open span bridge this is likely to be insignificant

Culvert - on unnamed watercourse east of Godington

Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
1. Macrophytes and phytobenthos: diatoms	N/A	N/A	N/A	N/A	N/A
2. Macrophytes and phytobenthos: macrophytes	-	-	-	-	-
3. Macroinvertebrates	Receptor is insensitive to impact	• Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. • There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoP. • No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	• Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities. • No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	• Localised changes in flow dynamics may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in downstream areas). • No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality
4. Fish	Receptor is insensitive to impact	• Possible temporary sub lethal effects on fish (e.g. displacement) from impacts during construction. No baseline data available, but this is a site drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	• Landtake will reduce the availability of fish habitats within the culvert. • There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoP. • No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Shading will only have negligible or no effects on fish.	• Localised changes in flow dynamics likely to be minimal as there is already several existing (crossing) (culverts), the culvert extension will be appropriately sized, and it is not likely that the extension will act as a barrier to fish migration. Baseline data confirm that this is a ditch with low value for fish and therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality
Predicted change to status elements (green = none, amber = possible, red = likely)					
5. Dissolved Oxygen	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
6. pH	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
7. Phosphate	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
8. Ammonia	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
9. Temperature	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated	Receptor is insensitive to impact	Receptor is insensitive to impact
10. Specific Pollutants (Annex VIII)	N/A	N/A	Receptor is insensitive to impact	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
WFD classification elements					
11. Quantity and dynamics of river flow	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A
12. Connection to Groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A
13. River continuity	N/A	N/A	N/A	• The culvert would disconnect the channel from the existing bank habitats and effectively sever existing flow and habitat continuity along the channel, on both sides of the channel. • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A
14. River depth and width variation bed	N/A	N/A	N/A	• Out of bank flows would be similar to existing, as the channel flows may become deeper than natural peak flows, and may even surcharge in extreme events. • The culvert extension suggests there would not be significant loss of diversity in river depth and width	N/A
15. Structure and substrate of river bed	N/A	N/A	N/A	The survey reports excess deposition of fine sediment on the bed, which is therefore considered to be of little morphological value • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A
16. Structure of riparian zone	N/A	N/A	N/A	The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A

Culvert - on unnamed drain north-east of Godington

Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
1. Macrophytes and phytobenthos: diatoms	N/A	N/A	N/A	N/A	N/A
2. Macrophytes and phytobenthos: macrophytes	-	-	-	-	-
3. Macroinvertebrates	Receptor is insensitive to impact	• Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. • There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoP. • No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	• Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities. • No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	• Localised changes in flow dynamics may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in downstream areas). • No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality
4. Fish	Receptor is insensitive to impact	• Possible temporary sub lethal effects on fish (e.g. displacement) from impacts during construction. No baseline data available, but this is a site drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	• Landtake will reduce the availability of fish habitats within the culvert. • There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoP. • No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Shading will only have negligible or no effects on fish.	• Localised changes in flow dynamics likely to be minimal as there is already several existing (crossing) (culverts), the culvert extension will be appropriately sized, and it is not likely that the extension will act as a barrier to fish migration. Baseline data confirm that this is a ditch with low value for fish and therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality
Predicted change to status elements (green = none, amber = possible, red = likely)					
5. Dissolved Oxygen	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
6. pH	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
7. Phosphate	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
8. Ammonia	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
9. Temperature	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated	Receptor is insensitive to impact	Receptor is insensitive to impact
10. Specific Pollutants (Annex VIII)	N/A	N/A	Receptor is insensitive to impact	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
WFD classification elements					
11. Quantity and dynamics of river flow	N/A	N/A	N/A	• Culvert on small unnamed drain which is a tributary to Padbury Brook. • The survey reports that the channel width varied from approximately 1.5 m to 2.m with limited bed and flow diversity. This means there is unlikely to be significant impact from the culvert on hydromorphology. • Out of bank flows would be similar to existing, as the channel flows may become deeper than natural peak flows, and may even surcharge in extreme events. • The culvert extension suggests there would not be significant loss of diversity in river depth and width	N/A
12. Connection to Groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A
13. River continuity	N/A	N/A	N/A	• The culvert would disconnect the channel from the existing bank habitats and effectively sever existing flow and habitat continuity along the channel, on both sides of the channel. • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A
14. River depth and width variation bed	N/A	N/A	N/A	• Out of bank flows would be similar to existing, as the channel flows may become deeper than natural peak flows, and may even surcharge in extreme events. • The culvert extension suggests there would not be significant loss of diversity in river depth and width	N/A
15. Structure and substrate of river bed	N/A	N/A	N/A	The survey reports excess deposition of fine sediment on the bed, which is therefore considered to be of little morphological value • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A
16. Structure of riparian zone	N/A	N/A	N/A	The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A

Culvert - on unnamed drain near Barton Hartshorn

Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
1. Macrophytes and phytobenthos: diatoms	N/A	N/A	N/A	N/A	N/A
2. Macrophytes and phytobenthos: macrophytes	-	-	-	-	-
3. Macroinvertebrates	Receptor is insensitive to impact	• Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. • There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoP. • No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	• Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities. • No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	• Localised changes in flow dynamics may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in downstream areas). • No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality
4. Fish	Receptor is insensitive to impact	• Possible temporary sub lethal effects on fish (e.g. displacement) from impacts during construction. Baseline data confirm that this is a ditch with low value for fish and therefore only minor and localised effects are anticipated.	• Landtake will reduce the availability of fish habitats within the culvert. • There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoP. • Baseline data confirm that this is a ditch with low value for fish and therefore only minor and localised effects are anticipated.	Shading will only have negligible or no effects on fish.	• Localised changes in flow dynamics likely to be minimal as there is already several existing (crossing) (culverts), the culvert extension will be appropriately sized, and it is not likely that the extension will act as a barrier to fish migration. Baseline data confirm that this is a ditch with low value for fish and therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality
Predicted change to status elements (green = none, amber = possible, red = likely)					
5. Dissolved Oxygen	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
6. pH	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
7. Phosphate	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
8. Ammonia	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
9. Temperature	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated	Receptor is insensitive to impact	Receptor is insensitive to impact
10. Specific Pollutants (Annex VIII)	N/A	N/A	Receptor is insensitive to impact	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
WFD classification elements					
11. Quantity and dynamics of river flow	N/A	N/A	N/A	• Surveys report that the channel width varied from approximately 3.7m to 5.m with limited bed and flow diversity. This means there is unlikely to be significant impact from the culvert on hydromorphology. • Culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • Unnamed drain near Barton Hartshorn is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A
12. Connection to Groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A
13. River continuity	N/A	N/A	N/A	• The culvert would disconnect the channel from the existing bank habitats and effectively sever existing flow and habitat continuity along the channel, on both sides of the channel. • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A
14. River depth and width variation bed	N/A	N/A	N/A	• Out of bank flows would be similar to existing, as the channel flows may become deeper than natural peak flows, and may even surcharge in extreme events. • The culvert extension suggests there would not be significant loss of diversity in river depth and width	N/A
15. Structure and substrate of river bed	N/A	N/A	N/A	The survey reports excess deposition of fine sediment on the bed, which is therefore considered to have little morphological diversity • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A
16. Structure of riparian zone	N/A	N/A	N/A	The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A

Culvert - on unnamed watercourse near Barton Hartshorn

Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
1. Macrophytes and phytobenthos: diatoms	N/A	N/A	N/A	N/A	N/A
2. Macrophytes and phytobenthos: macrophytes	-	-	-	-	-
3. Macroinvertebrates	Receptor is insensitive to impact	• Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. • There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoP. • No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	• Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities. • No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	• Localised changes in flow dynamics may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in downstream areas). • No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality
4. Fish	Receptor is insensitive to impact	• As baseline data indicated very low value for fish, there is no risk of impacts due to shading and have no effects or negligible effects on macroinvertebrates.	• Landtake will reduce the availability of fish habitats within the culvert. • There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoP. • Fish in tributary poor, only minor species present. • Baseline data indicated moderate to low value for fish, but only a few trout species were recorded. The drain is not likely to support migratory fish and the culvert would not affect the wider water body, therefore only minor and localised effects are anticipated.	Shading will only have negligible or no effects on fish.	• Localised changes in flow dynamics likely to be minimal as there is already several existing (crossing) (culverts), the culvert extension will be appropriately sized, and it is not likely that the extension will act as a barrier to fish migration. Baseline data indicated moderate to low value for fish, but only a few trout species were recorded. The drain is not likely to support migratory fish and the culvert would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality
Predicted change to status elements (green = none, amber = possible, red = likely)					
5. Dissolved Oxygen	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
6. pH	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
7. Phosphate	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
8. Ammonia	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
9. Temperature	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated	Receptor is insensitive to impact	Receptor is insensitive to impact
10. Specific Pollutants (Annex VIII)	N/A	N/A	Receptor is insensitive to impact	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
WFD classification elements					
11. Quantity and dynamics of river flow	N/A	N/A	N/A	• The survey reports that the channel width varies from approximately 1.m to 3.m with limited bed and flow diversity, so there is unlikely to be significant impact from the culvert on hydromorphology. • Depth and cross-sectional dimensions flows may be impounded upstream during high flows, and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • Unnamed drain near Barton Hartshorn is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A
12. Connection to Groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A
13. River continuity	N/A	N/A	N/A	• The culvert would disconnect the channel from the existing bank habitats and effectively sever existing flow and habitat continuity along the channel, on both sides of the channel. • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A
14. River depth and width variation bed	N/A	N/A	N/A	• Out of bank flows would be similar to existing, as the channel flows may become deeper than natural peak flows, and may even surcharge in extreme events. • The culvert extension suggests there would not be significant loss of diversity in river depth and width	N/A
15. Structure and substrate of river bed	N/A	N/A	N/A	The survey reports excess deposition of fine sediment on the bed, which is therefore considered to have little morphological diversity • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A
16. Structure of riparian zone	N/A	N/A	N/A	• The baseline survey indicated that sections of the channel have been artificially modified including the construction of culverts. • The culvert would disconnect the channel from the existing vegetated riparian zones and sever any existing riparian habitat continuity along the channel. Baseline data indicate that due to previous bank reinforcements and modifications. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A

Culverts - three culverts on unnamed tributary (drain) of Padbury Brook

Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
1. Macrophytes and phytobenthos: diatoms	N/A	N/A	N/A	N/A	N/A
2. Macrophytes and phytobenthos: macrophytes	-	-	-	-	-
3. Macroinvertebrates	Receptor is insensitive to impact	• Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. • There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoP. • This is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	• Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities. • This is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	• Localised changes in flow dynamics may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in downstream areas). • This is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality
4. Fish	Receptor is insensitive to impact	• Possible temporary sub lethal effects on fish (e.g. displacement) from impacts during construction. This is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	• Landtake will reduce the availability of fish habitats within the culvert. • There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoP. • Fish in tributary poor, only minor species present. • This is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Shading will only have negligible or no effects on fish.	• Localised changes in flow dynamics likely to be minimal as there is already several existing (crossing) (culverts), the culvert extension will be appropriately sized, and it is not likely that the extension will act as a barrier to fish migration. Baseline data indicated moderate to low value for fish, but only a few trout species were recorded. The drain is not likely to support migratory fish and the culvert would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality
Predicted change to status elements (green = none, amber = possible, red = likely)					
5. Dissolved Oxygen	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
6. pH	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
7. Phosphate	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
8. Ammonia	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
9. Temperature	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated	Receptor is insensitive to impact	Receptor is insensitive to impact
10. Specific Pollutants (Annex VIII)	N/A	N/A	Receptor is insensitive to impact	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
WFD classification elements					
11. Quantity and dynamics of river flow	N/A	N/A	N/A	• The survey reports that the channel width varies from approximately 1.m to 3.m with limited bed and flow diversity, so there is unlikely to be significant impact from the culvert on hydromorphology. • Depth and cross-sectional dimensions flows may be impounded upstream during high flows, and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • Unnamed drain near Barton Hartshorn is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A
12. Connection to Groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A
13. River continuity	N/A	N/A	N/A	• The culvert would disconnect the channel from the existing bank habitats and effectively sever existing flow and habitat continuity along the channel, on both sides of the channel. • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A
14. River depth and width variation bed	N/A	N/A	N/A	• Out of bank flows would be similar to existing, as the channel flows may become deeper than natural peak flows, and may even surcharge in extreme events. • The culvert extension suggests there would not be significant loss of diversity in river depth and width	N/A
15. Structure and substrate of river bed	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or structure diversity. • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A
16. Structure of riparian zone	N/A	N/A	N/A	• The baseline survey indicated that sections of the channel have been artificially modified including the construction of culverts. • The culvert would disconnect the channel from the existing vegetated riparian zones and sever any existing riparian habitat continuity along the channel. Baseline data indicate that due to previous bank reinforcements and modifications. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A

Culvert - Culverted tributary (drain) of Padbury Brook

| Identified biological impacts | Noise and vibration |

A. Risk screening of potential to cause deterioration of current WFD Ecolog

Surface Water body	Current status	Status objective	Scheme Elements	River Diversion - Culverted tributary (drain) of Padbury Brook.			River Diversion - Unnamed tributary (drain) of Padbury Brook.			Cutting (Chetwode Cutting, Twyford Cutting		Cutting (Barton to Mixbury)		CULVERT - Newton Purcell Culvert - AP-C222-209						RIVER DIVERSION - Newton Purcell Culvert - AP-C222-209			Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB105033038210	Moderate	Good Ecological Potential by 2015	Description of scheme element impact	River diversion during extension of existing culvert on Culverted tributary (drain) of Padbury Brook (SWC-CFA14-1, SWC-CFA14-1d).			Surface water will be diverted on unnamed tributary (drain) of Padbury Brook (SWC-CFA14-1, SWC-CFA14-1d, SWC-CFA14-11, SWC-CFA14-13). Surface water diverted into drain from both north and south, the drain will also be diverted near Station House and then further south, parallel to the route.			No impact on contributions to SW from deep groundwater as nearby cuttings (Chetwode Cutting, Twyford Cutting and Calvert Cutting) on unproductive strata. Potential localised reduction in contribution from shallow groundwater in superficial deposits.		Potential influence of groundwater contribution from Barton to Mixbury Cutting to SW tributaries near Newton Purcell as located on Upper Bedford Oxae Oolite Secondary aquifer. Potential localised reduction in contribution from shallow groundwater in superficial deposits.		There is a clash between the HS2 railway drainage and the Newton Purcell culvert at ch B7+800. To eliminate this clash, the drainage ditch will need to be diverted, with a relocated outfall also being provided. As the outfall location has changed, additional length of culvert (approximately 40m) will need to be introduced to tie back into the railway drainage. Walkover surveys carried out, WFD PA1-17B. Photos taken WFD-HM1-0017-P8D1, P8D4, P8D5, P8J8, P8J7, P8J9 and P8J9. The other scheme elements (culverts) on this tributary (SWC-CFA14-11 and SWC-CFA14-13) remain unchanged.					Original scheme incorporated existing channel into design. With the new outfall location, a new channel is to be constructed almost adjacent to the existing channel.					Construction	Operation	
Padbury Brook (The Twins)			Identified biological impacts	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Creation of new habitats						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes			- There will be loss of marginal and channel macrophytes over the length of the diverted section. This within the diverted section. - No baseline data are available, but the macrophyte community will re-establish within 1 to 2 years of completion of the diversion. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. Effects will be temporary and localised and only affect the minor drain.	- The new channel will replicate existing habitat and where possible incorporate marginal berms to encourage emergent macrophyte species as the channel will include a range of habitats suitable for colonisation by emergent species. The effect on this quality element is considered to be minor positive.	- Minor hydromorphological effects anticipated with no likely effect on macrophyte communities of small drain.	- There will be loss of marginal and channel macrophytes over the length of the diverted section. This within the diverted section. - No baseline data are available, but the macrophyte community will re-establish within 1 to 2 years of completion of the diversion. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. Effects will be temporary and localised and only affect the minor drain.	- The new channel will replicate existing habitat and where possible incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by emergent species. The effect on this quality element is considered to be minor positive.	- Minor hydromorphological effects anticipated with no likely effect on macrophyte communities of small drain.	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	Possible minor reduction in flow with no significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	Only minor and localised changes anticipated.	Receptor not sensitive to impact.	Likely to lead to a localised but permanent loss of habitat. The watercourse is heavily shaded and therefore unlikely to support macrophytes. Effect likely to be negligible.	Likely to lead to localised but permanent loss of macrophytes, due to reduction of photosynthetic activity. The watercourse is heavily shaded and therefore unlikely to support macrophytes. Effect likely to be negligible.	Potential localised homogenisation of flow patterns, and reduction of flow and habitat continuity and floodplain disconnection. The watercourse is of moderate macroinvertebrate quality. Potential localised and minor adverse effect.	Potential localised and temporary adverse effect on dissolved oxygen levels and other contaminants. The watercourse is heavily shaded and therefore unlikely to support macrophytes. Effect likely to be negligible.	Temporary loss of habitats of this existing watercourse that lies within the diverted section while the new channel is re-established. The watercourse is heavily shaded and therefore unlikely to support macrophytes. Effect likely to be negligible.	Potential minor adverse effect through flow reductions. The watercourse is heavily shaded and therefore unlikely to support macrophytes. Effect likely to be negligible.	The new channel will be at least partially unshaded and incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. The watercourse is heavily shaded and therefore currently unlikely to support macrophytes. The effect on this quality element is considered to be minor beneficial and localised.	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.	- Padbury Brook does not currently have a WFD status for macrophytes, is not known to be monitored for this element, although baseline data collected on this watercourse indicated the presence abundant macrophyte communities. - Although the scheme will lead to a loss of habitat and photosynthetic activity (in shaded areas) due to culverting and viaducts, this is mostly on minor tributaries and drains. Smost of which are heavily shaded, heavily modified and already crossed by roads and railways) rather than on Padbury Brook itself. - All of the effects identified are minor and localised when considered individually. Taking into account the number of scheme elements and the sensitivity of the receptor there remains a risk that there could be a deterioration for this element. - When the WFD design modifications contribute to the overall and cumulative effect on the waterbody, they are not extensive enough to change to overall assessment.	- impacts on Padbury Brook and its Tributaries will be mitigated by constructing temporary diversions in advance (identified in the EIA as 'additional mitigation')	None required.	Only minor and localised effects are anticipated, which will not affect the status of this WFD element.
	3. Macroinvertebrates	Good	-	- There will be temporary loss of macroinvertebrates and habitat over the length of the existing drain that lies within the diverted section. - No baseline data are available from this minor ditch, but it will only to require less than 1 year to re-populate (or the short distance affected). - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. Effects will be temporary and localised and only affect the minor drain.	- The diversion will replicate existing habitat and where possible be designed to include a range of habitats suitable for the fish species present The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities.	- Minor hydromorphological effects anticipated with no likely effect on macroinvertebrate communities of small drain.	- There will be temporary loss of macroinvertebrates and habitat over the length of the existing drain that lies within the diverted section. - No baseline data are available from this minor ditch. But it will only to require less than 1 year to re-populate (or the short distance affected. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. Effects will be temporary and localised and only affect the minor drain.	- The diversion will replicate existing habitat and where possible be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach.	- Minor hydromorphological effects anticipated with no likely effect on macroinvertebrate communities of small drain.	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	Possible minor reduction in flow with no significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	Only minor and localised changes anticipated.	Receptor not sensitive to impact.	Potential localised loss of macroinvertebrate habitat. The watercourse is of moderate macroinvertebrate quality. Potential localised and minor adverse effect.	The watercourse is heavily shaded. Effect on macroinvertebrates habitat likely to be negligible.	Potential localised homogenisation of flow patterns, and reduction of flow and habitat continuity and floodplain disconnection. The watercourse is of moderate macroinvertebrate quality. Potential localised and minor adverse effect.	Potential localised and temporary adverse effect on dissolved oxygen levels and other contaminants. The watercourse is of moderate macroinvertebrate quality. Potential localised and minor adverse effect.	Temporary loss of habitats of the existing watercourse that lies within the diverted section while the new channels re-establish. The watercourse is of moderate macroinvertebrate quality. Potential localised, minor and temporary adverse effect.	Potential minor adverse effect through flow reductions. The watercourse is of moderate macroinvertebrate quality, and communities adapted to relatively slow flowing conditions and sedimentation. Potential localised and minor adverse effect.	The river diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach. The watercourse currently supports moderate macroinvertebrate quality, and communities adapted to relatively slow flowing conditions and sedimentation, only beneficial effects anticipated.		- Padbury Brook is currently of 'Good' WFD status for macroinvertebrates, which supported by the baseline data collected on the main Padbury Brook watercourse. - Although the scheme will lead to a loss and photosynthetic activity (in shaded areas) due to extensive culverting, this is mostly on minor tributaries and drains rather (most of which are heavily shaded, heavily modified and already crossed by roads and railways) rather than on Padbury Brook itself. - All of the effects identified are minor and localised when considered individually. Embedded mitigation (such as the inclusion of habitat creation upstream and downstream of culverts), will help to offset negative effects from culverts and diversions. However, taking into account the number of scheme elements and the sensitivity of the receptor there remains a risk that there could be a deterioration for this element. - When the WFD design modifications contribute to the overall and cumulative effect on the waterbody, they are not extensive enough to change to overall assessment.	- impacts on Padbury Brook and its Tributaries will be mitigated by constructing temporary diversions in advance (identified in the EIA as 'additional mitigation')	None required.	Risk of deterioration remains until detailed design and construction programming are complete.
	4. Fish	High	-	- There will be temporary loss of habitat over the length of the existing drain that lies within the diverted section. - No baseline data are available, but given that this is a minor drain, only minor species will be present. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. Effects will be temporary and localised and only affect the minor drain.	- The diversion will replicate existing habitat and where possible be designed to include a range of habitats that are suitable for the fish species present The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities.	- Minor hydromorphological effects anticipated with no likely effect on fish communities of small drain.	- There will be temporary loss of habitat over the length of the existing drain that lies within the diverted section. - No baseline data are available, but given that this is a minor drain, only minor species will be present. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. Effects will be temporary and localised and only affect the minor drain.	The diversion will replicate existing habitat and where possible be designed to include a range of habitats that are suitable for the fish species present The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities.	Minor hydromorphological effects anticipated with no likely effect on fish communities of small drain.	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	Possible minor reduction in flow with no significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	Only minor and localised changes anticipated.	No data on fish but given the size of the watercourse and magnitude of impact, only potential localised and minor adverse effect anticipated in a worst case scenario.	No data on fish although presence of extensive trout spawning habitat downstream of crossing. However, baseline data did not demonstrate the presence of migratory fish species in Padbury Brook and as the watercourse upstream of crossing does not appear suitable for fish (heavily silted), potential localised adverse effect.	The watercourse is heavily shaded. Effect on fish habitat likely to be negligible.	Potential localised homogenisation of flow patterns, and reduction of flow and habitat continuity and floodplain disconnection. No data on fish although presence of extensive trout spawning habitat downstream of crossing. Potential minor adverse effect.	Potential localised and temporary adverse effect on dissolved oxygen levels and other contaminants. No data on fish. No data on fish although presence of extensive trout spawning habitat downstream of crossing. Potential minor adverse effect.	Temporary loss of habitats of the existing watercourse that lies within the diverted section while the new channels re-establish. No data on fish although presence of extensive trout spawning habitat downstream of crossing. Potential localised, minor and temporary adverse effect.	Potential minor adverse effect through flow reductions. No data on fish although presence of trout spawning habitat downstream of crossing. By default, potential localised and minor adverse effect.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities. No data available on fish. Locally beneficial effect anticipated.		- Padbury Brook is currently of 'High' WFD status for fish, which supported by the baseline data collected on the main Padbury Brook watercourse, but not on the tributaries. - Important fish populations, including migratory brown trout, are recorded downstream of the River Cherwell. The diversion will not affect the migration of fish. - A precautionary approach has been adopted and it is considered that there would be potential for adverse effects to be identified and worked with the environment Agency. Breaks in the channel drains, should not expose to be of importance to fish. Embedded mitigation measures, such as habitat creation upstream and downstream of culverts, should be sufficient in negating adverse effects to fish migration or loss of habitat. - When the WFD design modifications contribute to the overall and cumulative effect on the waterbody, they are not extensive enough to change to overall assessment.	- impacts on Padbury Brook and its Tributaries will be mitigated by constructing temporary diversions in advance (identified in the EIA as 'additional mitigation')	- An assessment of flows and fish passage within culverts must be assessed to inform detailed design of culverts and stream re-alignments. The detailed design of the culverts with respect to fish passage and other measures will be agreed with the Environment Agency.	Risk of deterioration remains until detailed design and construction programming are complete.
	Physico-Chemical status																											
WFD classification elements	5. Dissolved Oxygen	High	-	-	N/A	- Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. - The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor locally, with no degradation of the element status anticipated at the scale of the water body.	- CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. - Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	N/A	- Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen levels. Overall effect likely to be minor locally, with no degradation of the element status anticipated at the scale of the water body. - The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor locally, with no degradation of the element status anticipated at the scale of the water body.	- CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. - Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and reaeration.	Only minor and localised changes anticipated.	N/A	N/A	• The additional length of the proposed AP2 culvert will increase the amount of shaded watercourse. Despite this, it is predicted to result in no more than a minor impact on DO sub-element. • This impact is likely to have a minor, local effect in relation to the overall water body. Therefore, no change in status from the previous assessment is anticipated.	• The construction of the proposed AP2 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	• The construction of the proposed AP2 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	N/A	• The construction of the proposed AP2 river channel is predicted to result in no more than a temporary, minor impact on this sub-element. • Release of sediment during construction of new channel may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	• The construction of the proposed AP2 river channel is predicted to result in no more than a temporary, minor impact on this sub-element. • Release of sediment during construction of new channel may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.	Potential minor and localised effects on element. The additional culvert length and addition of the channel diversion will contribute slightly to the cumulative impact on this physico-chemical sub-element. However, it is not considered to be significant, and subsequently there will be no change in overall impact from the previous assessment. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	Monitoring will be required to confirm that the effectiveness of the identified CoCP measures are adequate and that no further measures are required to control the temporary impact of sediment mobilisation	No additional mitigation required	Minor and localised effects
	6. pH	High	-	-	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact			Receptor is insensitive to impact			Receptor is insensitive to impact
	7. Phosphate	Moderate	-	-	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	Only minor and localised changes anticipated.	N/A	N/A	Receptor is insensitive to impact	• The construction of the proposed AP2 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	Receptor is insensitive to impact	N/A	• The construction of the proposed AP2 river channel is predicted to result in no more than a temporary, minor impact on this sub-element. • Release of sediment during construction of new channel may cause a temporary increase in phosphate levels. But no change in status is anticipated • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	Receptor is insensitive to impact						
	8. Ammonia	High	-	-	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and reaeration, and other possible effects	Only minor and localised changes anticipated.	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact			Potential minor and localised effects on element. The additional culvert length and addition of the channel diversion will contribute slightly to the cumulative impact on this physico-chemical sub-element. However, it is not considered to be significant, and subsequently there will be no change in overall impact from the previous assessment. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.			Minor and localised effects
	9. Temperature				N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	• The additional length of the proposed AP2 culvert will increase the amount of shaded watercourse. Despite this, it is predicted to result in no more than a minor impact on temperature. • This impact is likely to have a minor, local effect in relation to the overall water body. Therefore, no change in status from the previous assessment is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact						
	10. Specific Pollutants (Annex VIII)	High	-	-	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and reaeration, and other possible effects	Only minor and localised changes anticipated.	N/A	N/A	Receptor is insensitive to impact	• The construction of the proposed AP2 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	• The construction of the proposed AP2 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	N/A	• The construction of the proposed AP2 river channel is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	Receptor is insensitive to impact						
	Hydromorphological status																											**Hydromorphology**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	-	N/A	• The extent of new watercourse that would be created, and the possible negative effects of altering existing channel conditions, mean that there would be no significant habitat creation	• Minor diversion of watercourse (lengthening) during extension of existing culvert. • Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics • The unnamed tributary drain of Padbury Brook is in practical terms a drainage ditch and represents a small proportion of the water body • Lengthening the channel may reduce flow rates although the effect will be small from the existing channel course • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of lengthening the watercourse still needs to be flagged as a risk	N/A	• The extent of new watercourse that would be created, and the possible negative effects of altering existing channel conditions, mean that there would be no significant habitat creation	• Diversion of small drains (lengthening) assumed to divert watercourse around cutting. • Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics • The unnamed tributary drain of Padbury Brook is in practical terms a drainage ditch and represents a small proportion of the water body • Lengthening the channel may reduce flow rates although the effect will be small from the existing channel course • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of lengthening the watercourse still needs to be flagged as a risk	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	N/A	• Reduction of flows in this tributary could cause a localised reduction in flow volumes, depths and dynamics, and consequent reductions in habitat availability (including sediment deposition) and reduced non-of-channel habitat connectivity. The effect could be significant for this tributary, but would be buffered as soon as the tributary connects to the larger downstream watercourse so there would not be severe effects at water body scale	• There is opportunity to enhance morphological diversity and for habitat creation during the diversion, and this presents an ideal opportunity to enhance a poor riparian habitat with increased flow and morphological diversity and a riparian buffer zone. However, because the channel diversion is minor, WFD zones are likely to be more localised than waterbody-wide.	N/A	N/A	N/A	• The baseline survey reported that the original channel width varied from approximately 0.5m to 1.5m with trimbed bed and flow diversity, so there is unlikely to be significant impact from the new channel on this sub-element. • Depending on culvert dimension, flows may be impounded upstream during high flows. • Culvert boundaries would be smooth compared to natural banks and vegetation cover, which would lead to non-homogenous flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • The unnamed tributary drain is a drainage ditch within the waterbody, and in practical terms the culvert would impact a small proportion of the waterbody	N/A	N/A	• Flaseline survey reported that the original channel width varied from approximately 0.5m to 1.5m with trimbed bed and flow diversity. • The potential lengthening of the channel may reduce flow rates although the diversion is not far from the existing channel course. • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of lengthening the watercourse still needs to be flagged as a risk	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.	• Watercourse flagged as potential to have cumulative adverse effect on WFD elements due to diversion of main WFD watercourse and extensive culverting of tributaries to Padbury Brook. • Diversion of main WFD watercourse has potential to impact diversity of flow dynamics, the lengthening of the channel may reduce velocity and turbulence / mixing / flow aeration. • Majority of the culverts and associated river diversions are on small tributaries to Padbury Brook and are likely to have local impacts on the diversity of flow dynamics and disconnect floodplains which is likely to have combined impacts at times of high flow. The scheme elements are extensive and therefore in combination may have potential to pose adverse effects on hydromorphological elements • The overall impact on the waterbody has not needed to be updated as a result of the AP2 assessments	Incorporate hydromorphological measures into detailed design where practicable. Mitigation measures may include: • Bank reprofiling (rehabilitation) • Create reed fringe • Creation of shallow margin in front of hard defence • Retain marginal vegetation • Introduce riparian vegetation/green corridors where space allows • Recreate a sinuous river channel (re-meandering) where space allows • Recreation of gravel bars and riffles using permanent and/or temporary bed structures (increase morphological diversity) • Creation of shallow margin in front of hard defence • Retain marginal vegetation • Use of engineering techniques to assist natural recovery • Use soft engineering techniques		Risk of deterioration remains until detailed design and construction programming are complete.	**Unnamed tributary of Padbury Brook, east of Portway Farm** Baseline survey WFD-HM1-0019 indicated that the tributary is acting as land drainage and is heavily vegetated and dry in areas at the time of the survey. **Unnamed tributary of Padbury Brook, near Cowley Lodge** The quantity and dynamics of flow and morphology are significantly altered by historic land drainage activities; channel was dry at the time of observation and is thought to only develop flow following precipitation **Unnamed tributary of Padbury Brook, parallel to main water body** Baseline survey WFD-HM1-0021 photos show that the tributary in a drainage ditch with very little flow at the time of survey, the channel widens as it flows downstream reducing flow diversity and promoting the deposition of fine sediments that enter the tributary from adjacent fields. Flow and morphology have likely been altered by historic land drainage activities. **Padbury Brook** The river through WFD-PA1-0010b was wide with chiefly smooth laminar flow. Bed substrate was an assortment of pebbles, gravels in isolated areas with sand and silt the dominate bed substrate. The variability in flow and morphology dynamics within the channel is likely influenced by existing and historical structures.
	12. Connection to Groundwater	-	-	-	N/A		• Likely to be no significant relationship between hydromorphology and groundwater	N/A		• Likely to be no significant relationship between hydromorphology and groundwater	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	N/A		N/A	N/A	N/A	• Likely to be as significant relationship between hydromorphology and groundwater	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater							
	13. River continuity	-	-	-	N/A		• Lengthening the channel may result in increased channel storage and reduced floodplain connectivity, but the size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected	N/A		• Lengthening the channel may result in increased channel storage and reduced floodplain connectivity, but the size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	N/A		N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, have habitats less suitable for fish and mammals and will hamper continuity within and adjacent to both sides of the channel. • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A	N/A	• Lengthening the channel may result in increased channel storage and reduced floodplain connectivity, but the size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected							
	14. River depth and width variation bed	-	-	-	N/A		• The diversion would replicate existing channel geometry. Out of channel flow depths may decrease as a result of lengthening the channel, but in practical terms there would be no significant change	N/A		• The diversion would replicate existing channel geometry. Out of channel flow depths may decrease as a result of lengthening the channel, but in practical terms there would be no significant change	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	N/A		N/A	N/A	N/A	• Out-of bank flows would be severed by the culvert, and in-bank flows would be deeper than natural peak flows, and may even surcharge in extreme events • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A	N/A	• The diversion would replicate existing channel geometry. Out of channel flow depths may decrease as a result of lengthening the channel, but in practical terms there would be no significant change							
	15. Structure and substrate of river bed	-	-	-	N/A		• Lengthening a channel tends to reduce flow rates and increase deposition of sediment • Given the size of the watercourse there would probably be no measurable impact	N/A		• Lengthening a channel tends to reduce flow rates and increase deposition of sediment • Given the size of the watercourse there would probably be no measurable impact	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	N/A		N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant impact on sediment transport in situ. • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	N/A	• Lengthening a channel tends to reduce flow rates and increase deposition of sediment • Given the size of the watercourse there would probably be no measurable impact							
	16. Structure of riparian zone	-	-	-	N/A		• Although channel capacity would increase, there is likely to be no net change to existing bank, riparian and floodplain structure and connectivity with channel	N/A		• Although channel capacity would increase, there is likely to be no net change to existing bank, riparian and floodplain structure and connectivity with channel	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	N/A		N/A	N/A	N/A	• The baseline survey indicated that sections of the channel have been artificially modified including the bank and riparian zone. • The culvert extension would disconnect the channel from the existing vegetated riparian zones and sever any existing riparian habitat continuity along the channel, which may already be at risk from the proposed enhancements and modifications. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	N/A	• Although channel capacity would increase, there is likely to be no net change to existing bank, riparian and floodplain structure and connectivity with channel							

B. Risk screening of potential to prevent future attainment of good Ecolog

WFD-EP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where WFD-EP measure will happen	When WFD-EP measure will happen	Predicted change to status elements (green = none, amber = possible, red = likely)
NONE	-	-	-

GB102603030070

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	River Diversion			Culvert beneath Quainton South Embankment					Culvert beneath Doddershall Embankment					River Diversion			Cutting		Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	-
GB102603030070			Description of scheme element impact	Unnamed tributary of Tetchwick Brook - SWC CFA12.2 (T5->T10) - 95 m, and SWC CFA12-15, SWC CFA12-16, SWC CFA12-17 (short diversions at Station Road)			Unnamed tributaries of Tetchwick Brook: SWC CFA12.2 (T7->E0) - 61 m and 24 m culverts, SWC CFA12-15 - 12 m culvert, SWC CFA12-16 - 15 m culvert, SWC CFA12-17 - 18 m culvert					Unnamed tributaries of Doddershall Brook: SWC CFA12-5 (T3->E0) - 61 m culvert and 13 m culvert, SWC CFA12-6 (T3->E0) - 67 m culvert, SWC CFA12-7 (T3->E0) - 5 m culvert and 68 m culvert, SWC CFA12-8 (T3->E0) - 5 m culvert, 17 m culvert and 46 m culvert, SWC CFA12-19 (T2->S0), 50 m culvert extension					Unnamed tributaries of Doddershall Brook - SWC CFA12-6 (T3->E0) - 67 m ?, and SWC CFA12-7 (T3->E0) - 68 m ?			Quainton cutting - Approximately 72+000						
Tetchwick Brook, Source to Ray and tributaries	Bad	Good by 2027	Identified biological impacts	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to discharge in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.		OVERALL effect on element	Construction	Operation		-
WFD classification elements			1.Macrophytes and phytobenthos - diatoms	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			2. Macrophytes and phytobenthos - macrophytes	N/A	N/A	YELLOW TO GREEN - Scheme will cause loss of marginal and channel macrophytes - due the lift in length of the existing tributaries off Tetchwick Brook that has within the diverted section. No baseline data available for the tributaries (drainage ditches). Baseline data indicates that tributaries are wide open of the water body, only localised adverse effect anticipated. Baseline data indicates that tributaries are heavily shaded with low flows and therefore not suitable for macrophytes. No effect anticipated	The new channels will incorporate scrubland zone and marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by macrophytes and aquatic species. No baseline data available for the tributary. Potential beneficial effect anticipated.	YELLOW TO GREEN - Scheme will cause loss of marginal and channel macrophytes - due the lift in length of the existing tributaries off Tetchwick Brook that has within the diverted section. No baseline data available for the tributaries. Baseline data indicates that tributaries are wide open of the water body, only localised adverse effect anticipated. Baseline data indicates that tributaries are heavily shaded with low flows and therefore not suitable for macrophytes. No effect anticipated	Receptor not sensitive to impact. No likely effect anticipated.	YELLOW TO GREEN - Potential homogenised flow patterns and increase in flow velocities locally, with no significant effect on the scale of the water body. Baseline data indicates that tributaries are wide open of the water body, only localised adverse effect anticipated. Baseline data indicates that tributaries are heavily shaded and low flows, and therefore not suitable for macrophytes. No effect anticipated	Likely to lead to the loss of a total of 300 m of macrophytes habitat (i.e. emergent, aquatic vegetation, riparian vegetation) on the tributaries of Tetchwick Brook. No baseline data available for any of the tributaries. No data, localised adverse effect anticipated on the tributaries. Baseline data indicates that tributaries are heavily shaded and low flows, and therefore not suitable for macrophytes. No effect anticipated	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run off from the proposed railway. No anticipated change in water quality.	Receptor not sensitive to impact. No likely effect anticipated.	YELLOW TO GREEN - Potential homogenised flow patterns and increase in flow velocities locally. In the absence of baseline data for any of the tributaries (drainage ditches), localised adverse effect anticipated. Tributaries are heavily shaded and dry in places, considered to be of low macroinvertebrate value. Potential localised and minor adverse effects	YELLOW TO GREEN - Potential homogenised flow patterns and increase in flow velocities locally. In the absence of baseline data for any of the tributaries (drainage ditches), localised adverse effect anticipated. Tributaries are heavily shaded and dry in places, considered to be of low macroinvertebrate value. Potential localised and minor adverse effects	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run off from the proposed railway. No anticipated change in water quality.	YELLOW TO GREEN - Please will no loss of marginal and channel macrophytes over the 14km length of the existing tributaries of Doddershall Brook that lie within the diverted section. No baseline data available for any of the tributaries (drainage ditches). No data, localised adverse effect anticipated on the tributaries. Tributaries are heavily shaded and dry in places. No effects anticipated.	The new channels will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. No baseline data available for any of the tributaries. Potential beneficial effect anticipated.	No measurable effect on flow rates or dynamics anticipated from Hydromorphological assessment unless watercourse is lengthened. This information will not be available until the detailed design stage. Given lack of baseline data a precautionary assessment of minor adverse has been applied.		No scheme elements on upstream water body	YELLOW TO GREEN - Scheme elements present on this water body are only located on minor tributaries (drainage ditches) of Tetchwick Brook and of one of its tributaries, Doddershall Brook. River diversions are considered as having the potential for temporary adverse effects on the tributaries but would be balanced by the creation of new habitats within the diverted channels. The numerous culverts are identified as having an adverse effect locally on the tributaries but although there will be 400 m of culverts in total, they will be designed to ensure there is no change to flow regimes downstream of the culverts. Given the small size of the tributaries, the cumulative effect of the culverts, and the fact that the culverts are not located on the main water body, the deterioration of this quality element is anticipated. The overall impact anticipated for this macrophyte	None required.	None required.	YELLOW TO GREEN- No overall effect anticipated.	
			3. Macroinvertebrates	Bad	Good by 2027	Temporary loss of 95 m macroinvertebrate of habitat on Tetchwick Brook with the new channels re-established. No baseline data available for the tributaries (drainage ditches). Baseline data indicates that the tributaries are of low value to macroinvertebrates (drainage ditches). Given the small size of the tributaries, the cumulative effect of the culverts at the scale of the water body, only localised adverse effect anticipated.	The new diversion will be designed to include appropriate habitats for colonisation by macroinvertebrates (see that currently characterise the ditch habitat. No baseline data available for the tributaries. Baseline data indicates that the tributaries are of low value to macroinvertebrates (drainage ditches). Given the small size of the tributaries, the cumulative effect of the culverts at the scale of the water body, only localised adverse effect anticipated. Potential beneficial effect anticipated.	The new diversion will be designed to include appropriate habitats for colonisation by macroinvertebrates (see that currently characterise the ditch habitat. No baseline data available for the tributaries. Baseline data indicates that the tributaries are of low value to macroinvertebrates (drainage ditches). Given the small size of the tributaries, the cumulative effect of the culverts at the scale of the water body, only localised adverse effect anticipated.	Receptor not sensitive to impact. No likely effect anticipated.	No additional effect anticipated (loss of vegetation already considered in the landtake impact), locally or at the scale of the water body.	Likely to lead to the loss of a total of 300 m of macroinvertebrates habitat (i.e. emergent, aquatic vegetation, riparian vegetation) on the tributaries of Tetchwick Brook. No baseline data available for any of the tributaries. No data, localised adverse effect anticipated on the tributaries. Baseline data indicates that tributaries are heavily shaded and low flows, and therefore not suitable for macroinvertebrates. Given the small size of the tributaries, the cumulative effect of the culverts at the scale of the water body, only localised adverse effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run off from the proposed railway. No anticipated change in water quality.	No additional effect anticipated (loss of vegetation already considered in the landtake impact), locally or at the scale of the water body.	Potential homogenised flow patterns and increase in flow velocities locally. In the absence of baseline data for any of the tributaries (drainage ditches), localised adverse effect anticipated. Tributaries are heavily shaded and dry in places, considered to be of low macroinvertebrate value. Potential localised and minor adverse effects	YELLOW TO GREEN - Potential homogenised flow patterns and increase in flow velocities locally. In the absence of baseline data for any of the tributaries (drainage ditches), localised adverse effect anticipated. Tributaries are heavily shaded and dry in places, considered to be of low macroinvertebrate value. Potential localised and minor adverse effects	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run off from the proposed railway. No anticipated change in water quality.	YELLOW TO GREEN - Temporary loss of 140 m of habitat on the tributaries within the new channels to be re-established. No baseline data available for the tributaries (drainage ditches). Localised adverse effects for tributaries anticipated. Tributaries are dry in places, considered to be unsuitable for fish. No effect anticipated.	BLUE TO GREEN- The range of habitats incorporated into the diverted channels is considered to represent an improvement over the existing channel. No baseline data available for the tributaries (drainage ditches). Localised adverse effect anticipated. Tributaries are dry in places, considered to be unsuitable for fish. No effect anticipated.	No measurable effect on flow rates or dynamics anticipated from Hydromorphological assessment unless watercourse is lengthened. This information will not be available until the detailed design stage. Given lack of baseline data a precautionary assessment of minor adverse has been applied.	No likely impacts from reduction of groundwater levels by dewatering to contribution to surface water levels or cutting is an unproductive strata	No likely impacts from reduction of groundwater levels by dewatering to contribution to surface water levels or cutting is an unproductive strata	No scheme elements on upstream water body	Scheme elements present on this water body are only located only on minor tributaries (drainage ditches) of Tetchwick Brook and of one of its tributaries, Doddershall Brook. River diversions are considered as having the potential for temporary adverse effects on the tributaries but would be balanced by the creation of new habitats within the diverted channels. The numerous culverts are identified as having an adverse effect locally on the tributaries but although there will be 400 m of culverts in total, they will be designed to ensure there is no change to flow regimes downstream of the culverts. Given the small size of the tributaries, the cumulative effect of the culverts (drainage ditches) have a relatively low contribution to the whole water body. No deterioration of this quality element is anticipated.	None required.	None required.	Minor and localised effects	
			4. Fish	N/A	N/A	Temporary loss of 95 m of habitat on the tributaries while the new channels re-established. Baseline data indicates that tributaries are considered to be of low value to fish. No baseline data available for the tributaries (drainage ditches). Given the small importance of the tributaries at the scale of the water body, and localised adverse effect anticipated. The range of habitats incorporated into the diverted channel is considered to represent an improvement over the existing channel. No baseline data available for the tributaries (drainage ditches). Given the small importance of the tributaries at the scale of the water body, and localised adverse effect anticipated.	Potential localised reduction in flow rates with no significant effect at the scale of the water body. Baseline data indicates that tributaries are considered to be of limited importance for fish. No fish data available locally for the tributaries - Potential beneficial effect anticipated.	Localised and temporary effect during construction. No deterioration of the water body status of the element is however reported.	Reprofiling and channel straightening are likely to lead to a loss of habitat and connectivity for fish. Baseline data is substitute, riparian vegetation on the tributaries of Tetchwick Brook. Culverts would also constitute a barrier to fish movements. Baseline data indicates that tributaries are considered to be of limited importance for fish. No baseline data available for any of the tributaries. The tributaries are not a Freshwater Fish Directive designated water body. Therefore, localised adverse effect anticipated on the tributaries.	No additional effect anticipated (loss of vegetation already considered in the landtake impact), locally or at the scale of the water body.	Potential homogenised flow patterns and increase in flow velocities locally, with no significant effect at the scale of the water body. In the absence of baseline data for any of the tributaries (drainage ditches), localised adverse effect anticipated. Baseline data indicates that tributaries are considered to be of limited importance for fish. Tetchwick Brook is not a designated fishery, only localised adverse effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run off from the proposed railway. No anticipated change in water quality.	YELLOW TO GREEN - Localised and temporary effect during construction. Tributaries are dry in places, considered to be unsuitable for fish. No deterioration of the water body status of the element is however reported.	No additional effect anticipated (loss of vegetation already considered in the landtake impact), locally or at the scale of the water body.	YELLOW TO GREEN - Potential homogenised flow patterns and increase in flow velocities locally. In the absence of baseline data for any of the tributaries (drainage ditches), and no information on fish in the tributaries, localised adverse effect anticipated. Tributaries are heavily shaded and dry in places, considered to be of low importance for fish. Potential localised and minor adverse effects	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run off from the proposed railway. No anticipated change in water quality.	YELLOW TO GREEN - Temporary loss of 140 m of habitat on the tributaries while the new channels re-established. No baseline data available for the tributaries (drainage ditches). Localised adverse effects for tributaries anticipated. Tributaries are dry in places, considered to be unsuitable for fish. No effect anticipated.		No measurable effect on flow rates or dynamics anticipated from Hydromorphological assessment unless watercourse is lengthened. This information will not be available until the detailed design stage. Given lack of baseline data a precautionary assessment of minor adverse has been applied.			No scheme elements on upstream water body	Scheme elements present on this water body are only located only on minor tributaries (drainage ditches) of Tetchwick Brook and of one of its tributaries, Doddershall Brook. River diversions are considered as having the potential for temporary adverse effects on the tributaries but would be balanced by the creation of new habitats within the diverted channels. The numerous culverts are identified as having an adverse effect locally on the tributaries but although there will be 400 m of culverts in total, they will be designed to ensure there is no change to flow regimes downstream of the culverts. Given the small size of the tributaries, the cumulative effect of the culverts (drainage ditches) have a relatively low contribution to the whole water body. No deterioration of this quality element is anticipated.	None required.	None required.	No significant effects	-
			Physico-Chemical status																									
WFD classification elements	Moderate	-	5. Dissolved Oxygen	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	N/A	N/A	Due to the length of the proposed culverts, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	Due to the length of the proposed culverts, there is likely to have a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body.	No impacts from reduction of groundwater levels by dewatering to contribution to surface water levels or cutting is an unproductive strata	No impacts from reduction of groundwater levels by dewatering to contribution to surface water levels or cutting is an unproductive strata	No scheme elements on upstream water body	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. This will ensure complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are considered temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operational phase. Any effects on water quality from operational activities such as road drainage and spillages will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	-	-
	-	-	6. pH	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	No scheme elements on upstream water body						
	-	-	7. Phosphate	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	-	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	-	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	No impacts from reduction of groundwater levels by dewatering to contribution to surface water levels or cutting is an unproductive strata	No impacts from reduction of groundwater levels by dewatering to contribution to surface water levels or cutting is an unproductive strata	No scheme elements on upstream water body						
	-	-	8. Ammonia	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	No scheme elements on upstream water body						
	-	-	9. Temperature	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the proposed culverts, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the proposed culverts, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	No scheme elements on upstream water body						
	-	-	10. Specific Pollutants (Annex VIII)	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact			No scheme elements on upstream water body						
			Hydromorphological status																									Hydromorphology Baseline
WFD classification elements	-	-	11. Quantity and dynamics of river flow	N/A	N/A	• Temporary loss of 95 m of channel. Given the lift in length, there is unlikely to be significant diversity in flow dynamics, although flow characteristics were not visible during the survey. • Unnamed tributary of Tetchwick Brook is a minor tributary of Tetchwick Brook, and in practical terms represents a small proportion of the water body. Given the lift in length of the existing channel, there is unlikely to be significant diversity in flow dynamics, although it appears that the diversion is an extension of the existing channel. Given the small proportion of the water body, the channel may reduce flow rates, although the diversion is not far from the existing channel course. • Overall, it is considered that the impacts on flow rates and dynamics will be minor and in relation to the lift of lengthening the watercourse lift needs to be flagged as a risk	N/A	N/A	• The survey reports that the channel is two stage channel with low flows and there is a lack of significant diversity in flow dynamics, although flow characteristics were not visible during the survey	N/A	• The survey reports that the channel width is approximately 8 m, so there is unlikely to be significant diversity in flow dynamics. However, as there are likely to be several hundred metres of culverts on the tributaries, including river diversions, which would amount to a significant proportion of the open watercourses of the water body, there is potential for local impact with the potential for cumulative impact on hydromorphology in the area. • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased conveyance and decreased roughness. • The unnamed tributaries to Tetchwick Brook are ephemeral and dry in places, and in practical terms the culverts would impact a small proportion of the water body	N/A	• Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics. • Unnamed tributary of Doddershall Brook is a minor tributary of Doddershall Brook, and in practical terms represents a small proportion of the water body. Given the lift in length, it is unclear whether proposed realignment would shorten the local channel reach or extend, although it appears that the diversion is an extension of the existing channel. Given the small proportion of the water body, the channel may reduce flow rates, although the diversion is not far from the existing channel course. • Overall, it is considered that the impacts on flow rates and dynamics are unlikely to be measurable, but the effect of lengthening the watercourse lift needs to be flagged as a risk	N/A	No impacts from reduction of groundwater levels by dewatering to contribution to surface water levels or cutting is an unproductive strata	N/A	No scheme elements on upstream water body	• Culverts and river diversions on small unnamed tributaries are unlikely to adversely impact flow rates and dynamics. However, as there are likely to be several hundred metres of culverts on the tributaries, including river diversions, which would amount to a significant proportion of the open watercourses of the water body, there is potential for local impact with the potential for cumulative impact on hydromorphology in the area. Given the small size of the tributaries, the cumulative effect of the culverts at the scale of the water body, only localised adverse effect anticipated. Overall, the impact on the tributaries, Doddershall Brook, have been assessed and assigned with have general characteristics of field drainage ditches with low flows and derive marginal vegetation. Overall impact anticipated for hydromorphology is considered to be minor and localised in relation to the overall waterbody. MINOR TO NEGLIGIBLE	Hydromorphological surveys to be undertaken to aid detailed design development Hydromorphological mitigation should be incorporated into detailed design development. Mitigation measures that might be incorporated into the detailed design include: • Create low flow channels in over-widened/over-deepened channels • Create road fringes • Introduce riparian vegetation/green corridors where space allows • Recreate a sinuous river channel (re meandering) where space allows • Use of bio-engineering techniques • Use of engineering techniques to assist natural recovery • Use soft engineering techniques	N/A	N/A	Potential widespread or prolonged effects Minimal anticipated for hydromorphology is considered to be minor and localised in relation to the overall waterbody. MINOR TO NEGLIGIBLE	• Hydromorphological baseline data derived from desk study of main hydrological features. Further data will be required to assess impacts on the type of crossings, the scale of the watercourses and their significance to the overall water body.
	-	-	12. Connection to Groundwater	N/A	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No scheme elements on upstream water body						
	-	-	13. River continuity	N/A	N/A	• Lengthening the channel may result in increased channel storage and reduced floodplain connectivity, but the size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected • The size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected	N/A	N/A	• The culverts on unnamed tributaries of Tetchwick Brook would disconnect floodplains and out-of-bank flows, bank habitats and sediment transport. However, in water body terms, this is a minor feature and the culverts would not impact on deterioration of the overall water body status	N/A	N/A	N/A	N/A	• Lengthening the channel may result in increased channel storage and reduced floodplain connectivity, but the size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected • The size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected	N/A	No impacts from reduction of groundwater levels by dewatering to contribution to surface water levels or cutting is an unproductive strata	N/A	No scheme elements on upstream water body						
	-	-	14. River depth and width variation bed	N/A	N/A	• The diversion would replicate existing channel geometry. Out of channel flow depths may decrease as a result of lengthening the channel, but in practical terms there would be no significant change	N/A	N/A	• Out of bank flows would be severed by the culverts, and in channel flows may become deeper upstream of the culverts and may even surcharge in extreme events • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A	N/A	N/A	N/A	• The diversion would replicate existing channel geometry. Out of channel flow depths may decrease as a result of lengthening the channel, but in practical terms there would be no significant change	N/A	N/A	N/A	No scheme elements on upstream water body						
	-	-	15. Structure and substrate of river bed	N/A	N/A	• Lengthening a channel tends to reduce flow rates and increase deposition of sediment • Given the size of the watercourse, impact would probably be no measurable impact	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour • If the culverts disconnect the channel from the floodplain, the impacts on the bed should be minimal, but this is a risk	N/A	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour • Given the size of the watercourse, impact would probably be no measurable impact	N/A	N/A	N/A	No scheme elements on upstream water body						
	-	-	16. Structure of riparian zone	N/A	N/A	• Although channel capacity would increase, there is likely to be no change to existing bank, riparian and floodplain structure and connectivity with channel	N/A	N/A	• The culverts would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	N/A	N/A	N/A	• Although channel capacity would increase, there is likely to be no change to existing bank, riparian and floodplain structure and connectivity with channel	N/A	N/A	N/A	No scheme elements on upstream water body						

B. Risk screening of potential to prevent future attainment of good Ecological status

Which measure to achieve objective (yet to be implemented or confirmed as feasible/viable)	Where measure will happen	When measure will happen	-																									
NONE			Potential strategic measures (Water Framework Directive, Water Resources Management Plan, Flood Risk Management Plan)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

WFD Baseline Survey Details

Water Body ID		GB106039030070			
Surface Water Body Name		Tetchwick Brook, Source to Ray and tributaries			
Scheme Element		**Unnamed tributaries of Doddershall Brook River Diversion and 9 x Culverts**	**Unnamed tributary of Tetchwick Brook River Diversion and 5 x Culverts**	**OVERALL EFFECT**	**RESIDUAL EFFECT**
Surface Water Crossing ID		**CFA12-SWC02 and CFA12-SWC03**	**CFA12-SWC05, CFA12-SWC06, CFA12-SWC07, CFA12-SWC08**		
Survey Site		Doddershall Brook west of Quainton	Unnamed tributary of Tetchwick Brook, near Upper South Farm		
Survey ID		WFD-PA1-0012a, WFD-PA1-0012b, WFD-PA1-0012c	WFD-PA1-0013a, WFD-PA1-0013b		
Objectives of the Survey		• Establish ecological baseline for tributaries. • Assess ecological habitat type. • Assess the local hydromorphology	• Establish ecological baseline for tributaries. • Assess ecological habitat type. • Assess the local hydromorphology		
Survey Scope		Ecological Walkover Survey Hydromorphological Survey	Ecological Walkover Survey Hydromorphological Survey		
Medium Term Survey Results Summary	**Bio**	No access at crossing points. However, tributaries appear to be parts of a field drainage system, heavily shaded by hedgerows and trees at WFD-PA1-0012a, WFD-PA1-0012b and WFD-PA1-0012c. Very low flows, and dry in places. Not considered to be of importance for fish, macrophytes and macroinvertebrates.	Where accessible (WFD-PA1-0013a &WFD-PA1-0013b), tri butary is a field drainage ditch, heavily shaded by hedgerows and scrub. Low flows and assessed as to support limited habitat for fish, macrophytes or macroinvertebrates.		
	Phys	A heavily shaded watercourse (>70%) with little to no flow was observed.	A heavily shaded watercourse (>70%) with little to no flow was observed.		
	Hydro	Survey access was very restricted. Resectioned and realigned channel with no flow at the first crossing point. The second crossing point observed a field drainage ditch, low flows and dense marginal vegetation. bed and flow characteristics were not identifiable.	Survey WFD-PA1-0013a access was very restricted. Resectioned and realigned channel with no flow at the first crossing point. The second crossing point observed (WFD-PA1-0013b) a field drainage ditch, low flows and dense marginal vegetation. bed and flow characteristics were not identifiable.		
Additional Comments		Limited/No access to survey point WFD-PA1-0012a and 12c. Landowner permission not given.	No access to survey point WFD-PA1-0013a. Landowner permission not given.		

Audit Trail for the Update of the WFD Water Body Assessment with Baseline Data

		Nature of the Assessment Update and Justification			
	WFD Classification Elements Changed	**Unnamed tributaries of Doddershall Brook River Diversion and 9 x Culverts**	**Unnamed tributary of Tetchwick Brook River Diversion and 5 x Culverts**	**OVERALL IMPACT**	**RESIDUAL EFFECT**
Biological	**2. Macrophytes and phytobenthos - macrophytes**	"Landtake" and "Shading" effects from culverts downgraded from minor to negligible, as baseline suggests absence of macrophytes. "Landtake" and "Changes to hydromorphology" effects from river diversion downgraded from yellow to green. Rest remains unchanged.	"Landtake", "Shading" and "Changes to hydromorphology" effects from culverts downgraded from minor to negligible, as baseline suggests absence of macrophytes. "Landtake" and "Changes to hydromorphology" effects from river diversion downgraded from yellow to green.	Baseline data indicated that tributaries were heavily shaded and therefore unsuitable for macrophytes. No overall impact anticipated for this macrophytes. YELLOW TO GREEN.	Baseline data indicated that tributaries were heavily shaded and therefore unsuitable for macrophytes. No residual effect anticipated for this macrophytes. YELLOW TO GREEN.
	3. Macroinvertebrates	Although tributaries are assessed of poor potential for macroinvertebrates, as there was no access at the crossing points, assessment remains unchanged.	The baseline survey findings do not significantly alter our conclusions (localised/minor adverse effects on drainage ditch) and provide increased confidence in the assessment. Minor change to wording to reflect the new baseline data, but no change in overall assessment.	No change in overall impact.	No change in residual effect.
	4. Fish	"Landtake" and "Noise and vibration" effects from culvert downgraded from minor to negligible, as baseline suggests that tributaries are unsuitable for fish (dry). "Landtake" and "Changes to hydromorphology" effects from river diversion downgraded from yellow to green. "Habitat creation" effect from river diversion changed from blue to green.	The baseline survey findings do not significantly alter our conclusions (localised/minor adverse effects on drainage ditch) and provide increased confidence in the assessment. Minor change to wording to reflect the new baseline data, but no change in overall assessment.	No change in overall impact.	No change in residual effect.
Physico-Chemical	**5. Dissolved Oxygen**	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	6. pH	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No change in overall impact.	No change in residual effect.
	7. Phosphate	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	8. Ammonia	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No change in overall impact.	No change in residual effect.
	9. Temperature	Considering that the watercourse is heavily shaded, the presence of culverts is not likely to result in a deterioration in temperature, therefore no change in assessment update.	Considering that the watercourse is heavily shaded, the presence of culverts is not likely to result in a deterioration in temperature, therefore no change in assessment update.	No change in overall impact.	No change in residual effect.
	10. Specific Pollutants (Annex VIII)	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
Hydromorphological	**11. Quantity and dynamics of river flow**	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.	AMBER TO YELLOW. Baseline data indicated that the minor tributaries (drainage ditches) of Tetchwick Brook and of one of its tributaries, Doddershall Brook, have been resectioned and realigned and have general characteristics of field drainage ditches with low flows and dense marginal vegetation. Overall impact anticipated for hydromorphology is considered to be minor and localised in relation to the overall waterbody.	AMBER TO YELLOW. Baseline data indicated that the minor tributaries (drainage ditches) of Tetchwick Brook and of one of its tributaries, Doddershall Brook, have been resectioned and realigned and have general characteristics of field drainage ditches with low flows and dense marginal vegetation. Residual effect anticipated for hydromorphology is considered to be minor and localised in relation to the overall waterbody.
	12. Connection to Groundwater	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.		
	13. River continuity	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.		
	14. River depth and width variation bed	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.		
	15. Structure and substrate of river bed	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.		
	16. Structure of riparian zone	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.		

Water Body ID	GB106039030070
Surface Water Body Name	Tetchwick Brook, Source to Ray and tributaries
CFAs covered by Waterbody	12

CFA	12
AP2 ID	AP2-012-001
AP2 Name	Land drainage downstream of Footpath QUA/26 Accommodation Underbridge
AP2 Location	Waddesdon and Quainton
New/Replacement Scheme Element	NEW
Scheme Element Type	River Diversion/Re-grading
Original Scheme	Original scheme has no provision for regrading the ditch downstream of Footbridge QUA/26 accommodation underbridge, down to the private access road to Doddershall House
AP2 Description	Revised scheme shows the landtake limits extended on the west side of the HS2 alignment at ch. 73+200 to enable regrading of the ditch downstream of Footbridge QUA/26 accommodation underbridge.
AP2 Changes to Previously Assessed Elements	None
AP2 Additional Elements Assessment Requirement	New River Diversion

GB100039030070 WFD Assessment

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	River Diversion				Culvert beneath Quainton South Embankment					Culvert beneath Doddershall Embankment					River Diversion				Cutting		RIVER DIVERSION/RE-GRADING - Land drainage downstream of Footpath QUA/26 Accommodation Underbridge - AP-C222-080			Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB100039030070	Bad	Good by 2027	Description of scheme element impact	Unnamed tributary of Tetchwick Brook - SWC-CFA12-3 (71+710) - 95 m, and SWC-CFA12-15, SWC-CFA12-16, SWC-CFA12-17 (short diversions at Station Road)				Unnamed tributaries of Tetchwick Brook: SWC-CFA12-2 (71+450) - 61 m and 24 m culverts, SWC-CFA12-15 - 12 m culvert, SWC-CFA12-16 - 15 m culvert, SWC-CFA12-17 - 18 m culvert					Unnamed tributaries of Doddershall Brook: SWC-CFA12-5 (73+190) - 61 m culvert and 13 m culvert, SWC-CFA12-6 (73+430) - 67 m culvert, SWC-CFA12-7 (73+490) - 5 m culvert and 68 m culvert, SWC-CFA12-8 (73+650) - 5 m culvert, 17 m culvert and 46 m culvert, SWC-CFA12-19 (72+500), 50 m culvert extension					Unnamed tributaries of Doddershall Brook - SWC-CFA12-6 (73+430) - 67 m , and SWC-CFA12-7 (73+490) - 68 m					Quainton cutting - Approximately 72+000		The original ordinary watercourse/drainage ditch on this section was to remain as normal (according to original scheme drawings). WF2 change will result in a reach of approximately 100m of drainage ditch being re-graded. Walkover survey undertaken on this stretch, reference WF0-FM1-0012b. Photo references WF0-HM1-0012-P1688, WF0-HM1-0012-P1687 and WF0-HM1-0012-P1688.							
Tetchwick Brook, Source to Ray and tributaries			Identified biological impacts	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream		Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either discharge due to the watering/damming of groundwater flows or increase due to to changes in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream			Construction	Operation		
WFD Quality elements	Predicted change to status elements (green = none, amber = possible, red = likely)																															
1.Macrophytes and phytobenthos - diatoms	N/A	N/A		N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
2. Macrophytes and phytobenthos - macrophytes	n/a	n/a		Baseline data indicates that tributaries are heavily shaded with low flows and therefore not suitable for macrophytes. No effect anticipated.	The new channels will incorporate unshaded areas and marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species if suitable. No baseline data collected for this tributary. Potential beneficial effect anticipated.	YELLOW TO GREEN - Potential localised reduction in flow rates and velocities in the vicinity of the new channel on the Tetchwick Brook itself. As no data is available for other minor tributaries of Tetchwick Brook. Baseline data indicates that tributaries are heavily shaded with low flows and therefore not suitable for macrophytes. No effect anticipated.	Receptor not sensitive to impact. No likely effect anticipated.	Baseline data indicates that tributaries are heavily shaded with low flows and therefore not suitable for macrophytes. No effect anticipated.	Baseline data indicates that tributaries are heavily shaded with low flows and therefore not suitable for macrophytes. No effect anticipated.	Potential homogenised flow patterns and increase in flow velocities locally, with no significant effect at the scale of the water body. Baseline data indicates that tributaries are heavily shaded with low flows and therefore not suitable for macrophytes. No effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Receptor not sensitive to impact. No likely effect anticipated.	Tributaries are heavily shaded and dry in places. No effect anticipated.	Tributaries are heavily shaded and dry in places. No effect anticipated.	Potential homogenised flow patterns and increase in flow velocities locally, with no significant effect at the scale of the water body. Tributaries are heavily shaded and dry in places. No effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Tributaries are heavily shaded and dry in places. No effect anticipated.	The new channels will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species if suitable. Tributaries are heavily shaded and dry in places. Potential beneficial effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	No measurable effect on flow rates or dynamics anticipated from hydromorphological assessment (where watercourse is lengthened). This information will be available until the detailed design stage. Any effects are considered to be negligible.			Tributary is heavily shaded, dry in places and not considered to be suitable for macrophytes. No effect anticipated.	Tributary is heavily shaded, dry in places and not considered to be suitable for macrophytes. No effect anticipated.	Tributary is heavily shaded, dry in places and not considered to be suitable for macrophytes. No effect anticipated.	No scheme elements on upstream water body	Scheme elements present on this water body are only located on minor tributaries (drainage ditches) of Tetchwick Brook and of one of its tributaries, Doddershall Brook. River diversions are considered as having a slight adverse effect locally on the hydromorphology of the channels affected by the creation of new habitats within the diverted channels. The numerous culverts are identified as having an adverse effect locally on the flow regime and hydromorphology of the channels affected by the culverting. Minor changes in flow rates and velocities have been identified as having a slight adverse effect locally on the Tetchwick Brook. Furthermore, the tributaries (drainage ditches) of Tetchwick Brook and of one of its tributaries, Doddershall Brook, have been reactivated and realigned and have given characteristics of field drainage ditches with low flow and diverse marginal vegetation. Minor changes in flow regime downstream of the culverted sections have been identified as having a slight adverse effect locally on the

GB100030030100

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Adam's Embankment culvert					River Diversion				Culvert					River Diversion					Cutting		Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)
GB100030030100			Description of scheme element impact	River Ray: SWC-CFA12-9 (74+530) extension existing culvert - 50m					River Ray: river diversion (74+500) - no details available				Tributaries of River Ray: Lee Wood Farm Ditch - SWC-CFA12-10 (75+110) - culvert replacement (31 m), Muswell Brook - SWC-CFA12-12 (76+730) - extension existing culvert - 24 m, Unname Tributary of Muswell Brook - SWC-CFA12-11 (76+705) - culvert extension - 25 m, Greatmoor Ditch - culvert extension					Tributary of River Ray: Muswell Brook - SWC-CFA12-12 (76+730), Greatmoor ditch (75+500 to 75+600) - small river diversion (no details), Unnamed Tributary of Muswell Brook (76+000 to 76+250) - diversion (no details), Unnamed Tributary of River Ray (no details)				Culvert Cutting				
Ray and tributaries North East of Grendon Underwood	Moderate	Good by 2027	Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.					
1.Macrophytes and phytobenthos - diatoms	n/a	n/a	Predicted change to status elements (green = none, amber = possible, red = likely)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2. Macrophytes and phytobenthos - macrophytes	n/a	n/a		Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to the loss of a maximum of 50 m of macrophyte habitat. The River Ray only supports very sparse aquatic vegetation on the stretch impacted (HS2 baseline survey). However, as culvert already existing, effect likely to be negligible.	Likely to lead to the loss of a maximum of 50 m of macroinvertebrate habitat (i.e. streambed, aquatic vegetation, riparian vegetation). The watercourse currently support poor macroinvertebrate quality (baseline survey). As culvert already existing, negligible effect anticipated.	Minor changes to flow dynamics given existing culvert, with no more than minor adverse effects at this location. The River Ray only supports very sparse aquatic vegetation on the stretch impacted (HS2 baseline survey). Potential adverse effect likely to be minor and localised.	Minor changes to flow dynamics given existing culvert, with no more than minor adverse effects at this location. The watercourse currently support poor macroinvertebrate quality (baseline survey). Potential adverse effect likely to be minor and localised.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	There will be loss of marginal and channel habitat over the length of the existing River Ray that lies within the diverted section, while the new channel re-establishes. The River Ray only supports very sparse aquatic vegetation on the stretch impacted (HS2 baseline survey). Potential beneficial effect anticipated.	A 40m zone up and downstream of the culvert will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. The River Ray only supports very sparse aquatic vegetation on the stretch impacted (HS2 baseline survey). Potential beneficial effect anticipated.	Effects on flow dynamics are considered insignificant. River Ray only supports very sparse aquatic vegetation on the stretch impacted (HS2 baseline survey). Potential minor beneficial effect anticipated locally.	Likely to lead to very localised increase in flow velocities, with no significant effect at the scale of the water body. Tributaries heavily shaded and with very few aquatic vegetation (ecology baseline survey). Effect likely to be negligible.	As the culverts are already existing and will only be extended or replaced, these are likely to lead to the loss of macrophytes over very localised areas. Tributaries heavily shaded and with very few aquatic vegetation (ecology baseline survey). Effect likely to be negligible.	As the culverts are already existing and will only be extended or replaced, these are likely to lead to the loss of macrophytes over very localised areas by reduction of photosynthetic activity. Tributaries heavily shaded and with very few aquatic vegetation (ecology baseline survey). Effect likely to be negligible.	Likely to lead to very localised increase in flow velocities, with no significant effect at the scale of the water body. Tributaries heavily shaded and with very few aquatic vegetation (ecology baseline survey). Effect likely to be negligible.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	There will be loss of marginal and channel habitat over the length of the existing tributaries that lie within the diverted section, while the new channels re-establish. Tributaries heavily shaded and with very few aquatic vegetation (ecology baseline survey). Potential beneficial effect anticipated.	The new channels will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. Tributaries heavily shaded and with very few aquatic vegetation (ecology baseline survey). Potential temporary adverse effect anticipated.	Potential reduction in flow rates and increase diversity of bed formations locally, with no significant effect at the scale of the water body. Muswell Brook currently supports poor to moderate macroinvertebrate quality (baseline survey). No baseline data available for other tributaries. Potential minor beneficial effect anticipated at very localised scale.		No scheme elements on upstream water body	River diversions (400 m in total) on the tributaries of the River Ray have the potential for temporary adverse effects but would be balanced by the creation of new habitats within the diverted channels. The 4 culverts on the tributaries and on the River Ray are either replacements or extensions of existing structures and are therefore considered to have only very localised additional effects. Given the that the tributaries are already heavily shaded, and support very few aquatic vegetation, effects of scheme elements in isolation or cumulatively are not considered to likely to cause a deterioration in status for this element.	None required.	None required.	Potential minor and localised effects
3. Macroinvertebrates	Moderate	Good by 2027		Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to the loss of a maximum of 50 m of macroinvertebrate habitat (i.e. streambed, aquatic vegetation, riparian vegetation). The watercourse currently support poor macroinvertebrate quality (baseline survey). As culvert already existing, negligible effect anticipated.	No additional effect anticipated (loss of vegetation already considered in the landtake impact), locally or at the scale of the water body.	Minor changes to flow dynamics given existing culvert, with no more than minor adverse effects at this location. The watercourse currently support poor macroinvertebrate quality (baseline survey). Potential adverse effect likely to be minor and localised.	Minor changes to flow dynamics given existing culvert, with no more than minor adverse effects at this location. The watercourse currently support poor macroinvertebrate quality (baseline survey). Potential adverse effect likely to be minor and localised.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Temporary loss of macroinvertebrate habitat over the length of the existing River Ray that lies within the diverted section, while the new channel re-establishes. The watercourse currently support poor macroinvertebrate quality (baseline survey). As culvert already existing, negligible effect anticipated. Potential adverse effect likely to be minor and localised.	A 40m zone up and downstream of the culvert will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by macroinvertebrates. The watercourse currently support poor macroinvertebrate quality (baseline survey). As culvert already existing, negligible effect anticipated. Potential beneficial effect anticipated.	Effects on flow dynamics are considered insignificant. The watercourse currently support poor macroinvertebrate quality (baseline survey). Potential minor beneficial effect anticipated locally.	Likely to lead to very localised increase in flow velocities and homogenised flow patterns, with no significant effect at the scale of the water body. Muswell Brook currently support poor to moderate macroinvertebrate quality (baseline survey). No baseline data available for other tributaries. Potential adverse effect likely to be minor and very localised.	As the culverts are already existing and will only be extended or replaced, these are likely to lead to the loss of macroinvertebrate habitats over very localised areas. Tributaries heavily shaded and with very few aquatic vegetation (ecology baseline survey).	No additional effect anticipated (loss of vegetation already considered in the landtake impact), locally or at the scale of the water body.	Likely to lead to very localised increase in flow velocities and homogenised flow patterns, with no significant effect at the scale of the water body. Muswell Brook currently support poor to moderate macroinvertebrate quality (baseline survey). No baseline data available for other tributaries. Potential adverse effect likely to be minor and very localised.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Temporary loss of macroinvertebrate habitat over the length of the existing tributaries that lie within the diverted section, while the new channels re-establish. Muswell Brook currently supports poor to moderate macroinvertebrate quality (baseline survey). No baseline data available for other tributaries. Potential beneficial effect anticipated, with no degradation of the element status at the scale of the water body.	The new diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach. Muswell Brook currently supports poor to moderate macroinvertebrate quality (baseline survey). No baseline data available for other tributaries. Potential beneficial effect anticipated, with no degradation of the element status at the scale of the water body.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities. Baseline surveys showed low habitat fish quality and no fish were recorded for Muswell Brook. No fish data available for the other tributaries. In addition, the River Ray is not a Freshwater Fish Directive designated water body. Potential adverse effect likely to be minor and very localised.	Potential reduction in flow rates and increase diversity of bed formations locally, with no significant effect at the scale of the water body. Muswell Brook currently supports poor to moderate macroinvertebrate quality (baseline survey). No baseline data available for other tributaries. Potential minor beneficial effect anticipated at a very localised scale.		• It is unlikely that Culvert cutting will impact surface water flows in the Ray and tributaries the area is an unproductive strata and therefore there is unlikely to be a significant groundwater contribution to surface water flow. • Any minor impacts on flow will be minor and localised and the reduction in contribution of flow from groundwater will only impact a small proportion of the watercourse	• It is unlikely that Culvert cutting will impact surface water flows in the Ray and tributaries the area is an unproductive strata and therefore there is unlikely to be a significant groundwater contribution to surface water flow. • Any minor impacts on flow will be minor and localised and the reduction in contribution of flow from groundwater will only impact a small proportion of the watercourse	No scheme elements on upstream water body	River diversions (400 m in total) on the tributaries of the River Ray have the potential for temporary adverse effects but would be balanced by the creation of new habitats within the diverted channels. The 4 culverts on the tributaries and on the River Ray are either replacements or extensions of existing structures and are therefore considered to have only very localised additional effects. Although no baseline data is available for the small tributaries (drainage ditches), as the scheme is on this quality element is likely to be negligible, and would not lead to a deterioration of the WFD status of this quality element.	None required.	None required.	Potential minor and localised effects
4. Fish	n/a	n/a		Localised and temporary effect during construction. No deterioration of the water body status of the element is however expected.	Likely to lead to the loss of a maximum of 50 m of fish habitat (i.e. streambed, aquatic vegetation, riparian vegetation). The watercourse is culvert already existing. It is not considered to constitute a further barrier to fish movements. Baseline surveys showed moderate habitat fish quality but no fish were recorded. The River Ray is not a Freshwater Fish Directive designated water body. As culvert already existing, very localised adverse effect anticipated.	No additional effect anticipated (loss of vegetation already considered in the landtake impact), locally or at the scale of the water body.	Minor changes to flow dynamics given existing culvert, with no more than minor adverse effects at this location. Baseline surveys showed moderate habitat fish quality but no fish were recorded. The River Ray is not a Freshwater Fish Directive designated water body. Potential adverse effect likely to be minor and localised.	Minor changes to flow dynamics given existing culvert, with no more than minor adverse effects at this location. Baseline surveys showed moderate habitat fish quality but no fish were recorded. The River Ray is not a Freshwater Fish Directive designated water body. Potential adverse effect likely to be minor and localised.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Temporary loss of fish habitat over the length of the existing River Ray that lies within the diverted section, while the new channel re-establishes. Baseline surveys showed moderate habitat fish quality but no fish were recorded. The River Ray is not a Freshwater Fish Directive designated water body. Localised and temporary adverse effect anticipated.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities. Baseline surveys showed moderate habitat fish quality but no fish were recorded. The River Ray is not a Freshwater Fish Directive designated water body. Potential beneficial effect anticipated.	Effects on flow dynamics are considered insignificant. Baseline surveys showed moderate habitat fish quality but no fish were recorded. The River Ray is not a Freshwater Fish Directive designated water body. Potential minor beneficial effect anticipated locally.	Likely to lead to very localised increase in flow velocities and homogenised flow patterns, with no significant effect at the scale of the water body. Baseline surveys showed low habitat fish quality and no fish were recorded for Muswell Brook. No fish data available for the other tributaries. In addition, the River Ray is not a Freshwater Fish Directive designated water body. Potential adverse effect likely to be minor and very localised.	As the culverts are already existing and will only be extended or replaced, these are likely to lead to the loss of macroinvertebrate habitats over very localised areas. Tributaries heavily shaded and with very few aquatic vegetation (ecology baseline survey).	No additional effect anticipated (loss of vegetation already considered in the landtake impact), locally or at the scale of the water body.	Likely to lead to very localised increase in flow velocities and homogenised flow patterns, with no significant effect at the scale of the water body. Baseline surveys showed low habitat fish quality and no fish were recorded for Muswell Brook. No fish data available for the other tributaries. In addition, the River Ray is not a Freshwater Fish Directive designated water body. Potential adverse effect likely to be minor and very localised.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Temporary loss of fish habitat over the length of the existing tributaries that lie within the diverted section, while the new channels re-establish. Baseline surveys showed low habitat fish quality and no fish were recorded for Muswell Brook. No fish data available for the other tributaries. In addition, the River Ray is not a Freshwater Fish Directive designated water body. Localised and temporary adverse effect anticipated.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities. Baseline surveys showed low habitat fish quality and no fish were recorded for Muswell Brook. No fish data available for the other tributaries. In addition, the River Ray is not a Freshwater Fish Directive designated water body. Potential beneficial effect anticipated.	Potential reduction in flow rates and increase diversity of bed formations locally, with no significant effect at the scale of the water body. Muswell Brook currently supports poor to moderate macroinvertebrate quality (baseline survey). Baseline surveys showed low habitat fish quality and no fish were recorded for Muswell Brook. No fish data available for the other tributaries. In addition, the River Ray is not a Freshwater Fish Directive designated water body. Potential minor beneficial effect anticipated at a very localised scale.				No scheme elements on upstream water body				

Physico-Chemical status

5. Dissolved Oxygen	Poor	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor with no degradation of current status anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor with no degradation of current status anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.		No scheme elements on upstream water body	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of pollutants from construction activities is unrealistic, however, in this case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and treated where required to ensure compliance with Water Quality Standards (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	No significant effects
6. pH	High	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact				No scheme elements on upstream water body				
7. Phosphate	Poor	-		N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.		No scheme elements on upstream water body				
8. Ammonia	Good	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact				No scheme elements on upstream water body				
9. Temperature	-	-		N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact				No scheme elements on upstream water body				
10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.		No scheme elements on upstream water body				

Hydromorphological status

																													Hydromorphology Baseline
11. Quantity and dynamics of river flow	-	-		N/A	N/A	N/A	• There could be significant diversity of flow dynamics - however a culvert already exists at this location • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • The River Ray is small watercourse at this point, and in practical terms the culvert would impact a small proportion of the water body	N/A	N/A	• Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics • The crossing is over the upper reaches of the River Ray, and in practical terms represents a small proportion of the water body. • It is considered that the watercourse will be unaffected by the new culvert installation. The channel may reduce flow rates although the diversion is not far from the existing channel course • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of lengthening the watercourse still needs to be flagged as a risk	N/A	N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • Lee Wood Ditch, Greatmoor Ditch, Muswell Brook and an unnamed tributary of Muswell Brook are effectively drainages ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	N/A	• Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics • The tributaries of the River Ray (Muswell Brook, Greatmoor ditch and unnamed tributary of Muswell Brook) are effectively drainages ditch within a small proportion of the water body • It appears that diversion will lengthen watercourse at Embankment. Lengthening the channel may reduce flow rates although the diversion is not far from the existing channel course • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of lengthening the watercourse still needs to be flagged as a risk	N/A	No upstream water body impacted by the scheme					
12. Connection to Groundwater	-	-		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A		• Likely to be no significant relationship between hydromorphology and groundwater		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A			• Likely to be no significant relationship between hydromorphology and groundwater		N/A	No upstream water body impacted by the scheme					
13. River continuity	-	-		N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within a small proportion of the water body. • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A	N/A		• Shortening the channel may result in accelerated flows and increased erosion, which in turn could increase overbank spillage and floodplain connectivity downstream • The size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected		N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within a small proportion of the water body. • Lee Wood Ditch, Greatmoor Ditch, Muswell Brook and an unnamed tributary of Muswell Brook are effectively drainages ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	N/A	• Shortening the channel may result in accelerated flows and increased erosion, which in turn could increase overbank spillage and floodplain connectivity downstream • The size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected		• It is unlikely that Culvert cutting will impact surface water flows in the Ray and tributaries the area is an unproductive strata and therefore there is unlikely to be a significant groundwater contribution to surface water flow. • Any minor impacts on flow will be minor and localised and the reduction in contribution of flow from groundwater will only impact a small proportion of the watercourse	N/A	No upstream water body impacted by the scheme	Undertake hydromorphological survey to ed detailed design development Incorporate mitigation measures into detailed design where practicable. Mitigation measures might include: • Bank re-profiling (rehabilitation) • Bank re-vegetation • Creation of shallow margin in front of hard defence • Install silt, sand or gravel traps • Introduce riparian vegetation/green corridors where space allows • Recreate a sinuous river channel (re-meandering) where space allows Recreation of gravel bars and riffles using permanent and/or temporary bed structures (increase morphological diversity) • Retain marginal vegetation • Use of engineering techniques to avoid natural recovery • Use soft engineering techniques		Potential minor and localised effects	• Extension to culvert on the river Ray and construction of culverts on minor tributaries are unlikely to have a significant impact on flow dynamics and hydromorphology of the watercourse • Bryer diversion on the river Ray and tributaries are on small watercourses and unlikely and unlikely to impact flow dynamics and hydromorphology • However, as culverts and diversions on tributaries are fairly extensive and diversion on main watercourse, this has been flagged as having localised effects.	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
14. River depth and width variation bed	-	-		N/A	N/A	N/A	• Out of bank flows would be severed by the culvert and in-channel flows may become deeper than natural pools, and may even surcharge in extreme events • The culvert would disconnect channel morphology - Scour adjacent to the structure upstream and downstream could result in sharp changes in channel geometry and a stepped channel / perched culvert base • The size of the channel suggests there could be significant loss of channel depth and width - and this is a risk	N/A	N/A		• The diversion would replicate existing channel geometry • Increasing flow rates may result in local scour of the bed, which could increase morphological diversity and allow the channel to regain a dynamic equilibrium form • Some local scour and substrate deposition would promote morphological diversity • Overall , there is unlikely to be significant channel change	N/A	N/A	N/A	N/A	• Out-of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural pools, and may even surcharge in extreme events • The culvert would not be significant loss of channel depth and width	N/A	N/A	• The diversion would replicate existing channel geometry • Increasing flow rates may result in local scour of the bed, which could increase morphological diversity and allow the channel to regain a dynamic equilibrium form • Some local scour and substrate deposition would promote morphological diversity • Overall , there is unlikely to be significant channel change		N/A	No upstream water body impacted by the scheme					
15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be any significant change in substrate or scour, but bed structure could be homogenised • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	N/A		• Shortening the channel could increase gradients and flows and increase erosion • This could result in loss of substrates in the shortened reach, but increased diversity of bed formations immediately downstream and possibly increased sediment deposition • The locally increased flow rates could trigger bed scour upstream as the channel attempts to smooth its bed gradient • Given the size of the channel there is unlikely to be major adjustment, but this is still a risk	N/A	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be any significant change in substrate or transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	N/A	• Shortening the channel could increase gradients and flows and increase erosion • This could result in loss of substrates in the shortened reach, but increased diversity of bed formations immediately downstream and possibly increased sediment deposition • The locally increased flow rates could trigger bed scour upstream as the channel attempts to smooth its bed gradient • Given the size of the channel there is unlikely to be major adjustment, but this is still a risk		N/A	No upstream water body impacted by the scheme					
16. Structure of riparian zone	-	-		N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	N/A		• There is unlikely to be any net change to existing bank, riparian and floodplain structure and connectivity with channel		N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	N/A	• There is unlikely to be any net change to existing bank, riparian and floodplain structure and connectivity with channel		N/A	No upstream water body impacted by the scheme					

B. Risk screening of potential to prevent future attainment of good Ecological status

Joint measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	Predicted change to status elements (green = none, amber = possible, red = likely)																										
NONE	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Water Body ID	GB106039030100
Surface Water Body Name	Ray and tributaries North East of Grendon Underwood
CFAs covered by Waterbody	12

CFA	12
AP2 ID	AP-C222-158
AP2 Name	Adam's Underbridge Extension ch 074+500
AP2 Location	Waddesdon and Quainton
New/Replacement Scheme Element	NEW
Scheme Element Type	Culvert drainage
Original Scheme	The section of railway drainage north of Adam's accommodation underbridge is shown to cross the underbridge and discharge into an attenuation pond at ch 73+430.
AP2 Description	An additional outfall and rail drainage attenuation pond with volume of 187 m3 to be added immediately upstream of Adam's accommodation underbridge. The railway drainage pond at ch. 73+650 is reduced in size.
AP2 Changes to Previously Assessed Elements	Adam's Embankment culvert
AP2 Additional Elements Assessment Requirement	None

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Adam's Embankment culvert					CULVERT DRAINAGE - Adam's Underbridge Extension ch 074+500 - AP-C222-158					River Diversion				Culvert					River Diversion					Cutting		Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)
GB103060390100	Moderate	Good by 2027	Description of scheme element impact	River Ray: SWC-CFA12-9 (74+530) extension existing culvert - 50m					No major changes to the culvert itself. An additional outfall and rail and drainage attenuation pond is to be added immediately upstream of Adam's accommodation underbridge. All impacts likely to remain unchanged, with the exception of Drainage.					River Ray: river diversion (74+500) - no details available				Tributaries of River Ray: Lee Wood Farm Ditch - SWC-CFA12-10 (75+110) - culvert replacement (31 m), Muswell Brook - SWC-CFA12-12 (76+730), Greenmoor ditch (75+500 to 75+600) - small river diversion (no details), Unnamed Tributary of Muswell Brook (76+000 to 76+250) - diversion (no details), Unnamed Tributary of River Ray (no details)					Tributary of River Ray: Muswell Brook - SWC-CFA12-12 (76+730), Greenmoor ditch (75+500 to 75+600) - small river diversion (no details), Unnamed Tributary of Muswell Brook (76+000 to 76+250) - diversion (no details), Unnamed Tributary of River Ray (no details)				Culvert-Cutting				
Ray and tributaries North East of Grendon Underwood	Moderate	Good by 2027	Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/lowering of groundwater flows or increase due to discharge of flow water/silt and volume due to de-watering	Changes to groundwater flows and quality due to discharge of groundwater to a surface water body.			Construction	Operation	
WFD classification elements	Physical changes to water bodies (elements in green = none, amber = possibly, red = likely)																																
1. Macrophytes and phytobenthos-diatoms	n/a	n/a		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2. Macrophytes and phytobenthos-Macrophytes	n/a	n/a		Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to the loss of a maximum of 50 m of riparian habitat. The River Ray supports very sparse aquatic vegetation on the stretch impacted (HSI baseline survey). However, as culvert already existing, effect likely to be negligible.	Likely to lead to the loss of macrophytes of a maximum of 50 m by reduction of photosynthetic activity. The River Ray only supports very sparse aquatic vegetation on the stretch impacted (HSI baseline survey). However, as culvert already existing, effect likely to be negligible.	Minor changes to flow dynamics given existing culvert, with no more than minor adverse effects at the impacts. The River Ray only supports very sparse aquatic vegetation on the stretch impacted (HSI baseline survey). Potential adverse effect likely to be minor and localised.	Drainage (including balancing ponds) has been designed to reduce the rate of surface water run-off from the proposed culvert. No anticipated change in water quality.	Culvert will lead to the permanent loss of habitat. The River Ray only supports very sparse aquatic vegetation on the stretch impacted (HSI baseline survey). Potential adverse and localised adverse effect.	No additional effect anticipated (loss of vegetation already considered in the landtake impact).	No significant changes in hydromorphology. Effects likely to be neutral.	Potential temporary, localised and minor adverse effect on dissolved oxygen and pollutants concentrations. Potential minor and localised adverse effect.	There will be loss of marginal and channel macrophytes over the length of the existing culvert. River Ray flow within the diverted section, while the new channel is established, may cause temporary increase in turbidity and may cause temporary impacts on macrophytes (HSI baseline survey). Localised and temporary adverse effect anticipated.	A 40m zone up and downstream of the culvert will be cleared of vegetation including marginal macrophytes species and the channel will include a range of habitats suitable for colonisation by aquatic macrophytes. The River Ray only supports very sparse aquatic vegetation on the stretch impacted (HSI baseline survey). Localised and temporary adverse effect anticipated.	Effects on flow dynamics are considered insignificant. River Ray only supports very sparse aquatic vegetation on the stretch impacted (HSI baseline survey). Potential minor beneficial effect anticipated locally.	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream: Effects likely to be negligible.	Receptor not sensitive to impact. No likely effect anticipated.	As the culverts are already existing and will only be extended or replaced, these are likely to lead to the loss of macrophytes over very localised areas. Tributaries heavily shaded and with very few aquatic vegetation (ecology baseline survey). Effect likely to be negligible.	As the culverts are already existing and will only be extended or replaced, these are likely to lead to the loss of macrophytes over very localised areas. Tributaries heavily shaded and with very few aquatic vegetation (ecology baseline survey). Effect likely to be negligible.	Likely to lead to very localised increase in flow velocities, with no significant effect at the scale of the water body. Tributaries heavily shaded and with very few aquatic vegetation (ecology baseline survey). Effect likely to be negligible.	Drainage (including balancing ponds) has been designed to reduce the rate of surface water run-off from the proposed culvert. No anticipated change in water quality.	There will be loss of marginal and channel macrophytes over the length of the existing tributaries that lie within the diverted section, while the new channels re-establish. Baseline data available for other tributaries. Localised and temporary adverse effect anticipated, with no degradation of the element status at the scale of the water body.	The new channels will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by aquatic species. Tributaries heavily shaded and with very few aquatic vegetation (ecology baseline survey). Potential beneficial effect anticipated.	Potential reduction in flow rates and increase diversity of bed formations locally, with no significant effect at the scale of the water body. Muswell Brook currently supports very poor to moderate macroinvertebrate quality (baseline survey). Potential minor beneficial effect anticipated at a very localised scale.	n/a	n/a	No scheme elements on upstream water body	River diversions (400 m in total) on the tributaries of the River Ray have the potential for temporary adverse effects but would be balanced by the creation of new habitats within the diverted channels. The 4 culverts on the tributaries and the River Ray are either replacement or extensions of existing structures and are therefore considered to have only very localised additional effects. Given the fact that the tributaries are already shaded, and support very few aquatic vegetations, effects of scheme elements in isolation or cumulatively are not considered to likely to cause a deterioration in status for this element. The additional WFS attenuation pond and outfall will lead to potentially localised and minor adverse effects on water quality on the River Ray, which currently supports very sparse vegetation within the stretch impacted. Therefore, additional effects likely to be of low significance at the scale of the waterbody (alone or in combination), and no change in the overall effect, which remains minor adverse locally, as part of the WFS assessment is anticipated.	None required.	None required.	Potential minor and localised effects.
3. Macroinvertebrates	Moderate	Good by 2027		Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to the loss of a maximum of 50 m of macroinvertebrate habitat (i.e. stranded, crushed or displaced macroinvertebrates). The watercourse currently supports poor macroinvertebrate quality (baseline survey). As culvert already existing, negligible effect anticipated.	No additional effect anticipated (loss of vegetation already considered in the landtake impact), locally or at the scale of the water body.	Minor changes to flow dynamics given existing culvert, with no more than minor adverse effects at the impacts. The watercourse currently support poor macroinvertebrate quality (baseline survey). Potential adverse effect likely to be minor and localised.	Drainage (including balancing ponds) has been designed to reduce the rate of surface water run-off from the proposed culvert. No anticipated change in water quality.	Culvert will lead to the permanent loss of habitat. The watercourse currently supports poor macroinvertebrate quality (baseline survey). As culvert already existing, negligible effect anticipated.	No additional effect anticipated (loss of vegetation already considered in the landtake impact).	No significant changes in hydromorphology. Effects likely to be neutral.	Potential temporary, localised and minor adverse effect on dissolved oxygen and pollutants concentrations. Potential minor and localised adverse effect.	Temporary loss of macroinvertebrate habitat over the length of the existing River Ray flow lies within the diverted section, while the new channel is established. Baseline surveys showed currently support poor macroinvertebrate quality (baseline survey). As culvert already existing, negligible effect anticipated, with no degradation of the element status at the scale of the water body.	A 40m zone up and downstream of the culvert will be cleared of vegetation including marginal macrophytes species and the channel will include a range of habitats suitable for colonisation by aquatic species, including where possible, pools, riffles and runs in order to allow for colonisation by aquatic species. Baseline surveys showed currently support poor macroinvertebrate quality (baseline survey). As culvert already existing, negligible effect anticipated, with no degradation of the element status at the scale of the water body.	Effects on flow dynamics are considered insignificant. The watercourse currently support poor macroinvertebrate quality (baseline survey). Potential minor beneficial effect anticipated locally.	No significant changes in hydromorphology. Effects likely to be neutral.	Receptor not sensitive to impact. No likely effect anticipated.	As the culverts are already existing and will only be extended or replaced, these are likely to lead to the loss of macroinvertebrate habitats over very localised areas. Baseline surveys showed currently support poor to moderate macroinvertebrate quality (baseline survey). No baseline data available for other tributaries. Potential adverse effect likely to be minor and very localised.	As the culverts are already existing and will only be extended or replaced, these are likely lead to the loss of macroinvertebrate habitats over very localised areas. Baseline surveys showed currently support poor to moderate macroinvertebrate quality (baseline survey). No baseline data available for other tributaries. Potential adverse effect likely to be minor and very localised.	Likely to lead to very localised increase in flow velocities and homogenised flow patterns, with no significant effect at the scale of the water body. Baseline surveys showed currently support poor to moderate macroinvertebrate quality (baseline survey). No baseline data available for other tributaries. Potential adverse effect likely to be minor and very localised.	Drainage (including balancing ponds) has been designed to reduce the rate of surface water run-off from the proposed culvert. No anticipated change in water quality.	Temporary loss of macroinvertebrate habitat over the length of the existing tributaries that lie within the diverted section, while the new channels re-establish. Baseline data available for other tributaries. Localised and temporary adverse effect anticipated, with no degradation of the element status at the scale of the water body.	The new channels will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by aquatic species. Tributaries heavily shaded and with very few aquatic vegetation (ecology baseline survey). Potential beneficial effect anticipated.	Potential reduction in flow rates and increase diversity of bed formations locally, with no significant effect at the scale of the water body. Muswell Brook currently supports very poor to moderate macroinvertebrate quality (baseline survey). No baseline data available for other tributaries. Potential minor beneficial effect anticipated at a very localised scale.	n/a	n/a	No scheme elements on upstream water body	No scheme elements on upstream water body	Minor adverse effects on water quality on the River Ray, which currently supports poor macroinvertebrate quality, are anticipated. Therefore, additional effects likely to be of low significance at the scale of the waterbody (alone or in combination), and no change in the overall effect, which remains minor adverse locally, as part of the WFS assessment is anticipated.	None required.	None required.	Potential minor and localised effects.
4. Fish	n/a	n/a		Localised and temporary effects during construction. No permanent effects anticipated. Baseline data of the element is however, expected.	Likely to lead to the loss of a maximum of 50 m of fish habitat (i.e. stranded, aquatic vegetation and woody debris). As culvert already existing, it is unlikely to constitute a further barrier to fish movements. Baseline surveys showed moderate habitat fish quality but no fish were recorded. The River Ray is not a freshwater Fish Directive designated water body. Localised and temporary effects anticipated.	No additional effect anticipated (loss of vegetation already considered in the landtake impact), locally or at the scale of the water body.	Minor changes to flow dynamics given existing culvert, with no more than minor adverse effects at the impacts. Baseline surveys showed moderate habitat fish quality but no fish were recorded. The River Ray is not a Freshwater Fish Directive designated water body. Potential adverse effect likely to be minor and localised.	Drainage (including balancing ponds) has been designed to reduce the rate of surface water run-off from the proposed culvert. No anticipated change in water quality.	Localised and temporary effect During construction. No permanent effects anticipated in terms of the element as baseline expected.	Culvert will lead to the permanent loss of habitat and is unidirectional, an obstruction to fish movements. Baseline surveys showed moderate habitat fish quality but no fish were recorded. The River Ray is not a Freshwater Fish Directive designated water body. In addition, the watercourse is already culverted in the area. Potential localised adverse effect.	No additional effect anticipated (loss of vegetation already considered in the landtake impact).	No significant changes in hydromorphology. Effects likely to be neutral.	Potential temporary, localised and minor adverse effect on dissolved oxygen and pollutants concentrations. Potential minor and localised adverse effect.	Temporary loss of fish habitat over the length of the existing River Ray flow lies within the diverted section, while the new channel is established. Baseline surveys showed moderate habitat fish quality but no fish were recorded. The River Ray is not a Freshwater Fish Directive designated water body. Localised and temporary adverse effect anticipated.	The range of habitats incorporated into the diverted channel channel is considered to represent an improvement for fish communities. Baseline surveys showed moderate habitat fish quality but no fish were recorded. The River Ray is not a Freshwater Fish Directive designated water body. Potential beneficial effect anticipated.	Effects on flow dynamics are considered insignificant. Baseline surveys showed moderate habitat fish quality but no fish were recorded. The River Ray is not a Freshwater Fish Directive designated water body. Potential minor beneficial effect anticipated.	No significant changes in hydromorphology. Effects likely to be neutral.	Receptor not sensitive to impact. No likely effect anticipated.	As the culverts are already existing and will only be extended or replaced, these are likely lead to the loss of macroinvertebrate habitats over very localised areas. Baseline surveys showed moderate habitat fish quality and no fish were recorded. Muswell Brook, the fish data available for the other tributaries, in addition, the River Ray is not a Freshwater Fish Directive designated water body. Potential adverse effect likely to be minor and very localised.	As the culverts are already existing and will only be extended or replaced, these are likely lead to the loss of macroinvertebrate habitats over very localised areas. Baseline surveys showed moderate habitat fish quality and no fish were recorded. Muswell Brook, the fish data available for the other tributaries, in addition, the River Ray is not a Freshwater Fish Directive designated water body. Potential adverse effect likely to be minor and very localised.	Likely to lead to very localised increase in flow velocities and homogenised flow patterns, with no significant effect at the scale of the water body. Baseline surveys showed low habitat fish quality and no fish were recorded. Muswell Brook, the fish data available for the other tributaries, in addition, the River Ray is not a Freshwater Fish Directive designated water body. Potential adverse effect likely to be minor and very localised.	Drainage (including balancing ponds) has been designed to reduce the rate of surface water run-off from the proposed culvert. No anticipated change in water quality.	Temporary loss of fish habitat over the length of the existing tributaries that lie within the diverted section, while the new channels re-establish. Baseline surveys showed low habitat fish quality and no fish was recorded for Muswell Brook, the fish data available for the other tributaries, in addition, the River Ray is not a Freshwater Fish Directive designated water body. Localised and temporary adverse effect anticipated.	The range of habitats incorporated into the diverted channel channel is considered to represent an improvement for fish communities. Baseline surveys showed low habitat fish quality and no fish were recorded for Muswell Brook, the fish data available for the other tributaries, in addition, the River Ray is not a Freshwater Fish Directive designated water body. Potential beneficial effect anticipated.	Potential reduction in flow rates and increase diversity of bed formations locally, with no significant effect at the scale of the water body. Muswell Brook currently supports very poor to moderate macroinvertebrate quality (baseline survey). No fish data available for other tributaries. Potential minor beneficial effect anticipated at a very localised scale.	n/a	n/a	No scheme elements on upstream water body	No scheme elements on upstream water body	Minor adverse effects on water quality on the River Ray, which currently supports poor macroinvertebrate quality, are anticipated. Therefore, additional effects likely to be of low significance at the scale of the waterbody (alone or in combination), and no change in the overall effect, which remains minor adverse locally, as part of the WFS assessment is anticipated.	None required.	None required.	Potential minor and localised effects.
WFD classification elements	Physico-Chemical status																																
5. Dissolved Oxygen	Poor	-		N/A	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. Effects on water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	N/A	N/A	The construction of the proposed WFS attenuation pond is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated. • The new channel can provide: when re-established, improved dissolved oxygen levels. Overall, effects likely to be minor with no degradation of current status anticipated.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be local/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	N/A	N/A	Receptor is insensitive to impact	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be local/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	N/A	Receptor is insensitive to impact	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect

GB105033037880

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Turweston Viaduct (footings in or within riparian zone of watercourse)						River Diversion - Channel diversion at Turweston Viaduct				Culvert extension on Unnamed tributary of River Great Ouse near Hall Farm						Brackley South Cutting		Turweston Cutting		Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB105033037880	Good	Good Ecological Status by 2015	Description of scheme element impact	*Construction of pier footings and balancing ponds at SWC-CFA14-5 and SWC-CFA14-6. Viaduct 80m in length.*						*Channel diversion associated with construction of pier footings in riparian area (SWC-CFA14-5 and SWC-CFA14-6).*				*Extension of culvert on tributary to River Great Ouse at SWC-CFA14-15. - New Road realignment and overbridge meaning extension of existing culvert.*						*Cutting within catchment of Ouse GB105033037880. No springs within Rot. Cutting proxiimt means drainage will be primarily to the south. Potential for reduction in spring flows to a major tributary of Ouse to SW of cutting. Tributary affected but not Ouse itself as discharge point is upstream in catchment.*		*Ouse and tributaries in vicinity of Turweston Cutting - consideration of SW/GW interaction.*						
Ouse			Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage		Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream		Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage		Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.			Construction	Operation		
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	2. Macrophytes and phytobenthos - macrophytes				Receptor is insensitive to impact	- Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats.	- No baseline data were available for this section, but marginal and channel macrophytes are recorded in other sections of the Great River Ouse. There may be minor changes in the cover and composition of macrophyte communities, but this is not considered to be greater than a minor localised change.	- No likely effects anticipated.	- CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.		-There will be temporary loss of marginal and channel macrophytes over the 150 m length of the existing channel that lies within the diverted section. No baseline data were available for this section, but marginal and channel macrophytes are recorded in other sections of the Great River Ouse - It is anticipated that the macrophyte community will re-establish within 1 to 2 years of completion of the river diversion.	The new channel will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. - The effect on this quality element is considered to be minor positive.	No hydromorphological effects anticipated and therefore no effect on macrophyte communities	- Receptor is insensitive to impact	- Landtake will lead to direct loss of marginal and channel habitats and the availability of macrophyte habitats within the culvert. No baseline data available, but as there is an existing culvert that will only be extended on a minor tributary, only minor and localised effects are anticipated	- Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - As there is already an existing culvert that will be extended, effects will be minimal	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the extended culvert) may result in changes to macroinvertebrate communities within the culvert (notably in immediate downstream area). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.		- Potential permanent reduction on flow over 2/3 km of a major tributary of the Great Ouse, not effecting the Ouse itself - No baseline data available on the tributary and this element does not currently have a status class. - The main watercourse would not be affected and therefore it is considered that this scheme element would have localised effects and does not have has the potential to affect this scheme element.	No change to surface water quality identified in groundwater assessment, no effects on this WFD element anticipated.	No change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	- Only upstream water body identified was Radstone Brook Provided mitigation measures are implemented there will be no effect on the Great River Ouse	- The Great River Ouse does not currently have a WFD status for macrophytes, is not known to be monitored for this element. - Although the scheme will lead to a loss of habitat and photosynthetic activity (in shaded areas) and loss of flow in a tributary, this is relatively localised. Taking into account embedded mitigation (such as the inclusion of habitat creation upstream and downstream of culverts and in diverted sections of the river) it is anticipated that there would only be minor and localised adverse effects, with no change to the current and future status of this element.	No additional measures required	No additional measures required	Minor and localised effects	
	3. Macroinvertebrates	Good	-		Receptor is insensitive to impact	- Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats which may be important for macroinvertebrates.	- Macroinvertebrate community may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor.	- No likely effects anticipated.	- CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.		-There will be temporary loss of invertebrate habitat over the 150 m length of the existing channel that lies within the diverted section. - Baseline data from the river show that the invertebrate community in diverse, and pollution sensitive groups are present. - Effects will be localised and it is anticipated that the community will re-establish within 1 to 2 years of completion of the river diversion.	- The river diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach.	No hydromorphological effects anticipated and therefore no effect on macroinvertebrate communities	- Receptor is insensitive to impact	- Landtake will reduce the availability of invertebrate habitats within the culvert. There is also the potential for impacts during construction (e.g. release of suspended solids). No baseline data available, but as there is an existing culvert that will only be extended on a minor tributary, only minor, short term and localised effects are anticipated	- Loss of macrophytes may lead to indirect effects on macroinvertebrates, due to loss of habitat - No baseline data available, but it is anticipated that this will have a localised impact, not affecting the WFD status for this element	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the extended culvert) may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably immediately downstream). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.		- Potential permanent reduction on flow over 2/3 km of a major tributary of the Great Ouse, not effecting the Ouse itself - No baseline data available on the tributary but macroinvertebrates are 'Good' overall status in the Great Ouse - The main watercourse would not be affected and therefore it is considered that this scheme element would have localised effects and does not have has the potential to affect this scheme element.	No change to surface water quality identified in groundwater assessment, no effects on this WFD element anticipated.	No change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	- Only upstream water body identified was Radstone Brook Provided mitigation measures are implemented there will be no effect on the Great River Ouse	The Great River Ouse is currently of 'Good' overall status for macroinvertebrates. - Although the scheme will lead to a loss of habitat in culverts and diverted sections of river, this is relatively localised and/or temporary. The change in flow due to reduction in groundwater flows (brought about by cuttings) has the potential to affect the macroinvertebrates in a major tributary, but not the main watercourse. - Taking into account embedded mitigation (such as the inclusion of habitat creation upstream and downstream of culverts and in diverted sections of the river) it is anticipated that there would only be minor and localised adverse effects, with no change to the current and future status of this element.	No additional measures required	No additional measures required	Minor and localised effects	
	4. Fish	High	-		- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - Baseline data show good fish habitat and diverse species diversity, including salmonids. However, effects are likely to be temporary and localised.	- Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats which may be important for fish.	Shading will only have negligible or no effects on fish.	- No likely effects anticipated.	- CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.		There will be temporary loss of fish and fish habitat quality over the 150 m length of the existing channel that lies within the diverted section. - Baseline data show good fish habitat and diverse species diversity, including salmonids. - It is anticipated that the community will re-establish within 1 to 2 years of completion of the river diversion.	- The river diversion will be designed to include a range of habitats that are suitable for the fish species present The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities.	No hydromorphological effects anticipated and therefore no effect on fish communities	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - Effects are likely to be temporary and localised	- Landtake will reduce the availability of fish habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids). No baseline data available, but this is a tributary of a salmonid river - as there is an existing culvert that will only be extended on a minor tributary, only minor, short term and localised effects are anticipated	Shading will only have negligible or no effects on fish.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.		- Potential permanent reduction on flow over 2/3 km of a major tributary of the Great Ouse, not effecting the Ouse itself - No baseline data available on the tributary but fish have a 'High' overall status in the Great Ouse and surveys indicate the presence of salmonid fish, which use the tributary for refuge and/or spawning. - Given the length of watercourse affected and the presence of fish in the area, it is considered that the scheme element has the potential to affect this scheme element.	No change to surface water quality identified in groundwater assessment, no effects on this WFD element anticipated.	No change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	- Only upstream water body identified was Radstone Brook Provided mitigation measures are implemented there will be no effect on the Great River Ouse	The Great River Ouse is currently of 'High' overall status for fish. - Although the scheme will lead to a loss of habitat in culverts and diverted sections of river, this is relatively localised and/or temporary. - The change in flow due to reduction in groundwater flows (brought about by cuttings) has the potential to affect the fish in a major tributary. This has the potential to deteriorate the fish element WFD status.	1. Monitoring of fish populations and flow gauging during construction and operation. 2. If flows are found to fall below critical thresholds for fish populations consideration will be given to measures such as altering re charge locations in order to augment flows.		Although mitigation measures to address the potential impacts on flow are being considered, it will not be possible to state with confidence that there will be no deterioration of status at this stage	
Physico-Chemical status																													
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• Some shading with negligible/no effect	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated. Once the channel has been established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor with no degradation of current status anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	No significant change to water quality likely. No effects anticipated	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation. Therefore, no effects anticipated.	No significant change to water quality likely. No effects anticipated	- Only upstream water body identified was Radstone Brook Provided mitigation measures are implemented there will be no effect on the Great River Ouse	Potential minor and localised effects on element.	No additional measures required	No additional measures required	Minor and localised effects	
	6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	- Only upstream water body identified was Radstone Brook Provided mitigation measures are implemented there will be no effect on the Great River Ouse	Receptor is insensitive to impact			No significant effects	
	7. Phosphate	Good	-		N/A	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be temporary/local in relation to timescale and the water body. Therefore, no change in status is anticipated.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	No significant change to water quality likely. No effects anticipated	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	No significant change to water quality likely. No effects anticipated	- Only upstream water body identified was Radstone Brook Provided mitigation measures are implemented there will be no effect on the Great River Ouse	Depending on how much flow is lost, potential minor and localised effects on element.			Minor and localised effects	
	8. Ammonia	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	- Only upstream water body identified was Radstone Brook Provided mitigation measures are implemented there will be no effect on the Great River Ouse	Potential minor and localised effects on element.			Minor and localised effects	
	9. Temperature	-	-		N/A	N/A	Some shading with negligible/no effect	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	- Only upstream water body identified was Radstone Brook Provided mitigation measures are implemented there will be no effect on the Great River Ouse	Receptor is insensitive to impact			No significant effects	
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	No significant change to water quality likely. No effects anticipated	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	No significant change to water quality likely. No effects anticipated	- Only upstream water body identified was Radstone Brook Provided mitigation measures are implemented there will be no effect on the Great River Ouse	Potential minor and localised effects on element.			Minor and localised effects	
Hydromorphological status																													Hydromorphology Baseline
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change ~~that could mean that the river erodes against viaduct footings~~ • However survey photographs indicate an active channel in places, so where viaduct footings are proposed close to the bank toe, there is a small risk of scour against the footings • Overall the risk of deterioration is considered to be low, assuming that hydromorphological mitigation is considered at design stage, so there would probably be no hydromorphological impact	N/A	N/A	N/A	• The extent of the diversion is likely to mean that any effects on flow dynamics would be very localised and are unlikely to be significant	N/A	N/A	N/A	• Interpretation of survey photos indicates a channel width of approximately 0.5 m with limited flow and bed diversity in the local reach • Out of bank flows would be cutoff and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones (although surveys show that vegetation is thinned), which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • The culvert invert elevation is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A			• Reduction of flows in this tributary could cause a localised reduction in flow volumes, depths and dynamics, and consequent reductions in sediment transport (and increased sediment deposition) and increased out-of-channel habitat connectivity. • The survey indicated that the Tributary may be groundwater dominated, with flowing water for periods of the year, and the groundwater monitoring has taken place to confirm this. • The effect could be significant for this tributary, but would be buffered as soon as the tributary connects to the larger downstream watercourse so there would not be severe effects at water body scale • Further assessment is required to confirm groundwater influences and the impacts or risks of the cutting	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	• Reduction of flows in this tributary could cause a localised reduction in flow volumes, depths and dynamics, and consequent reductions in sediment transport (and increased sediment deposition) and increased out-of-channel habitat connectivity. • The survey indicated that the Tributary may be groundwater dominated, with flowing water for periods of the year, and the groundwater monitoring has taken place to confirm this. • The effect could be significant for this tributary, but would be buffered as soon as the tributary connects to the larger downstream watercourse so there would not be severe effects at water body scale • Further assessment is required to confirm groundwater influences and the impacts or risks of the cutting	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	- Only upstream water body identified was Radstone Brook Provided mitigation measures are implemented there will be no effect on the Great River Ouse	~~Undertake hydromorphological surveys to aid detailed design~~ Undertake groundwater assessments to clarify the influence of groundwater on hydromorphology Incorporate hydromorphological measures into detailed design where practicable. Mitigation measures may include: • Bank reprofiling (rehabilitation) • Recreate a sinuous river channel (re-meandering) where space allows • Retain marginal vegetation • Use of engineering techniques to assist natural recovery • Use soft engineering techniques • Narrow overwide sections • At Turweston viaduct, the channel has been artificially modified with a secondary, straightened channel that may be associated with a former mill. If feasible, and if the mill race has no heritage value, it may be appropriate to restore the channel to a single thread with naturalised hydromorphology			**River Ouse** Baseline Hydromorphology survey WFD-HM1-0023 shows evidence of flow diversion (weirs), an overwide channel, especially near bridges and confluences, with bank erosion at structures within the survey area. There is evidence of flow and bed diversity with the appearance of clean gravels accompanied with pools and riffles in some areas, with fine sediment deposition within overwide areas. **Unnamed tributary of River Ouse** Hydromorphology survey WFD-HM1-0024 and survey point WFD-GW1-0003a and b report that it was not possible to access the stream. However, the site was reported as being very wet and despite the dry weather conditions there was flowing water, suggesting possible groundwater influence, but the source could not be identified during the site visit. • Hydromorphology baseline derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.	Minor and localised effects	
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A							- Only upstream water body identified was Radstone Brook Provided mitigation measures are implemented there will be no effect on the Great River Ouse					
	13. River continuity	-	-		N/A	N/A	N/A	• The impact of riparian footings is unlikely to be significant at waterbody scale	N/A	N/A	N/A	• The extent of the diversion is likely to mean that there would be no significant effects on continuity	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel, However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A						- Only upstream water body identified was Radstone Brook Provided mitigation measures are implemented there will be no effect on the Great River Ouse					
	14. River depth and width variation bed	-	-		N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change ~~that could mean that the river erodes against viaduct footings~~ • However survey photographs indicate an active channel in places, so where viaduct footings are proposed close to the bank toe, there is a small risk of scour against the footings • Overall the risk of impact on channel form is considered to be low, assuming that hydromorphological mitigation is considered at design stage, so there would probably be no hydromorphological impact	N/A	N/A	N/A	• The diversion would replicate existing channel geometry • Survey photographs indicate an active channel in places, so the channel will need to be designed appropriately, with a morphological inputs require to make the design naturally sustainable	N/A	N/A	N/A	• Out of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and hence surcharge in extreme events • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A						- Only upstream water body identified was Radstone Brook Provided mitigation measures are implemented there will be no effect on the Great River Ouse					
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• The impact of riparian footings is unlikely to be significant on the channel bed	N/A	N/A	N/A	• Some minor and localised effects on scour and substrate deposition could occur, but these are unlikely to be significant and would promote morphological diversity rather than have any detrimental effects	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A						- Only upstream water body identified was Radstone Brook Provided mitigation measures are implemented there will be no effect on the Great River Ouse					
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	• The impact of riparian footings is unlikely to be significant at waterbody scale	N/A	N/A	N/A	• Pier footings would have localised impact on riparian zones, but these are unlikely to have significant negative effects • Bank protection may be required to maintain the new river course and prevent lateral scouring against the piers, but the extent of bank engineering is unlikely to be significant at water body scale	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A						- Only upstream water body identified was Radstone Brook Provided mitigation measures are implemented there will be no effect on the Great River Ouse					

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen																									
NONE	-	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect on attaining future good status/potential anticipated	None necessary	None necessary	No further change

WFD Baseline Survey Details

Water Body ID		GB105033037880					
Surface Water Body Name		Ouse					
Scheme Element		**Turweston Viaduct and River Diversion (footings in or within riparian zone of watercourse)**	**Culvert extension on Unnamed tributary of River Great Ouse near Hall Farm**	**Brackley South Cutting**	**Turweston Cutting**	**OVERALL EFFECT**	**RESIDUAL EFFECT**
Surface Water Crossing ID		**SWC-CFA14-5 and SWC-CFA14-6**	**SWC-CFA14-15**	**N/A**	**N/A**		
Survey Site		River Ouse, north of Turweston	Unnamed tributary of River Ouse near Brackley	Unnamed tributary of River Ouse near Brackley	Ouse and tributaries in vicinity of Turweston Cutting		
Survey ID		WFD-PA1-0023	WFD-PA1-0024, WFD-GW1-0003a, WFD-GW1-0003b	WFD-PA1-0024, WFD-GW1-0003a, WFD-GW1-0003b	WFD-GW1-0002b		
Objectives of the Survey		• Assess ecological habitat type. • Assess the local hydromorphology	• Establish ecological baseline for tributary. • Assess ecological habitat type. • Assess the local hydromorphology	• Establish ecological baseline for tributaries. • Assess ecological habitat type. • Assess the local hydromorphology • Assessment of spring flows (including temporal / seasonal variation) • Hydrological assessment of tributary of Great Ouse to south of cutting	• Assessment of spring flows (including temporal / seasonal variation)		
Survey Scope		Ecological Walkover Survey - NOT UNDERTAKEN (parked till 2015) Hydromorphological Survey	Ecological Walkover Survey - NOT UNDERTAKEN (parked till 2015) Hydromorphological Survey	Ecological Walkover Survey - NOT UNDERTAKEN (parked till 2015) Hydromorphological Survey Hydrological survey of springs / tributary of Ouse to south of cutting. Spring flow monitoring	Hydrological survey of springs / tributaries feeding GWDTEs and Ouse.		
Medium Term Survey Results Summary	**Bio**	No Walkover Survey undertaken	No Walkover Survey undertaken	No Walkover Survey undertaken	No Walkover Survey undertaken		
	Phys	No Walkover Survey undertaken,	No Walkover Survey undertaken.	No Walkover Survey undertaken. Survey point WFD-GW1-0003a was reported as a stream and pond visited on 18/07/2014 12:55. It was not possible to access the stream for a flow rate, there was no evidence of a spring feeding the stream. Vegetation of W21– Crataegus monogyna - Hedera helix scrub is quoted, which is not identified under NVC as being groundwater dependent, and is noted as being surface water reliant. The site was reported as being very wet and despite the dry weather conditions there was flowing water, suggesting possible groundwater influence, however, the source could not be identified during the site visit. Survey point WFD-GW1-0003b looked at the disused railway on 15/07/2014 11:30. The report identifies that the presence of shallow standing water in the disused railway cutting could be groundwater fed. The wet feature, was heavily vegetated with a dominant community, S22a, noted. This community is not identified under NVC as groundwater dependent.	Survey point WFD-GW1-0002b was reported as a spring and stream and was visited on 08/08/2014 10:12. A flow rate of 0.0285m3/s was reported for the stream, but no flow was evident from the spring. The stream and spring are identified as both likely to be groundwater dependent as evident by the relatively low temperature of the surface water. Very minor pollution/runoff from the adjacent A road was also observed in the unnamed tributary.		
	Hydro	Baseline Hydromorphology survey WFD-HM1-0023 photos show that there is evidence of flow obstructions (weirs), overwide channels, especially near bridges and confluences, with bank erosion at structures. There is evidence of flow and bed diversity with the appearance of clean gravels accompanied with pools and riffles in some areas, with fine sediment deposition within overwide areas.	Baseline Hydromorphology survey WFD-HM1-0024 and survey points WFD-GW1-0003a and b indicated that the 'unnamed' watercourse have very little / no morphological diversity in flow or bed. There is evidence of fine sediment deposition on the bed with large amounts of woody debris present. Survey Point WFD-GW1-1003a indicated that there was no direct evidence of a spring but it is possible that the stream is spring-fed. The survey point (pond) was not connected to the stream directly, although water from the pond may seep into the stream.	Hydromorphology survey WFD-HM1-0024 and survey point WFD-GW1-0003a and b report that it was not possible to access the stream. However, the site was reported as being very wet and despite the dry weather conditions there was flowing water, suggesting possible groundwater influence, however, the source could not be identified during the site visit.	Baseline update based on WFD-GW1-0002b and WFD-HM1-0023. Groundwater survey WFD-GW1-0002b recorded at Turweston found that a small unnamed spring stream was flowing into the Ouse. The Hydromorphology survey WFD-HM1-0023 did not indicate whether the River Great Ouse was groundwater dependent. However the presence of a spring located close to the River Ouse may indicate that groundwater has an impact on base flow		
Additional Comments		No detailed survey information was provided; only photographs. Surveys indicate that the river has been modified in the past but is showing signs of morphological recovery in terms of flow and bed diversity development. River diversion offers the ability to improve river processes over a small reach of the river. Viaduct footings are proposed close to the bank tops, so there is a risk of scour against the footings and this will need to be assessed in more detail, but review of historic maps suggest that the channel is stable and that this is unlikely.	No detailed survey information was provided; only photographs. Surveys indicate that the 'unnamed' tributary of the River Great Ouse is straight with a narrow cross section and little flow or bed diversity. It is not anticipated that a culvert extension would significantly impede the hydromorphological quality.	Surveys indicate that the stream is likely to be groundwater dependent, however, the exact source was not identified. A precautionary approach has therefore been applied, and as such the assumption made in the previous physico-chemical assessment that there is potential for up to 60% reduction in spring flows to tributary of Ouse to SW of cutting, which may have water quality consequences during low flows, remains unchanged at this stage of assessment. Tributary affected but not Ouse itself as discharge point is upstream in catchment. The unknown nature of the watercourse's source means that the impact from cutting is unknown to hydromorphology. And a sensitive assessment to surface water reduction is required, therefore the original Amber classification will remain unchanged.	Surveys indicate that the stream visited is likely to be groundwater dependent. As such the assumption made in the previous **physico-chemical** assessment that there is potential for baseflow may be locally affected in the tributary of the Ouse, which may have water quality consequences during low flows, remains unchanged at this stage of assessment. Hydromorphological and Groundwater surveys indicate that the River Great Ouse has the potential to have interaction with groundwater. Therefore the assumption made in the previous the hydromorphology assessment, that there is a potential temporary impact on baseflow during the cutting processes, locally impacting in-channel hydromorphology, remains unchanged at this stage of the assessment.		

Audit Trail for the Update of the WFD Water Body Assessment with Baseline Data

		Nature of the Assessment Update and Justification					
	WFD Classification Elements Changed	**Turweston Viaduct and River Diversion (footings in or within riparian zone of watercourse)**	**Culvert extension on Unnamed tributary of River Great Ouse near Hall Farm**	**Brackley South Cutting**	**Turweston Cutting**	**OVERALL EFFECT**	**RESIDUAL EFFECT**
Biological	**2. Macrophytes and phytobenthos - macrophytes**	No assessment update undertaken due to lack of new baseline data.	No assessment update undertaken due to lack of new baseline data.	No assessment update undertaken due to lack of new baseline data.	No assessment update undertaken due to lack of new baseline data.	No change in overall impact.	No change in residual effect.
Biological	**3. Macroinvertebrates**	No assessment update undertaken due to lack of new baseline data.	No assessment update undertaken due to lack of new baseline data.	No assessment update undertaken due to lack of new baseline data.	No assessment update undertaken due to lack of new baseline data.	No change in overall impact.	No change in residual effect.
Biological	**4. Fish**	No assessment update undertaken due to lack of new baseline data.	No assessment update undertaken due to lack of new baseline data.	No assessment update undertaken due to lack of new baseline data.	No assessment update undertaken due to lack of new baseline data.	No change in overall impact.	No change in residual effect.
Physico-Chemical	**5. Dissolved Oxygen**	Assessment update not possible due to lack of baseline survey data.	Assessment update not possible due to lack of baseline survey data.	The effect of this Scheme Element (Cutting) on the Dissolved Oxygen WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a 60% reduction in spring flows to the tributary of the Ouse to SW of cutting (Ouse itself not affected as discharge point is upstream in catchment), leading to depleted reaches of river flow on the watercourse, and thus reducing turbulence and oxygenation.	The effect of this Scheme Element (Cutting) on the Dissolved Oxygen WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction in baseflow in the Ouse and tributaries in vicinity of Turweston Cutting over 1km stretch, leading to depleted reaches of river flow on the watercourse, and thus reducing turbulence and oxygenation.	No change in overall impact.	No change in residual effect.
Physico-Chemical	**6. pH**	Assessment update not possible due to lack of baseline survey data.	Assessment update not possible due to lack of baseline survey data.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No change in overall impact.	No change in residual effect.
Physico-Chemical	**7. Phosphate**	Assessment update not possible due to lack of baseline survey data.	Assessment update not possible due to lack of baseline survey data.	The effect of this Scheme Element (Cutting) on the Phosphate WFD element remains AMBER. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a 60% reduction in spring flows to the tributary of the Ouse to SW of cutting (Ouse itself not affected as discharge point is upstream in catchment), leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including phosphate.	The effect of this Scheme Element (Cutting) on the Phosphate WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction in baseflow in the Ouse and tributaries in vicinity of Turweston Cutting over 1km stretch, leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including phosphate.	No change in overall impact.	No change in residual effect.
Physico-Chemical	**8. Ammonia**	Assessment update not possible due to lack of baseline survey data.	Assessment update not possible due to lack of baseline survey data.	The effect of this Scheme Element (Cutting) on the Ammonia WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a 60% reduction in spring flows to the tributary of the Ouse to SW of cutting (Ouse itself not affected as discharge point is upstream in catchment), leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including ammonia.	The effect of this Scheme Element (Cutting) on the Ammonia WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction in baseflow in the Ouse and tributaries in vicinity of Turweston Cutting over 1km stretch, leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including ammonia.	No change in overall impact.	No change in residual effect.
Physico-Chemical	**9. Temperature**	Assessment update not possible due to lack of baseline survey data.	Assessment update not possible due to lack of baseline survey data.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No change in overall impact.	No change in residual effect.
Physico-Chemical	**10. Specific Pollutants (Annex VIII)**	Assessment update not possible due to lack of baseline survey data.	Assessment update not possible due to lack of baseline survey data.	The effect of this Scheme Element (Cutting) on the Specific Pollutants WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a 60% reduction in spring flows to the tributary of the Ouse to SW of cutting (Ouse itself not affected as discharge point is upstream in catchment), leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including specific pollutants.	The effect of this Scheme Element (Cutting) on the Specific Pollutants WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction in baseflow in the Ouse and tributaries in vicinity of Turweston Cutting over 1km stretch, leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including specific pollutants.	No change in overall impact.	No change in residual effect.
Hydromorphological	**11. Quantity and dynamics of river flow**	No assessment update required. Non-temporary and temporary impacts remain unchanged. Minor text additions made to clarify assessments in light of survey information	No assessment update required. Non-temporary and temporary impacts remain unchanged. Minor text additions made to clarify assessments in light of survey information	No assessment update required. Non-temporary and temporary impacts remain unchanged. Minor text additions made to clarify assessments in light of survey information and other assessments	No assessment update required. Non-temporary and temporary impacts remain unchanged. Minor text additions made to clarify assessments in light of survey information and other assessments	No change in overall impact.	No change in residual effect.
Hydromorphological	**12. Connection to Groundwater**	No assessment update required. Non-temporary and temporary impacts remain unchanged. Minor text additions made to clarify assessments in light of survey information	No assessment update required. Temporary minor impacts remain unchanged.			No change in overall impact.	No change in residual effect.
Hydromorphological	**13. River continuity**	No assessment update required. Non-temporary and temporary impacts remain unchanged. Minor text additions made to clarify assessments in light of survey information	No assessment update required. Temporary minor impacts remain unchanged.			No change in overall impact.	No change in residual effect.
Hydromorphological	**14. River depth and width variation bed**	No assessment update required. Non-temporary and temporary impacts remain unchanged. Minor text additions made to clarify assessments in light of survey information	No assessment update required. Temporary minor impacts remain unchanged.			No change in overall impact.	No change in residual effect.
Hydromorphological	**15. Structure and substrate of river bed**	No assessment update required. Non-temporary and temporary impacts remain unchanged. Minor text additions made to clarify assessments in light of survey information	No assessment update required. Temporary minor impacts remain unchanged.			No change in overall impact.	No change in residual effect.
Hydromorphological	**16. Structure of riparian zone**	No assessment update required. Non-temporary and temporary impacts remain unchanged. Minor text additions made to clarify assessments in light of survey information	No assessment update required. Temporary minor impacts remain unchanged.			No change in overall impact.	No change in residual effect.

GB105033037940

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	River Diversion			Cutting		Culvert						Greatworth Green Tunnel		Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)
GB105033037940	Moderate	Good Ecological Potential by 2027	Description of scheme element impact	640m diversion of unnamed tributary (drain) of the Radstone Brook SWC-CFA14-8 and 19. 230m length of drain, from source, may be lost to construction.			Brackley north, Brackley South and Greatworth South Cutting. Possible minor changes to base flow of tributaries and Radstone Brook , particularly from Brackley North and Greatworth South Cutting. - Greatworth South Cutting has the potential to affect dry weather flows of approx. 1. 5 km of an upstream trib (headwater stream), for which no baseline data are available, but not affecting Radstone Brook as a whole. - Brackley North Cutting will affect dry weather flows on Radstone Brook, and drainage from the cutting will be discharge to the Great Ouse watercourse, not Radstone Brook.		Radstone Brook SWC-CFA14-7, 16, 17 and 18. Four new culverts (including Brackley culvert) carrying Radstone Brook under access roads and Brackley embankment. Total length of culverts 34m + 7m + 36m + 60m. Headwater channel of Radstone Brook SWC-CFA15-9. New culvert (Helmdon culvert) under Greatworth south embankment. Length 30m. Includes a small diversion through culvert.					Temporary effects (loss of flow) during construction of tunnel				Construction	Operation	
Radstone Brook			Identified biological Impacts	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Creation of new habitats	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.					
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	-	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	-	-		~~YELLOW TO GREEN~~ ~~- There will be loss of marginal and channel macrophytes over the 640 m length of the existing small tributary that lies within the diverted section.~~ ~~- No baseline data are available for the ditch, but given its small size and current linear planform it is not likely to important for macrophytes within the context of the wider watercourse~~ ~~- It is anticipated that the macrophyte community will re-establish within 1 to 2 years of completion of the river diversion within the diverted channel, while macrophytes within approximately 230 m that may be permanently lost to construction will be permanently lost~~ ~~- given that this is a minor ditch, only localised effects are anticipated~~ Baseline data show that there are no macrophytes present in this section due to heavy shading, therefore no impact	~~-The new channel will incorporate marginal berms and unshaded areas to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. The effect on this quality element is considered to be minor positive.~~ ~~Riverine biological elements are not continuously supported by the watercourse. Moreover, any ecological value of the watercourse as an ephemeral channel is undermined by the impacted fluvial hydromorphology. Poor general aquatic habitat for all elements. CHANGED TO GREEN.~~	~~No significant hydromorphological effects on macroinvertebrates anticipated.~~ ~~Riverine biological elements are not continuously supported by the watercourse. Moreover, any ecological value of the watercourse as an ephemeral channel is undermined by the impacted fluvial hydromorphology. Poor general aquatic habitat for all elements. CHANGED TO GREEN.~~	- Impacts have the potential to reduce the macrophyte element by altering dry weather flows to the watercourse. Following a precautionary approach and given limited information on likely change in flow and baseline information/ status of this WFD element, adverse effects on this element are anticipated.	Only minor and localised effects anticipated as a result of changes in water quality.	- Receptor is insensitive to impact	- ~~Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert.~~ ~~- No baseline data are available for this section, but it is likely to be localised.~~ Baseline data show that there are no macrophytes present in this section due to heavy shading, therefore no impact anticipated. CHANGED TO GREEN	~~-Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present.~~ ~~-No baseline data are available for this section, but effects are likely to be localised to the culverted sections. Baseline data show that there are no macrophytes present in this section due to heavy shading, therefore no impact anticipated.~~ Baseline data show that there are no macrophytes present in this section due to heavy shading, therefore no impact anticipated. CHANGE TO GREEN	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert) may result in changes to macrophyte communities within the culvert (notably in downstream area). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality	- Re-alignments associated with culverts and other habitat creation immediately upstream and downstream of culverts will incorporate a range of habitats suitable for colonisation. The effect on this quality element is considered to be minor positive.	Minor and localised effects, no change in WFD class of element.	Minor and localised effects, no change in WFD class of element.	No upstream water bodies	- Radstone Brook does not currently have a WFD status for macrophytes, is not known to be monitored for this element and no baseline data were collected on this watercourse. - Although the scheme will lead to a loss of habitat and photosynthetic activity (in shaded areas), this is relatively localised. - Taking into account embedded mitigation (such as the inclusion of habitat creation upstream and downstream of culverts) it is anticipated that there would only be minor and localised adverse effects, with no change to the current and future status of this element. - Further assessment of changes to groundwater flows on surface water required.	None required.	No additional mitigation measures required for invertebrates, but mitigation measures proposed for fish (see below) will provide to some further mitigation for this element. - Further assessment of changes to groundwater flows on surface water required.	- Further assessment of changes to groundwater flows on surface water required.
	3. Macroinvertebrates	-	-		~~YELLOW TO GREEN~~ ~~- There will be loss of invertebrates over the 640 m length of the existing small tributary that lies within the diverted section.~~ ~~- No detailed baseline data are available, but given its small size and current linear planform it is not likely to important for macroinvertebrates within the context of the wider watercourse~~ ~~- It is anticipated that the macroinvertebrate community will re-establish within 1 to 2 years of completion of the river diversion within the diverted channel, while invertebrates within approximately 230 m that may be permanently lost to construction will be permanently lost~~ ~~- given that this is a minor ditch, only localised effects are anticipated~~ ~~-Riverine biological elements are not continuously supported by the watercourse. Moreover, any ecological value of the watercourse as an ephemeral channel is undermined by the impacted fluvial hydromorphology. Poor general aquatic habitat for all elements.~~	~~-the diversion will be designed to include a range of channel habitats where possible given the context of a small ditch), including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach.~~ ~~Riverine biological elements are not continuously supported by the watercourse. Moreover, any ecological value of the watercourse as an ephemeral channel is undermined by the impacted fluvial hydromorphology. Poor general aquatic habitat for all elements. CHANGED TO GREEN.~~	~~No significant hydromorphological effects on macroinvertebrates anticipated.~~ ~~Riverine biological elements are not continuously supported by the watercourse. Moreover, any ecological value of the watercourse as an ephemeral channel is undermined by the impacted fluvial hydromorphology. Poor general aquatic habitat for all elements. CHANGED TO GREEN.~~	- Impacts have the potential to reduce the macroinvertebrate element by altering dry weather flows to the watercourse (possible loss of flow sensitive taxa). Following a precautionary approach and given limited information on likely change in flow and baseline information/ status of this WFD element.		- Receptor is insensitive to impact	- Landtake will reduce the availability of macroinvertebrate habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids). - No detailed baseline data available on Radstone Brook, but effects are likely to be minor and localised	- Loss of macrophytes may lead to indirect effects on macroinvertebrates, due to loss of habitat - No detailed baseline data available, but it is anticipated that this will have a localised impact, not affecting the WFD status for this element	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert) may result in changes to macroinvertebrate communities within the culvert (notably in downstream area). - This would only be affect a limited distance of the watercourse and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality	- Re-alignments associated with culverts and other habitat creation immediately upstream and downstream of culverts will incorporate a range of habitats suitable for colonisation. The effect on this quality element is considered to be minor positive.	Minor and localised effects, no change in WFD class of element.	Minor and localised effects, no change in WFD class of element.	No upstream water bodies	- Radstone Brook does not currently have a WFD status for macroinvertebrates, is not known to be monitored for this element and no baseline data were collected on this watercourse. - Although the scheme will lead to a loss of habitat, this will be localised. - Taking into account embedded mitigation (such as the inclusion of habitat creation upstream and downstream of culverts) it is anticipated that there would only be minor and localised adverse effects, with no change to the current and future status of this element. - Further assessment of changes to groundwater flows on surface water required.	None required.	No additional mitigation measures required for invertebrates, but mitigation measures proposed for fish (see below) will provide to some further mitigation for this element. - Further assessment of changes to groundwater flows on surface water required.	- Further assessment of changes to groundwater flows on surface water required.
	4. Fish	-	-		YELLOW TO GREEN - There will be potential effects on fish over the 640 m length of the existing small tributary that lies within the diverted section. - No detailed baseline data are available for the fish, but given it is a ditch of a small size and current linear platform, it is only likely to be characterised by common fish species and unlikely to be a significant refuge or spawning habitat for the wider water body - It is anticipated that fish will re-establish within 1 to 2 years of completion of the river diversion within the diverted channel, while within approximately 230 m channel permanently lost to construction effects on fish and fish habitat will be permanent given that this is a minor ditch, only localised effects are anticipated -Riverine biological elements are not continuously supported by the watercourse. Moreover, any ecological value of the watercourse as an ephemeral channel is undermined by the impacted fluvial hydromorphology. Poor general aquatic habitat for all elements.	~~-The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish species.~~ Riverine biological elements are not continuously supported by the watercourse. Moreover, any ecological value of the watercourse as an ephemeral channel is undermined by the impacted fluvial hydromorphology. Poor general aquatic habitat for all elements. CHANGED TO GREEN.	~~No significant hydromorphological effects on fish anticipated.~~ Riverine biological elements are not continuously supported by the watercourse. Moreover, any ecological value of the watercourse as an ephemeral channel is undermined by the impacted fluvial hydromorphology. Poor general aquatic habitat for all elements. CHANGED TO GREEN.	No baseline data available on Radstone Brook, but important fish populations, including migratory brown trout, are recorded downstream on the Great Ouse watercourse - These impacts have the potential to reduce the fish element by altering dry weather flows to the watercourse (possible loss of flow sensitive taxa), following a precautionary approach and given limited information on likely change in flow and baseline information/ status of this WFD element.		- Possible temporary sub-lethal effects on fish (e.g. displacement from impacted area) effects are likely to be temporary and localised	- Landtake will reduce the availability of fish habitats within culverted sections - There is also the potential for impacts during construction (e.g. release of suspended solids). - No detailed baseline data available on Radstone Brook, but ~~important fish populations, including migratory brown trout, are recorded downstream on the Great Ouse watercourse~~ given the length of watercourse affected ~~and lack of detailed design or baseline fish habitat data, a~~ precautionary approach has been adopted and it is considered that there would be a potential deterioration of this WFD element if the impact is not mitigated. ~~Although habitat surveys indicated it was quite poor fish habitat,~~ remains as amber give the length of watercourse affected and lack of detailed fish survey data	- Loss of macrophytes may lead to indirect effects on fish, due to loss of habitat - No baseline data available, but this will have a minor impact, not affecting the WFD status for this element	- Localised changes in flow dynamics (potential increased flow due to the straightened channel in the culvert) in the presence of culvert within a short distance have the potential to impede upstream passage of any migratory fish. ~~- No detailed baseline data available on Radstone Brook, but important fish populations, including migratory brown trout, are recorded downstream on the Great Ouse watercourse, which may use this tributary for spawning~~ - There is very limited information on the design of the culvert - A precautionary approach has been adopted and it is considered that there would be a potential deterioration of this WFD element if the impact is not mitigated.	- No impact. Runoff will be collected by drainage to balancing pond.	- Re-alignments associated with culverts and other habitat creation immediately upstream and downstream of culverts will incorporate will include a range of habitats suitable for colonisation. The effect on this quality element is considered to be minor positive.	Minor and localised effects, no change in WFD class of element.	Minor and localised effects, no change in WFD class of element.	No upstream water bodies	- Radstone Brook does not currently have a WFD status for fish, is not known to be monitored for this element and no fish baseline data were collected. - Important fish populations, including migratory brown trout, are recorded downstream on the Greater Ouse watercourse, which may use this tributary for spawning - A precautionary approach has been adopted and it is considered that there would be a potential deterioration of this WFD element associated with the culverts on Radstone Brook - Embedded mitigation measures (i.e. habitat creation immediately upstream and downstream of culverts) may not be sufficient in negating adverse effects to fish migration or loss of habitat. - Further assessment of changes to groundwater flows on surface water required.	None required.	- Further surveys to assess the value of the tributary for fish should be undertaken as part of the assessment to inform the detailed design of the culvert and habitat improvements. - An assessment of flows and fish passage within culverts must be assessed to inform detailed design of culverts and stream re-alignments. It may be necessary to provide "rest" areas in re-aligned sections of water between each of the culverts. - It is also proposed that habitat creation should be extended to the section of Radstone Brook downstream culvert SWC 7. This section of the watercourse is currently linear and likely to be of limited quality as fish habitat. As mitigation for lost habitats in culverts and any upstream stretches of Radstone Brook no longer accessible to fish (due to culverts creating barriers that cannot be mitigated), channel morphology modifications (i.e. improved sinuosity) and habitat improvements (notably the creation of spawning habitat if subsequent surveys indicate that this would be appropriate) should be made within this stretch of watercourse. - Further, construction and post-construction monitoring should be considered (if necessary) to assess any effects on fish migration. - Further assessment of changes to groundwater flows on surface water required.	Provided mitigation measures are implemented, there would only be minor and localised effects on fish from culverts. - Further assessment of changes to groundwater flows on surface water required.	
	Physico-Chemical status																				
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	~~• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body.~~ ~~• The new channel can provide - when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor locally, with no degradation of the element status anticipated at the scale of the water body.~~ ~~Watercourse observed was dry/ephemeral, therefore no impact predicted to occur. YELLOW TO GREEN.~~	• Water quality could be reduced in the depleted reaches due to reduced inflow of water and reduced flow rates, turbulence and oxygenation.	No significant change to water quality likely. No effects anticipated .	N/A	N/A	Due to the length of the proposed culverts, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. Overall effect likely to be minor locally, with no degradation of the element status anticipated at the scale of the water body.	No significant change to water quality likely. No effects anticipated .	No upstream water bodies	• Water quality could be temporarily reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	No significant change to water quality likely. No effects anticipated .	No upstream water bodies	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	Minor and localised effects. Further assessment of changes to groundwater flows on surface water required	
	6. pH	High	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No upstream water bodies				
	7. Phosphate	Good	-		N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. ~~• Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.~~ ~~Watercourse observed was dry/ephemeral, therefore no impact predicted to occur. YELLOW TO GREEN.~~	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	No significant change to water quality likely. No effects anticipated .	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	• Water quality could be temporarily reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	No significant change to water quality likely. No effects anticipated .	No upstream water bodies				
	8. Ammonia	High	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	No significant change to water quality likely. No effects anticipated .	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No upstream water bodies				
	9. Temperature	-	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culverts, there is likely to be a minor impact on temperature. This impact is likely to have a minor effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No upstream water bodies				
	10. Specific Pollutants (Annex VIII)	High	-		N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. ~~Watercourse observed was dry/ephemeral, therefore no impact predicted to occur. YELLOW TO GREEN.~~	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	No significant change to water quality likely. No effects anticipated .	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	• Water quality could be temporarily reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	No significant change to water quality likely. No effects anticipated .	No upstream water bodies				
	Hydromorphological status																				**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	~~YELLOW TO GREEN. Watercourse observed was dry/ephemeral, therefore no impact predicted to occur.~~ ~~• The survey walkover reports indicate that the channel width is approximately 0.5 m width with low flow and substrate diversity.~~ ~~• This unnamed watercourse is a minor tributary of the Radstone Brook, a small watercourse leading to the Great Ouse and in practical terms represents a small proportion of the water body~~ ~~• Proposed realignment would shorten the local channel reach~~ ~~• Shortening the channel could increase gradients and flow velocities, and the tendency for bed and bank scour. Flow levels could be increased downstream as the channel gradient levels, which could increase overbank spillage~~ ~~• Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of shortening the watercourse still needs to be flagged as a risk~~	N/A	N/A	N/A	N/A	**Brackley Culverts** • The walkover survey indicates that the channel width is approximately 0.5 m wide with limited flow and substrate diversity • Out of bank flows could be cut off by the culverts and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • These sections of Radstone Brook are first and second order streams within a 7km water body, and in practical terms the culvert would impact a small proportion of the water body, although there are existing culverts for minor roads and some historic channel straightening **Helmdon Culvert** • Surveys of the upstream extent of this tributary show that the banks are vegetation and a dry channel • A culvert is unlikely to impact overbank flows as the channel is likely ephemeral with over deepened channel banks	N/A	N/A	• Potential reduction in channel flows during construction phase, which would be reversed post construction • water body is a HMWB due to Land Drainage, but the quantity of flow and dynamics currently support good status • Reduction of flows is likely to deteriorate existing flow dynamics (flow rates, velocities, natural turbulence etc.), although the effects are thought to be temporary and future objectives would not be impeded	N/A	No upstream water bodies	• The culverts are quite extensive and likely to cause deterioration. The diversion may result in scour and sediment deposition, which should be monitored • Even though the diversion and culverts are on minor tributaries and overall impacts are considered to be minor, the principal watercourse of the water body and would not result in water body status change. The cumulative effects of multiple culverts and historic channel straightening and culverts is likely to be significant • Dewatering during construction could be detrimental to flow dynamics, but this would be a temporary effect and reversible post-construction	~~Undertaken hydromorphological surveys to aid detailed design development.~~ Incorporate hydromorphological mitigation into detailed design where practicable. Mitigation measures that might be incorporated into the detailed design include: • Bank re-profiling (rehabilitation) • Create reed fringes • Creation of shallow margin in front of hard defence • Install silt, sand or gravel traps • Introduce riparian vegetation/green corridors where space allows • Recreate a sinuous river channel (re-meandering) where space allows • Recreation of gravel bars and riffles using permanent and/or temporary bed structures (increase morphological diversity) • Retain marginal vegetation • Use of engineering techniques to assist natural recovery • Use soft engineering techniques	Minor and localised effects	**Radstone Brook** The baseline walkover survey indicated that the river channel has been resectioned, realigned and over-deepened. The channel is described as resembling an arable drainage ditch with low substrate/flow diversity (though some gravels present) at the proposed crossing point. Up- and downstream of the culvert and crossing points the brook channel is over wide with a visible gravel bed and the appearance of changing flow diversity, the bank is cohesive which suggests that bank erosion is minimal. **Radstone Brook upper reaches** Baseline survey indicates that the channel is a historically resectioned, realigned channel. The channel is 100% shaded with low flow and substrate diversity. The channel is narrowly in places and gravel deposits present, providing some microhabitat heterogeneity. However, in general the bed is generally heavily silted with ponded flow and dry channel in places. **Unnamed tributary of Radstone Brook** Baseline survey indicates that the channel has been historically resectioned and realigned. The channel is 100% shaded with low flow and substrate diversity. It is narrowed in places with gravel deposits present, providing some microhabitat heterogeneity. However in general the bed is heavily silted with ponded flow and dry channel in places. • Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater		N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater		N/A	• Potential reduction in channel flows during construction phase, which would be reversed post construction	N/A	No upstream water bodies				
	13. River continuity	-	-		N/A	N/A	• Shortening the channel may result in accelerated flows and reduced channel storage capacity, which in turn could increase overbank spillage and floodplain connectivity and sediment transport • The size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected	• There are possible reductions to base flow in Radstone Brook but the ES states that sufficient flow will remain to Radstone Brook due to aquifer thickness • There is unlikely to be a significant impact on the hydromorphology of the watercourse unless there is a significant reduction in surface water flow which may affect river continuity, or increase in flows from the redirection of drainage from the cutting which could affect the dynamics of flow and the width and depth of the watercourse. This is uncertain at present, but localised risks are highlighted	N/A	N/A	N/A	N/A	**Brackley Culverts** • The culverts could disconnect floodplains and out-of bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status and as channel banks were high along the detailed survey reach (1.5-2 m) high flows may not overtop banks. **Helmdon Culvert** • Observed flow conditions and high banks (approximately 1.5m) suggest connection with the floodplain has been detrimentally affected by historic modification • The proposal of a box culvert allows the bed structure to be maintained therefore the proposed culvert should not have a significant impact on connectivity with the floodplain	N/A	N/A	• Hydraulic effects would be temporary, but the combination of inevitable increase in sediment due to construction and reduced flows could be detrimental to continuity during this time	N/A	No upstream water bodies				
	14. River depth and width variation bed	-	-		N/A	N/A	• The diversion would replicate existing channel geometry. • Increasing flow rates may result in local scour of the bed and banks which would promote morphological diversity and allow the channel to regain a dynamic equilibrium form • Some local scour and substrate deposition would promote morphological diversity • Overall , there is unlikely to be significant channel change		N/A	N/A	N/A	N/A	**Brackley Culvert** • Out-of bank flows could be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The size of the channel suggests there would not be significant loss of diversity in river depth and width • However, the cumulative effects of multiple culverts and historic channel modifications could be significant **Helmdon Culvert** • The channel with is approximately 0.5 m wide with straight planform and limited flow and bed diversity • Channel is heavily shaded with limited vegetation growth along the banks • The proposal of a box culvert allows the bed structure to be maintained therefore the proposed culvert should not have a significant impact of flow / morphology based on flow observations	N/A	N/A	• Reduction of flows could decrease flow depth, wetted perimeter and hydraulic radius, but the effects are likely to be temporary and reversible	N/A	No upstream water bodies				
	15. Structure and substrate of river bed	-	-		N/A	N/A	~~YELLOW TO GREEN. Watercourse observed was dry/ephemeral, therefore no impact predicted to occur.~~ ~~• Shortening the channel could increase gradients and sediment transport rates~~ ~~•This could result in loss of substrate in the shortened reach, but increased diversity of bed formation downstream of realignment and possibly increased sediment deposition~~ ~~• The locally increased gradient could trigger bed scour upstream as the channel attempts to smooth its bed gradient~~ ~~• Given the size of the channel there is unlikely to be major adjustment, but this is still a risk~~		N/A	N/A	N/A	N/A	**Brackley Culverts** • The walkover survey report indicated that the channel is approximately 0.5 m wide with poor substrate diversity, suggesting that there is unlikely to be significant bed substrate or transport or scour near the proposed crossing points/culverts • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk • The cumulative effects of multiple culverts and historic channel modifications could be significant **Helmdon Culvert** • The channel with is approximately 0.5 m wide with straight planform and limited flow and bed diversity • The proposal of a box culvert allows the bed structure to be maintained therefore the proposed culvert should not have a significant impact of flow / morphology based on flow observations	N/A	N/A	• Combination of inevitable increase in sediment due to construction and reduced flows could be detrimental to bed habitats. The effect of increased sedimentation - if it occurs during the construction phase - would be reversible but could persist for several years after construction ceases	N/A	No upstream water bodies				
	16. Structure of riparian zone	-	-		N/A	N/A	• There is unlikely to be any net change to existing bank, riparian and floodplain structure and connectivity with channel		N/A	N/A	N/A	N/A	**Brackley and Helmdon culverts** • The culvert would disconnect the channel from the existing vegetated narrow riparian zones (mature trees) and sever any existing riparian habitat continuity along the channel.	N/A	N/A	• Hydraulic connectivity with riparian zones could be decreased if flows are reduced, but this would be temporary and likely to have no significant effects in the medium to long term	N/A	No upstream water bodies				

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen																			
Sediment management strategies (develop and revise)	-	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	• Nature of impact means that opportunities to implement these measures could be limited in this particular watercourse as a result of the scheme, but the impact on this tributary is unlikely to inhibit future implementation of measures at water body scale	• Nature of impact means that opportunities to implement these measures could be limited in this particular watercourse as a result of the scheme, but the impact on this tributary is unlikely to inhibit future implementation of measures at water body scale	N/A	Measures included as part of CoCP will ensure no significant effects	Measures included as part of CoCP will ensure no significant effects	Measures included as part of CoCP will ensure no significant effects	Measures included as part of CoCP will ensure no significant effects	Measures included as part of CoCP will ensure no significant effects	Measures included as part of CoCP will ensure no significant effects	Measures included as part of CoCP will ensure no significant effects	N/A	N/A	N/A	N/A	N/A
Appropriate techniques (invasive species)	-	-		Measures included as part of CoCP will ensure no significant effects	Measures included as part of CoCP will ensure no significant effects														None required.	None required.	
Appropriate timing (vegetation control)	-	-		N/A	N/A				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Appropriate vegetation control technique	-	-		No effects anticipated	No effects anticipated				No effects anticipated	No effects anticipated	No effects anticipated	No effects anticipated	No effects anticipated	No effects anticipated	No effects anticipated	No effects anticipated	N/A	No effects anticipated	None required.	None required.	No effects anticipated
Selective vegetation control regime	-	-		No effects anticipated	No effects anticipated				No effects anticipated	No effects anticipated	No effects anticipated	No effects anticipated	No effects anticipated	No effects anticipated	No effects anticipated	No effects anticipated	N/A	No effects anticipated	None required.	None required.	No effects anticipated
Appropriate channel maintenance strategies and techniques - minimise disturbance to channel bed and margins	-	-		N/A	N/A				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

WFD Baseline Survey Details

Water Body ID	GB105033037940							
Surface Water Body Name	Radstone Brook							
Scheme Element	**Brackley South Cutting**	**River Diversion and 4 x Culverts - Radstone Brook. Four new culverts (including Brackley culvert) carrying Radstone Brook under access roads and Brackley embankment**	**River Diversion of unnamed tributary (drain) of the Radstone Brook**	**Culvert and River Diversion - Headwater channel of Radstone Brook (Helmdon culvert)**	**Brackley North Cutting - will affect dry weather flows on Radstone Brook, and drainage from the cutting will be discharge to the Great Ouse watercourse, not Radstone Brook.**	**Greatworth South Cutting - potential to affect dry weather flows of approx. 1.5 km of an upstream trib (headwater stream), for which no baseline data are available**	**OVERALL EFFECT**	**RESIDUAL EFFECT**
Surface Water Crossing ID	**N/A**	**SWC-CFA14-7, SWC-CFA14-16, SWC-CFA14-17 and SWC-CFA14-18**	**SWC-CFA14-8 and 19**	**SWC-CFA15-9**	**N/A**	**N/A**		
Survey Site	Radstone Brook at Radstone	Radstone Brook at Radstone	Unnamed tributary of Radstone Brook, north of Radstone	Radstone Brook upper reaches, near Radstone	Unnamed tributary of Radstone Brook, north of Radstone	Radstone Brook upper reaches, near Radstone		
Survey ID	WFD-GW1-0003b, WFD-GW1-0004g	WFD-PA1-0025, WFD-GW1-0006g	WFD-PA1-0026, WFD-GW1-0004f	WFD-PA1-0027a, WFD-GW1-0004e	WFD-GW1-0004f, WFD-GW1-0004g,WFD-PA1-0026	WFD-GW1-0004b, WFD-GW1-0004e, WFD-PA1-0027a, WFD-PA1-0027b		
Objectives of the Survey	• Assessment of spring flows (including temporal / seasonal variation)	• Assess ecological habitat type. • Assess the local hydromorphology • Assessment of spring flows (including temporal / seasonal variation)	• Establish ecological baseline for tributary. • Assess ecological habitat type. • Assess the local hydromorphology • Assessment of spring flows (including temporal / seasonal variation)	• Establish ecological baseline for tributary. • Assess ecological habitat type. • Assess the local hydromorphology • Assessment of spring flows (including temporal / seasonal variation)	• Establish ecological baseline for tributary. • Assess ecological habitat type. • Assess the local hydromorphology • Assessment of spring flows (including temporal / seasonal variation)	• Establish ecological baseline for tributary. • Assess ecological habitat type. • Assess the local hydromorphology • Assessment of spring flows (including temporal / seasonal variation)		
Survey Scope	Hydrological survey of springs / tributaries feeding Radstone Brook. Spring flow monitoring	Ecological Walkover Survey Hydromorphological Survey Hydrological survey of springs / tributaries feeding Radstone Brook. Spring flow monitoring	Ecological Walkover Survey Hydromorphological Survey Hydrological survey of springs / tributaries feeding Radstone Brook. Spring flow monitoring	Ecological Walkover Survey Hydromorphological Survey Hydrological survey of springs / tributaries feeding Radstone Brook. Spring flow monitoring	Ecological Walkover Survey Hydromorphological Survey Hydrological survey of springs / tributaries feeding Radstone Brook. Spring flow monitoring	Ecological Walkover Survey Hydromorphological Survey Hydrological survey of springs / tributaries feeding Radstone Brook. Spring flow monitoring		
Medium Term Survey Results Summary — **Bio**	Only walkover data available from limited sections of Radstone Brook and tributaries. Generally shows re-aligned watercourse with variable but limited habitat for the 3 biological elements considered. No detailed survey data (fish, macroinvertebrates, macrophytes).	Biological elements are likely to have been affected by the impacted hydromorphology. No macrophytes present, habitat not suitable for salmonid species.	Riverine biological elements are not continuously supported by the watercourse. Moreover, any ecological value of the watercourse as an ephemeral channel is undermined by the impacted fluvial hydromorphology. Poor general aquatic habitat for all elements. No macrophytes present, habitat not suitable for salmonid species.	Biological elements are likely to have been affected by the impacted hydromorphology. However the reach provides some limited habitat potential for macroinvertebrate communities. No macrophytes present, habitat not suitable for salmonid species.	Upstream reach mostly dry ditch habitat at WFD-PA1-0026, with more natural and wetted area downstream. Ecological value the watercourses a winterbourne was heavily diminished by the severely impacted hydromorphology. Limited habitat for fish, invertebrates and macrophytes.	Biological elements are likely to have been affected by the impacted hydromorphology. However the reach provides some limited habitat potential for macroinvertebrate communities. No macrophytes present, habitat not suitable for salmonid species.		
Medium Term Survey Results Summary — **Phys**	No Walkover Survey undertaken. Survey point WFD-GW1-0003b (south of the cutting) looked at the disused railway on 15/07/2014 11:30. The report identifies that the presence of shallow standing water in the disused railway cutting could be groundwater fed. The wet feature, was heavily vegetated with a dominant community, S22a, noted. This community is not identified under NVC as groundwater dependent. Survey point WFD-GW1-0004g (north west of the cutting) looked at a stream at SP 57900 40029 on 18/08/2014 14:03. The stream was dry at the time of the visit. Vegetation of W21– Crataegus monogyna - Hedera helix scrub is quoted, which is not identified under NVC as being groundwater dependent, and is noted as being surface water reliant. No springs were observed with the report noting that a culvert outlet is present at the location where issues are marked on OS maps (photo reference: WFD-GW1-004f_2376-18082014-18082014 SP 457900 240029) and is most likely linked to a field drainage network.	The watercourse observed was heavily shaded (>70%), low flowing, slightly turbid Main River.	This is an ephemeral/winterbourne watercourse. A dry and heavily shaded watercourse was observed. Continuous (but not perceptually flowing) water did not establish within the channel until some 800m downstream of the proposed crossing point. At survey point WFD-GW1-0004f, the ditch surveyed was dry. During wet winter periods, rainwater is likely to recharge the underlying bedrock (Principal Aquifers) and cause groundwater levels to rise. The potential rise in groundwater levels could possibly lead to flows occurring in areas where the ground surface intersects the water table. The rise in groundwater level is likely to result in flow to the ditch (i.e., low lying area).	The watercourse observed was heavily shaded (100%) and looks to be eutrophic. Probably high nutrient load in runoff from farmland. No obvious signs of pollution such as litter/ oil sheen. Low flowing, slightly turbid tributary of the main Radstone Brook watercourse. Physico-chemical parameters measured at survey point WFD-GW1-0004e: pH = 7.54 Temp = 12.1 deg C Conductivity = 674 µS	At survey point WFD-GW1-0004f, the ditch surveyed was dry. During wet winter periods, rainwater is likely to recharge the underlying bedrock (Principal Aquifers) and cause groundwater levels to rise. The potential rise in groundwater levels could possibly lead to flows occurring in areas where the ground surface intersects the water table. The rise in groundwater level is likely to result in flow to the ditch (i.e., low lying area). Survey point WFD-GW1-0004g (north west of the cutting) looked at a stream at SP 57900 40029 on 18/08/2014 14:03. The stream was dry at the time of the visit. Vegetation of W21– Crataegus monogyna - Hedera helix scrub is quoted, which is not identified under NVC as being groundwater dependent, and is noted as being surface water reliant. No springs were observed with the report noting that a culvert outlet is present at the location where issues are marked on OS maps (photo reference: WFD-GW1-004f_2376-18082014-18082014 SP 457900 240029) and is most likely linked to a field drainage network.	At survey point WFD-PA1-0027a and WFD-PA1-0027b, the watercourse observed was heavily shaded (100%) and looks to be eutrophic (probable high nutrient load in runoff from farmland). Low flowing, slightly turbid tributary of the main Radstone Brook watercourse. Survey point WFD-GW1-0004e looked at a watercourse at SP 57869 41396 on 20/08/2014 13:25. The report states that the watercourse drains the adjacent Halse Copse Woodland to the north west. The upper section (upstream) of the watercourse is dry and flow (recorded at 0.00073m3/s) is not continuous along the entire length of the watercourse. An issue/drain (at NGR: SP 57861, 41388) is seen flowing into the watercourse from the adjacent land. The report concludes that springs are likely to emerge where the underlying Great Oolite Group has geological contacts with the underlying Rutland Formation Mudstone, and that the issues and land drains feeding the watercourse are evidence of flows from the underlying Great Oolite Group which is thought to contribute base flow to the watercourse. Physico-chemical parameters measured at survey point WFD-GW1-0004e: pH = 7.54 Temp = 12.1 deg C Conductivity = 674 µS At survey point WFD-GW1-0004b a ditch was observed (5957424 42189) on 20/08/2014 11:45 with still water. The watercourse looks to be ephemeral. An inspection of the upstream location (SP 57294, 42553) confirmed that the channel is dry, and channels in the adjacent woodland (SP 57246, 42378; and SP 57190, 42445) also dry. It is stated that rises in groundwater levels may lead to flows occurring in areas where the ground surface		
Medium Term Survey Results Summary — **Hydro**	The quantity and dynamics of flow and morphology appear to be significantly altered by historic land drainage activities, as well as existing structures. River continuity is affected by culverts underneath the road and existing railway embankment	The quantity and dynamics of flow and morphology appear to be significantly altered by historic land drainage activities, as well as existing structures. River continuity is affected by culverts underneath the road and existing railway embankment	The quantity and dynamics of flow and morphology appear to be significantly altered by historic land drainage activities, as well as existing structures	The quantity and dynamics of flow and morphology appear to be altered but some dynamism is present in the downstream reaches	The quantity and dynamics of flow and morphology appear to be significantly altered by historic land drainage activities, as well as existing structures	The quantity and dynamics of flow and morphology appear to be altered but some dynamism is present in the downstream reaches		
Additional Comments	Surveys indicate that the ditches in the upper reaches of the Radstone Brook are unlikely to be groundwater dependent, and connectivity is also considered negligible. However, surveys do not clarify the level of impact of the cutting on base flow of the Radstone Brook and its tributaries.				Surveys indicate that an element of groundwater dependency could be present in this area. The ditches on the tributaries of Radstone Brook were dry during site visit, and assumed to only flow following heavy rainfall events causing groundwater levels to rise. The proposed drainage from the cutting being discharged to the Great Ouse watercourse and not the Radstone Brook is likely to occur occasionally (following heavy rainfall), potentially reducing high flows in the Radstone Brook, but having minimal impact on the dry weather flow.	Surveys indicate that an element of groundwater dependency could be present in this area of the headwaters of the Radstone Brook. The northern tributary branch of Radstone Brook is assumed to only flow following heavy rainfall events causing groundwater levels to rise. Issues and land drains feeding the western tributary branch of the Radstone Brook are evidence of flows from the underlying geology which is thought to contribute base flow.		

Audit Trail for the Update of the WFD Water Body Assessment with Baseline Data

			Nature of the Assessment Update and Justification						
	WFD Classification Elements Changed	**Brackley South Cutting**	**River Diversion and 4 x Culverts - Radstone Brook. Four new culverts (including Brackley culvert) carrying Radstone Brook under access roads and Brackley embankment**	**River Diversion of unnamed tributary (drain) of the Radstone Brook**	**Culvert and River Diversion - Headwater channel of Radstone Brook (Helmdon culvert)**	**Brackley North Cutting - will affect dry weather flows on Radstone Brook, and drainage from the cutting will be discharge to the Great Ouse watercourse, not Radstone Brook.**	**Greatworth South Cutting - potential to affect dry weather flows of approx. 1.5 km of an upstream trib (headwater stream), for which no baseline data are available**	**OVERALL IMPACT**	**RESIDUAL EFFECT**
Biological	**2. Macrophytes and phytobenthos - macrophytes**	Only limited data available, no assessment update possible.	Assessment updated to reflect baseline data. Several impacts downgraded from yellow to green, due to the absence of macrophytes in this section.	Assessment updated to reflect baseline data. Several impacts downgraded from yellow to green, due to the absence of macrophytes in this section.	Assessment updated to reflect baseline data. Several impacts downgraded from yellow to green, due to the absence of macrophytes in this section.	Only limited data available, no assessment update possible.	Only limited data available, no assessment update possible.	No change in overall impact.	No change in residual effect.
Biological	**3. Macroinvertebrates**	Only limited data available, no assessment update possible.	Assessment updated to reflect baseline data. No change in overall assessment for macroinvertebrates.	Assessment updated to reflect baseline data. Watercourse observed was dry/ephemeral, therefore no impact predicted to occur. YELLOW TO GREEN.	Assessment updated to reflect baseline data. No change in overall assessment for macroinvertebrates.	Only limited data available, no assessment update possible.	Only limited data available, no assessment update possible.	No change in overall impact.	No change in residual effect.
Biological	**4. Fish**	Only limited data available, no assessment update possible.	Assessment updated to reflect baseline data. No change in overall assessment for fish (several impacts remain amber).	Assessment updated to reflect baseline data. Watercourse observed was dry/ephemeral, therefore no impact predicted to occur. YELLOW TO GREEN.	Assessment updated to reflect baseline data. No change in overall assessment for fish (several impacts remain amber).	Only limited data available, no assessment update possible.	Only limited data available, no assessment update possible.	No change in overall impact.	No change in residual effect.
Physico-Chemical	**5. Dissolved Oxygen**	The effect of this Scheme Element (Cutting) on the Dissolved Oxygen WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a slight reduction in baseflow in the Radstone Brook, leading to depleted reaches of river flow on the watercourse, and thus reducing turbulence and oxygenation.	No assessment update required. Temporary minor impacts remain unchanged.	The effect of this Scheme Element on the Dissolved Oxygen WFD element has been changed from YELLOW to GREEN. Watercourse observed was dry/ephemeral, therefore no impact predicted to occur.	No assessment update required. Temporary minor impacts remain unchanged.	The effect of this Scheme Element (Cutting) on the Dissolved Oxygen WFD element remains YELLOW. The proposed drainage from the cutting being discharged to the Great Ouse watercourse and not the Radstone Brook is likely to occur occasionally (following heavy rainfall), potentially reducing high flows in the Radstone Brook, but having minimal impact on the dry weather flow. Occasionally reduced high flows may result in a temporary minor reduction in turbulence and oxygenation.	The effect of this Scheme Element (Cutting) on the Dissolved Oxygen WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a slight reduction in dry weather flows of approx. 1.5 km of an upstream tributary to the north of Radstone Brook (but not affecting Radstone Brook as a whole), leading to depleted reaches of river flow on the tributary, and thus reducing turbulence and oxygenation.	No change in overall impact.	No change in residual effect.
Physico-Chemical	**6. pH**	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No change in overall impact.	No change in residual effect.
Physico-Chemical	**7. Phosphate**	The effect of this Scheme Element (Cutting) on the Phosphate WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a slight reduction in baseflow in the Radstone Brook, leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including phosphate.	No assessment update required. Temporary minor impacts remain unchanged.	The effect of this Scheme Element on the Phosphate WFD element has been changed from YELLOW to GREEN. Watercourse observed was dry/ephemeral, therefore no impact predicted to occur.	No assessment update required. Temporary minor impacts remain unchanged.	The effect of this Scheme Element (Cutting) on the Phosphate WFD element remains YELLOW. The proposed drainage from the cutting being discharged to the Great Ouse watercourse and not the Radstone Brook is likely to occur occasionally (following heavy rainfall), potentially reducing high flows in the Radstone Brook, but having minimal impact on the dry weather flow. Occasionally reduced high flows may result in a temporary minor increase in concentrations of resident contaminants, including phosphate.	The effect of this Scheme Element (Cutting) on the Phosphate WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a slight reduction in dry weather flows of approx. 1.5 km of an upstream tributary to the north of Radstone Brook (but not affecting Radstone Brook as a whole), leading to depleted reaches of river flow on the tributary, and thus increasing concentrations of resident contaminants, including phosphate.	No change in overall impact.	No change in residual effect.
Physico-Chemical	**8. Ammonia**	The effect of this Scheme Element (Cutting) on the Ammonia WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a slight reduction in baseflow in the Radstone Brook, leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including ammonia.	No assessment update required. Receptor remains insensitive to impact.	The effect of this Scheme Element on the Ammonia WFD element has been changed from YELLOW to GREEN. Watercourse observed was dry/ephemeral, therefore no impact predicted to occur.	No assessment update required. Receptor remains insensitive to impact.	The effect of this Scheme Element (Cutting) on the Ammonia WFD element remains YELLOW. The proposed drainage from the cutting being discharged to the Great Ouse watercourse and not the Radstone Brook is likely to occur occasionally (following heavy rainfall), potentially reducing high flows in the Radstone Brook, but having minimal impact on the dry weather flow. Occasionally reduced high flows may result in a temporary minor increase in concentrations of resident contaminants, including ammonia.	The effect of this Scheme Element (Cutting) on the Ammonia WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a slight reduction in dry weather flows of approx. 1.5 km of an upstream tributary to the north of Radstone Brook (but not affecting Radstone Brook as a whole), leading to depleted reaches of river flow on the tributary, and thus increasing concentrations of resident contaminants, including ammonia.	No change in overall impact.	No change in residual effect.
Physico-Chemical	**9. Temperature**	No assessment update required. Receptor remains insensitive to impact.	Considering that the watercourse is heavily shaded, the presence of culverts is not likely to result in a deterioration in temperature, therefore no change in assessment update.	No assessment update required. Receptor remains insensitive to impact.	Considering that the watercourse is heavily shaded, the presence of culverts is not likely to result in a deterioration in temperature, therefore no change in assessment update.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No change in overall impact.	No change in residual effect.
Physico-Chemical	**10. Specific Pollutants (Annex VIII)**	The effect of this Scheme Element (Cutting) on the Specific Pollutants WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a slight reduction in baseflow in the Radstone Brook, leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including specific pollutants.	No assessment update required. Temporary minor impacts remain unchanged.	The effect of this Scheme Element on the Specific Pollutant WFD element has been changed from YELLOW to GREEN. Watercourse observed was dry/ephemeral, therefore no impact predicted to occur.	No assessment update required. Temporary minor impacts remain unchanged.	The effect of this Scheme Element (Cutting) on the Specific Pollutants WFD element remains YELLOW. The proposed drainage from the cutting being discharged to the Great Ouse watercourse and not the Radstone Brook is likely to occur occasionally (following heavy rainfall), potentially reducing high flows in the Radstone Brook, but having minimal impact on the dry weather flow. Occasionally reduced high flows may result in a temporary minor increase in concentrations of resident contaminants, including specific pollutants.	The effect of this Scheme Element (Cutting) on the Specific Pollutants WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a slight reduction in dry weather flows of approx. 1.5 km of an upstream tributary to the north of Radstone Brook (but not affecting Radstone Brook as a whole), leading to depleted reaches of river flow on the tributary, and thus increasing concentrations of resident contaminants, including specific pollutants.	No change in overall impact.	No change in residual effect.
Hydromorphological	**11. Quantity and dynamics of river flow**	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text in light of survey information	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text in light of survey information	Watercourse observed was dry/ephemeral, therefore no impact predicted to occur. YELLOW TO GREEN	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text in light of survey information	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text in light of survey information	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text in light of survey information	No change in overall impact.	No change in residual effect.
Hydromorphological	**12. Connection to Groundwater**		No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text in light of survey information	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text in light of survey information	No assessment update required. Temporary minor impacts remain unchanged.			No change in overall impact.	No change in residual effect.
Hydromorphological	**13. River continuity**		No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text in light of survey information	No assessment update required. Temporary minor impacts remain unchanged.			No change in overall impact.	No change in residual effect.
Hydromorphological	**14. River depth and width variation bed**		No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text in light of survey information	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text in light of survey information	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text in light of survey information			No change in overall impact.	No change in residual effect.
Hydromorphological	**15. Structure and substrate of river bed**		No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text in light of survey information	Watercourse observed was dry/ephemeral, therefore no impact predicted to occur. YELLOW TO GREEN	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text in light of survey information			No change in overall impact.	No change in residual effect.
Hydromorphological	**16. Structure of riparian zone**		No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text in light of survey information	No assessment update required. Temporary minor impacts remain unchanged.			No change in overall impact.	No change in residual effect.

GB102603020320

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective
GB102603020320		
Stoke Brook Aylesbury	Moderate	Good Ecological Status by 2015

Scheme Elements	Description of scheme element impact	River diversions Stoke Brook and Tributaries			Culverts on Stoke Brook					Cutting		Culverts on Sedrup Ditch					Culverts on Lower Hartwell Ditches					Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	-
										Wendover North Cutting - dewatering activities and other hydrological impacts on Stoke Brook upstream springs, water discharged approximately 1 km downstream of springs with potential effects on dry weather flow of upstream areas of Stoke Brook and tribs. Spring and surface water flows potentially affected locally thus influencing surface water		Existing alignment of managed field drains straightened at Sedrup Ditch and tributary (Crossing CFA11-SWC7 and CFA11-SWC8). Culvert lengths on Sedrup ditch and tributaries = 187m + 150m. Total = 337m. Also includes 200m of new channel/realignment downstream.					Crossings requiring culverts on Hartwell Ditches at CFA11-SWC9 to CFA11-SWC11, including approximately 210m of diversion. Culvert lengths = 45m + 33m + 30m + 30m. Total = 136m.							
Identified biological impacts	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage			Construction	Operation		-
1. Macrophytes and phytobenthos: Diatoms	-	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2. Macrophytes and phytobenthos: Macrophytes	-	-	- The new channel will replicate existing habitat and where possible incorporate marginal berms to encourage emergent macrophyte growth. Berms will provide a range of habitats suitable for colonisation by submerged species. The effects of the audit proposals mentioned to be minor positive.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. -Disruption/loss of habitat and access to certain areas of the watercourse - however, only relatively short distance of Stoke Brook affected. -Reduction in habitat quality - Stoke Brook and tributaries heavily shaded, with poor macrophyte diversity and common species only. -Potential localised adverse effect with no effect on the element status at the scale of the waterbody.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel) may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in the immediate downstream). Effects are considered to be minimal.	- Shading of the channel from the culvert has the potential to reduce photosynthetic actors and therefore effect macrophyte communities present. -Landtake data show that certain areas of the watercourse are heavily shaded, and some improvements are proposed which will provide some mitigation on this. - Stoke Brook and tributaries currently support low diversity macrophyte communities, with only common species. There may be effects on macrophyte communities. - Following a precautionary approach, and in the absence of more detailed data, it is considered that an effect on the status of this element is possible.	- Changes in flow dynamics (potential increased flow and scour due to the straightened channel) may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in the immediate downstream). - This would only be where a limited distance and potential effects are considered to be minimal on this element.	Drainage (including balancing ponds) has been designed to reduce the rate of discharge into Stoke Brook. The proposed culvert. There is no anticipated change in water quality.	Possible change in macrophyte communities over approx. 1 km of the upstream area of Stoke Brook (with potential downstream effects). -No baseline macroinvertebrate data available. - Following a precautionary approach, and in the absence of more detailed data, it is considered that an effect on the status of this element is possible.	- CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. - Localised scour/erosion downstream, but only a relatively short distance of this minor water body will be affected. Linear the main WFD water body and there would be no cumulative effect on this element. - Disruption/loss of habitat and access to certain areas of the watercourse - Stoke Brook and tributaries currently support low diversity macrophyte communities, with only common species. There may be effects on macrophyte communities. - Following a precautionary approach, and in the absence of more detailed data, it is considered that an effect on the status of this element is possible.	Receptor is insensitive to impact	- Shading of the channel from the culvert has the potential to reduce photosynthetic actors and therefore effect macrophyte communities present. - There would only be a localised adverse effect on the element status at the scale of the waterbody.	- Changes in flow dynamics (potential increased flow and scour due to the straightened channel) may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in the immediate downstream). - This would only be where a limited distance and potential effects are considered to be minimal on this element.	Drainage (including balancing ponds) has been designed to reduce the rate of discharge into Stoke Brook. The proposed culvert. There is no anticipated change in water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. - Localised scour/erosion downstream, but only a relatively short distance of this minor water body will be affected. Linear the main WFD water body and there would be no cumulative effect on this element. - Disruption/loss of habitat and access to certain areas of the watercourse - Stoke Brook and tributaries currently support low diversity macrophyte communities, with only common species. There may be effects on macrophyte communities. - Following a precautionary approach, and in the absence of more detailed data, it is considered that an effect on the status of this element is possible.	- Shading of the channel from the culvert has the potential to reduce photosynthetic actors and therefore effect macrophyte communities present. - There would only be a localised adverse effect on the element status at the scale of the waterbody. - Landtake data show that certain areas of the watercourse are heavily shaded, and some improvements are proposed which will provide some mitigation on this. - Stoke Brook and tributaries currently support low diversity macrophyte communities, with only common species. - Dry drainage ditch will be widened of more flow. - No effect anticipated 'FOLLOW TO GREEN'	Drainage (including balancing ponds) has been designed to reduce the rate of discharge into Stoke Brook. The proposed culvert. There is no anticipated change in water quality.	No impact be from upstream water bodies	- No baseline data available on this element and the assessment follows a precautionary approach. - Baseline shows that Stoke Brook and tributaries currently support low diversity macrophyte communities, with only common species. There may be effects on macrophyte communities. - Possible changes to flows due to the cuttings potentially affecting the macrophytes element in the spring fed upstream stretch of Stoke Brook and its tributaries. - Other effects (from culverts/diversions etc.) likely to be more localised. - Following a precautionary approach, it is considered that an effect on the status of this element is possible.	None required.	- Measures to improve macrophyte habitat or mitigate any adverse effects form part of the embedded mitigation measures described previously, therefore no additional measures are required. - These include channel habitat improvements to habitat downstream of around culverts. - It is important to ensure that these potential beneficial effects are maximised during the detailed design/positioning the culverts so that bed substrate can deposit. - Construction monitoring should be considered as part of the CEMP for sensitive water bodies. - Further investigation required to assess whether the changes in flow brought about by the construction of the cutting will affect this WFS element.	- No baseline data available on this element and the assessment follows a precautionary approach. - Baseline shows that Stoke Brook and tributaries currently support low diversity macrophyte communities, with only common species. There may be effects on macrophyte communities. - Possible changes to flows due to the cuttings potentially affecting the macrophytes element in the spring fed upstream stretch of Stoke Brook and its tributaries. - Other effects (from culverts/diversions etc.) likely to be more localised. - Following a precautionary approach, it is considered that an effect on the status of this element is possible.
3. Macroinvertebrates	-	Moderate	- Landtake will lead to direct loss of macroinvertebrates and reduce the habitats available for colonisation within the culvert. - Baseline invertebrate data indicate that Stoke Brook is of moderate quality, and the community is therefore not likely to be highly sensitive to impacts. Effects on the relatively short distance affected and the invertebrate community present, there would only be highly localised effects on the invertebrate community and no measurable effect on this element at a water body level.	- The diversion will replicate existing habitat and where possible will be designed to include a range of habitats suitable for colonisation by aquatic species. The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel) may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in the immediate downstream). - This would only be after a limited distance and potential effects are considered to be minimal.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrates and reduce the habitats available for colonisation within the culvert. - Baseline invertebrate data indicate poor to moderate quality invertebrates. - Therefore not likely to be highly sensitive to the impact. - Disruption/loss of habitat and access to certain areas of the watercourse - however, only relatively short distance of Stoke Brook affected and the invertebrate community present, there would only be highly localised effects on the invertebrate community and no measurable effect on this element at a water body level.	- Shading will have to be the loss of habitat with only hard no vegetation resource. - Baseline invertebrate data indicate poor to moderate quality invertebrate quality. - Effects are likely to be minor adverse.	- Changes in flow dynamics (potential increased flow and scour due to the straightened channel) may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in the immediate downstream). - This would only be where a limited distance and potential effects are considered to be minimal on macroinvertebrates	Drainage (including balancing ponds) has been designed to reduce the rate of discharge into Stoke Brook. The proposed culvert. There is no anticipated change in water quality.	Possible change in macroinvertebrate communities over approx. 1 km of the upstream area of Stoke Brook (with potential downstream effects). -No baseline macroinvertebrate data available. - Following a precautionary approach, and in the absence of more detailed data, it is considered that an effect on the status of this element is possible. - Stoke Brook and tributary of Friar's Good Stream are heavily shaded, and some improvements are proposed which will provide some mitigation on this. - Stoke Brook and tributaries currently support low diversity macroinvertebrate communities, with only common species. - Following a precautionary approach, and in the absence of more detailed data, it is considered that an effect on the status of this element is possible.	- CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	- Landtake will lead to direct loss of macroinvertebrates and reduce the habitats available for colonisation within the culvert. - Localised scour/erosion downstream, but only a relatively short distance of this minor water body will be affected. Linear the main WFD water body and there would be no cumulative effect on this element. - Disruption/loss of habitat and access to certain areas of the watercourse - Stoke Brook and tributaries currently support low diversity macroinvertebrate communities, with only common species. There may be effects on macroinvertebrate communities. - Following a precautionary approach, and in the absence of more detailed data, it is considered that an effect on the status of this element is possible.	Receptor is insensitive to impact	- Shading of the channel from the culvert has the potential to reduce photosynthetic actors and therefore effect macroinvertebrate communities present. - There would only be a localised adverse effect on the element status at the scale of the waterbody. - Landtake data show that certain areas of the watercourse are heavily shaded, and some improvements are proposed which will provide some mitigation on this. - Stoke Brook and tributaries currently support low diversity macroinvertebrate communities, with only common species. - Dry drainage ditch will be widened of more flow. - No effect anticipated 'FOLLOW TO GREEN'	- Changes in flow dynamics (potential increased flow and scour due to the straightened channel) may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in the immediate downstream). - This would only be where a limited distance and potential effects are considered to be minimal. - Dry drainage ditch will be widened of more flow. - No effect anticipated 'FOLLOW TO GREEN'	Drainage (including balancing ponds) has been designed to reduce the rate of discharge into Stoke Brook. The proposed culvert. There is no anticipated change in water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrates and reduce the habitats available for colonisation within the culvert. - Localised scour/erosion downstream, but only a relatively short distance of this minor water body will be affected. Linear the main WFD water body and there would be no cumulative effect on this element. - Disruption/loss of habitat and access to certain areas of the watercourse - Stoke Brook and tributaries currently support low diversity macroinvertebrate communities, with only common species. There may be effects on macroinvertebrate communities. - Following a precautionary approach, and in the absence of more detailed data, it is considered that an effect on the status of this element is possible.	- Possible indirect effects on macroinvertebrates present due to the shading effects. - Shading will only have negligible or no effects on fish. - Stoke Brook and tributaries currently support low diversity macroinvertebrate communities, with only common species. - Dry drainage ditch will be widened of more flow. - No effect anticipated 'FOLLOW TO GREEN'	- Changes in flow dynamics (potential increased flow and scour due to the straightened channel) may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in the immediate downstream). - This would only be where a limited distance and potential effects are considered to be minimal. - Dry drainage ditch will be widened of more flow. - No effect anticipated 'FOLLOW TO GREEN'	Drainage (including balancing ponds) has been designed to reduce the rate of discharge into Stoke Brook. The proposed culvert. There is no anticipated change in water quality.	No impact be from upstream water bodies	- No baseline data available on this element and the assessment follows a precautionary approach. - Baseline data indicate that Stoke Brook and tributaries currently support low diversity macroinvertebrate communities, with only common species. There may be effects on macroinvertebrate communities. - Possible changes to flows due to the cuttings potentially affecting the macroinvertebrates element in the spring fed upstream stretch of Stoke Brook and its tributaries. - Other effects (from culverts/diversions etc.) likely to be more localised. - Following a precautionary approach, it is considered that an effect on the status of this element is possible.	None required.	- Measures to mitigate any adverse effects on macroinvertebrates form part of the embedded mitigation measures described previously. - These include channel habitat improvements to habitat within the proximity of the culverts and designing/positioning the culverts so that bed substrate can deposit. - It is important to ensure that these potential beneficial effects are maximised during the detailed design/positioning the culverts so that bed substrate can deposit. - Further investigation required to assess whether the changes in flow brought about by the construction of the cutting will affect this WFS element.	- No baseline data available on this element and the assessment follows a precautionary approach. - Baseline shows that Stoke Brook and tributaries currently support low diversity macroinvertebrate communities, with only common species. There may be effects on macroinvertebrate communities. - Possible changes to flows due to the cuttings potentially affecting the macroinvertebrates element in the spring fed upstream stretch of Stoke Brook and its tributaries. - Other effects (from culverts/diversions etc.) likely to be more localised. - Following a precautionary approach, it is considered that an effect on the status of this element is possible.
4. Fish	-	-	- Landtake is unlikely to result in direct mortality of fish but there will be direct loss of fish habitat, available for colonisation within the culvert. - Baseline fish hydrobiological data indicates that Stoke Brook is of moderate quality, and the community is therefore not likely to be highly sensitive to impacts. - Effects on the relatively short distance affected and the invertebrate community present, there would only be highly localised effects on the invertebrate community and no measurable effect on this element at a water body level. - Stoke Brook and tributaries are not considered to support fish suitable habitat, or potential for salmonid. Only localised minor effect anticipated with no effect at the scale of the waterbody.	- The diversion will replicate existing habitat and where possible be designed to include a range of habitats suitable for colonisation by aquatic species. The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities.	- Localised changes in flow dynamics may result in changes to fish habitat. Potential for localised adverse effects considered to be minimal and would not result in a change in status. - Stoke Brook and tributaries are not considered to support fish suitable habitat, or potential for salmonid. Potential for minor fish species only. Only localised minor effect anticipated.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). - No fish on fish habitat data indicates that the tributary location is very unlikely to be a significant nursery area for salmonids. - Stoke Brook and tributaries are not considered to support fish suitable habitat, or potential for salmonid. Only localised minor effect anticipated with no effect at the scale of the waterbody.	Shading will only have negligible or no effects on fish.	- Stoke Brook and tributaries are not considered to support fish suitable habitat, or potential for salmonid. Only localised minor effect anticipated with no effect at the scale of the waterbody.	DRAINAGE TO FOLLOW - Changes in flow dynamics (potential increased flow due to the straightened channel in the culvert, loss of flow diversity etc.) may result in changes to fish habitat within the immediate vicinity of the culvert (notably in the immediate downstream). - There is very limited information on the design of the proposed culvert. Stoke Brook and tributaries are not considered to support fish suitable habitat, or potential for salmonid. Only localised minor effect anticipated with no effect at the scale of the waterbody.	Drainage (including balancing ponds) has been designed to reduce the rate of discharge into Stoke Brook. The proposed culvert. There is no anticipated change in water quality.	DRAINAGE TO FOLLOW - Possible change in fish communities over approx. 1 km of the upstream area of Stoke Brook (with potential downstream effects). - No baseline fish data available. - Following a precautionary approach, and in the absence of more detailed data, it is considered that an effect on the status of this element is possible. - Stoke Brook and tributary of Friar's Good Stream are heavily shaded, and some improvements are proposed which will provide some mitigation on this. - Stoke Brook and tributaries are not considered to support fish suitable habitat, or potential for salmonid. Only localised minor effect anticipated with no effect at the scale of the waterbody.	- CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	- Landtake is unlikely to result in direct mortality of fish but there will be direct loss of fish habitat available for colonisation within the culvert. - Fish and fish habitat data indicate that the tributary location is very unlikely to be a significant nursery area for salmonids. - Localised scour/erosion downstream, but only a relatively short distance of this minor water body will be affected. Linear the main WFD water body and there would be no cumulative effect on this element. - Disruption/loss of habitat and access to certain areas of the watercourse - Stoke Brook and tributaries are not considered to support fish suitable habitat, or potential for salmonid. Only localised minor effect anticipated with no effect at the scale of the waterbody.	Receptor is insensitive to impact	- Shading of the channel from the culvert has the potential to reduce photosynthetic actors and therefore effect macrophyte communities present. - There would only be a localised adverse effect on the element status at the scale of the waterbody. - Landtake data show that certain areas of the watercourse are heavily shaded, and some improvements are proposed which will provide some mitigation on this. - Stoke Brook and tributaries are not considered to support fish suitable habitat, or potential for salmonid. - Dry drainage ditch will be widened of more flow. - No effect anticipated 'FOLLOW TO GREEN'	- Changes in flow dynamics (potential increased flow and scour due to the straightened channel) may result in changes to fish habitat within the immediate vicinity of the culvert (notably in the immediate downstream). - This would only be where a limited distance and potential effects are considered to be minimal. - Dry drainage ditch will be widened of more flow. - No effect anticipated 'FOLLOW TO GREEN'	Drainage (including balancing ponds) has been designed to reduce the rate of discharge into Stoke Brook. The proposed culvert. There is no anticipated change in water quality.	Receptor is insensitive to impact	- Landtake is unlikely to result in direct mortality of fish but there will be direct loss of fish habitat available for colonisation within the culvert. - Fish and fish habitat data indicate that the tributary location is very unlikely to be a significant nursery area for salmonids. - Localised scour/erosion downstream, but only a relatively short distance of this minor water body will be affected. Linear the main WFD water body and there would be no cumulative effect on this element. - Disruption/loss of habitat and access to certain areas of the watercourse - Stoke Brook and tributaries are not considered to support fish suitable habitat, or potential for salmonid. - Dry drainage ditch will be widened of more flow. - No effect anticipated 'FOLLOW TO GREEN'	Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). - Fish and fish habitat data indicate that the tributary location is very unlikely to be a significant nursery area for salmonids. - Given that species present aren't highly sensitive and the effects are likely impacts are likely to be temporarily, low and highly localised, no measurable effects are anticipated.	N/A	- Localised changes in flow dynamics (potential increased flow due to the straightened channel) may result in changes to fish habitat within the immediate vicinity of the culvert (notably in the immediate downstream). - This would only be where a limited distance and potential effects are considered to be minimal. - Dry drainage ditch will be widened of more flow. - No effect anticipated 'FOLLOW TO GREEN'	Shading will only have negligible or no effects on fish. - Stoke Brook and tributaries are not considered to support fish suitable habitat, or potential for salmonid. - Dry drainage ditch will be widened of more flow. - No effect anticipated 'FOLLOW TO GREEN'	Drainage (including balancing ponds) has been designed to reduce the rate of discharge into Stoke Brook. The proposed culvert. There is no anticipated change in water quality.	No impact be from upstream water bodies	AMBER TO YELLOW - No baseline data available on this element and the assessment follows a precautionary approach. - Baseline data indicate that Stoke Brook and tributaries currently support low diversity fish populations. - Otherwise unlikely to have any effects on fish populations. - Baseline data indicate that Stoke Brook and tributaries currently support low diversity fish populations. - Possible changes to flows due to the cuttings potentially affecting the fish element in the spring fed upstream stretch of Stoke Brook and its tributaries. - Overall impact likely to be minor and localised with no effect on WFD status of the element at the waterbody scale.	None required.	- Measures to mitigate any adverse effects on fish form part of the embedded mitigation measures described previously. - These include channel habitat improvements to habitat within the proximity of the culverts and designing/positioning the culverts so that bed substrate can deposit. - It is important to ensure that these potential beneficial effects are maximised during the detailed design/positioning the culverts so that bed substrate can deposit. - Further investigation required to assess whether the changes in flow brought about by the construction of the cutting will affect this WFS element.	- No baseline data available on this element and the assessment follows a precautionary approach. - Otherwise unlikely to have any effects on fish populations. - Baseline data indicate that Stoke Brook and tributaries currently support low diversity fish populations. - Possible changes to flows due to the cuttings potentially affecting the fish element in the spring fed upstream stretch of Stoke Brook and its tributaries. - Overall impact likely to be minor and localised with no effect on WFD status of the element at the waterbody scale.
Physico-Chemical status																											
5. Dissolved Oxygen	High	High	N/A	- Release of sediment during construction and other pollutants in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary and is unlikely to lower the water body.	- CoCP measures (Section 5) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. - Release of sediment during construction and other pollutants in river processes may cause a temporary drop in dissolved oxygen. The impact is likely to be temporary/local in relation to the water body. Therefore, no permanent change in status is anticipated.	N/A	Due to the length of the culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	- CoCP measures (Section 5) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. - CoCP measures (Section 5) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	- CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	Due to the length of the culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	- CoCP measures (Section 5) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. - CoCP measures (Section 5) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	- CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	N/A	Due to the length of the culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	- CoCP measures (Section 5) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. - CoCP measures (Section 5) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	- CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	No impact to upstream water bodies	Potential minor and localised effects on element.	None required.	None required.	- Construction impacts are likely to have only temporary, minor effects. Complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). For scheme elements are anticipated to have mean flows. There is a small risk associated with pollution from truck drainage. Where this is not possible to a mean a floodplain or watercourse) and unobstructed discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	- None required.- Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS).
6. pH	High	High	N/A	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	No impact to upstream water bodies	Receptor is insensitive to impact	None required.	None required.	YELLOW TO GREEN. No effect on this element. Receptor is insensitive to impact	-
7. Phosphate	Moderate	Moderate	N/A	Receptor is insensitive to impact	- CoCP measures (Section 5) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. - Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate. This impact is likely to be temporary/local in relation to the water body and the water body. Therefore, no permanent change in status is anticipated.	N/A	Receptor is insensitive to impact	- CoCP measures (Section 5) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	Water quality could be reduced in the depleted reaches due to reduced concentrations of phosphate. Phosphate is a limiting factor in algal growth and pollution. This impact is likely to be groundwater dependent, however the source of the stream second need to be located to confirm this.	- CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	- CoCP measures (Section 5) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	- CoCP measures (Section 5) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	- CoCP measures (Section 5) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	No impact to upstream water bodies	There is potential for an adverse effect on the downstream water bodies (Hartwell Ditch and Stoke Brook Culvert), depending on the source of the upstream spring. Depending on how much flow is diverted, potential minor and localised effects on element. Also private discharge consents (not water company).	None required.	None required.- Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS).	YELLOW TO AMBER. A combination of the Scheme Element Impacts of dewatering/discharge of groundwater, and the existing discharge consents, may result in a temporary, minor effect on water quality during construction. Receptor is insensitive to impact
8. Ammonia	High	High	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Water quality could be reduced in the depleted reaches due to reduced concentrations of ammonia. Ammonia is a pollutant and toxic to aquatic life. This impact is likely to be groundwater dependent, however the source of the stream second need to be located to confirm this.	- CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	No impact to upstream water bodies	Potential minor and localised effects on element.	None required.	None required.	Construction impacts are likely to have only temporary, minor effects. Complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). For scheme elements are anticipated to have mean flows. There is a small risk associated with pollution from truck drainage. Where this is not possible to a mean a floodplain or watercourse) and unobstructed discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.
9. Temperature	-	-	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	No impact to upstream water bodies	Receptor is insensitive to impact	None required.	None required.	YELLOW TO GREEN. No effect on this element. Receptor is insensitive to impact	-
10. Specific Pollutants (Annex VIII)	-	-	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Water quality could be reduced in the depleted reaches due to reduced concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects.	- CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	- CoCP measures (Section 5) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	- CoCP measures (Section 5) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	- CoCP measures (Section 5) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	- CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	N/A	N/A	- CoCP measures (Section 5) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	- CoCP measures (Section 5) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	- CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	No impact to upstream water bodies	Potential minor and localised effects on element.	None required.- Implementation of CoCP measures and Best Practice Measures will ensure potential impacts only have a temporary, minor effect on water quality during construction.	None required.- Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS).	Construction impacts are likely to have only temporary, minor effects. Complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). For scheme elements are anticipated to have mean flows. There is a small risk associated with pollution from truck drainage. Where this is not possible to a mean a floodplain or watercourse) and unobstructed discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.
Hydromorphological status																											**Hydromorphology Baseline**
11. Quantity and dynamics of river flow	-	-	N/A	N/A	- Based on the walkover survey report and the hydrology assessment report, there is a risk that the proposed culverting will have only an significant diversity in flow dynamics. - It appears that the culverts will be straightened and straightened to align against the embankment. Straightening the channel may reduce flow rates and increase flow velocities in the existing channel course. Lengthening would reduce sinuosity and morphological dynamics.	N/A	N/A	- Approximately 300 m of culverts would be shaded by the road bridge at Stoke Mandeville, which is currently of Moderate-G. small status (according to the 2009 FRAME), but with some relatively high-quality habitat upstream of the culvert (according to Mitchell-Jones & Mitchell-Jones 2009). - Extensive culverting would result in significant loss of diversity in flow dynamics. - Out of bank flows would be contained in culverts and would not be dissipated to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. - The size of the channel suggests there is unlikely to be major diversity in river depth and width, but there is still a significant risk to the water body.	- Developing would reduce flows volumes and diversity in the headwaters. - This would be localised to approximately 1km, but this is still a significant proportion of the overall length of the water body. - The water body is currently of good status and may be sensitive to impacts. - The majority of the downstream part of the water body is currently classified as a heavily modified channel, making the upper 1km sensitive at water body scale	- Developing would reduce flow depths and along-stream and lateral migration and flexibility - connectivity between channel and floodplain dependent on the upper reaches	N/A	channel width varies from approximately 2m to 5m and is mainly consists narrow flow and increase gradients and flow velocities, and the tendency for out of bank flows to be dissipated and be increased downstream as the channel gradient levels, which contributes to increased flow velocities due to increased channel gradients. - Lengthening would reduce sinuosity and morphological dynamics. However, shortening the channel and straightening would increase the cumulative floodplain flows. - Culvert boundaries would be contained in culverts and banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. - There are drainage ditches, and, in practical terms the culvert would impact a small proportion of the overall water body.	- Lengthening would reduce flow velocities and diversity in flow dynamics. - Lengthening would increase flow depths and along-stream and lateral migration and flexibility - connectivity between channel and floodplain dependent on the upper reaches - However, on a water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status.	N/A	- Lengthening would increase flow velocities and diversity in flow dynamics. - Lengthening would increase flow depths and along-stream and lateral migration and flexibility - connectivity between channel and floodplain dependent on the upper reaches - However, on a water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status.	N/A	No impact to upstream water bodies	- The impacts of diverting, culverting and dewatering ca. 300 m of the 9.33 km, 'Moderate-G' overall status Stoke Brook (ID: GB102 0603 0320) are considered to be minor. The culverting of the Stoke Brook is a small proportion of the overall length of the Stoke Brook and is not considered part of the principal watercourse of the water body, where morphological status is moderate and sensitive to hydromorphological impacts. - The culverts are likely to result in adverse effects on the water body that could affect (deterioration) to overall status	Incorporate hydromorphological mitigation measures into detailed design where practicable. Mitigation measures might include: • Bank reprofiling (rehabilitation) • Create low flow channels within dispersed channels • Create reed fringes • Creation of shallow margins in front of hard defence • Install sill, sand or gravel traps • Introduce riparian vegetation/green corridors where space allows • Create/restore floodplain connectivity where space allows or at key nodes • Recreation of gravel bars and riffles using permanent and/or temporary bed structures (increase morphological diversity) • Retain marginal vegetation

GB106039030320 Audit Trail

WFD Baseline Survey Details

Water Body ID	GB106039030320									
Surface Water Body Name	Stoke Brook Salisbury									
Scheme Element	**2 x Culverts and 2 x River Diversion - Stoke Brook**	**Culvert and River Diversion - Stoke Brook**	**Culvert and River Diversion - Stoke Brook tributary**	**Culvert and River Diversion - Stoke Brook tributaries**	**Wendover North Cutting**	**2 x River Diversions and 2 x Culverts - Sedrup Ditch**	**3 x River Diversions and 3 x Culverts - Lower Harnwell Ditches**	**OVERALL EFFECT**	**RESIDUAL EFFECT**
Surface Water Crossing ID	**CR413-SWC2 and CR413-SWC10**	**CR413-SWC1**	**CR413-SWC3**	**CR413-SWC4, CR413-SWC5, CR413-SWC6**	**N/A**	**CR413-SWC7 and CR413-SWC8**	**CR413-SWC9 to CR413-SWC12**		
Surface Water Site	Stoke Brook at North Lee	Stoke Brook at North Lee	Unnamed tributary of Stoke Brook near Nash Lee	Unnamed tributary of Stoke Brook east of North Lee Unnamed tributary of Stoke Brook south of North Lee Unnamed tributary of Stoke Brook (parallel to main water body), east of North Lee	Stoke Brook and upstream springs	Sedrup Ditch at Aylesbury x 2	Harnwell Ditches at Lower Harnwell x 3		
Survey ID	WFD-PA1-0007b, WFD-MF1-0006, WFD-MI1-0007, WFD-MP1-0007	WFD-PA1-0007a, WFD-MF1-0006, WFD-MI1-0007, WFD-MP1-0007	WFD-PA1-0008, WFD-MF1-0008, WFD-MI1-0008	WFD-PA1-0005, WFD-PA1-0006a, WFD-PA1-0006b, WFD-PA1-0006c, WFD-MF1-0006, WFD-MP1-0006	WFD-CW1-0001d, WFD-PA1-0008, WFD-MP1-0008, WFD-MI1-0008	WFD-PA1-0004a, WFD-PA1-0004b	WFD-PA1-0003a, WFD-PA1-0003b, WFD-PA1-0003c		
Objectives of the Survey	• Update ecological baseline for Stoke Brook. • Assess ecological habitat type. • Assess the local hydromorphology.	• Update ecological baseline for Stoke Brook. • Assess ecological habitat type. • Assess the local hydromorphology.	• Establish ecological baseline for tributaries. • Assess ecological habitat type. • Assess the local hydromorphology.	• Establish ecological baseline for tributaries. • Assess ecological habitat type. • Assess the local hydromorphology. • Establish ecological baseline of tributaries.	• Assessment of flow regime in Stoke Brook headwaters • Assess ecological habitat type. • Assess the local hydromorphology • Establish ecological baseline of tributaries.	• Assess ecological habitat type. • Assess the local hydromorphology	• Assess ecological habitat type. • Assess the local hydromorphology		
Survey Scope	Ecological Walkover Survey Hydromorphological Survey Macrophyte Survey Macroinvertebrate Survey	Ecological Walkover Survey Hydromorphological Survey Macrophyte Survey Macroinvertebrate Survey	Ecological Walkover Survey Hydromorphological Survey Macrophyte Survey Macroinvertebrate Survey	Ecological Walkover Survey Hydromorphological Survey Macrophyte Survey Macroinvertebrate Survey	Ecological Walkover Survey Hydromorphological Survey Macrophyte Survey Macroinvertebrate Survey Hydrological survey of springs / tributaries feeding Stoke Brook Stoke Brook walk-over to measure pre-construction riparian habitat and relocations, looking crossings under land and pasture farmland. Channels are heavily shaded by hedgerows, woodland and / or encroaching marginal vegetation.	Ecological Walkover Survey Hydromorphological Survey	Ecological Walkover Survey Hydromorphological Survey		
Medium Term Survey Results Summary — **Bio**	At WFD-PA1-0007b, Stoke Brook historically realigned and reactioned watercourses with high levels of shading from bankside hedgerows, woodland areas and encroaching marginal vegetation. Ponded in places and relatively highly sedimented. At WFD-MI1-0006 and WFD-MI1-0006 macroinvertebrate quality Moderate, with only a few sensitive taxa and communities adapted to slow flows and sedimented conditions. Poor macrophyte diversity (4 species recorded) at WFD-MP1-0007 with only common species recorded. Poor suitability for fish, although potential for minor fish species.	At WFD-PA1-0007a Stoke Brook historically realigned and reactioned watercourses with high levels of shading from bankside hedgerows, woodland areas and encroaching marginal vegetation. Ponded in places and relatively highly sedimented. Macroinvertebrate quality Moderate at WFD-MI1-0006 and WFD-MI1-0007, with only a few sensitive taxa and communities adapted to slow flows and sedimented conditions. Poor macrophyte diversity (4 species recorded) with only common species recorded at WFD-MP1-0007. Poor suitability for fish, although potential for minor fish species.	Tributary at WFD-PA1-0008 is a watercourse historically realigned and reactioned, flowing through arable land and pasture farmland. Channel is heavily shaded by hedgerows, woodland and / or encroaching marginal vegetation. Ponded in places and relatively highly sedimented. Low macrophyte diversity (7 species) and only common species recorded WFD-MP1-0008. Good macroinvertebrate quality and communities adapted to moderate / fast flows and slight sedimentation. at WFD-MI1-0008. Tributary only considered to be suitable for minor fish species, no potential for salmonids.	Unnamed tributary east of North Lee: Field drainage ditch, heavily shaded with very low flows, not considered to be suitable for fish, macrophytes or macroinvertebrates. Unnamed tributary parallel the main waterbody: historically realigned and reactioned, flowing through arable land and pasture farmland. Channel is heavily shaded by hedgerows, woodland and / or encroaching marginal vegetation. Poor / moderate macroinvertebrate quality, with no pollution sensitive taxa . Low life scores, indicative of communities adapted to slow flows and silt. Relatively low macrophyte diversity (5 species), with common species only. Assessed as to be unsuitable for fish.	Stoke Brook appears to have relatively low diversity (4 species recorded) macrophyte communities, with only common species. Tributary also heavily shaded, with low macrophyte diversity (7 species) and only common species recorded. However, reach downstream of survey stretch support dense emergent macrophyte communities. Stoke Brook with Poor/Moderate macroinvertebrate quality and communities adapted to slow flows and sedimented conditions. Tributary with higher macroinvertebrate quality (Good) and communities adapted to moderate / fast flows and slight sedimentation, with however only a few taxa (Dinotiba, Simuliidae) typical of fast flows.	Sedrup Ditch, dry drainage ditch with no evidence of recent flows and terrestrial vegetation in places. Heavily shaded and sedimented drainage ditch, with limited macrophytes, likely to be of poor macroinvertebrate quality and considered as not suitable for salmonid species, only potential for minor fish species.	Ditches part of field drainage system. Heavily shaded, sedimented and slow flowing. Assessed as to be of poor suitability for fish, macroinvertebrates and macrophytes.		
Medium Term Survey Results Summary — **Phys**	A heavily shaded watercourse (>70%) with moderate turbidity was observed.	A heavily shaded watercourse (>70%) with moderate turbidity was observed.	The unnamed tributary was observed to be heavily shaded but with good water clarity.	The unnamed tributary of Stoke Brook east of North Lee (WFD-PA1-0005) and the unnamed tributary parallel to the main waterbody (WFD-PA1-0006a, 6b and 6c) were observed to be heavily shaded watercourses (>70%) with moderate to high turbidity. Predominantly low flowing with some dry sections. unnamed tributary east of North Lee: The quantity and dynamics of flow and morphology have been significantly altered by historic land drainage activities. The channel was heavily vegetated and no flow was observed at the time of the site visit Unnamed tributary parallel the main waterbody: The quantity and dynamics of flow and morphology appear to be significantly altered by historic modification. Upstream of this reach, an off-take feeds a mill lost which is managed to take the majority of the flow, which partly explains the non-perceptible flow observed	The unnamed tributary was observed to be heavily shaded but with good water clarity. At survey point WFD-CW1-0001d information provided suggests the stream is unlikely to be groundwater dependent, however the source of the stream would need to be located to confirm this. Flow velocity of 0.2m/s recorded on 08/08/2014 14:15.	Slow flows have produced turbid water and highly sedimented substrate, but predominantly dry with no evidence of recent flow.	A heavily shaded watercourse (>70%) with moderate turbidity was observed.		
Medium Term Survey Results Summary — **Hydro**	The quantity and dynamics of flow and morphology appear to be dictated by the historical function of the channel for industry	The quantity and dynamics of flow and morphology appear to be dictated by the historical function of the channel for industry	The quantity and dynamics of flow and morphology appear to be significantly altered by historic realignment through the detailed survey reach. However, more variation is observed in the upper survey reach	The quantity and dynamics of flow and morphology appear to be significantly altered by historic realignment through the detailed survey reach. However, more variation is observed in the upper survey reach	The quantity and dynamics of flow and morphology appear to be significantly altered by historic land drainage activities. Depth and width of the channel have historically been modified with embankments suggesting dredging in the past	The quantity and dynamics of flow and morphology appear to be significantly altered by historic land drainage activities. The quantity and dynamics of flow and morphology appear to be significantly altered by historic land drainage activities through a golf course. The structure and substrate of the river bed and riparian zone have been constrained by ongoing maintenance of the channel.		

Audit Trail for the Update of the WFD Water Body Assessment with Baseline Data

	Nature of the Assessment Update and Justification								
	WFD Classification Elements Changed	**2 x Culverts and 2 x River Diversion - Stoke Brook**	**Culvert and River Diversion - Stoke Brook**	**Culvert and River Diversion - Stoke Brook tributary**	**Culvert and River Diversion - Stoke Brook tributaries**	**Wendover North Cutting**	**2 x River Diversions and 2 x Culverts - Sedrup Ditch**	**3 x River Diversions and 3 x Culverts - Lower Harnwell Ditches**	**OVERALL IMPACT**	**RESIDUAL EFFECT**
Biology	**2. Macrophytes and phytobenthos - macrophytes**	Culvert elements "Landtake", "Shading" and "Changes in Hydromorphology" likely to have localised and minor adverse effect with no likely effect at the scale of the waterbody. River Diversion "Landtake" and "Changes to Hydromorphology" likely to have localised and minor adverse effect only. Assessment not updated, remains Yellow.	Culvert elements "Landtake", "Shading" and "Changes in Hydromorphology" likely to have localised and minor adverse effect with no likely effect at the scale of the waterbody. Assessment not updated, remains Yellow.	Culvert elements "Landtake", "Shading" and "Changes in Hydromorphology" likely to have localised and minor adverse effect with no likely effect at the scale of the waterbody. River Diversion "Landtake" and "Changes to Hydromorphology" likely to have localised and minor adverse effect only. Assessment not updated, remains Yellow.	Culvert elements "Landtake", "Shading" and "Changes in Hydromorphology" likely to have localised and minor adverse effect with no likely effect at the scale of the waterbody. River Diversion "Landtake" and "Changes to Hydromorphology" likely to have localised and minor adverse effect only. Assessment not updated, remains Yellow.	As baseline data shows that Stoke Brook and tributaries support poor macrophytes, effect downgraded from amber to yellow. However it may affect a wider area, therefore assessment outcome unchanged.	No effect on this element, either locally or at the waterbody scale. Culverts effects "Landtake", "Shading" and "Changes to hydromorphology" downgraded from Yellow to Green.	No effect on this element, either locally or at the waterbody scale. Culvert impacts "Landtake", "Shading" and "Changes to hydromorphology" downgraded from Yellow to Green.	No change in overall impact.	No change in residual effect.
	3. Macroinvertebrates	No significant change in baseline. Assessment not updated.	No significant change in baseline. Assessment not updated.	No significant change in baseline. Assessment not updated.	No significant change in baseline. Assessment not updated.	Assessment unchanged.	No effect on this element, either locally or at the waterbody scale. Culverts effects "Landtake", "Shading" and "Changes to hydromorphology" downgraded from Yellow to Green.	No effect on this element, either locally or at the waterbody scale. Culvert impact "Landtake" downgraded from Yellow to Green.	No change in overall impact.	No change in residual effect.
	4. Fish	As baseline data shows that Stoke Brook and tributaries are only suitable for minor fish species, effect downgraded from amber to yellow.	As baseline data shows that Stoke Brook and tributaries are only suitable for minor fish species, effect downgraded from amber to yellow.	As baseline data shows that Stoke Brook and tributaries are only suitable for minor fish species, effect downgraded from amber to yellow.	As baseline data shows that Stoke Brook and tributaries are only suitable for minor fish species, effect downgraded from amber to yellow.	As baseline data shows that Stoke Brook and tributaries are only suitable for minor fish species, effect downgraded from amber to yellow.	No effect on this element, either locally or at the waterbody scale. Culverts effects "Landtake", "Shading" and "Changes to hydromorphology" downgraded from Yellow to Green.	No effect on this element, either locally or at the waterbody scale. Culvert impacts "Landtake" and "Changes to hydromorphology" downgraded from Yellow to Green.	AMBER TO YELLOW: Baseline data indicated that neither Stoke Brook nor its tributaries support suitable habitat for salmonid species, although localised potential for minor fish species. Overall impact likely to be minor and localised with no effect on WFD status of the element at the waterbody scale.	No change in residual effect.
Physico-Chemical	**5. Dissolved Oxygen**	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	The effect of this Scheme Element (Cutting) on the Dissolved Oxygen WFD element remains YELLOW: A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of dry weather flow in the upstream reaches of Stoke Brook and its tributaries, leading to depleted reaches of river flow on the watercourse, and thus reducing turbulence and oxygenation.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	6. pH	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No change in overall impact.	No effect on this element. Receptor is insensitive to impact. Residual effect changed from YELLOW TO GREEN.
	7. Phosphate	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	The effect of this Scheme Element (Cutting) on the Phosphate WFD element remains AMBER: A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of dry weather flow in the upstream reaches of Stoke Brook and its tributaries, leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including phosphate.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	A combination of the Scheme Element impacts of dewatering/discharge of groundwater, and the existing discharge consents, has been identified as having the potential for adverse effects and to deteriorate Phosphate status. Residual effect changed from YELLOW TO AMBER.
	8. Ammonia	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	The effect of this Scheme Element (Cutting) on the Ammonia WFD element remains YELLOW: A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of dry weather flow in the upstream reaches of Stoke Brook and its tributaries, leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including ammonia.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No change in overall impact.	No change in residual effect.
	9. Temperature	Considering that the watercourse is heavily shaded, the presence of culverts is not likely to result in a deterioration in temperature, therefore no change in assessment update.	Considering that the watercourse is heavily shaded, the presence of culverts is not likely to result in a deterioration in temperature, therefore no change in assessment update.	Considering that the watercourse is heavily shaded, the presence of culverts is not likely to result in a deterioration in temperature, therefore no change in assessment update.	Considering that the watercourse is heavily shaded, the presence of culverts is not likely to result in a deterioration in temperature, therefore no change in assessment update.	No assessment update required.	Considering that the watercourse is heavily shaded, the presence of culverts is not likely to result in a deterioration in temperature, therefore no change in assessment update.	Considering that the watercourse is heavily shaded, the presence of culverts is not likely to result in a deterioration in temperature, therefore no change in assessment update.	No change in overall impact.	No effect on this element. Receptor is insensitive to impact. Residual effect changed from YELLOW TO GREEN.
	10. Specific Pollutants (Annex VIII)	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	The effect of this Scheme Element (Cutting) on the Specific Pollutants WFD element remains YELLOW: A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of dry weather flow in the upstream reaches of Stoke Brook and its tributaries, leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including specific pollutants.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
Hydro-morphology	**11. Quantity and dynamics of river flow**	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.	Survey indicates that the Source of the Stoke Brook is unlikely to be groundwater dependent. However the source is not identified, therefore no change to previous assessments.	No assessment update required. Non-temporary and temporary impacts remain unchanged. Minor text changes made in accordance with survey results.	No assessment update required. Non-temporary and temporary impacts remain unchanged. Minor text changes made in accordance with survey results.	No change in overall impact.	No change in residual effect.
	12. Connection to Groundwater	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.	Survey indicates that the Source of the Stoke Brook is unlikely to be groundwater dependent. However the source is not identified, therefore no change to previous assessments.	No assessment update required. Non-temporary and temporary impacts remain unchanged. Minor text changes made in accordance with survey results.	No assessment update required. Non-temporary and temporary impacts remain unchanged. Minor text changes made in accordance with survey results.	No change in overall impact.	No change in residual effect.
	13. River continuity	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.	Survey indicates that the Source of the Stoke Brook is unlikely to be groundwater dependent. However the source is not identified, therefore no change to previous assessments.	No assessment update required. Non-temporary and temporary impacts remain unchanged. Minor text changes made in accordance with survey results.	No assessment update required. Non-temporary and temporary impacts remain unchanged. Minor text changes made in accordance with survey results.	No change in overall impact.	No change in residual effect.
	14. River depth and width variation bed	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.	Survey indicates that the Source of the Stoke Brook is unlikely to be groundwater dependent. However the source is not identified, therefore no change to previous assessments.	No assessment update required. Non-temporary and temporary impacts remain unchanged. Minor text changes made in accordance with survey results.	No assessment update required. Non-temporary and temporary impacts remain unchanged. Minor text changes made in accordance with survey results.	No change in overall impact.	No change in residual effect.
	15. Structure and substrate of river bed	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.	Survey indicates that the Source of the Stoke Brook is unlikely to be groundwater dependent. However the source is not identified, therefore no change to previous assessments.	No assessment update required. Non-temporary and temporary impacts remain unchanged. Minor text changes made in accordance with survey results.	No assessment update required. Non-temporary and temporary impacts remain unchanged. Minor text changes made in accordance with survey results.	No change in overall impact.	No change in residual effect.
	16. Structure of riparian zone	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.	Survey indicates that the Source of the Stoke Brook is unlikely to be groundwater dependent. However the source is not identified, therefore no change to previous assessments.	No assessment update required. Non-temporary and temporary impacts remain unchanged. Minor text changes made in accordance with survey results.	No assessment update required. Non-temporary and temporary impacts remain unchanged. Minor text changes made in accordance with survey results.	No change in overall impact.	No change in residual effect.

GB102023020560

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	River Diversion - Watercourse M23			River Diversion - Tributary to S72/M23 near Shepherd's Furze Farm			Culvert - Watercourse M23				Culvert - Tributary to S72/M23 near Shepherd's Furze Farm				Siphon - Sherpherds Furze Inverted Siphon				Culvert Cutting		Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	-
GB105033030560			Description of scheme element impact	Approximately four field drains and one pond may be lost or potentially affected by general construction works to the east of Calvert (DMC-CFA13-12, SWC-CFA13-15) .			Drain diversion and FWR realignment Embankment (SWC-CFA13-1, SWC-CFA13-13, SWC-CFA13-14).			Construction of approximately 7 culverts greater up to 300m in length proposed at Calvert INFO (DMC-CFA13-12, SWC-CFA13-15) - length >300m.				Culverting of watercourse and drain diversion (SWC-CFA13-1, SWC-CFA13-13, SWC-CFA13-14) - length >100m.				Sherpherds Furze Inverted Siphon (SWC-CFA13-1, SWC-CFA13-13, SWC-CFA13-14) - length of 10m.				Length of culvert where not significantly affecting flow velocity and volume due to re-wetting.	Change in water quality due to discharge of groundwater to a surface water body.					
Twin	Good	Good Ecological Potential by 2015	Identified biological impacts	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-wetting) in flow velocity and volume due to de-watering.	Change in water quality due to discharge of groundwater to a surface water body.					
WFD classification elements	Predicted change to status elements (green = none, amber = possible, red = likely)																												
1. Macrophytes and phytobenthos - diatoms	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2. Macrophytes and phytobenthos - macrophytes	-	-		N/A - There will be loss of marginal and shallow water habitat and potential loss of the existing floodplain drain lines within the diversion section. - Baseline data shows that this is a key drainage ditch with an indication of recent flows and unsuitable for macrophytes. No impact anticipated. CHANGE TO GREEN	N/A - The new channel will replicate and/or improve on existing habitat and where possible. - The diffusers will be temporary and localised and only affect the main drain. Baseline data shows that this is a key drainage ditch with an indication of recent flows and unsuitable for macrophytes. No impact anticipated. CHANGE TO GREEN	N/A No hydromorphological effects anticipated on macrophyte communities	N/A - There will be loss of marginal and shallow water habitat and potential loss of the existing floodplain drain lines within the diversion section. - Baseline data shows that this is a key drainage ditch with an indication of recent flows and unsuitable for macrophytes. No impact anticipated. CHANGE TO GREEN	N/A - The new channel will replicate and/or improve on existing habitat and where possible. - The diffusers will be temporary and localised and only affect the main drain. Baseline data shows that this is a key drainage ditch with an indication of recent flows and unsuitable for macrophytes. No impact anticipated. CHANGE TO GREEN	N/A No hydromorphological effects anticipated on macrophyte communities	N/A Receptor is insensitive to impact	N/A - Localised will lead to direct loss of macroinvertebrates and reduce the habitats available for colonisation within the culvert. - Baseline data was available but this is a small ditch in arable farmland is already highly modified and likely to be ephemeral. - There would be no significant impacts during construction as the culvert would be shaded. Therefore, no change in status is anticipated. - Localised measures that are proposed will provide some mitigation as this will increase the amount of habitat and variety lost to one minor and localised effects, with no cumulative effects on the water body as a whole. - Embedded measures that are proposed will provide some mitigation as this will increase the amount of habitat and variety lost to one minor and localised effects, with no cumulative effects on the water body as a whole. CHANGE TO GREEN	N/A - Shading of the channel from the structure has the potential to reduce the amount of aquatic macrophyte communities present. - Baseline data was available, but this is a small ditch in arable farmland which appears to be shaded by Nantiole trees and hedges and is already highly modified and likely to support abundant aquatic macrophytes. - Only minor and localised effects are anticipated. Therefore there will be no impact on the WFD elements. Baseline data shows that this is a key drainage ditch with an indication of recent flows and unsuitable for macrophytes. No impact anticipated. CHANGE TO GREEN	N/A No hydromorphological effects anticipated on macrophyte communities	Drainage (including balancing ponds) has been designed to reduce the rate of runoff of run-off from the proposed railway. There is no anticipated change in water quality

WFD Baseline Survey Details

Water Body ID		GB105033030560				
Surface Water Body Name		Twin				
Scheme Element		**Culvert and Diversion - Watercourse M23**	**Culvert, Diversion and Inverted Siphon - Tributary to S72/M23 near Shepherd's Furze Farm**	**Culvert and Diversion - IMD Culvert No 2**	**OVERALL EFFECT**	**RESIDUAL EFFECT**
Surface Water Crossing ID		**SWC-CFA13-12 and SWC-CFA13-15**	**SWC-CFA13-1, SWC-CFA13-13, SWC-CFA13-14**	**SWC-CFA13-16**		
Survey Site		Unnamed tributary of the Twin, near Shepherds Furze Farm	Unnamed tributary of the Twin, near Shepherds Furze Farm	Unnamed tributary of the Twin, south of Steeple Claydon		
Survey ID		WFD-PA1-0014	WFD-PA1-0014	WFD-PA1-0015		
Objectives of the Survey		• Establish ecological baseline for tributaries. • Assess ecological habitat type. • Assess the local hydromorphology	• Establish ecological baseline for tributaries. • Assess ecological habitat type. • Assess the local hydromorphology	• Establish ecological baseline for tributaries. • Assess ecological habitat type. • Assess the local hydromorphology		
Survey Scope		Ecological Walkover Survey Hydromorphological Survey	Ecological Walkover Survey Hydromorphological Survey	Ecological Walkover Survey Hydromorphological Survey		
Medium Term Survey Results Summary	**Bio**	At **WFD-PA1-0014** tributary is part of a series of drainage ditches flowing through arable farmland. It was dry at the time of the survey with no evidence or recent flows. Not suitable for fish, macroinvertebrates and macrophytes.	At **WFD-PA1-0014**tributary is part of a series of drainage ditches flowing through arable farmland. it was dry at the time of the survey with no evidence or recent flows. Not suitable for fish, macroinvertebrates and macrophytes.	Tributary is a resectioned, realigned and over-deepened drainage ditch at **WFD-PA1-0015**. It is heavily shaded and relatively homogeneous in terms of flows and substrate. very low potential for macrophytes (none observed), macroinvertebrates and fish.		
	Phys	A heavily shaded (>70%), dry watercourse with little to no sign of recent flow was observed.	A heavily shaded (>70%), dry watercourse with little to no sign of recent flow was observed.	A heavily shaded watercourse (>70%) with high turbidity was observed.		
	Hydro	Survey indicates that the watercourses at the location of the proposed crossing are field drainage ditches through arable farmland. The survey point WFD-PA1-0014 shows that the ditch was dry at the time of observation with no evidence of recent flows. Flows are therefore only likely to develop after precipitation. The bed is currently sedimented which is likely a result of runoff from arable farmland that dominates the catchment. River continuity is affected by a series of long culverts downstream.	The survey reports field drainage ditches through arable farmland. The survey point WFD-PA1-0014 showed that the ditch was dry in the upper most reaches with flow present in the downstream survey area. Flow is slow moving and laminar with little bed diversity. The bed is heavily sedimented which is likely a result of runoff from arable farmland that dominates the catchment. River continuity is affected by a series of long culverts downstream.	Baseline survey indicated that the tributary has been resectioned, realigned and over-deepened, and the watercourse functions as a trapezoidal drainage ditch. There is a lack of in-channel flow and bed diversity limiting the potential for riverine biodiversity.		

Audit Trail for the Update of the WFD Water Body Assessment with Baseline Data

		Nature of the Assessment Update and Justification				
	WFD Classification Elements Changed	**Culvert and Diversion - Watercourse M23**	**Culvert, Diversion and Inverted Siphon - Tributary to S72/M23 near Shepherd's Furze Farm**	**Culvert and Diversion - IMD Culvert No 2**	**OVERALL IMPACT**	**RESIDUAL EFFECT**
Biological	**2. Macrophytes and phytobenthos - macrophytes**	No effect on macrophytes in Watercourse M23 (dry, devoid of macrophytes) due to or river diversion. Assessment updated to reflect new data, wording changed and several impacts changed from yellow to green and from blue to green.	No effect on macrophytes in Watercourse M23 (dry, devoid of macrophytes) due to or river diversion. Assessment updated to reflect new data, wording changed and several impacts changed from yellow to green and from blue to green.	No effect on macrophytes in Watercourse M23 (dry, devoid of macrophytes) due to or river diversion. Assessment updated to reflect new data, wording changed and several impacts changed from yellow to green and from blue to green.	No change in overall impact.	No change in residual effect.
	3. Macroinvertebrates	No effect on macroinvertebrates in Watercourse M23 (dry, unsuitable for invertebrates) due to or culvert. Assessment updated to reflect new data, wording changed and several impacts changed from yellow to green.	No effect on macroinvertebrates in Watercourse M23 (dry, unsuitable for invertebrates) due to or culvert. Assessment updated to reflect new data, wording changed and several impacts changed from yellow to green.	No effect on macroinvertebrates in Watercourse M23 (dry, unsuitable for invertebrates) due to or culvert. Assessment updated to reflect new data, wording changed and several impacts changed from yellow to green.	No change in overall impact.	No change in residual effect.
	4. Fish	No effect on fish in Watercourse M23 (dry, unsuitable for fish) due to or culvert. Assessment updated to reflect new data, wording changed and several impacts changed from yellow to green.	No effect on fish in Watercourse M23 (dry, unsuitable for fish) due to or culvert. Assessment updated to reflect new data, wording changed and several impacts changed from yellow to green.	No effect on fish in Watercourse M23 (dry, unsuitable for fish) due to or culvert. Assessment updated to reflect new data, wording changed and several impacts changed from yellow to green.	No change in overall impact.	No change in residual effect.
Physico-Chemical	**5. Dissolved Oxygen**	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	6. pH	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No change in overall impact.	No change in residual effect.
	7. Phosphate	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	8. Ammonia	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No change in overall impact.	No change in residual effect.
	9. Temperature	Considering that the watercourse is heavily shaded, the presence of culverts is not likely to result in a deterioration in temperature, therefore no change in assessment update.	Considering that the watercourse is heavily shaded, the presence of culverts is not likely to result in a deterioration in temperature, therefore no change in assessment update.	Considering that the watercourse is heavily shaded, the presence of culverts is not likely to result in a deterioration in temperature, therefore no change in assessment update.	No change in overall impact.	No change in residual effect.
	10. Specific Pollutants (Annex VIII)	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
Hydromorphological	**11. Quantity and dynamics of river flow**	In light of survey evidence, the impacted watercourses are confirmed as field drains with no morphological value, so the impact risk has been reassessed as GREEN (no significant risk) from YELLOW (minor deterioration), i.e. the risk has been removed due to survey evidence	In light of survey evidence, the impacted watercourses are confirmed as field drains with no morphological value, so the impact risk has been reassessed as GREEN (no significant risk) from AMBER (minor deterioration), i.e. the risk has been removed due to survey evidence	In light of survey evidence, the impacted watercourses are confirmed as field drains with no morphological value, so the impact risk has been reassessed as YELLOW (no significant risk) from AMBER (minor deterioration), i.e. the risk has been removed due to survey evidence	The River Twin is a short (1.3km) watercourse with 'good' potential, making it sensitive to impacts in the tributary watercourses that would be affected by the scheme. However, surveys confirm that the watercourses at the proposed crossing points are effectively field drains with no morphological value, so hydromorphological impacts have been reassessed as GREEN (no significant impact) as opposed to AMBER (sever risk), i.e. following survey and reassessment, there is no longer considered to be a significant risk of impact.	The River Twin is a short (1.3km) watercourse with 'good' potential, making it sensitive to impacts in the tributary watercourses that would be affected by the scheme. However, surveys confirm that the watercourses at the proposed crossing points are effectively field drains with no morphological value, so hydromorphological impacts have been reassessed as GREEN (no significant impact) as opposed to AMBER (sever risk), i.e. following survey and reassessment, there is no longer considered to be a significant risk of impact.
	12. Connection to Groundwater	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.		
	13. River continuity	In light of survey evidence, the impacted watercourses are confirmed as field drains with no morphological value, so the impact risk has been reassessed as GREEN (no significant risk) from AMBER (minor deterioration), i.e. the risk has been removed due to survey evidence	In light of survey evidence, the impacted watercourses are confirmed as field drains with no morphological value, so the impact risk has been reassessed as GREEN (no significant risk) from AMBER (minor deterioration), i.e. the risk has been removed due to survey evidence	In light of survey evidence, the impacted watercourses are confirmed as field drains with no morphological value, so the impact risk has been reassessed as GREEN (no significant risk) from AMBER (minor deterioration), i.e. the risk has been removed due to survey evidence		
	14. River depth and width variation bed	In light of survey evidence, the impacted watercourses are confirmed as field drains with no morphological value, so the impact risk has been reassessed as GREEN (no significant risk) from AMBER (minor deterioration), i.e. the risk has been removed due to survey evidence	In light of survey evidence, the impacted watercourses are confirmed as field drains with no morphological value, so the impact risk has been reassessed as GREEN (no significant risk) from AMBER (minor deterioration), i.e. the risk has been removed due to survey evidence	In light of survey evidence, the impacted watercourses are confirmed as field drains with no morphological value, so the impact risk has been reassessed as GREEN (no significant risk) from AMBER (minor deterioration), i.e. the risk has been removed due to survey evidence		
	15. Structure and substrate of river bed	In light of survey evidence, the impacted watercourses are confirmed as field drains with no morphological value, so the impact risk has been reassessed as GREEN (no significant risk) from AMBER (minor deterioration), i.e. the risk has been removed due to survey evidence	In light of survey evidence, the impacted watercourses are confirmed as field drains with no morphological value, so the impact risk has been reassessed as GREEN (no significant risk) from AMBER (minor deterioration), i.e. the risk has been removed due to survey evidence	In light of survey evidence, the impacted watercourses are confirmed as field drains with no morphological value, so the impact risk has been reassessed as GREEN (no significant risk) from AMBER (minor deterioration), i.e. the risk has been removed due to survey evidence		
	16. Structure of riparian zone	In light of survey evidence, the impacted watercourses are confirmed as field drains with no morphological value, so the impact risk has been reassessed as GREEN (no significant risk) from AMBER (minor deterioration), i.e. the risk has been removed due to survey evidence	In light of survey evidence, the impacted watercourses are confirmed as field drains with no morphological value, so the impact risk has been reassessed as GREEN (no significant risk) from AMBER (minor deterioration), i.e. the risk has been removed due to survey evidence	In light of survey evidence, the impacted watercourses are confirmed as field drains with no morphological value, so the impact risk has been reassessed as GREEN (no significant risk) from AMBER (minor deterioration), i.e. the risk has been removed due to survey evidence		

Surface water body name	Waterbody ID	Catchment	CFA	Additional Baseline Survey	No. of AP2 Amendments	Original Assessment	Risk to Overall Status: Post-Additonal Baseline survey	Risk to Overall Status: Post-AP2 Amendments	Assessment Summary
Canley Bk - source to conf with Finham Bk	GB109054044520	Warwickshire Avon	18	Y	N/A				Original scheme + Baseline
Finham Bk - conf Canley Bk to conf R Sowe	GB109054044480	Warwickshire Avon	18	Y	N/A				Original scheme + Baseline
R Itchen - source to conf with R Stowe	GB109054044070	Warwickshire Avon	16	Y	N/A		reduced risk		Original scheme + Baseline
East Litchfield catchment - trib of Tame	GB104028047020	Tame Anker and Mease	22	Y	N/A				Original scheme + Baseline
Coventry and Ashby Canals	GB70910212	N/A	22	N	1				Original scheme + AP2
Trent & Mersey Canal, summit to Alrewas	GB70410142	N/A	22	N	2				Original scheme + AP2
River Leam - conf R Itchen to conf R Avon	GB109054044140	Warwickshire Avon	17	N	1				Original scheme + AP2
Bourne-Bilson Brook Catchment (trib of Trent)	GB104028047270	Staffordshire Trent Valley	22	N	1			increased risk	Original scheme + AP2
Pyford Brook Catchment (trib of Trent)	GB104028047250	Staffordshire Trent Valley	22	N	2				Original scheme + AP2
River Tame from River Anker to River Trent	GB104028047050	Tame Anker and Mease	22	N	7			increased risk	Original scheme + AP2
Black-Bourne Bk from source (confluence) to R Tame	GB104028047000	Tame Anker and Mease	21	N	2				Original scheme + AP2
Langley Brook from Middleton Hall Catch to R Tame	GB104028046900	Tame Anker and Mease	20, 21,	N	2				Original scheme + AP2
Langley Brook from Source to Middleton Hall Catch	GB104028046890	Tame Anker and Mease	20	N	2				Original scheme + AP2

Key for Baseline Assessment Changes:

	In audit trail, this cell indicates where the impact of a particular scheme element on a WFD sub-element has been changed as a result of baseline surveys
Red text	In assessment tab, where new text has been added describing why the assessment has changed
~~Strikethrough text~~	In assessment tab, where text from the previous assessment is no longer relevant/has been superseded and therefore has been removed (but is still visible to the reader).

Key for AP2 Assessment Changes:

	In AP2 Summary sheet, this cell indicates where assessment is required for the Scheme Element.
Red text	In assessment tab, where new assessment has been undertaken
	In assessment tab, where Main ES Scheme element has been removed or replaced by AP2 change

WFD Surface Water Survey Location Details

CFA 16-22

Key to Survey ID
- EF Electro Fishing Survey
- HM Hydromorphology Survey
- MI Macroinvertabrate Survey
- MP Macrophyte Survey
- PA Preliminary Aquatic Survey

CFA	Upstream Easting	Upstream Northing	Downstream Easting	Downstream Northing	Survey ID	Map Reference	Surface Water Body Survey Name	Surface Water Body WFD ID	Surface Water Body WFD Name
16	443136	258630	443086	258471	WFD-PA1-0033	0033	Unnamed Tributary of River Itchen, east of Ladbroke	GB109054044070	Itchen
16	443062	258565	-	-	WFD-HM1-0033				
18	430974	273198	431120	273328	WFD-PA1-0034	0034	Finham Brook, west of Stoneleigh	GB109054044480	Finham Brook - conf Canley Brook to conf River Sowe
18	431025	273254	-	-	WFD-MI1-0034				
18	431038	273261	431103	273306	WFD-EF1-0034				
18	431045	273267	-	-	WFD-HM1-0034				
18	429117	274375	429280	274413	WFD-PA1-0035a	0035	Canley Brook, east of Crackley Lane	GB109054044520	Canley Brook - source to conf with Finham Brook
18	430089	274024	430011	273878	WFD-PA1-0035b				
18	429993	273723	430047	273649	WFD-MP1-0035				
18	430025	273683	-	-	WFD-MI1-0035				
18	429993	273723	430047	273649	WFD-EF1-0035				
18	429204	274421	-	-	WFD-HM1-0035a				
18	430082	273947	-	-	WFD-HM1-0035b				
18	427022	275679	427180	275801	WFD-PA1-0036a	0036	Unnamed tributary of Canley Brook, near Hurst Farm		
18	427842	275125	427995	275129	WFD-PA1-0036b				
18	427102	275739	-	-	WFD-HM1-0036a				
18	427911	275141	-	-	WFD-HM1-0036b				

GB100656464320

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective
GB106039048400 Canley Brook - source to confluence with Finham Brook	Moderate	Good by 2027

Description of scheme element impact	River Diversion: Landfalls	River Diversion: Creation of new habitats	River Diversion: Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Culvert (Unnamed tributaries of Canley Brook CFA18 SW-004 (145+500) - culvert and realignment, CFA18 SW-005 (145+030) - culvert and realignment, CFA18 SW-006 (146+000) - culvert and realignment): Noise and vibration	Culvert: Landfalls	Culvert: Shading	Culvert: Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Culvert: Drainage	Cutting (Canley Brook: Kenilworth cutting (141+400 approximately), Crackley Road cutting): Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Cutting: Change in water quality due to discharge of groundwater to a surface water body	Cutting (North Crackley cutting): Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Cutting: Change in water quality due to discharge of groundwater to a surface water body	Retaining wall (Canley Brook: Burton Green Retaining Wall): Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Retaining wall: Change in water quality due to discharge of groundwater to a surface water body	Retaining wall (Canley Brook: Burton Green retaining wall): Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Retaining wall: Change in water quality due to discharge of groundwater to a surface water body	Impacts from other WFD water bodies (assessed separately)	OVERALL effect on Ecological Objectives	Additional Proposed Mitigation Measures: Construction	Additional Proposed Mitigation Measures: Operation	RESIDUAL effect on element (following any additional mitigation measures)	-
WFD Qualitative elements																				
Biological elements																				
1. Macrophytes and phytobenthos - totaxa	-	-	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2. Macrophytes and phytobenthos - macrophytes	-	-	-	There will be loss of marginal and channel macrophytes over the 100 m length of the existing Canley Brook that lies within the diverted section. Canley Brook currently supports moderate to good macroinvertebrate quality (HQ2 baseline survey). Temporary adverse effect anticipated while the new channel is established.	Design will also include marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. Canley Brook currently supports moderate to good macroinvertebrate quality (HQ2 baseline survey). Permanent beneficial effect anticipated.	YELLOW TO ORANGE - **assumed impacts on flow dynamics, predicted due to length of diversion, although the aim will be to create hydromorphological conditions to maintain ecological communities (EA Ecology chapter Volume 2).** Potential impact on macroinvertebrates and macrophytes due to changes in flow velocity and volume. Canley Brook currently supports moderate to good macroinvertebrate quality (HQ2 baseline survey). It is anticipated that the macrophyte community will re-establish within 1 to 2 years of completion of the river diversion. Temporary adverse effect anticipated while the new channel re-establishes.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to a localised but permanent loss of habitat. The tributary located at Lowhill (CFA18 SW-004) is heavily shaded and supports no aquatic vegetation (HQ2 baseline survey). **No barrier data available for the other tributaries.** Potential impacts on aquatic ecology **if barriers are present**, with no effect at the scale of the water body. Other tributaries dry or ephemeral channel. Likely to dry out during prolonged periods of low rainfall. Adverse effect anticipated. ORANGE FROM YELLOW TO GREEN	Some minor change to hydromorphology within the vicinity of the culvert may lead to localised effects on macrophytes.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Potential decrease in flows on Canley Brook during dewatering. **Canley Brook heavily shaded and supporting high quality macroinvertebrate community (HQ2 baseline survey). Temporary and localised adverse effect anticipated.**	Potential localised adverse effects on water quality if Canley Brook. Effect likely to be negligible. Potential impacts on macroinvertebrates and macrophytes if present. Potential to affect the HQ2 status of Canley Brook receiving water. ORANGE DROPS TO GREEN	No change in water quality expected. No likely effect anticipated on this quality element.	Potential temporary reduction in flows on headwaters and tributaries of Canley Brook. **Where available, Macroinvertebrate data from Canley Brook indicates Macroinvertebrate abundance is heavily skewed, this is very tolerant to low flows. Due to an aquatic vegetation survey, dry weather flows are unlikely to be a key ecological constraint, overall effect of the scheme is however likely to be minor.** In addition, the potential for isolated pollution events to affect the ecology of the watercourse is considered to be a potential adverse effect of the scheme.	No significant changes in water quality expected. Likely effect anticipated on this quality element.	No change in water quality expected. No likely effect anticipated on this quality element.	No significant changes in water quality expected. Likely effect anticipated on this quality element.	No change in water quality expected. No likely effect anticipated on this quality element.	No significant changes in water quality expected. Likely effect anticipated on this quality element.	No change in water quality expected. No likely effect anticipated on this quality element.	No change in water quality expected. No likely effect anticipated on this quality element.	No change in water quality expected. No

Water Body ID	GB109054044520														
Surface Water Body Name	Canley Brook - source to confluence with Finham Brook														
Scheme Element	Viaduct and River Diversion - Canley Brook Viaduct and Canley Brook Diversion	River Diversion and 3 x Culverts - Unnamed tributary of Canley Brook, Crackley Wood Culvert and 2 x access road culverts	River Diversion and Culvert - Unnamed tributary of Canley Brook, Broadweth Wood Culvert	River Diversion and Culvert - Unnamed tributary of Canley Brook, Black Water Wood Culvert	Kenilworth Cutting - Canley Brook	Crackley Road Cutting - Canley Brook	Rough Knowles Wood Cutting - Unnamed tributaries of Canley Brook	Burton Green Cutting - Unnamed tributaries of Canley Brook	North Crackley Cutting - Unnamed tributaries of Canley Brook	Canley Brook Retaining Wall - Canley Brook	Burton Green Retaining Wall - Canley Brook	OVERALL EFFECT	RESIDUAL EFFECT
Surface Water Crossing ID	SWC-CFA18-003	CFA18-SW-004	CFA18-SW-005 and CFA18-SW-006	CFA18-SW-007	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Survey Site	Canley Brook, east of Crackley Lane	Canley Brook, east of Crackley Lane- unnamed tributary	Unnamed tributary of Canley Brook, near Hurst Farm [minor additional tributary of unnamed tributary of Canley Brook]	Unnamed tributary of Canley Brook, near Hurst Farm	No Groundwater survey undertaken.	No Groundwater survey undertaken.	No Groundwater survey undertaken.	No Groundwater survey undertaken.	No Groundwater survey undertaken.	No Groundwater survey undertaken.	No Groundwater survey undertaken.		
Survey ID	WFD-PA1-0035b, WFD-MI1-0035, WFD-EF1-0035, WFD-MP1-0035	WFD-PA1-0035a	WFD-PA1-0036b	WFD-PA1-0036a	WFD-PA1-0035b, WFD-MI1-0035, WFD-EF1-0035, WFD-MP1-0035	WFD-PA1-0035b, WFD-MI1-0035, WFD-EF1-0035, WFD-MP1-0035	WFD-PA1-0035a	WFD-PA1-0036a	WFD-PA1-0035a	WFD-PA1-0035b, WFD-MI1-0035, WFD-EF1-0035, WFD-MP1-0035	WFD-PA1-0035b, WFD-MI1-0035, WFD-EF1-0035, WFD-MP1-0035		
Objectives of the Survey	• Assess ecological habitat type. • Update ecological baseline. • Assess the local hydromorphology	• Assess ecological habitat type. • Assess the local hydromorphology	• Assess ecological habitat type. • Assess the local hydromorphology	• Assess ecological habitat type. • Assess the local hydromorphology	No Groundwater Survey	No Groundwater Survey	No Groundwater Survey	No Groundwater Survey	No Groundwater Survey	No Groundwater Survey	No Groundwater Survey		
Survey Scope	Ecological Walkover Survey Hydromorphological Survey Macrophyte Survey Macroinvertebrate Survey Fish Survey	Ecological Walkover Survey Hydromorphological Survey	Ecological Walkover Survey Hydromorphological Survey	Ecological Walkover Survey Hydromorphological Survey	No Groundwater Survey	No Groundwater Survey	No Groundwater Survey	No Groundwater Survey	No Groundwater Survey	No Groundwater Survey	No Groundwater Survey		
Medium Term Survey Results Summary — **Bio**	Canley Brook is a moderately shaded watercourse with a good range of habitats at WFD-PA1-0035b. Good macrophyte diversity, with 16 species recorded at WFD-MP1-0035, including the notable *Ranunculus batrachian* spp. Good macroinvertebrate (RICT Class Good), with relatively high diversity and presence of a few pollution sensitive taxa (Ephemeridae, Glossosomatidae, Polycentropodidae) at WFD-MI1-0035. Moderately high LIFE score, indicative of communities adapted to moderate to fast flows. PSI score indicative of "Sedimented" conditions. Excellent wild brown trout population, with 41 specimen recorded at WFD-MP1-0035, including juveniles. Other minor fish species included three-spines sticklebacks, bullheads and stone loach.	Unnamed tributary at WFD-PA1-0035a is heavily shaded by hedgerows and scrubs, heavily sedimented and with low flows and poor habitat diversity. Macrophytes absent due to heavy shading. Limited potential for macroinvertebrates. Considered to be only suitable for minor fish species.	At WFD-PA1-0036b tributary is a small woodland stream with a good planform. Winterbourne character, likely to provide a good range of habitats at high flows. At time of the survey, flows were very low. Downstream of crossing point, tributary is culverted and / or straightened for field drainage and overgrown with terrestrial vegetation.	Tributary is a dry resectioned and realigned drainage ditch, heavily shaded at WFD-PA1-0036a. Culverted by railway crossing. Considered to be of no value for aquatic vegetation of fauna.	Canley Brook is a moderately shaded watercourse with a good range of habitats at WFD-PA1-0035b. Good macrophyte diversity, with 16 species recorded at WFD-MP1-0035, including the notable *Ranunculus batrachian* spp. Good macroinvertebrate (RICT Class Good), with relatively high diversity and presence of a few pollution sensitive taxa (Ephemeridae, Glossosomatidae, Polycentropodidae) at WFD-MI1-0035. Moderately high LIFE score, indicative of communities adapted to moderate to fast flows. PSI score indicative of "Sedimented" conditions. Excellent wild brown trout population, with 41 specimen recorded at WFD-MP1-0035, including juveniles. Other minor fish species included three-spines sticklebacks, bullheads and stone loach.	Canley Brook is a moderately shaded watercourse with a good range of habitats at WFD-PA1-0035b. Good macrophyte diversity, with 16 species recorded at WFD-MP1-0035, including the notable *Ranunculus batrachian* spp. Good macroinvertebrate (RICT Class Good), with relatively high diversity and presence of a few pollution sensitive taxa (Ephemeridae, Glossosomatidae, Polycentropodidae) at WFD-MI1-0035. Moderately high LIFE score, indicative of communities adapted to moderate to fast flows. PSI score indicative of "Sedimented" conditions. Excellent wild brown trout population, with 41 specimen recorded at WFD-MP1-0035, including juveniles. Other minor fish species included three-spines sticklebacks, bullheads and stone loach.	Unnamed tributary at WFD-PA1-0035a is heavily shaded by hedgerows and scrub, heavily sedimented and with low flows and poor habitat diversity. Macrophytes absent due to heavy shading. Limited potential for macroinvertebrates. Considered to be only suitable for minor fish species.	Tributary at WFD-PA-1036a is a dry resectioned and realigned drainage ditch, heavily shaded. Culverted by railway crossing. Considered to be of no value for aquatic vegetation of fauna.	Unnamed tributary at WFD-PA1-0035a is heavily shaded by hedgerows and scrub, heavily sedimented and with low flows and poor habitat diversity. Macrophytes absent due to heavy shading. Limited potential for macroinvertebrates. Considered to be only suitable for minor fish species.	Canley Brook is a moderately shaded watercourse with a good range of habitats at WFD-PA1-0035b. Good macrophyte diversity, with 16 species recorded at WFD-MP1-0035, including the notable *Ranunculus batrachian* spp. Good macroinvertebrate (RICT Class Good), with relatively high diversity and presence of a few pollution sensitive taxa (Ephemeridae, Glossosomatidae, Polycentropodidae) at WFD-MI1-0035. Moderately high LIFE score, indicative of communities adapted to moderate to fast flows. PSI score indicative of "Sedimented" conditions. Excellent wild brown trout population, with 41 specimen recorded at WFD-MP1-0035, including juveniles. Other minor fish species included three-spines sticklebacks, bullheads and stone loach.		
Medium Term Survey Results Summary — **Phys**	At survey point WFD-PA1-0035b, the Main River observed was moderately shaded (30 - 70%), of medium flow and good water clarity. Physico-chemical parameters measured at survey point WFD-EF1-0035: Dissolved Oxygen = 7mg/l pH = 7.63 Temp = 14.8 deg C Conductivity = 460 µS	At survey point WFD-PA1-0035a the watercourse observed was heavily shaded (>70%), low flowing and slightly turbid.	At survey point WFD-PA1-0036b the watercourse observed was a heavily shaded (>70%), low flowing and slightly turbid woodland stream. Stream is tending towards winterbourne in character.	At survey point WFD-PA1-0036a the watercourse observed was a heavily shaded (>70%), dry drainage channel.	No groundwater survey undertaken, unable to determine contribution of groundwater to baseflow. At survey point WFD-PA1-0035b, the Main River observed was moderately shaded (30 - 70%), of medium flow and good water clarity. Physico-chemical parameters measured at survey point WFD-EF1-0035: Dissolved Oxygen = 7mg/l pH = 7.63 Temp = 14.8 deg C Conductivity = 460 µS	No groundwater survey undertaken, unable to determine contribution of groundwater to baseflow. At survey point WFD-PA1-0035b, the Main River observed was moderately shaded (30 - 70%), of medium flow and good water clarity. Physico-chemical parameters measured at survey point WFD-EF1-0035: Dissolved Oxygen = 7mg/l pH = 7.63 Temp = 14.8 deg C Conductivity = 460 µS	No groundwater survey undertaken. Unable to determine groundwater dependency of tributary. Potential for significant impact on a watercourse identified as low flowing at survey point WFD-PA1-0035a.	No groundwater survey undertaken. Unable to determine groundwater dependency of tributary, but the watercourse observed was dry at survey point WFD-PA1-0036a.	No groundwater survey undertaken. Unable to determine groundwater dependency of tributary. Potential for significant impact on a watercourse identified as low flowing at survey point WFD-PA1-0035a.	At survey point WFD-PA1-0035b, the Main River observed was moderately shaded (30 - 70%), of medium flow and good water clarity. Physico-chemical parameters measured at survey point WFD-EF1-0035: Dissolved Oxygen = 7mg/l pH = 7.63 Temp = 14.8 deg C Conductivity = 460 µS	At survey point WFD-PA1-0035b, the Main River observed was moderately shaded (30 - 70%), of medium flow and good water clarity. Physico-chemical parameters measured at survey point WFD-EF1-0035: Dissolved Oxygen = 7mg/l pH = 7.63 Temp = 14.8 deg C Conductivity = 460 µS		
Medium Term Survey Results Summary — **Hydro**	Survey results do not change the previous physico-chemical assessment for this scheme element. Groundwater connectivity assessment changed from GREEN to YELLOW the rest of the Hydromorphological assessment remains unchanged	Survey results do not change the previous physico-chemical assessment for this scheme element. The Crakley Cutting assessment changed from YELLOW to AMBER. The rest of the Hydromorphological assessment remains unchanged	Survey results do not change the previous physico-chemical and hydromorphological assessment for this scheme element.	The watercourse present was dry during survey. Assessment is to be downgraded for the physico-chemical WFD element. Survey results do not change the previous hydromorphological assessment for this scheme element.	Survey results do not change the previous physico-chemical assessment for this scheme element.	Survey results do not change the previous physico-chemical assessment for this scheme element.	Survey results do not change the previous physico-chemical assessment for this scheme element.	The watercourse present was dry during survey. Assessment is to be downgraded for the physico-chemical WFD element.	Survey results do not change the previous physico-chemical assessment for this scheme element.	Survey results do not change the previous physico-chemical assessment for this scheme element.	Survey results do not change the previous physico-chemical assessment for this scheme element.		

Audit Trail for the Update of the WFD Water Body Assessment with Baseline Data

		Nature of the Assessment Update and Justification													
	WFD Classification Elements Changed	Viaduct and River Diversion - Canley Brook Viaduct and Canley Brook Diversion	River Diversion and 3 x Culverts - Unnamed tributary of Canley Brook, Crackley Wood Culvert and 2 x access road culverts	River Diversion and Culvert - Unnamed tributary of Canley Brook, Broadweth Wood Culvert	River Diversion and Culvert - Unnamed tributary of Canley Brook, Black Water Wood Culvert	Kenilworth Cutting - Canley Brook	Crackley Road Cutting - Canley Brook	Rough Knowles Wood Cutting - Unnamed tributaries of Canley Brook	Burton Green Cutting - Unnamed tributaries of Canley Brook	North Crackley Cutting - Unnamed tributaries of Canley Brook	Canley Brook Retaining Wall - Canley Brook	Burton Green Retaining Wall - Canley Brook	OVERALL IMPACT	RESIDUAL EFFECT
Biological	2. Macrophytes and phytobenthos - macrophytes	Additional baseline showed a relatively high macrophyte diversity within the stretch impacted. Effect from river diversion changed from yellow to orange, due to potential changes to hydromorphology.	"Landtake" and "Shading" effects from culverts downgraded from minor to negligible, as additional baseline shows that tributaries support no macrophytes at crossing points.	"Landtake" and "Shading" effects from culverts downgraded from minor to negligible, as additional baseline shows that tributaries support no macrophytes at crossing points.	"Landtake" and "Shading" effects from culverts downgraded from minor to negligible, as additional baseline shows that tributaries support no macrophytes at crossing points.	Additional baseline showed a relatively high macrophyte diversity within the stretch impacted, which would potentially be affected by the changes in water quality brought about by the cutting. Therefore impact changed from green to amber.	Additional baseline showed a relatively high macrophyte diversity within the stretch impacted, which would potentially be affected by the changes in water quality brought about by the cutting. Therefore impact changed from green to amber.	Additional baseline showed that the tributaries are either dry and covered with terrestrial vegetation or dry. Assessment downgraded from minor to negligible.	Additional baseline showed that the tributaries are either dry and covered with terrestrial vegetation or dry. Assessment downgraded from minor to negligible.	Additional baseline showed that the tributaries are either dry and covered with terrestrial vegetation or dry. Assessment downgraded from minor to negligible.	Additional baseline showed a relatively high macrophyte diversity within the stretch impacted. Likely minor and temporary adverse effect. No change in assessment.	No change in assessment.	No change in overall impact.	Canley brook supports diverse macrophyte communities - In addition, the potential for increased phosphate concentrations may affect the macrophyte communities present. Therefore there is a potential adverse effect at the scale of the waterbody. Residual effect changed from GREEN TO AMBER.
	3. Macroinvertebrates	Additional baseline showed a good macroinvertebrate quality, with communities potentially sensitive to changes in flows. Effect from river diversion changed from yellow to orange, due to potential changes to hydromorphology.	Tributary considered to be of limited potential for macroinvertebrates. Assessment remains unchanged: adverse minor and localised.	Tributary considered to be of limited potential for macroinvertebrates as likely to dry out relatively often. Assessment remains unchanged: adverse minor and localised.	Tributary of poor value for macroinvertebrate. Assessment remains unchanged.	Additional baseline showed a sensitive macroinvertebrate community within the stretch impacted, which would potentially be affected by the changes in water quality brought about by the cutting. Therefore impact changed from green to amber.	Additional baseline showed a sensitive macroinvertebrate community within the stretch impacted, which would potentially be affected by the changes in water quality brought about by the cutting. Therefore impact changed from green to amber.	Although two tributaries were dry or likely to dry out relatively often, no additional baseline was available for the tributary located at chainage 143+500. Assessment remains unchanged, adverse temporary.	Although two tributaries were dry or likely to dry out relatively often, no additional baseline was available for the tributary located at chainage 143+500. Assessment remains unchanged, adverse temporary.	Although two tributaries were dry or likely to dry out relatively often, no additional baseline was available for the tributary located at chainage 143+500. Assessment remains unchanged, adverse temporary.	No significant change in the baseline. No change in the assessment.	No change in assessment.	No change in overall impact.	No change in residual effect.
	4. Fish	Additional baseline showed that Canley brook supports excellent brown trout population within the stretch impacted. Effect from river diversion changed from yellow to orange, due to potential changes to hydromorphology.	Tributary was not assessed to be of any value for brown trout. Only minor and localised effect anticipated. No change in assessment.	Tributary considered to be of poor value for fish, as likely to dry out relatively often. Assessment remains unchanged: adverse minor and localised.	Tributary considered to be of no value for fish. Assessment remains unchanged.	Additional baseline showed a sensitive fish community within the stretch impacted, which would potentially be affected by the changes in water quality brought about by the cutting. Therefore impact changed from green to amber.	Additional baseline showed a sensitive fish community within the stretch impacted, which would potentially be affected by the changes in water quality brought about by the cutting. Therefore impact changed from green to amber.	Tributaries not considered to be of value for migratory fish, as dry or likely to dry out frequently. No change in assessment.	Although two tributaries were dry or likely to dry out relatively often, no additional baseline was available for the tributary located at chainage 143+500. Assessment remains unchanged, adverse temporary.	Although two tributaries were dry or likely to dry out relatively often, no additional baseline was available for the tributary located at chainage 143+500. Assessment remains unchanged, adverse temporary.	No significant change in the baseline. No change in the assessment.	No change in assessment.	No change in overall impact.	No change in residual effect.
Physico-Chemical	5. Dissolved Oxygen	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	The effect of this Scheme Element on the Dissolved Oxygen WFD element has been changed from YELLOW to GREEN. Watercourse observed was dry, therefore no impact predicted to occur.	The effect of this Scheme Element on the Dissolved Oxygen WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys and lack of groundwater surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of baseflow in Canley Brook, leading to depleted reaches of river flow on the watercourse, and thus reducing turbulence and oxygenation.	The effect of this Scheme Element on the Dissolved Oxygen WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys and lack of groundwater surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of baseflow in Canley Brook, leading to depleted reaches of river flow on the watercourse, and thus reducing turbulence and oxygenation.	The effect of this Scheme Element on the Dissolved Oxygen WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys and lack of groundwater surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of baseflow in Canley Brook, leading to depleted reaches of river flow on the watercourse, and thus reducing turbulence and oxygenation.	The effect of this Scheme Element on the Dissolved Oxygen WFD element has been changed from YELLOW to GREEN. Watercourse observed was dry, therefore no impact predicted to occur.	The effect of this Scheme Element on the Dissolved Oxygen WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys and lack of groundwater surveys. The impact of dewatering associated with the construction of the retaining wall remains unchanged. Dewatering may result in a reduction of baseflow in Canley Brook, leading to depleted reaches of river flow on the watercourse, and thus reducing turbulence and oxygenation.	The effect of this Scheme Element on the Dissolved Oxygen WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys and lack of groundwater surveys. The impact of dewatering associated with the construction of the retaining wall remains unchanged. Dewatering may result in a reduction of baseflow in Canley Brook, leading to depleted reaches of river flow on the watercourse, and thus reducing turbulence and oxygenation.	No assessment update required. Temporary minor beneficial impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	6. pH	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No effect on this element. Receptor is insensitive to impact. Residual effect changed from YELLOW TO GREEN.	No effect on this element. Receptor is insensitive to impact. Residual effect changed from YELLOW TO GREEN.
	7. Phosphate	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	The effect of this Scheme Element on the Ammonia WFD element has been changed from YELLOW to GREEN. Watercourse observed was dry, therefore no impact predicted to occur.	The effect of this Scheme Element on the Phosphate WFD element remains AMBER. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of baseflow in Canley Brook. Potential reduction in baseflow may lead to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution, deteriorating current status or preventing future good status from being achieved.	The effect of this Scheme Element on the Phosphate WFD element remains AMBER. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of baseflow in Canley Brook. Potential reduction in baseflow may lead to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution, deteriorating current status or preventing future good status from being achieved.	The effect of this Scheme Element on the Phosphate WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of baseflow in Canley Brook. Potential reduction in baseflow may lead to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution, deteriorating current status or preventing future good status from being achieved.	The effect of this Scheme Element on the Phosphate WFD element has been changed from YELLOW to GREEN. Watercourse observed was dry, therefore no impact predicted to occur.	The effect of this Scheme Element on the Phosphate WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of baseflow in Canley Brook. Potential reduction in baseflow may lead to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution, deteriorating current status or preventing future good status from being achieved.	The effect of this Scheme Element on the Phosphate WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the construction of the retaining wall remains unchanged. Dewatering may result in a reduction of baseflow in Canley Brook, leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including phosphate from source and diffuse pollution, deteriorating current status or preventing future good status from being achieved.	No assessment update required. Temporary minor beneficial impacts remain unchanged.	YELLOW TO AMBER. There is potential for an adverse effect and deterioration in Phosphate status within the Canley Brook catchment, for which the current hydrological regime does not support Good status. The adverse effects relate to: • Dewatering and the subsequent loss of baseflow in the Canley Brook, and • Changes in water quality due to discharge of groundwater to the Canley Brook.	The current hydrological regime for Canley Brook does not support Good status. Any potential loss of flow velocity or volume in Canley Brook as a result of the operation of the Proposed Scheme could result in a deterioration in current Phosphate status. In addition, there are nine sewage discharge consents to Canley Brook and its tributaries. A combination of the Scheme Element impacts of dewatering/discharge of groundwater, and the existing discharge consents, has been identified as having the potential for adverse effects and to deteriorate Phosphate status. Residual effect changed from YELLOW TO AMBER.
	8. Ammonia	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	The effect of this Scheme Element on the Ammonia WFD element has been changed from YELLOW to GREEN. Watercourse observed was dry, therefore no impact predicted to occur.	The effect of this Scheme Element on the Ammonia WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of baseflow in Canley Brook, leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including ammonia.	The effect of this Scheme Element on the Ammonia WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of baseflow in Canley Brook, leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including ammonia.	The effect of this Scheme Element on the Ammonia WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of baseflow in Canley Brook, leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including ammonia.	The effect of this Scheme Element on the Ammonia WFD element has been changed from YELLOW to GREEN. Watercourse observed was dry, therefore no impact predicted to occur.	The effect of this Scheme Element on the Ammonia WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of baseflow in Canley Brook, leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including ammonia.	The effect of this Scheme Element on the Ammonia WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the construction of the retaining wall remains unchanged. Dewatering may result in a reduction of baseflow in Canley Brook, leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including ammonia.	No assessment update required. Temporary minor beneficial impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	9. Temperature	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Temporary minor impacts remain unchanged.	No effect on this element. Receptor is insensitive to impact. Residual effect changed from YELLOW TO GREEN.	No effect on this element. Receptor is insensitive to impact. Residual effect changed from YELLOW TO GREEN.
	10. Specific Pollutants (Annex VIII)	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	The effect of this Scheme Element on the Specific Pollutant WFD element has been changed from YELLOW to GREEN. Watercourse observed was dry, therefore no impact predicted to occur.	The effect of this Scheme Element on the Specific Pollutants WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of baseflow in Canley Brook, leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including specific pollutants.	The effect of this Scheme Element on the Specific Pollutants WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of baseflow in Canley Brook, leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including specific pollutants.	The effect of this Scheme Element on the Specific Pollutants WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of baseflow in Canley Brook, leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including specific pollutants.	The effect of this Scheme Element on the Specific Pollutants WFD element has been changed from YELLOW to GREEN. Watercourse observed was dry, therefore no impact predicted to occur.	The effect of this Scheme Element on the Specific Pollutants WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the construction of the retaining wall remains unchanged. Dewatering may result in a reduction of baseflow in Canley Brook, leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including specific pollutants.	No assessment update required. Temporary minor beneficial impacts remain unchanged.	No change in overall impact.	No change in residual effect.
Hydromorphological	11. Quantity and dynamics of river flow	No assessment update required. Temporary minor impacts remain unchanged. Minor text changes to clarify assessment in light of survey records	No assessment update required. Temporary minor impacts remain unchanged. Minor text changes to clarify assessment in light of survey records	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged. Minor text changes to clarify assessment in light of survey records	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	12. Connection to Groundwater	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.						No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	13. River continuity	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged. Minor text amendment to clarify mitigation measure	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	14. River depth and width variation bed	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.						No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	15. Structure and substrate of river bed	No assessment update required. Temporary minor impacts remain unchanged. Minor text changes to clarify assessment in light of survey records	No assessment update required. Temporary minor impacts remain unchanged. Minor text changes to clarify assessment in light of survey records	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged. Minor text changes to clarify assessment in light of survey records						No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	16. Structure of riparian zone	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.						No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.

GB109054044480

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Viaduct (clear span)					Cutting		Retaining Wall		Impacts from other WFD water bodies (assessed separately) - Multiple scheme elements (Canley Bk - source to conf with Finham Bk (GB109054044520))	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	-
GB109054044480			Description of scheme element impact	Finham Brook Viaduct - :141-L1 (141+365), 1.9 m above ground level					Finham Brook: Kenilworth cutting (141+400 approximately), Glasshouse Wood cutting (140+500 approximately)		Burton Green retaining wall: Finham Brook				Construction	Operation		
Finham Brook - confluence Canley Brook to confluence River Sowe	Moderate	Good by 2027	Identified biological impacts	Vibration leading to disturbance	Landtake (for bridge footings) leading to loss of habitat and reduced connectivity	Shading leading to loss of habitats/sensitive vegetation	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Run off from bridge span resulting in changes to water quality	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.						
WFD classification elements																		
1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				
2. Macrophytes and phytobenthos - macrophytes	N/A	N/A		Receptor not sensitive to impact. No likely effect anticipated.	No footings in the watercourse. No likely effect anticipated.	NOT PRESENT IN AUST TRAIL - GREEN TO YELLOW - ~~Potential loss of macrophytes due to reduction in photosynthetic activity. Finham Brook is heavily shaded and supports no aquatic macrophytes within the stretch impacted (HS2 baseline surveys). Effect likely to be negligible.~~ Although no detailed macrophyte surveys were undertaken, Finham Brook supports *Ranunculus* sp. beds. Potential localised adverse effect.	No significant hydromorphological effect identified. No likely effect on this quality element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	GREEN TO YELLOW - Potential decrease in flows on Finham Brook during dewatering. Although no detailed macrophyte surveys were undertaken, Finham Brook supports *Ranunculus* sp. beds. ~~is heavily shaded and supports no aquatic macrophytes within the stretch impacted (HS2 baseline surveys). Effect likely to be negligible.~~ Potential localised adverse effect.	GREEN TO ORANGE - Potential localised adverse effects on water quality of Finham Brook. ~~Finham Brook currently heavily shaded and supporting no aquatic vegetation within the area impacted. Effect likely to be negligible.~~ Although no detailed macrophyte surveys were undertaken, Finham Brook supports *Ranunculus* sp. beds. Potential adverse effect on the status objectives of the element.	GREEN TO YELLOW - Only minor effects anticipated on baseflows of Finham Brook. ~~Finham Brook currently heavily shaded and supporting no aquatic vegetation within the area impacted. Effect likely to be negligible.~~ Although no detailed macrophyte surveys were undertaken, Finham Brook supports *Ranunculus* sp. beds. Potential localised adverse effect.	GREEN TO ORANGE - Potential localised adverse effects on water quality of Finham Brook. ~~Finham Brook currently heavily shaded and supporting no aquatic vegetation within the area impacted. Effect likely to be negligible.~~ Although no detailed macrophyte surveys were undertaken, Finham Brook supports *Ranunculus* sp. beds. Potential adverse effect on the status objectives of the element.	Cumulative effects from the scheme elements (cuttings, retaining walls, significant river diversion of Canley Brook) present on Canley Brook water body were identified as having the potential for permanent adverse effects on flows at the scale of the Canley Brook water body. However, these were considered to be localised to Canley Brook and therefore, no adverse effect is anticipated on Finham Brook. In addition, as the watercourse currently supports very few to no aquatic vegetation downstream of the confluence with Canley Brook (HS2 baseline surveys), effect anticipated to be negligible at the scale of the water body.	The scheme elements present on Finham Brook are identified as having very localised (viaduct) and ~~or temporary and localised~~ (cutting) adverse effect on this quality element. In addition, cumulative effects from the scheme elements located on the upstream water body including a significant diversion of Canley Brook, cuttings and retaining wall) were considered as having ~~negligible~~ effects on this quality element on Finham Brook. ~~Overall effect of the scheme is therefore considered to be negligible on this quality element at the scale of the water body. This quality element currently does not have a status.~~ Therefore, the overall effect of the scheme is likely to be adverse locally, and a potential deterioration of the current WFD status (Moderate) of this quality element cannot be ruled out. CHANGED FROM GREEN TO ORANGE	~~None required.~~ FURTHER CONSIDERATION REQUIRED	~~None required.~~ FURTHER CONSIDERATION REQUIRED	Potential residual adverse effects on WFD status of this element. CHANGE TO GREEN TO ORANGE	
3. Macroinvertebrates	Moderate	Good by 2027		Receptor not sensitive to impact. No likely effect anticipated.	No footings in the watercourse. No likely effect anticipated.	Shade increase likely to lead to localised but permanent loss of potential macroinvertebrate habitats (i.e. riparian vegetation). The watercourse locally supports ~~moderate~~ good macroinvertebrate quality (HS2 baseline surveys). Effect likely to be very localised and minor, with no effect anticipated at the scale of the water body.	No significant hydromorphological effect identified. No likely effect on this quality element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Potential decrease in flows on Finham Brook during dewatering. The watercourse locally supports ~~moderate~~ good macroinvertebrate quality, with communities highly sensitive to reduced flows (HS2 baseline surveys). Effect likely to be localised, with no effect anticipated at the scale of the water body.	GREEN TO ORANGE -Potential localised adverse effects on water quality of Finham Brook. ~~Finham Brook currently heavily shaded and supporting no aquatic vegetation within the area impacted. Effect likely to be negligible.~~ The watercourse supports good macroinvertebrate quality in the reach surveyed. Potential adverse effect on the status objectives of the element.	Only minor effects anticipated on baseflows of Finham Brook. The watercourse currently supports moderate macroinvertebrate quality, with communities highly sensitive to reduced flows (HS2 baseline surveys). Potential localised adverse effect, with no further effect at the water body level.	GREEN TO ORANGE -Potential localised adverse effects on water quality of Finham Brook. ~~Finham Brook currently heavily shaded and supporting no aquatic vegetation within the area impacted. Effect likely to be negligible.~~ The watercourse supports good macroinvertebrate quality in the reach surveyed. Potential adverse effect on the status objectives of the element.	Cumulative effects from the scheme elements (cuttings, retaining walls, significant river diversion of Canley Brook) present on the Canley Brook water body were identified as having the potential for permanent adverse effects on flows at the scale of the Canley Brook water body. These adverse effects were considered to be limited to Canley Brook. However, given the relatively short distance of the significant river diversion on Canley Brook (1 km upstream of Finham Brook), the fact that Finham Brook is a major tributary of Canley Brook and the fact that invertebrate communities on both Finham Brook and Canley Brook appear to be highly sensitive to reduced flows, a potential adverse effect on the status or status objectives this quality element can not be ruled out.	The scheme elements present on Finham Brook are identified as having localised or temporary adverse effects on this quality element. However, cumulative effects from the scheme elements located on the upstream water body (significant diversion of Canley Brook, cuttings and retaining wall) were also considered as having the potential for an adverse effect on Finham Brook, due to potential significant adverse effects on macroinvertebrate communities on Canley Brook, a major tributary of Finham Brook. Therefore, the overall effect of the scheme is likely to be adverse locally, and a potential deterioration of the current WFD status (Moderate) of this quality element cannot be ruled out. CHANGED FROM YELLOW TO AMBER.	~~None required.~~ FURTHER CONSIDERATION REQUIRED	~~None required.~~ FURTHER CONSIDERATION REQUIRED	~~Overall effect of the scheme likely to be adverse locally, with no deterioration of the current WFD status (Moderate). In addition, the achievement of Good status by 2027 for this quality element should not be compromised.~~ Potential residual adverse effects on WFD status of this element. CHANGED YELLOW TO ORANGE	
4. Fish	N/A	N/A		Localised and temporary adverse effect during construction. No deterioration of the water body status of the element is however expected.	No footings in the watercourse. No likely effect anticipated.	Shade increase likely to lead to localised but permanent loss of fish habitats (i.e. riparian vegetation). The watercourse currently supports good fish habitat quality but low species diversity, although brown trout were recorded (HS2 baseline surveys). Finham Brook is also designated under the Freshwater Fish Directive. Very localised and minor adverse effect anticipated, with no effect anticipated at the scale of the water body.	No significant hydromorphological effect identified. No likely effect on this quality element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Potential decrease in flows on Finham Brook during dewatering. The watercourse currently supports good fish habitat quality but low species diversity, although brown trout were recorded (HS2 baseline surveys). Finham Brook is also designated under the Freshwater Fish Directive. Effect likely to be localised	GREEN TO ORANGE -Potential localised adverse effects on water quality of Finham Brook. ~~Finham Brook currently heavily shaded and supporting no aquatic vegetation within the area impacted. Effect likely to be negligible.~~ The watercourse supports brown trout population in the reach surveyed. Potential adverse effect on the status objectives of the element.	Only minor effects anticipated on baseflows of Finham Brook. The watercourse currently supports good fish habitat quality but low species diversity, although brown trout were recorded (HS2 baseline surveys). Finham Brook is also designated under the Freshwater Fish Directive. Effect likely to be localised.	GREEN TO ORANGE -Potential localised adverse effects on water quality of Finham Brook. ~~Finham Brook currently heavily shaded and supporting no aquatic vegetation within the area impacted. Effect likely to be negligible.~~ The watercourse supports brown trout population in the reach surveyed. Potential adverse effect on the status objectives of the element.	Cumulative effects from the scheme elements (cuttings, retaining walls, significant river diversion of Canley Brook) considered to have the potential for permanent adverse effects on flows at the scale of the Canley Brook water body. Therefore, and as Finham Brook is a designated salmonid fisheries (Freshwater Fish Directive) and as both Canley Brook and Finham Brook currently support migratory fish species (brown trout), effects from scheme elements present on Canley Brook and its tributaries are considered as having the potential for an adverse on this quality element at the scale of the water body.	The scheme elements present on Finham Brook are identified as having very localised (viaduct, cutting) or temporary (retaining wall) adverse effect on this quality element. However, cumulative effects from scheme elements located on the upstream water body (Canley Brook) are considered as having the potential for an adverse effect on this quality element on Finham Brook. Overall, and given that Finham Brook is a designated salmonid fisheries (Freshwater Fish Directive) and as both Canley Brook and Finham Brook currently support migratory fish species (brown trout), the scheme is considered to have the potential for an adverse effect in this quality element at the water body scale.	Fish relocation during dewatering operations must be considered. Fish removal from the areas impacted by temporary dewatering to be considered while dewatering will be taking place. Possible relocation in suitable areas downstream of the works.	~~None required.~~ FURTHER CONSIDERATION REQUIRED	~~Providing that the additional mitigation measures proposed are implemented, the overall effect of the scheme on this scheme element would be considered as adverse locally but with no further effect at the scale of the water body.~~ Potential residual adverse effects on WFD status of this element. Potential residual adverse effects on WFD status of this element. CHANGED YELLOW TO ORANGE	
Physico-Chemical status																		
WFD classification elements																		
5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to temporary, minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no long term impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	Potential decrease in flows on Finham Brook during dewatering. No groundwater survey undertaken to confirm level of impact of dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	Potential decrease in flows on Finham Brook during dewatering. No groundwater survey undertaken to confirm level of impact of dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	The local minor impacts relate to; • Dewatering and the subsequent loss of baseflow in the Canley Brook, and • Changes in water quality due to discharge of groundwater to the Canley Brook. Assessment to be revisited following a detailed hydrology investigation of the Canley Brook catchment, for which the current hydrological regime does not support Good status. ~~Potential drop in baseflow may lead to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution, deteriorating current status or preventing future good status from being achieved.~~	~~Potential minor and localised effects on element.~~ The local minor impacts relate to; • Dewatering and the subsequent loss of baseflow in the Finham Brook, • Transfer of surface water out of the Finham Brook catchment and the subsequent loss of flow volume and velocity, and • Changes in water quality due to discharge of groundwater to the Finham Brook. In addition to this, there is potential for the cumulative impact of the local minor impacts within the Canley Brook catchment (upstream of Finham Brook) to also contribute to the cumulative impact in the Finham Brook catchment. Assessment to be revisited following a detailed hydrology investigation of the Finham Brook and Canley Brook catchments, for which the current hydrological regime does not support Good status.	~~None required.~~ Implementation of CoCP measures and Best Practice Measures will ensure potential impacts only have a temporary, minor effect on water quality during construction	~~None required.~~ Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS).	Construction impacts are likely to have only temporary, minor effects. ~~Complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS).~~ ~~No scheme elements are anticipated to have more than. There is a small risk associated with pollution from track drainage. Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge~~	
6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	YELLOW TO GREEN. No effect on this element.	No effect on this element. Receptor is insensitive to impact	None required.	None required.	YELLOW TO GREEN. No effect on this element. Receptor is insensitive to impact	
7. Phosphate	Good	-		N/A	N/A	N/A	ectively an open span bridge, so there would be no	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	Potential decrease in flows on Finham Brook during dewatering. No groundwater survey undertaken to confirm level of impact of dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	Potential decrease in flows on Finham Brook during dewatering. No groundwater survey undertaken to confirm level of impact of dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	There is potential for an adverse effect and deterioration in Phosphate status within the Canley Brook catchment, for which the current hydrological regime does not support Good status. The adverse effects relate to; • Dewatering and the subsequent loss of baseflow in the Canley Brook, and • Changes in water quality due to discharge of groundwater to the Canley Brook. Assessment to be revisited following a detailed hydrology investigation of the Canley Brook catchment. Potential drop in baseflow may lead to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution, deteriorating current status or preventing future good status from being achieved.	There is potential for an adverse effect and deterioration in Phosphate status within the Finham Brook catchment, for which the current hydrological regime does not support Good status. The potential adverse effects relate to; • Dewatering and the subsequent loss of baseflow in the Finham Brook, • Transfer of surface water out of the Finham Brook catchment and the subsequent loss of flow volume and velocity, and • Changes in water quality due to discharge of groundwater to the Finham Brook. In addition to this, there is potential for the cumulative impact of the adverse effects within the Canley Brook catchment (upstream of Finham Brook) to also contribute to the cumulative effect in the Finham Brook catchment. ~~Five~~ sewage discharge consents to Finham Brook and its tributaries. Potential for increase in phosphate concentration, if a significant amount of flow is lost. Assessment to be revisited following a detailed hydrology investigation of the Canley Brook catchment. ~~Implementation of CoCP measures and Best Practice Measures during construction will ensure potential impacts only have a temporary, minor effect on this element. Complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than A local, minor effect on the water body is predicted for this element during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge~~	~~None required.~~ Implementation of CoCP measures and Best Practice Measures will ensure potential impacts only have a temporary, minor effect on water quality during construction	~~None required.~~ Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS).	YELLOW TO AMBER. The current hydrological regime for Canley Brook does not support Good status. Any potential loss of flow velocity or volume in Canley Brook as a result of the operation of the Proposed Scheme could result in a deterioration in current Phosphate status. In addition, there are nine sewage discharge consents to Canley Brook and its tributaries. A combination of the Scheme Element impacts of dewatering/discharge of groundwaters and the existing discharge consents, has been identified as having the potential for adverse effects and to deteriorate Phosphate status. Construction impacts are likely to have only temporary, minor effects. ~~Complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS).~~ ~~No scheme elements are anticipated to have more than. There is a small risk associated with pollution from track drainage. Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge~~	
8. Ammonia	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Potential decrease in flows on Finham Brook during dewatering. No groundwater survey undertaken to confirm level of impact of dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Potential decrease in flows on Finham Brook during dewatering. No groundwater survey undertaken to confirm level of impact of dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	The local minor impacts relate to; • Dewatering and the subsequent loss of baseflow in the Canley Brook, and • Changes in water quality due to discharge of groundwater to the Canley Brook. Assessment to be revisited following a detailed hydrology investigation of the Canley Brook catchment, for which the current hydrological regime does not support Good status. ~~Potential drop in baseflow may lead to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution, deteriorating current status or preventing future good status from being achieved.~~	~~Potential minor and localised effects on element.~~ The local minor impacts relate to; • Dewatering and the subsequent loss of baseflow in the Finham Brook, • Transfer of surface water out of the Finham Brook catchment and the subsequent loss of flow volume and velocity, and • Changes in water quality due to discharge of groundwater to the Finham Brook. In addition to this, there is potential for the cumulative impact of the local minor impacts within the Canley Brook catchment (upstream of Finham Brook) to also contribute to the cumulative impact in the Finham Brook catchment. Assessment to be revisited following a detailed hydrology investigation of the Finham Brook and Canley Brook catchments, for which the current hydrological regime does not support Good status.	None required.	None required.	Construction impacts are likely to have only temporary, minor effects. ~~Complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS).~~ ~~No scheme elements are anticipated to have more than. There is a small risk associated with pollution from track drainage. Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge~~	
9. Temperature	-	-		N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	YELLOW TO GREEN. No effect on this element.	No effect on this element. Receptor is insensitive to impact	None required.	None required.	YELLOW TO GREEN. No effect on this element. Receptor is insensitive to impact	
10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	Potential decrease in flows on Finham Brook during dewatering. No groundwater survey undertaken to confirm level of impact of dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Potential decrease in flows on Finham Brook during dewatering. No groundwater survey undertaken to confirm level of impact of dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	The local minor impacts relate to; • Dewatering and the subsequent loss of baseflow in the Canley Brook, and • Changes in water quality due to discharge of groundwater to the Canley Brook. Assessment to be revisited following a detailed hydrology investigation of the Canley Brook catchment, for which the current hydrological regime does not support Good status. ~~Potential drop in baseflow may lead to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution, deteriorating current status or preventing future good status from being achieved.~~	~~Potential minor and localised effects on element.~~ The local minor impacts relate to; • Dewatering and the subsequent loss of baseflow in the Finham Brook, • Transfer of surface water out of the Finham Brook catchment and the subsequent loss of flow volume and velocity, and • Changes in water quality due to discharge of groundwater to the Finham Brook. In addition to this, there is potential for the cumulative impact of the local minor impacts within the Canley Brook catchment (upstream of Finham Brook) to also contribute to the cumulative impact in the Finham Brook catchment. Assessment to be revisited following a detailed hydrology investigation of the Finham Brook and Canley Brook catchments, for which the current hydrological regime does not support Good status.	~~None required.~~ Implementation of CoCP measures and Best Practice Measures will ensure potential impacts only have a temporary, minor effect on water quality during construction	~~None required.~~ Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS).	Construction impacts are likely to have only temporary, minor effects. ~~Complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS).~~ ~~No scheme elements are anticipated to have more than. There is a small risk associated with pollution from track drainage. Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge~~	
Hydromorphological status																		**Hydromorphology Baseline**
WFD classification elements																		
11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	• No Groundwater surveys recorded • There is ~~localised~~ risk because the water body is already affected by abstraction, and the hydrology rating for Finham Brook is currently Moderate (does not support Good ecological status/potential) due to abstraction • The surveys show that the stream reaches that would potentially be affected have significant hydromorphological value, so the risk of impacts and satisfactory mitigation cannot be ruled out without further study and design	N/A	• No Groundwater surveys recorded • Cutting near surface water divide, near headwaters of tributaries of River Blythe, Canley Brook and Finham Brook. • It is unlikely that reduction of groundwater contribution to flows in Finham Brook will have adverse impact on the quantity and dynamics of flows • There is still a localised risk because the water body is already affected by abstraction, and the hydrology rating for Finham Brook is currently Moderate (does not support Good ecological status/potential) due to abstraction • The surveys show that the stream reaches that would potentially be affected have significant hydromorphological value, so the risk of impacts and satisfactory mitigation cannot be ruled out without further study and design	N/A	Cumulative effects from the scheme elements (cuttings, retaining walls, significant river diversion of Canley Brook) on the Canley Brook water body have the potential for permanent adverse effects on flows in the Canley Brook water body, which could affect Finham Brook The surveys show that the stream reaches that would potentially be affected have significant hydromorphological value, so the risk of impacts and satisfactory mitigation cannot be ruled out without further study and design	• Viaduct footings in the floodplain are unlikely to be any significant impacts on hydromorphology • There is potential reduction of groundwater contribution to flows in Finham Brook as a result of the Glasshouse cutting. However the adverse impact on the quantity and dynamics of flows could be mitigated through reintroduced water to ground via SuDS • However, this water body has sensitive habitats, so any impacts on hydromorphology could be significant • The potential cumulative impacts in this water body combined with impacts cascading from the upstream connecting water body (Canley Brook), mainly in terms of decreased flow rates associated with cuttings, mean that hydromorphological deterioration could occur at water body scale • The surveys show that the stream reaches that would potentially be affected have significant hydromorphological value, so the risk of impacts and satisfactory mitigation cannot be ruled out without further study and design	~~Undertaken hydromorphological surveys to inform detailed design development.~~ Incorporate hydromorphology mitigation into detailed design where practicable. Mitigation measures that might be incorporated at detailed design include; • Create reed fringes • Implementation of SUDS • Introduce riparian vegetation/green corridors where space allows • Retain marginal vegetation	Reassess following more detailed assessment of groundwater impacts on hydromorphology, and detailed design including SuDS	• The baseline survey indicates that the river had been previous realigned, but it shows good signs of naturally restoring forms and processes, with good floodplain connectivity creating an encouraging salmonid and invertebrate habitat. The river upstream of the proposed crossing point was slightly different from the downstream reach, not showing the same improvement with more laminar flow with fine sediment deposition on the bed. ~~• Hydromorphology baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossing, the scale of the watercourses and their significance to the overall water body.~~	
12. Connection to Groundwater	-	-		N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact		• It is unlikely that reduction of groundwater contribution to flows in Finham Brook will have adverse impact on the quantity and dynamics of flows considering that captured water will be reintroduced to ground via SuDs	N/A	• It is unlikely that reduction of groundwater contribution to flows in Finham Brook will have adverse impact on the quantity and dynamics of flows considering that captured water will be reintroduced to ground via SuDs	N/A						
13. River continuity	-	-		N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	• There is a localised risk that continuity could be deteriorated by reductions in groundwater flows despite the SuDS, which is on the basis that the water body is already affected by abstraction and could be sensitive • The surveys show that the stream reaches that would potentially be affected have significant hydromorphological value, so the risk of impacts and satisfactory mitigation cannot be ruled out without further study and design	N/A	~~• There is a localised risk that continuity could be deteriorated by reductions in groundwater flows despite the SuDS, which is on the basis that the water body is already affected by abstraction and could be sensitive~~ • The surveys show that the stream reaches that would potentially be affected have significant hydromorphological value, so the risk of impacts and satisfactory mitigation cannot be ruled out without further study and design	N/A						
14. River depth and width variation bed	-	-		N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	• Flow widths and depths could potentially be affected as a result of the Glasshouse cutting, however there are no significant impacts anticipated from the Kenilworth cutting. • However, habitats are sensitive in this water body and any implications for wetted areas could be significant • The surveys show that the stream reaches that would potentially be affected have significant hydromorphological value, so the risk of impacts and satisfactory mitigation cannot be ruled out without further study and design	N/A	• Flow widths and depths are unlikely to be affected due to capture of discharge from the cuttings and return to groundwater by SuDS • However, habitats are sensitive in this water body and any implications for wetted areas could be significant • The surveys show that the stream reaches that would potentially be affected have significant hydromorphological value, so the risk of impacts and satisfactory mitigation cannot be ruled out without further study and design	N/A						
15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	• Flow dynamics and sediment regime could potentially be affected by the Kenilworth cutting but SUDs should help mitigate the issue, there is unlikely to be detrimental inwash of sediments due to surface runoff from the cuttings, but an increase in-channel sedimentation due to decreased flow rates is a possibility • However, habitats are sensitive in this water body (Finham Brook is a designated salmonid fisheries) so any implications for sediment transport, deposition or mobilisation could be significant • The surveys show that the stream reaches that would potentially be affected have significant hydromorphological value, so the risk of impacts and satisfactory mitigation cannot be ruled out without further study and design	N/A	• Flow dynamics and sediment regime are unlikely to be affected due to the SuDS, so there is unlikely to be detrimental inwash of sediments due to surface runoff from the cuttings, or increase in-channel sedimentation due to decreased flow rates • However, habitats are sensitive in this water body (Finham Brook is a designated salmonid fisheries) so any implications for sediment transport, deposition or mobilisation could be significant • The surveys show that the stream reaches that would potentially be affected have significant hydromorphological value, so the risk of impacts and satisfactory mitigation cannot be ruled out without further study and design	N/A						
16. Structure of riparian zone	-	-		N/A	N/A	N/A		N/A	• Riparian connectivity is unlikely to be affected because any reduction of groundwater contribution to flows in Finham Brook is unlikely to have adverse impacts on flow quantity and dynamics • However, the surveys show that the stream reaches that would potentially be affected have significant hydromorphological value, so the risk of impacts and satisfactory mitigation cannot be ruled out without further study and design	N/A	• Riparian connectivity is unlikely to be affected because any reduction of groundwater contribution to flows in Finham Brook is unlikely to have adverse impacts on flow quantity and dynamics • However, the surveys show that the stream reaches that would potentially be affected have significant hydromorphological value, so the risk of impacts and satisfactory mitigation cannot be ruled out without further study and design	N/A						

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
None identified in Appendix B of RBMP	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Water Body ID		GB109054044480				
Surface Water Body Name		Finham Brook - confluence Canley Brook to confluence River Sowe				
Scheme Element		**Kenilworth Cutting**	**Glasshouse Wood Cutting**	**Burton Green Retaining Wall**	**OVERALL EFFECT**	**RESIDUAL EFFECT**
Surface Water Crossing ID		**N/A**	**N/A**	**N/A**		
Survey Site		Finham Brook, west of Stoneleigh	Finham Brook, west of Stoneleigh	Finham Brook, west of Stoneleigh		
Survey ID		WFD-PA1-0034, WFD-MI1-0034, WFD-EF1-0034	WFD-PA1-0034, WFD-MI1-0034, WFD-EF1-0034	WFD-PA1-0034, WFD-MI1-0034, WFD-EF1-0034		
Objectives of the Survey		• Assess ecological habitat type. In particular for fish. • Assess the local hydromorphology	• Assess ecological habitat type. In particular for fish. • Assess the local hydromorphology	• Assess ecological habitat type. In particular for fish. • Assess the local hydromorphology		
Survey Scope		Ecological Walkover Survey Hydromorphological Survey Macroinvertebrate Survey Fish Survey	Ecological Walkover Survey Hydromorphological Survey Macroinvertebrate Survey Fish Survey	Ecological Walkover Survey Hydromorphological Survey Macroinvertebrate Survey Fish Survey		
Medium Term Survey Results Summary	**Bio**	Finham Brook at WFD-PA1-0034is a resectioned but naturalising river, meandering with good habitat diversity, including pooled sections upstream of the access bridge to Dalehouse Farm and riffles with Ranunculus sp. beds downstream. Good floodplain connectivity. Presence of non-native invasive Himalayan balsam (Impatiens glandulifera) in discrete but dense stands on the banks and evidence of presence of invasive non-native signal crayfish (Pacifastacus leniusculus). No detailed macrophyte survey undertaken although Ranunculus sp. bed habitats were observed downstream of the access bridge to Dalehouse Farm during walkover surveys. Good macroinvertebrate quality at WFD-MI1-0034 with moderate diversity and presence of pollution sensitive mayfly (Ephemerellidae) and caddisfly (Goeridae, Glossossomatidae, Hydroptilidae etc.), although abundances of pollution tolerant Chironomidae were relatively elevated. High LIFE score, indicative of communities adapted to fast flows and PSI score indicative of "Slight" sedimentation. Presence of salmonid fish at WFD-EF1-0034, with 24 specimen of brown trout (Salmo trutta) recorded, including juveniles. Minor fish species included bullhead, sotneloach and minnow in low to moderate abundances.	Finham Brook at WFD-PA1-0034is a resectioned but naturalising river, meandering with good habitat diversity, including pooled sections upstream of the access bridge to Dalehouse Farm and riffles with Ranunculus sp. beds downstream. Good floodplain connectivity. Presence of non-native invasive Himalayan balsam (Impatiens glandulifera) in discrete but dense stands on the banks and evidence of presence of invasive non-native signal crayfish (Pacifastacus leniusculus). No detailed macrophyte survey undertaken although Ranunculus sp. bed habitats were observed downstream of the access bridge to Dalehouse Farm during walkover surveys. Good macroinvertebrate quality at WFD-MI1-0034 with moderate diversity and presence of pollution sensitive mayfly (Ephemerellidae) and caddisfly (Goeridae, Glossossomatidae, Hydroptilidae etc.), although abundances of pollution tolerant Chironomidae were relatively elevated. High LIFE score, indicative of communities adapted to fast flows and PSI score indicative of "Slight" sedimentation. Presence of salmonid fish at WFD-EF1-0034, with 24 specimen of brown trout (Salmo trutta) recorded, including juveniles. Minor fish species included bullhead, sotneloach and minnow in low to moderate abundances.	Finham Brook at WFD-PA1-0034is a resectioned but naturalising river, meandering with good habitat diversity, including pooled sections upstream of the access bridge to Dalehouse Farm and riffles with Ranunculus sp. beds downstream. Good floodplain connectivity. Presence of non-native invasive Himalayan balsam (Impatiens glandulifera) in discrete but dense stands on the banks and evidence of presence of invasive non-native signal crayfish (Pacifastacus leniusculus). No detailed macrophyte survey undertaken although Ranunculus sp. bed habitats were observed downstream of the access bridge to Dalehouse Farm during walkover surveys. Good macroinvertebrate quality at WFD-MI1-0034 with moderate diversity and presence of pollution sensitive mayfly (Ephemerellidae) and caddisfly (Goeridae, Glossossomatidae, Hydroptilidae etc.), although abundances of pollution tolerant Chironomidae were relatively elevated. High LIFE score, indicative of communities adapted to fast flows and PSI score indicative of "Slight" sedimentation. Presence of salmonid fish at WFD-EF1-0034, with 24 specimen of brown trout (Salmo trutta) recorded, including juveniles. Minor fish species included bullhead, sotneloach and minnow in low to moderate abundances.		
	Phys	No Groundwater survey undertaken. At survey point WFD-PA1-0034, the Main River observed was moderately shaded (30 - 70%), low flowing and slightly turbid. Physico-chemical parameters measured at survey point WFD-EF1-0034: Dissolved Oxygen = 92% pH = 7.95 Temp = 14.6 deg C Conductivity = 751 uS	No Groundwater Survey undertaken. At survey point WFD-PA1-0034, the Main River observed was moderately shaded (30 - 70%), low flowing and slightly turbid. Physico-chemical parameters measured at survey point WFD-EF1-0034: Dissolved Oxygen = 92% pH = 7.95 Temp = 14.6 deg C Conductivity = 751 uS	No Groundwater Survey undertaken. At survey point WFD-PA1-0034, the Main River observed was moderately shaded (30 - 70%), low flowing and slightly turbid. Physico-chemical parameters measured at survey point WFD-EF1-0034: Dissolved Oxygen = 92% pH = 7.95 Temp = 14.6 deg C Conductivity = 751 uS		
	Hydro	The baseline survey indicates that the river had been previous realigned, but it shows good signs of naturally restoring forms and processes, with good floodplain connectivity creating an encouraging salmonid and invertebrate habitat. The river upstream of the proposed crossing point was slightly different from the downstream reach, not showing the same improvement with more laminar flow with fine sediment deposition on the bed.	The baseline survey indicates that the river had been previous realigned, but it shows good signs of naturally restoring forms and processes, with good floodplain connectivity creating an encouraging salmonid and invertebrate habitat. The river upstream of the proposed crossing point was slightly different from the downstream reach, not showing the same improvement with more laminar flow with fine sediment deposition on the bed.	The baseline survey indicates that the river had been previous realigned, but it shows good signs of naturally restoring forms and processes, with good floodplain connectivity creating an encouraging salmonid and invertebrate habitat. The river upstream of the proposed crossing point was slightly different from the downstream reach, not showing the same improvement with more laminar flow with fine sediment deposition on the bed.		

Audit Trail for the Update of the WFD Water Body Assessment with Baseline Data

		Nature of the Assessment Update and Justification				
	WFD Classification Elements Changed	**Kenilworth Cutting**	**Glasshouse Wood Cutting**	**Burton Green Retaining Wall**	**OVERALL IMPACT**	**RESIDUAL EFFECT**
Biological	**2. Macrophytes and phytobenthos - macrophytes**	As new baseline shows that Finham Brook supports macrophytes, assessment changed from green to orange due to potential changes in water quality (phosphates).	As new baseline shows that Finham Brook supports macrophytes, assessment changed from green to orange due to potential changes in water quality (phosphates).	As new baseline shows that Finham Brook supports macrophytes, assessment changed from green to orange due to potential changes in water quality (phosphates).	New baseline shows that Finham Brook supports macrophytes, in combination with the potential changes in water quality (phosphate). Overall impact changed from GREEN TO AMBER.	New baseline shows that Finham Brook supports macrophytes, in combination with the potential changes in water quality (phosphate). Residual effect changed from GREEN TO AMBER.
	3. Macroinvertebrates	Due to potential changes in water quality (phosphate) and the good macroinvertebrate quality of Finham Brook, assessment changed from green to orange.	Due to potential changes in water quality (phosphate) and the good macroinvertebrate quality of Finham Brook, assessment changed from green to orange.	Due to potential changes in water quality (phosphate) and the good macroinvertebrate quality of Finham Brook, assessment changed from green to orange.	New baseline shows that Finham Brook has good macroinvertebrate quality, in combination with the potential changes in water quality (phosphate). Overall impact changed from YELLOW TO AMBER.	New baseline shows that Finham Brook has good macroinvertebrate quality, in combination with the potential changes in water quality (phosphate). Residual effect changed from YELLOW TO AMBER.
	4. Fish	Due to potential changes in water quality (phosphate) and the fact that Finham Brook supports brown trout populations, assessment changed from green to orange.	Due to potential changes in water quality (phosphate) and the fact that Finham Brook supports brown trout populations, assessment changed from green to orange.	Due to potential changes in water quality (phosphate) and the fact that Finham Brook supports brown trout populations, assessment changed from green to orange.	New baseline shows that Finham Brook supports brown trout populations, in combination with the potential changes in water quality (phosphate). Overall impact changed from YELLOW TO AMBER.	New baseline shows that Finham Brook supports brown trout populations, in combination with the potential changes in water quality (phosphate). Residual effect changed from YELLOW TO AMBER.
Physico-Chemical	**5. Dissolved Oxygen**	The effect of this Scheme Element on the Dissolved Oxygen WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys and lack of groundwater surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of baseflow in Finham Brook, leading to depleted reaches of river flow on the watercourse, and thus reducing turbulence and oxygenation.	The effect of this Scheme Element on the Dissolved Oxygen WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys and lack of groundwater surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of baseflow in Finham Brook, leading to depleted reaches of river flow on the watercourse, and thus reducing turbulence and oxygenation.	The effect of this Scheme Element on the Dissolved Oxygen WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys and lack of groundwater surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of baseflow in Finham Brook, leading to depleted reaches of river flow on the watercourse, and thus reducing turbulence and oxygenation.	No change in overall impact.	No change in residual effect.
	6. pH	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No change in overall impact.	No effect on this element. Receptor is insensitive to impact. Residual effect changed from YELLOW TO GREEN.
	7. Phosphate	The effect of this Scheme Element on the Phosphate WFD element remains AMBER. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of baseflow in Finham Brook. Potential reduction in baseflow may lead to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution, deteriorating current status or preventing future good status from being achieved.	The effect of this Scheme Element on the Phosphate WFD element remains AMBER. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of baseflow in Finham Brook. Potential reduction in baseflow may lead to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution, deteriorating current status or preventing future good status from being achieved.	The effect of this Scheme Element on the Phosphate WFD element remains AMBER. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of baseflow in Finham Brook. Potential reduction in baseflow may lead to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution, deteriorating current status or preventing future good status from being achieved.	No change in overall impact.	The current hydrological regime for Finham Brook does not support Good status. Any potential loss of flow velocity or volume in Finham Brook as a result of the operation of the Proposed Scheme could result in a deterioration in current Phosphate status. In addition, there are five sewage discharge consents to Finham Brook and its tributaries. A combination of the Scheme Element impacts of dewatering/discharge of groundwater, and the existing discharge consents, has been identified as having the potential for adverse effects and to deteriorate Phosphate status. Residual effect changed from YELLOW TO AMBER.
	8. Ammonia	The effect of this Scheme Element on the Ammonia WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of baseflow in Finham Brook, leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including ammonia.	The effect of this Scheme Element on the Ammonia WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of baseflow in Finham Brook, leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including ammonia.	The effect of this Scheme Element on the Ammonia WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of baseflow in Finham Brook, leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including ammonia.	No change in overall impact.	No change in residual effect.
	9. Temperature	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No change in overall impact.	No effect on this element. Receptor is insensitive to impact. Residual effect changed from YELLOW TO GREEN.
	10. Specific Pollutants (Annex VIII)	The effect of this Scheme Element on the Specific Pollutants WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of baseflow in Finham Brook, leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including specific pollutants.	The effect of this Scheme Element on the Specific Pollutants WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of baseflow in Finham Brook, leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including specific pollutants.	The effect of this Scheme Element on the Specific Pollutants WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of dewatering associated with the cutting remains unchanged. Dewatering may result in a reduction of baseflow in Finham Brook, leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including specific pollutants.	No change in overall impact.	No change in residual effect.
Hydromorphological	**11. Quantity and dynamics of river flow**	No assessment update required. Minor impacts remain unchanged. More text detail added for clarity based on survey information	No assessment update required. Minor impacts remain unchanged. More text detail added for clarity based on survey information	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	12. Connection to Groundwater	No assessment update required. Minor impacts remain unchanged.	No assessment update required. Minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	13. River continuity	No assessment update required. Minor impacts remain unchanged. More text detail added for clarity based on survey information	No assessment update required. Minor impacts remain unchanged. More text detail added for clarity based on survey information	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	14. River depth and width variation bed	No assessment update required. Minor impacts remain unchanged. More text detail added for clarity based on survey information	No assessment update required. Minor impacts remain unchanged. More text detail added for clarity based on survey information	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	15. Structure and substrate of river bed	No assessment update required. Minor impacts remain unchanged. More text detail added for clarity based on survey information	No assessment update required. Minor impacts remain unchanged. More text detail added for clarity based on survey information	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	16. Structure of riparian zone	No assessment update required, since the impact of any changes in the groundwater regime remains YELLOW (minor detrimental)	No assessment update required, since the impact of any changes in the groundwater regime remains YELLOW (minor detrimental)	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.

GB103005404070

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements
GB103005404070	Moderate	Good Ecological Status by 2027	Description of scheme element impact
River Itchen - source to confluence with River Stowe			Identified biological impacts

	River Itchen Viaduct					Lower Radbourne North Viaduct					Lower Radbourne South Viaduct					Culvert 122-51					Impacts from other WFD water bodies (assessed separately)	OVERALL impact on element	Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)
	88m long viaduct over River Itchen with footings close to banks edge - Viaduct 5.5 m above ground and 14.3 m wide (CFA16-SW-001)					50m long viaduct over River Itchen, 14.3 m wide and 4.2 m high with footings close to banks edge (CFA16-SW-003)					90m long , 14.3 m wide and 7.2 m high viaduct over tributary of R Itchen with footings close to banks edge (CFA16-SW-002)					4.0m x 1.5m box culvert on tributary of River Itchen. Length roughly 50m. Located within the Ladbroke Embankment. (CFA16-SW-004)							Construction	Operation	
	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage					
1.Macrophytes and phytobentos - diatoms	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No upstream water body	n/a	n/a	n/a	n/a
2. Macrophytes and phytobentos - macrophytes	-	-	Receptor is insensitive to impact	No footings in watercourse, no loss of macrophyte habitat	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. There are no macrophyte data available, but there would only be a localised and minor effects on macrophyte communities, not affecting the status of this quality element.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	No footings in watercourse, no loss of macrophyte habitat	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - There are no macrophyte data available, but there would only be a localised and minor effects on macrophyte communities, not affecting the status of this quality element.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	No footings in watercourse, no loss of macrophyte habitat	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - There are no macrophyte data available, but there would only be a localised and minor effects on macrophyte communities, not affecting the status of this quality element.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrates and reduce the availability of macrophyte habitats within the culvert (no macrophyte data available). - However, only 50 m of a minor tributary of the River Itchen is affected and there would be no detectable effect on the overall status of a water body level. - Embedded mitigation measures that are proposed will reduce more effects on this element (notably improvements along watercourse either side of the culvert).	- Shading of the channel has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - There are no macrophyte data available, but it is considered that this would only be a localised and minor effects on macrophyte communities, not affecting the status of this quality element.	Localised changes in flow dynamics (potential increased flow due to the straightened channel in the culvert) may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediately downstream). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	No upstream water body	The River Itchen does not currently have a WFD status for macrophytes and is not known to be monitored for this element. - ~~No data were collected on macrophytes within the River Itchen as part of the Baseline survey.~~ - Although the scheme will lead to loss of habitat and photosynthetic activity (in shaded areas) these area relatively minor within the context of the River Itchen water body and embedded included as part of the scheme will mitigate for the loss. - The overall effect is likely to be neutral or have a minor and highly localised adverse effect, not affecting overall status.	No additional mitigation required	- Measures to mitigate any adverse effects form part of the embedded mitigation measures described previously. - For the culvert on the River Itchen tributary, further surveys to assess fish habitat and populations in upstream areas will be undertaken. An assessment of the culvert with relation to flows and fish passage must be included as part of the culvert design and assessment. This will ensure that the culvert design is designed to avoid/reduce effects on fish (minimal loss of habitat/habitat replacement, no effect on upstream migration etc.) and agreed with the Environment Agency. Consideration will be given for structures/culvert designs that have minimal impacts (e.g. open arch culvert) - Further, construction and post-construction monitoring should be considered (if necessary) to assess any effects on fish migration.	- The overall effect is likely to be neutral or have a minor and highly localised adverse effect, not affecting overall status.
3. Macroinvertebrates	High	-	Receptor is insensitive to impact	No footings in watercourse, no loss of habitat	- Shading may have indirect effects on macroinvertebrates (if macrophyte cover is lost) the invertebrate community is locally of low quality, tolerant and not highly sensitive. - the overall effect is likely to be of negligible magnitude and highly localised, with no anticipated effects on the wider water body.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	No footings in watercourse, no loss of habitat	- Shading may have indirect effects on macroinvertebrates (if macrophyte cover is lost) - the invertebrate community is locally of low quality, tolerant and not highly sensitive. - the overall effect is likely to be of negligible magnitude and highly localised, with no anticipated effects on the wider water body.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	No footings in watercourse, no loss of habitat	- Shading may have indirect effects on macroinvertebrates (if macrophyte cover is lost) - the invertebrate community is locally of low quality, tolerant and not highly sensitive. - overall effect is likely to be of negligible magnitude and highly localised, with no anticipated effects on the wider water body.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrates and reduce the habitats available for colonisation within the culvert. - There are no data on macroinvertebrates in this tributary, but ~~wallower survey data indicated that the watercourse at this location is of poor value for macroinvertebrates.~~ given the relative contribution of this minor tributary of the Itchen immediate vicinity of the culvert on this element at a water body level. - Embedded mitigation measures that are proposed will reduce some of the adverse effects on this element (notably improvements along watercourse either side of the culvert). - It is important that the culvert is positioned so that natural habitat substrate can deposit.	Shading may have indirect effects on macroinvertebrates (if macrophyte cover is lost) These are likely to be negligible and given the relative importance of this small tributary of the River Itchen, with no anticipated effects on the wider water body.	Localised changes in flow dynamics (potential increased flow due to the straightened channel in the culvert) may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediately downstream). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	No upstream water body	The River Itchen does not currently have a WFD status for fish and is not known to be monitored for this element. - Itchen is a designated salmonid river, although no salmonid species were identified during the baseline survey. - ~~This will lead to the loss of habitat and rivers is the potential for barriers to~~ There would only be minor and localised effects from culverting the tributary of the Itchen, as there would be no loss of habitat, no barriers to upstream migration and no ~~potential fish migration from proposed culverting of a tributary of the Itchen.~~ - The overall effect ~~is of~~ anticipated ~~potential to~~ lead to a deterioration in status of fish at the level of the water body, ~~if not mitigated.~~ CHANGED FROM AMBER TO YELLOW	- The mitigation measures proposed (notably the design of the culvert to allow for fish passage) will mitigate for the potential deterioration identified. - The overall effect is likely to be neutral or have a minor and highly localised adverse effect, not affecting overall status.
4. Fish	-	-	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). However, effects are likely to be temporary and localised with no impact on the water body as a whole or designated salmonid fishery.	No footings in watercourse, no loss of habitat	Shading will only have negligible or no effects on fish.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - Effects are likely to be temporary and localised with no impact on the water body as a whole or designated salmonid fishery	No footings in watercourse, no loss of habitat	Shading will only have negligible or no effects on fish.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - Effects are likely to be temporary and localised with no impact on the water body as a whole or designated salmonid fishery	No footings in watercourse, no loss of habitat	Shading will only have negligible or no effects on fish.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - Effects are likely to be temporary and localised with no impact on the water body as a whole or designated salmonid fishery - Embedded mitigation measures that are proposed will reduce some of the adverse effects on this element (notably improvements along watercourse either side of the culvert). - It is important that the culvert is positioned so that natural habitat substrate can deposit.	- Landtake is unlikely to result in direct mortality of fish but there will be direct loss of fish habitats available for colonisation within the culvert. - There are no detailed fish survey data ~~on fish on fish habitat~~ in this tributary, but the ~~wallower survey stated that the tributary is of poor habitat for fish in the areas surveyed (some area inaccessible) and nearby River Itchen is not of significant importance to fish.~~ - River Itchen is of high importance to fish. - Embedded mitigation measures that are proposed will reduce some of the adverse effects on this element (notably improvements along watercourse either side of the culvert). - It is important that the culvert is positioned so that natural habitat substrate can deposit.	Shading will only have negligible or no effects on fish.	- Localised changes in flow dynamics (potential increased flow due to the straightened channel in the culvert) may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediately downstream). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal. - Localised changes in flow dynamics (potential increased flow due to the straightened channel in the culvert) may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediately downstream) and nearby River Itchen is not of significant importance to fish. ~~- However, given that the tributary forms part of a culvert-dominated urban watercourse, the potential for significant fish migration from proposed culverting of a tributary of the Itchen, a quality element of the overall River Itchen water body, cannot be a proportionate approach due to the element of sufficient baseline data.~~ - Therefore, only minor adverse effects are anticipated. - However, it is important that mitigation measures are considered so that the culvert is designed and positioned so to allow for fish passage. CHANGED FROM AMBER TO YELLOW	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	No upstream water body				

Physico-Chemical status

5. Dissolved Oxygen	Poor	-	N/A	N/A	• Some shading with negligible/no effect.	• GLCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• GLCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	• Some shading with negligible/no effect.	• GLCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• GLCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	• Some shading with negligible/no effect.	• GLCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• GLCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact in dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• GLCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• GLCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	No upstream water body	Implementation of GLCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed in accordance with the Design Manual for Roads and Bridges standard HD 45/09. As this is not possible (i.e. over a floodplain or watercourse) and unobstructed discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	No additional mitigation required	No additional mitigation required	No significant impacts predicted
6. pH	High	-	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No upstream water body				
7. Phosphate	Moderate	-	N/A	N/A	N/A	Unlikely an open span bridge, so there would be no	• GLCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate	N/A	N/A	N/A	Unlikely an open span bridge, so there would be	• GLCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	N/A	N/A	Unlikely an open span bridge, so there would be	• GLCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	N/A	N/A	Receptor is insensitive to impact	• GLCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	No upstream water body				
8. Ammonia	High	-	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No upstream water body				
9. Temperature	-	-	N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact in water temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No upstream water body				
10. Specific Pollutants (Annex VIII)	High	-	N/A	N/A	N/A	• GLCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• GLCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	N/A	N/A	• GLCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• GLCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	N/A	N/A	• GLCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• GLCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	N/A	N/A	Receptor is insensitive to impact	• GLCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• GLCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	No upstream water body				

Hydromorphological status

																										Hydromorphology Baseline
11. Quantity and dynamics of river flow	-	-	N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant plantform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant plantform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant plantform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	N/A	N/A	N/A	• The survey walkover report show that the channel was larger than approximately 1.5m to 1m with depth from 0.1 to 0.2m with a deep fine layer of fine sediment suggesting there is unlikely to be significant erosion occurring at that time. • Out of bank flows through the culvert and culvert inverts would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • Feature is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	No upstream water body					
12. Connection to Groundwater	-	-	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	No upstream water body				
13. River continuity	-	-	N/A	N/A	N/A	• Crossing design means there will be no footings in the watercourse and no impact on fish passage. Footpaths would not interrupt continuity. • The crossing is near the existing A425 crossing, but the new viaduct would be unlikely to result in a significant cumulative impact	N/A	N/A	N/A	N/A	• Crossing design means there will be no footings in the watercourse and no impact on fish passage. Footpaths would not interrupt continuity. • Embankments set back from the channel could reduce floodplain connectivity at extreme flows, but this is unlikely to be significant	N/A	N/A	N/A	N/A	• Crossing design means there will be no footings in the watercourse and no impact on fish passage. Footpaths would not interrupt continuity. • Embankments set back from the channel could reduce floodplain connectivity at extreme flows, but this is unlikely to be significant	N/A	N/A	N/A	N/A	• The culvert could disconnect existing floodplain connectivity in areas, the survey reports that the bank height varies from approximately 0.2m to 1.5m. The culvert would effectively lower any existing bank or riparian habitat by 1.5m. This is likely to be significant in practical terms would not impact on deterioration of water body status	N/A	No upstream water body	• Viaducts would have no significant impacts • It is fully acknowledged that the culvert would be detrimental to a minor watercourse, but this is unlikely to be significant at water body scale. The scheme would ensure that the overall ecological status of the River Itchen would not be affected. The size of the culvert relative to the watercourse would minimise any effects on hydromorphology. Continuity of hydromorphology and physical habitats would be negatively affected, but the crossing is near the upstream end of a first order stream so only a very minor extent of open watercourse habitat would cut off from the rest of the water body. Mitigation measures such as creation of compensatory habitats (e.g. bank reprofiling, bank reinforcement and gravel weirs) would also help to offset the impacts of the culvert. An open span bridge crossing would not be cost proportionate and may not be technically feasible because of the embankment.	No additional mitigation is required for viaducts. Incorporate hydromorphological measures into detailed design where practicable. Mitigation measures may include: • Create compensation habitats • Bank reprofiling (rehabilitation) • Introduce riparian vegetation/green corridors where space allows • Use soft engineering techniques	Minor and localised effects	• Baseline Surveys WFD-HM1-0010 and WFD-PA1-0010 indicate that near the side of the crossing, there is very low flow, with evidence of fine sediment deposition along the unvegetated margins and along the bed, although with some coarser material present. The channel is characterised by a straight form except for a limited extent around some woody debris. The entire reach shows evidence of having been reactivated. The system appears to aggrading with some signs of erosion during the survey. • Hydromorphology baseline data derived from desk study of maps and aerial photographs. The assessment of impacts is proportional to the type of crossings, the scale of the water/courses and their significance to the overall water body.	-
14. River depth and width variation bed	-	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A			
15. Structure and substrate of river bed	-	-	N/A	N/A	N/A	• The survey indicated that the channel is dominated by fine sediment and is relatively aggrading. The impact resulting from the viaduct is likely to be minor. • Crossing design is effectively an open span bridge, so there would be no impact on the channel bed	N/A	N/A	N/A	N/A	• The survey indicated that the channel was dominated by fine sediment and is relatively aggrading. The impact resulting from the viaduct is likely to be minor. • Crossing design is effectively an open span bridge, so there would be no impact on the channel bed	N/A	N/A	N/A	N/A	• The survey indicated that the channel was dominated by fine sediment and is relatively aggrading. The impact resulting from the culvert is likely to be minor. • Crossing design is effectively an open span bridge, so there would be no impact on the channel bed	N/A	N/A	N/A	N/A	→ The survey walkover report indicated that the channel has significant fine sediment aggradation, so there is unlikely to be bed substrate transport or scour. • If the culvert cuts off floodplain flows and thereby increases flow rates through the culvert, it is possible that some fine sediments could be flushed through the culvert which could improve bed structure. However survey evidence suggests this would not be a major morphological gain. • If the culvert base is set below the channel bed, the impacts on natural sediment conveyance along the bed should be minimal.	N/A	No upstream water body					
16. Structure of riparian zone	-	-	N/A	N/A	N/A	• Footings in the riparian zones would require minor land take but not considered to be significant	N/A	N/A	N/A	N/A	• Footings in the riparian zones would require minor land take but not considered to be significant	N/A	N/A	N/A	N/A	• Footings in the riparian zones would require minor land take but not considered to be significant	N/A	N/A	N/A	N/A	→ The culvert would disconnect the channel from the existing wild developed, mature vegetation riparian zone and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms would not impact on deterioration of water body status	N/A	No upstream water body					

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	Abstraction Impoundment Hydrogeology Physical modifications Water quality Invasive species Flow Habitat Other
NONE in Appendix B of RBMP	-	-	-

WFD Baseline Survey Details

Water Body ID		GB109054044070		
Surface Water Body Name		River Itchen - source to confluence with River Stowe		
Scheme Element		**River Diversion and Culvert - Culvert 122-S1**	**OVERALL EFFECT**	**RESIDUAL EFFECT**
Surface Water Crossing ID		**CFA16-SW-004**		
Survey Site		Unnamed Tributary of River Itchen, east of Ladbroke		
Survey ID		WFD-PA1-0033		
Objectives of the Survey		• Assess ecological habitat type. In particular for fish. • Assess the local hydromorphology		
Survey Scope		Ecological Walkover Survey Hydromorphological Survey		
Medium Term Survey Results Summary	**Bio**	Tributary is resectioned and realigned at WFD-PA1-0033, heavily shaded, part of a drainage ditch system. It has very low flows and substrate diversity and no in-channel vegetation was recorded. Not considered to support good habitat diversity for macrophytes, fish and macroinvertebrates.		
	Phys	At survey point WFD-PA1-0033 the watercourse observed was a drainage ditch completely shaded (>70%), of low flow and slightly turbid.		
	Hydro	Baseline Surveys WFD-HM1-0033 and WFD-PA1-0033 indicate that near the site of the crossing, there is very low flow, with evidence of fine sediment deposition along the unvegetated margins and along the bed, although some gravels were visible. Overall there was little in-channel flow or bed diversity except for a limited extent around some woody debris. The entire reach shows evidence of having been resectioned. The system appears to aggrading with no signs of erosion during the survey.		

Audit Trail for the Update of the WFD Water Body Assessment with Baseline Data

		Nature of the Assessment Update and Justification		
	WFD Classification Elements Changed	**River Diversion and Culvert - Culvert 122-S1 (CFA16-SW-004)**	**OVERALL IMPACT**	**RESIDUAL EFFECT**
Biological	**2. Macrophytes and phytobenthos - macrophytes**	Other than minor changes to wording (to reflect the new survey data available) no changes made to the assessment. Updated baseline data provide greater confidence in the previous assessment outcome.	No change in overall impact.	No change in residual effect.
	3. Macroinvertebrates	Other than minor changes to wording (to reflect the new survey data available) no changes made to the assessment. Updated baseline data provide greater confidence in the previous assessment outcome.	No change in overall impact.	No change in residual effect.
	4. Fish	Given the poor quality habitat for fish in the tributary the assessment has been changed from 'amber' to 'yellow' to reflect that an impact at the level of the waterbody is not anticipated.	AMBER TO YELLOW. The overall effect is not anticipated potential to lead to a deterioration in status of fish at the level of the water body	No change in residual effect.
Physico-Chemical	**5. Dissolved Oxygen**	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	6. pH	No assessment update required. Receptor remains insensitive to impact.	No change in overall impact.	No change in residual effect.
	7. Phosphate	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	8. Ammonia	No assessment update required. Receptor remains insensitive to impact.	No change in overall impact.	No change in residual effect.
	9. Temperature	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	10. Specific Pollutants (Annex VIII)	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
Hydromorphological	**11. Quantity and dynamics of river flow**	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	12. Connection to Groundwater	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	13. River continuity	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	14. River depth and width variation bed	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	15. Structure and substrate of river bed	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	16. Structure of riparian zone	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Capper Lane Viaduct CFA22-SW-062					Swinfen Cutting		Impacts from other WFD water bodies (assessed separately)	OVERALL impact on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB104028047020			Description of scheme element impact	Approximately 250m long viaduct over Capper Lane and disused Wyrley Essington canal with footings close to banks edge.					Cutting may interrupt groundwater flows and lead to the transfer of water from East Litchfield catchment to Black Bourne Brook catchment .							
East Litchfield catchment - tributary of Tame	Moderate	Good Ecological Status by 2027	Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.			Construction	Operation		
WFD classification elements			Predicted change to status elements (green = none, amber = possibly, red = likely)													
1.Macrophytes and phytobenthos - diatoms	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
2. Macrophytes and phytobenthos - macrophytes	-	-		Receptor is insensitive to impact	The footings will not be in the watercourse.	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. ~~There were no baseline macrophyte data available, however.~~ The macrophyte communities area limited and there would be a minor and highly localised effect on this minor tributary, which would not affect the status of this quality element.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- The water body does not currently have a WFD status for macrophytes and is no data were collected on macrophytes within the watercourse as part of the baseline surveys - Given that the likely loss in flow through the whole length of the catchment, it is possible that there will be a deterioration of the macrophyte WFD element.	Minor and localised effects, no change in WFD class of element.	No impacts from other WFD water bodies anticipated.	- The water body does not currently have a WFD status for macrophytes and is not known to be monitored for this element. - No data were collected on macrophytes within the watercourse as part of the baseline surveys - Although the scheme will lead to loss of habitat and photosynthetic activity (in shaded areas) on a minor tributary, this is relatively minor within the context of the water body. - It is possible that the changes to flow will lead to the deterioration of this WFD element, while other effects (e.g. due to a viaduct crossing on a minor tributary), will be minor and localised.	None required.	None required.	Potential widespread or prolonged adverse effects	-
3. Macroinvertebrates	-	-		Receptor is insensitive to impact	As above	- Shading may have indirect effects on macroinvertebrates (if macrophyte cover is lost), but the overall effect is likely to be negligible.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- The water body does not currently have a WFD status for macroinvertebrates but data collected on macroinvertebrates within the watercourse as part of the baseline surveys indicated that macroinvertebrates present were indicative of good biological quality, but also indicative of sedimented conditions. - Given that the likely loss in flow through the whole length of the catchment, it is possible that there will be a deterioration of the macroinvertebrate WFD element.	Minor and localised effects, no change in WFD class of element.	No impacts from other WFD water bodies anticipated.	- The water body does not currently have a WFD status for macroinvertebrates and is not known to be monitored for this element. - Data collected on macroinvertebrates within the watercourse as part of the baseline surveys indicated that macroinvertebrates present in the affected tributary were indicative of good biological quality, but also indicative of sedimented conditions. - It is possible that the changes to flow will lead to the deterioration of this WFD element, while other effects (e.g. due to a viaduct crossing on a minor tributary), will be minor and localised.	None required.	None required.	Potential widespread or prolonged adverse effects	-
4. Fish	-	-		Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). However, effects are likely to be temporary and localised with no impact on the water body as a whole.	As above	Shading will only have negligible or no effects on fish.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- The water body does not currently have a WFD status for fish but baseline data collected on fish indicated only minor species were present, with limited fish habitat present. - Although there will a loss in flow, the fish community is relatively poor and tolerant to changes in flow. ~~Therefore effects are considered to be minor and localised.~~ However, as the whole length of the waterbody may be affected it is considered possible that this will affect the WFD status of fish for this WFD waterbody.	Minor and localised effects, no change in WFD class of element.	No impacts from other WFD water bodies anticipated.	- The water body does not currently have a WFD status for fish and is not known to be monitored for this element. It is not a designated cyprinid or salmonid river. - Baseline data collected on fish in the crossed tributary indicated only minor species were present, with limited fish habitat present. - The scheme may lead to temporary construction effects on a minor tributary and changes to flow. - It is possible that the changes to flow will lead to the deterioration of this WFD element, while other effects (e.g. due to a viaduct crossing on a minor tributary), will be minor and localised.	None required.	None required.	Potential widespread or prolonged adverse effects	-
Physico-Chemical status																
WFD classification elements			Predicted change to status elements (green = none, amber = possibly, red = likely)													
5. Dissolved Oxygen	Good	-		N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	Minor and localised effects, no change in WFD class of element.	No impacts from other WFD water bodies anticipated.	Potential minor and localised effects on element.	None required.	None required.	Minor and localised effects	-
6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No impacts from other WFD water bodies anticipated.	Receptor is insensitive to impact			No significant effects	-
7. Phosphate	Bad	-		N/A	N/A	N/A	ely an open span bridge, so there would b	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	Minor and localised effects, no change in WFD class of element.	No impacts from other WFD water bodies anticipated.	Depending on how much flow is lost, potential minor and localised effects on element. Five sewage discharge consents on tributaries of East Litchfield. The phosphate status cannot be deteriorated any further than 'Bad', therefore this effect will be presented in the prevention to future good status assessment.			Minor and localised effects	-
8. Ammonia	Good	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Minor and localised effects, no change in WFD class of element.	No impacts from other WFD water bodies anticipated.	Potential minor and localised effects on element.			Minor and localised effects	-
9. Temperature	High	-		N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No impacts from other WFD water bodies anticipated.	Receptor is insensitive to impact			No significant effects	-
10. Specific Pollutants (Annex VIII)	-	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Minor and localised effects, no change in WFD class of element.	No impacts from other WFD water bodies anticipated.	Potential minor and localised effects on element.			Minor and localised effects	-
Hydromorphological status																**Hydromorphology Baseline**
WFD classification elements			Predicted change to status elements (green = none, amber = possibly, red = likely)													
11. Quantity and dynamics of river flow	-	-		N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	• Potential reduction in channel flows for the whole length of East Litchfield catchment • Existing status is moderate partly due to abstraction • Further reduction of flows could be detrimental to hydrodynamics in terms of reduced flow rates and velocities, turbulence and mixing, water depths, wetted areas	N/A	No impacts from other WFD water bodies anticipated.	• Unlikely to be any impact from the viaduct which is effectively an open span bridge • The cutting could sever base flow to the whole East Litchfield watercourse, which would decrease flow rates with negative effects on hydrodynamics, sedimentation and wetted habitats • The available survey data suggest that the water body already has high rates of sedimentation, so if the cutting reduces groundwater inflows, any resultant impacts on hydromorphology could have significant impacts	~~Undertake hydromorphological surveys to aid detailed design development.~~ Incorporate hydromorphological mitigation measures into detailed design where practicable. Mitigation measures might include: • Create low flow channels in over-widened/over-deepened channels • Create reed fringes • Creation of shallow margin in front of hard defence • Establish in-field sediment buffer strips • Implementation of SUDS • Retain marginal vegetation		• Decreased quantity and dynamics of flow	~~• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.~~ The baseline survey indicates that up- and downstream of the proposed crossing the river banks and channel have been completely resectioned and realigned, constraining natural processes. Both up- and downstream the river flows through a variety of environments that include newly realigned sections (leaving existing channels dry) and reaches with clean gravels. Further upstream there is a reach with trapezoidal and mowed grass banks, and further upstream again the channel has more floodplain connectivity that supports emergent aquatic flora and wet woodland with good flow diversity.
12. Connection to Groundwater	-	-		N/A	N/A	N/A		N/A	• Cutting may decrease base flow base flow, with impacts to all hydromorphological properties	N/A	No impacts from other WFD water bodies anticipated.				• Reduced groundwater inflow	
13. River continuity	-	-		N/A	N/A	N/A		N/A	• Hydraulic effects would be catchment wide. Combination of inevitable increase in sediment due to construction and reduced flows could be detrimental to bed habitat continuity and species migration	N/A	No impacts from other WFD water bodies anticipated.				• Decreased continuity	
14. River depth and width variation bed	-	-		N/A	N/A	N/A		N/A	• Reduction of flows could decrease flow depth, wetted perimeter and hydraulic radius in a catchment that is already hydraulically modified	N/A	No impacts from other WFD water bodies anticipated.				• Decreased flow depths, and possible need to narrow base channel width as a result	
15. Structure and substrate of river bed	-	-		N/A	N/A	N/A		N/A	• Decreased flow rates could increase sedimentation of bed habitats	N/A	No impacts from other WFD water bodies anticipated.				• Increased sedimentation	
16. Structure of riparian zone	-	-		N/A	N/A	N/A		N/A	• Hydraulic connectivity with riparian zones could be decreased if flows are reduced	N/A	No impacts from other WFD water bodies anticipated.				• Reduced hydraulic connectivity to riparian zone	

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen													
None listed in RBMP. Reasons for failure include the following:	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-
A1a - Ammonia	-	-		-	-	-	-	-	-	-	-	No effect	-	-	No significant effects	-
P1a - Phosphate or Total Phosphate	-	-		-	-	-	-	-	-	-	-	No effect	-	-	No significant effects	-
HR4a - Hydrology (Abstraction	-	-		-	-	-	-	-	-	-	-	River diversions will be designed to replicate existing hydromorphological conditions and therefore the scheme is not considered to prevent implementation of future measures to address this failure	-	-	No significant effects	-

WFD Baseline Survey Details

Water Body ID		GB104028047020			
Surface Water Body Name		East Litchfield catchment - tributary of Tame			
Scheme Element		**Swinfen Cutting**	**Capper Lane Viaduct**	**OVERALL EFFECT**	**RESIDUAL EFFECT**
Surface Water Crossing ID		**N/A**			
Survey Site		Fisherwick Brook, west of Cappers Lane	Fisherwick Brook, viaduct over Capper Lane and disused Wyrley Essington canal with footings close to banks edge.		
Survey ID		WFD-PA1-0043, WFD-GW1-0009	WFD-PA1-0043, WFD-GW1-0009		
Objectives of the Survey		• Assess ecological habitat type. • Assess the local hydromorphology • Refine understanding of GW-SW interactions	• Assess ecological habitat type. • Assess the local hydromorphology • Refine understanding of GW-SW interactions		
Survey Scope		Ecological Walkover Survey Hydromorphological Survey Hydrological survey of flows/levels at springs / tributaries feeding East Litchfield catchment and Black Brook Corridor.	Ecological Walkover Survey Hydromorphological Survey Hydrological survey of flows/levels at springs / tributaries feeding East Litchfield catchment and Black Brook Corridor.		
Medium Term Survey Results Summary	**Bio**	At WFD-PA1-0043, the location of the proposed crossing, the watercourse was a resectioned and realigned channel. It was overgrown with marginal macrophyte species and there was also in channel submerged macrophytes, the non-native Elodea, Habitats at this location were limited for other species. Further upstream, there was more natural habitat, with greater microhabitat and substrate diversity, including good macroinvertebrate habitat. No detailed biological data provided.	At WFD-PA1-0043, the location of the proposed crossing, the watercourse was a resectioned and realigned channel. It was overgrown with marginal macrophyte species and there was also in channel submerged macrophytes, the non-native Elodea, Habitats at this location were limited for other species. Further upstream, there was more natural habitat, with greater microhabitat and substrate diversity, including good macroinvertebrate habitat. No detailed biological data provided.		
	Phys	The watercourse observed at survey point WFD-PA1-0043 was a low flowing drainage channel, with no shading and good water clarity. At survey point WFD-GW1-0009 a large lake and a water course were observed. The flows from the large lake could not be estimated. A water control system exists on site to keep water levels below ground surface. The large lake is likely to be groundwater dependent, there is minimal flow of surface water to the lake from an upstream source. A flow velocity of 0.004 m3/s was recorded on 29/07/2014 11:40 from the watercourse downstream of the lake (SK14285,05732). The flow from the upstream watercourse is described as very low, but is not quantified.	The baseline survey indicates that up- and downstream of the proposed crossing the river banks and channel have been completely resectioned and realigned, constraining natural processes. Both up- and downstream the river flows through a variety of environments that include newly realigned sections (leaving existing channels dry) and reaches with clean gravels. Further upstream there is a reach with trapezoidal and mowed grass banks, and further upstream again the channel has more floodplain connectivity that supports emergent aquatic flora and wet woodland with good flow diversity.		
	Hydro	The baseline survey indicates that up- and downstream of the proposed crossing the river banks and channel have been completely resectioned and realigned, constraining natural processes. Both up- and downstream the river flows through a variety of environments that include newly realigned sections (leaving existing channels dry) and reaches with clean gravels. Further upstream there is a reach with trapezoidal and mowed grass banks, and further upstream again the channel has more floodplain connectivity that supports emergent aquatic flora and wet woodland with good flow diversity.	The baseline survey indicates that up- and downstream of the proposed crossing the river banks and channel have been completely resectioned and realigned, constraining natural processes. Both up- and downstream the river flows through a variety of environments that include newly realigned sections (leaving existing channels dry) and reaches with clean gravels. Further upstream there is a reach with trapezoidal and mowed grass banks, and further upstream again the channel has more floodplain connectivity that supports emergent aquatic flora and wet woodland with good flow diversity.		

Audit Trail for the Update of the WFD Water Body Assessment with Baseline Data

		Nature of the Assessment Update and Justification			
	WFD Classification Elements Changed	**Swinfen Cutting**	**Capper Lane Viaduct**	**OVERALL IMPACT**	**RESIDUAL EFFECT**
Biological	**2. Macrophytes and phytobenthos - macrophytes**	Minor changes to wording, no change in assessment.	Minor changes to wording, no change in assessment.	No change in overall impact.	No change in residual effect.
	3. Macroinvertebrates	Minor changes to wording, no change in assessment.	Minor changes to wording, no change in assessment.	No change in overall impact.	No change in residual effect.
	4. Fish	Minor changes to wording, no change in assessment.	Minor changes to wording, no change in assessment.	No change in overall impact.	No change in residual effect.
Physico-Chemical	**5. Dissolved Oxygen**	The effect of this Scheme Element (Cutting) on the Dissolved Oxygen WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of the cutting remains unchanged. The cutting may interrupt groundwater flows and lead to the transfer of water from East Litchfield catchment to Black Bourne Brook catchment. Change will significantly affect the whole length of East Litchfield catchment, which is currently moderate due to abstraction, leading to depleted reaches of river flow on the watercourse, and thus reducing turbulence and oxygenation.	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	6. pH	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No change in overall impact.	No change in residual effect.
	7. Phosphate	The effect of this Scheme Element (Cutting) on the Phosphate WFD element remains AMBER. A precautionary approach has been applied due to the limited nature of the surveys. The impact of the cutting remains unchanged. The cutting may interrupt groundwater flows and lead to the transfer of water from East Litchfield catchment to Black Bourne Brook catchment. Change will significantly affect the whole length of East Litchfield catchment, which is currently moderate due to abstraction, leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including phosphate.	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	8. Ammonia	The effect of this Scheme Element (Cutting) on the Ammonia WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of the cutting remains unchanged. The cutting may interrupt groundwater flows and lead to the transfer of water from East Litchfield catchment to Black Bourne Brook catchment. Change will significantly affect the whole length of East Litchfield catchment, which is currently moderate due to abstraction, leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including ammonia.	No assessment update required. Receptor remains insensitive to impact.	No change in overall impact.	No change in residual effect.
	9. Temperature	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	10. Specific Pollutants (Annex VIII)	The effect of this Scheme Element (Cutting) on the Specific Pollutants WFD element remains YELLOW. A precautionary approach has been applied due to the limited nature of the surveys. The impact of the cutting remains unchanged. The cutting may interrupt groundwater flows and lead to the transfer of water from East Litchfield catchment to Black Bourne Brook catchment. Change will significantly affect the whole length of East Litchfield catchment, which is currently moderate due to abstraction, leading to depleted reaches of river flow on the watercourse, and thus increasing concentrations of resident contaminants, including specific pollutants.	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
Hydromorphological	**11. Quantity and dynamics of river flow**	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	12. Connection to Groundwater	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	13. River continuity	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	14. River depth and width variation bed	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	15. Structure and substrate of river bed	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	16. Structure of riparian zone	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No assessment update required. Non-temporary and temporary impacts remain unchanged.	No change in overall impact.	No change in residual effect.

GB70910212

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Viaduct - Cappers Lane Viaduct (footings in or within riparian zone of watercourse)					Cutting and viaducts GW/SW interaction -		Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	-
GB70910212			Description of scheme element impact	Cappers Lane Viaduct - Canal Tunnel (disused) Wryley and Essington Canal at Cappers Lane) connected to Coventry and Ashby Canals (active and <50m away)					Cuttings and scheme elements in vicinity of Coventry and Ashby canal - receptor assessed as unlikely to be groundwater							
Coventry and Ashby Canals	Good	Good Ecological Potential by 2015	Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.			Construction	Operation		
WFD classification elements																
1.Macrophytes and phytobenthos - diatoms	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
2. Macrophytes and phytobenthos - macrophytes	-	-		- Receptor is insensitive to impact.	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats.	- Baseline surveys indicate limited channel macrophyte communities in the canal. - There may be minor changes in the cover and composition of macrophyte communities, but this is not considered to be greater than a minor localised change.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	No effects anticipated	No effects anticipated	None identified	Only minor and localised effects anticipated, no effect on WFD element	None required.	None required.	N/A	-
3. Macroinvertebrates	-	-		- Receptor is insensitive to impact.	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats which may be important for macroinvertebrates.	- Macroinvertebrate community (no baseline data available) may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	No effects anticipated	No effects anticipated	None identified	Only minor and localised effects anticipated, no effect on WFD element	None required.	None required.	N/A	-
4. Fish	-	-		- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). - There were no baseline fish surveys, but fish habitat assessment indicated poor fish habitat quality in the canal. - Effects are likely to be temporary and localised.	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats.	- No likely effects on fish.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	No effects anticipated	No effects anticipated	None identified	Only minor and localised effects anticipated, no effect on WFD element	None required.	None required.	N/A	-
Physico-Chemical status																
WFD classification elements																
5. Dissolved Oxygen	Good	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	No effects anticipated	No effects anticipated	None identified	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	N/A	-
6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No effects anticipated	No effects anticipated	None identified					-
7. Phosphate	High	-		N/A	N/A	N/A	- is effectively an open span bridge, so there would be no impa	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	No effects anticipated	No effects anticipated	None identified					-
8. Ammonia	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No effects anticipated	No effects anticipated	None identified					-
9. Temperature	-	-		N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	No effects anticipated	No effects anticipated	None identified					-
10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	No effects anticipated	No effects anticipated	None identified					-
Hydromorphological status																**Hydromorphology Baseline**
WFD classification elements																
11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	No effects on hydromorphology anticipates, due to insignificant changes in hydromorphological regime.	N/A	N/A	N/A	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
12. Connection to Groundwater	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A		N/A	N/A		
13. River continuity	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A		N/A	N/A		
14. River depth and width variation bed	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A		N/A	N/A		
15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A		N/A	N/A		
16. Structure of riparian zone	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A		N/A	N/A		

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	-		-	-	-	-	-	-	-	-	-	-	-	-
Manage disturbance	-	In Place	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Possible minor/localised effects.	N/A	N/A	N/A	N/A
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	-	In Place		Some loss of bankside habitat due to construction of viaduct					N/A	N/A	N/A	Some loss of bankside habitat due to construction of viaduct	None required.	None required.	N/A	N/A
Avoid the need to dredge (e.g. minimise under-keel clearance; use fluid mud navigation; flow manipulation or training works)	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Prepare a dredging / disposal strategy	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Reduce impact of dredging	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Reduce sediment resuspension	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Alter timing of dredging / disposal	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bank rehabilitation / reprofiling	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Possible localised effects (footings near to banks at viaduct)	None required.	None required.	N/A	N/A
Site selection (dredged material disposal) (e.g. avoid sensitive sites)	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Awareness raising / information boards (boat wash / sources of fine sediment)	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Phased de-watering and other techniques	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Selective vegetation control regime	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Appropriate vegetation control technique	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Appropriate timing (vegetation control)	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Appropriate techniques (invasive species)	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Modify vessel design	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vessel Management	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sediment management	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Water Body ID	GB70910212
Surface Water Body Name	Coventry and Ashby Canals
CFAs covered by Waterbody	

CFA	22
AP2 ID	AP-C223-103
AP2 Name	Revised vertical alignment at Streethay
AP2 Location	Parish of Fradley & Streethay Parish of Lichfield
New/Replacement Scheme Element	NEW
Scheme Element Type	Viaducts, Embankments, Retained Cut, Cuttings, Underbruidges, Road Realignment
Original Scheme	Wood End Lane realigned to pass under HS2 to south of junction; drainage pumping station needed. Shaw Lane closed just south of Handsacre junction. Fulfen Wood stream passes under embankment in culvert at 184+200. Mare Brook passes under embankment in culverts at 185+600 and 186+200. False cutting earthworks included to south of Cappers Lane, to north of A38, by T&M Canal and by Shaw Lane. Lower slopes of embankments regraded to north of Cappers Lane, with noise barrier fences along embankment north to 184+200. Planting included on regraded earthworks and most of outer slopes of false cuttings. Large ecological compensation area on west side to north of Streethay. Large quantities of import for engineering and environmental fill require provision of Streethay construction sidings between A38 and route, with reception sidings to east alongside SSL and rail connection on temp bridge over Coventry Canal. Fulfen Wood stream culverted under sidings
AP2 Description	Further land and rights are required to enable the vertical realignment of the HS2 where it crosses the A38 and the Trent and Mersey Canal. The vertical alignment of the railway (where it currently crosses over the A38, SSRL and WCML) is proposed to be lowered to pass under the transport corridors. This would delete the 16m high embankments (extending approximately 3km), lowering the railway into cutting with a maximum localised depth of 18m half way between the WCML crossing and the A38/SSRL crossing. **Drawings indicate a diversion of a branch of the Coventry Canal (formerly Wyrley and Essington Canal).**
AP2 Changes to Previously Assessed Elements	None
AP2 Additional Elements Assessment Requirement	Canal Diversion

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Viaduct - Cappers Lane Viaduct (footings in or within riparian zone of watercourse)						Cutting and viaducts GW/SW interaction -		CANAL DIVERSION - Revised vertical alignment at Streethay - AP-C223-103			Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	-
GB70910212			Description of scheme element impact	Cappers Lane Viaduct - Canal Tunnel (disused) Wryley and Essington Canal at Cappers Lane) connected to Coventry and Ashby Canals (active and <50m away)						Cuttings and scheme elements in vicinity of Coventry and Ashby canal - receptor assessed as unlikely to be groundwater		Drawings indicate a diversion of a branch of the Coventry Canal (formerly Wyrley and Essington Canal) associated with Cappers Lane Viaduct. The canal to the west of HS2 is currently abandoned and not in use, canal currently ends at Cappers Lane. Diversion would result in both parts of the								
Coventry and Ashby Canals	Good	Good Ecological Potential by 2015	Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream		OVERALL effect on element	Construction	Operation		
WFD classification elements			Predicted change to status elements (green = none, amber = possibly, red = likely)																	
1.Macrophytes and phytobenthos - diatoms	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
2. Macrophytes and phytobenthos - macrophytes	-	-		- Receptor is insensitive to impact.	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats.	- Baseline surveys indicate limited channel macrophyte communities in the canal. - There may be minor changes in the cover and composition of macrophyte communities, but this is not considered to be greater than a minor localised change.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	No effects anticipated	No effects anticipated	There will be loss of marginal and channel macrophytes over the length of the existing Coventry Canal that lies within the diverted section. Baseline surveys indicate limited channel macrophyte communities in the canal. Potential temporary adverse effect while the new channel re-establishes.	Potential beneficial effects likely to be offset by site constraints of maintaining a navigable canal. Negligible effect anticipated.	No anticipated effects, due to insignificant changes in hydromorphological regime.	None Identified	- Only minor and localised effects anticipated, no effect on WFD element. The addition of the canal diversion as part of AP2 design, while contributing slightly to the overall impact, is only likely to lead to localised and temporary adverse effects and therefore, no there is no change in the overall effect on this quality element, with no change in status of this element at the level of the waterbody.	None required.	None required.	N/A	-
3. Macroinvertebrates	-	-		- Receptor is insensitive to impact.	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats which may be important for macroinvertebrates.	- Macroinvertebrate community (no baseline data available) may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	No effects anticipated	No effects anticipated	There will be loss of macroinvertebrate habitat over the length of the existing Coventry Canal that lies within the diverted section. No baseline data available for macroinvertebrates. Potential temporary adverse effect while the new channel re-establishes.	Potential beneficial effects likely to be offset by site constraints of maintaining a navigable canal. Negligible effect anticipated.	No anticipated effects, due to insignificant changes in hydromorphological regime.	None Identified	- Only minor and localised effects anticipated, no effect on WFD element. The addition of the canal diversion as part of AP2 design, while contributing slightly to the overall impact, is only likely to lead to localised and temporary adverse effects and therefore, no there is no change in the overall effect on this quality element, with no change in status of this element at the level of the waterbody.	None required.	None required.	N/A	-
4. Fish	-	-		- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). - There were no baseline fish surveys, but fish habitat assessment indicated poor fish habitat quality in the canal. - Effects are likely to be temporary and localised.	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats.	- No likely effects on fish.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	No effects anticipated	No effects anticipated	There will be loss of fish habitat over the length of the existing Coventry Canal that lies within the diverted section. No baseline data available for fish. Potential temporary adverse effect while the new channel re-establishes.	Potential beneficial effects likely to be offset by site constraints of maintaining a navigable canal. Negligible effect anticipated.	No anticipated effects, due to insignificant changes in hydromorphological regime.	None Identified	- Only minor and localised effects anticipated, no effect on WFD element. The addition of the canal diversion as part of AP2 design, while contributing slightly to the overall impact, is only likely to lead to localised and temporary adverse effects and therefore, no there is no change in the overall effect on this quality element, with no change in status of this element at the level of the waterbody.	None required.	None required.	N/A	-
Physico-Chemical status																				
WFD classification elements			Predicted change to status elements (green = none, amber = possibly, red = likely)																	
5. Dissolved Oxygen	Good	-		N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	No effects anticipated	No effects anticipated	N/A	• The construction of the proposed AP2 canal diversion is predicted to result in no more than a temporary, minor impact on this sub-element. • Release of sediment during construction of new channel may cause a temporary drop in dissolved oxygen. But no change in status is anticipated. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	• The construction of the proposed AP2 canal diversion is predicted to result in no more than a temporary, minor impact on this sub-element. • Release of sediment during construction of new channel may cause a temporary drop in dissolved oxygen. But no change in status is anticipated. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	None Identified	GREEN TO YELLOW. The addition of the canal diversion will contribute slightly to the cumulative impact on this sub-element. A minor overall impact is anticipated, however, will not result in a change in WFD status to this physico-chemical sub-element. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	GREEN TO YELLOW. Minor and localised effects	-
6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No effects anticipated	No effects anticipated	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	None Identified	Receptor is insensitive to impact			Receptor is insensitive to impact	-
7. Phosphate	High	-		N/A	N/A	N/A	is effectively an open span bridge, so there would be no impa	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	No effects anticipated	No effects anticipated	N/A	Receptor is insensitive to impact	• The construction of the proposed AP2 canal diversion is predicted to result in no more than a temporary, minor impact on this sub-element. • Release of sediment during construction of new channel may cause a temporary increase in phosphate levels. But no change in status is anticipated. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	None Identified	GREEN TO YELLOW. The addition of the canal diversion will contribute slightly to the cumulative impact on this sub-element. A minor overall impact is anticipated, however, will not result in a change in WFD status to this physico-chemical sub-element. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.			GREEN TO YELLOW. Minor and localised effects	-
8. Ammonia	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No effects anticipated	No effects anticipated	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	None Identified	Receptor is insensitive to impact			Receptor is insensitive to impact	-
9. Temperature	-	-		N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	No effects anticipated	No effects anticipated	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	None Identified	Receptor is insensitive to impact			Receptor is insensitive to impact	-
10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	No effects anticipated	No effects anticipated	N/A	Receptor is insensitive to impact	• The construction of the proposed AP2 canal diversion is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	None Identified	GREEN TO YELLOW. The addition of the canal diversion will contribute slightly to the cumulative impact on this sub-element. A minor overall impact is anticipated, however, will not result in a change in WFD status to this physico-chemical sub-element. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.			GREEN TO YELLOW. Minor and localised effects	-
Hydromorphological status																				**Hydromorphology Baseline**
WFD classification elements			Predicted change to status elements (green = none, amber = possibly, red = likely)																	
11. Quantity and dynamics of river flow	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	No effects on hydromorphology anticipates, due to insignificant changes in hydromorphological regime • The overall impact on the waterbody has not needed to be updated as a result of the AP2 assessments	N/A	N/A	No significant effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kepc proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
12. Connection to Groundwater	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A		N/A	N/A		
13. River continuity	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A		N/A	N/A		
14. River depth and width variation bed	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A		N/A	N/A		
15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A		N/A	N/A		
16. Structure of riparian zone	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A		N/A	N/A		

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	-																
Maintenance dredging	-	In Place	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	Possible minor/localised effects.	N/A	N/A	N/A	N/A
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	-	In Place		Some loss of bankside habitat due to construction of viaduct					N/A	N/A			N/A	Some loss of bankside habitat due to construction of viaduct	None required.	None required.	N/A	N/A
Avoid the need to dredge (e.g. minimise under-keel clearance; use fluid mud navigation; flow manipulation or training works)	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A
Prepare a dredging / disposal strategy	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A
Reduce impact of dredging	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A
Reduce sediment suspension	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A
Alter timing of dredging / disposal	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A
Bank rehabilitation / reprofiling	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	Possible localised effects (footings near to banks at viaduct)	None required.	None required.	N/A	N/A
Site selection (dredged material disposal) (e.g. avoid sensitive sites)	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A
Awareness raising / information boards (boat wash / sources of fine sediment)	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A
Phased de-watering and other techniques	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A
Selective vegetation control regime	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A
Appropriate vegetation control technique	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A
Appropriate timing (vegetation control)	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A
Appropriate techniques (invasive species)	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A
Modify vessel design	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A
Vessel Management	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A
Sediment management	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A

GB70410142

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Viaduct/Underbridge - Trent and Mersey Canal east viaduct (footings in or within riparian zone of watercourse)					Viaduct/Underbridge - Trent and Mersey Canal west viaduct (footings in or within riparian zone of watercourse)					Underbridge - Trent and Mersey Canal underbridge.					Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation		RESIDUAL effect on element (following any additional mitigation measures)	
GB70410142			Description of scheme element impact	East Viaduct/underbridge over Trent and Mersey Canal (summit to Alrewas) at Fradley Wood (CFA22-SWC-069)					West Viaduct/underbridge over Trent and Mersey Canal (summit to Alrewas) at Wood End Lock (CFA22-SWC-071)					Trent and Mersey Canal underbridge at CFA22-SWC-069 - North Viaduct							Construction	Operation		
Trent & Mersey Canal, summit to Alrewas	Good	Good Ecological Potential by 2015	Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage						
WFD classification elements			Predicted change to status elements (green = none, amber = possibly, red = likely)																					
1.Macrophytes and phytobenthos - diatoms				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
2. Macrophytes and phytobenthos - macrophytes	-	-		- Receptor is insensitive to impact.	No footings in watercourse.	- Baseline surveys indicate limited channel macrophyte communities in the canal. - There may be minor changes in the cover and composition of macrophyte communities, but this is not considered to be greater than a minor localised change.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- Receptor is insensitive to impact.	No footings in watercourse.	- Baseline surveys indicate limited channel macrophyte communities in the canal. - There may be minor changes in the cover and composition of macrophyte communities, but this is not considered to be greater than a minor localised change.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- Receptor is insensitive to impact.	No footings in watercourse.	- Baseline surveys indicate limited channel macrophyte communities in the canal. - There may be minor changes in the cover and composition of macrophyte communities, but this is not considered to be greater than a minor localised change.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	None identified	Only minor and localised effects anticipated, no effect on WFD element	None required.	None required.	-	
3. Macroinvertebrates	-	-		- Receptor is insensitive to impact.	No footings in watercourse.	- Macroinvertebrate community (no baseline data available) may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- Receptor is insensitive to impact.	No footings in watercourse.	- Macroinvertebrate community (no baseline data available) may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- Receptor is insensitive to impact.	No footings in watercourse.	- Macroinvertebrate community (no baseline data available) may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	None identified	Only minor and localised effects anticipated, no effect on WFD element	None required.	None required.		
4. Fish	-	-		- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). - There were no baseline fish surveys, but fish habitat assessment indicated poor fish habitat quality in the canal. - Effects are likely to be temporary and localised	No footings in watercourse.	- No likely effects on fish.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). - There were no baseline fish surveys, but fish habitat assessment indicated poor fish habitat quality in the canal. - Effects are likely to be temporary and localised	No footings in watercourse.	- No likely effects on fish.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). - There were no baseline fish surveys, but fish habitat assessment indicated poor fish habitat quality in the canal. - Effects are likely to be temporary and localised	No footings in watercourse.	- No likely effects on fish.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	None identified	Only minor and localised effects anticipated, no effect on WFD element	None required.	None required.		
Physico-Chemical status																								
WFD classification elements			Predicted change to status elements (green = none, amber = possibly, red = likely)																					
5. Dissolved Oxygen	Good	-		N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	None identified	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	-
6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	None identified					
7. Phosphate	Good	-		N/A	N/A	N/A	y an open span bridge, so there would	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	N/A	N/A	y an open span bridge, so there would	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	N/A	N/A	tively an open span bridge, so there would bo	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	None identified					
8. Ammonia	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	None identified					
9. Temperature	-	-		N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	• Some shading with negligible/no effect	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	None identified					
10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	None identified					
Hydromorphological status																								**Hydromorphology baseline**
WFD classification elements			Predicted change to status elements (green = none, amber = possibly, red = likely)																					
11. Quantity and dynamics of river flow	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
12. Connection to Groundwater	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
13. River continuity	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
14. River depth and width variation bed	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
16. Structure of riparian zone	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen																						
Manage disturbance	-	In Place	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	There will be disturbance during construction although this will be minimised through CoCP measures.	None required.	None required.	Minor and localised effects	
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone.	-	In Place		Some loss of bankside habitat due to construction of viaduct					Some loss of bankside habitat due to construction of viaduct					Some loss of bankside habitat due to construction of viaduct						Some loss of bankside habitat due to construction of viaduct , although there will be enhancements associated with the diversion.	None required.	None required.	Minor and localised effects	
Avoid the need to dredge (e.g. minimise under-keel clearance; use fluid mud navigation; flow manipulation or training works)	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Prepare a dredging / disposal strategy	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Reduce impact of dredging	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Reduce sediment resuspension	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Alter timing of dredging / disposal	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Bank rehabilitation / reprofiling	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Site selection (Dredged material disposal) (e.g. avoid sensitive sites)	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Awareness raising / information boards (boat wash / sources of fine sediment)	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Phased de-watering and other techniques	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Selective vegetation control regime	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Appropriate vegetation control technique	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Appropriate timing (vegetation control)	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Appropriate techniques (invasive species)	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Modify vessel design	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Vessel Management	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Sediment management	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	

Water Body ID	GB70410142
Surface Water Body Name	Trent & Mersey Canal, summit to Alrewas
CFAs covered by Waterbody	22

CFA	22
AP2 ID	AP-C223-064
AP2 Name	Horizontal and vertical realignment near the Trent and Mersey Canal
AP2 Location	Whittington to Handsacre
New/Replacement Scheme Element	REPLACEMENT
Scheme Element Type	Viaducts
Original Scheme	In the November 2013 scheme, the Route runs on embankment northwards at around 8- 10m above GL to cross over Wood End Lane and the Trent & Mersey Canal, with junction for links to Handsacre that have paired viaducts over T&M Canal (twice) and Pyford Brook before descending to near ground level. Wood End Lane realigned to pass under HS2 to south of junction; drainage pumping station needed. Shaw Lane closed just south of Handsacre junction. Fulfen Wood stream passes under embankment in culvert at 184+200. Mare Brook passes under embankment in culverts at 185+600 and 186+200.
AP2 Description	Further land and rights are required to enable the vertical realignment of the HS2 where it crosses the A38 and the Trent and Mersey Canal. New Curborough Viaduct replaces 2 Viaducts over Trent and Mersey Canals and 1 Viaduct over Pyford Brook. **This AP relates to the removal of the Trent and Mersey Canal East and West Viaducts. No replacement scheme element.**
AP2 Changes to Previously Assessed Elements	None
AP2 Additional Elements Assessment Requirement	No replacement scheme element.

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Viaduct/Underbridge - Trent and Mersey Canal east viaduct (footings in or within riparian zone of watercourse)					Viaduct/Underbridge - Trent and Mersey Canal west viaduct (footings in or within riparian zone of watercourse)					Underbridge - Trent and Mersey Canal underbridge.					Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation		RESIDUAL effect on element (following any additional mitigation measures)	
GB70410142			Description of scheme element impact	East Viaduct/underbridge over Trent and Mersey Canal (summit to Alrewas) or Fosley Wood (CFA22-SWC-069)					West Viaduct/underbridge over Trent and Mersey Canal (summit to Alrewas) or Wood End Lock (CFA22-SWC-071)					Trent and Mersey Canal underbridge at CFA22-SWC-069 - North Viaduct							Construction	Operation		
Trent & Mersey Canal, summit to Alrewas	Good	Good Ecological Potential by 2015	Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage						
WFD classification elements			Predicted change to status elements (green = none, amber = possibly, red = likely)																					
1.Macrophytes and phytobenthos - diatoms				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
2. Macrophytes and phytobenthos - macrophytes	-	-		Receptor is insensitive to impact.	No footings in watercourse.	- Baseline surveys indicate limited channel macrophyte communities in the canal. - There may be minor changes in the cover and composition of macrophyte communities, but this is not considered to be greater than a minor localised change.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	Receptor is insensitive to impact.	No footings in watercourse.	- Baseline surveys indicate limited channel macrophyte communities in the canal. - There may be minor changes in the cover and composition of macrophyte communities, but this is not considered to be greater than a minor localised change.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- Receptor is insensitive to impact.	No footings in watercourse.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	None identified	Only minor and localised effects anticipated, no effect on WFD element. The removal of the two viaducts will not lead to any change on the overall effect on this quality element, which is likely to remain very minor and localised.	None required.	None required.	
3. Macroinvertebrates	-	-		Receptor is insensitive to impact	No footings in watercourse.	- Macroinvertebrate community (no baseline data available) may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	Receptor is insensitive to impact.	No footings in watercourse.	- Macroinvertebrate community (no baseline data available) may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- Receptor is insensitive to impact.	No footings in watercourse.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	None identified	Only minor and localised effects anticipated, no effect on WFD element. The removal of the two viaducts will not lead to any change on the overall effect on this quality element, which is likely to remain very minor and localised.	None required.	None required.	-
4. Fish	-	-		- Possible temporary sub-lethal effects on fish (e.g. displacement from impacted area). - There were no baseline fish surveys, but fish habitat assessment indicated poor fish habitat quality in the canal. - Effects are likely to be temporary and localised.	No footings in watercourse.	No likely effects on fish.	No anticipated effects due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- Possible temporary sub-lethal effects on fish (e.g. displacement from impacted area). - There were no baseline fish surveys, but fish habitat assessment indicated poor fish habitat quality in the canal. - Effects are likely to be temporary and localised.	No footings in watercourse.	No likely effects on fish.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- Possible temporary sub-lethal effects on fish (e.g. displacement from impacted area). - There were no baseline fish surveys, but fish habitat assessment indicated poor fish habitat quality in the canal. - Effects are likely to be temporary and localised.	No footings in watercourse.	- No likely effects on fish.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	None identified	Only minor and localised effects anticipated, no effect on WFD element. The removal of the two viaducts will not lead to any change on the overall effect on this quality element, which is likely to remain very minor and localised.	None required.	None required.	
Physico-Chemical status																								
WFD classification elements			Predicted change to status elements (green = none, amber = possibly, red = likely)																					
5. Dissolved Oxygen	Good	-		N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	None identified	GREEN TO YELLOW. The removal of two viaducts crossing the canal reduces the cumulative impact on this waterbody. A minor overall impact on this physico-chemical sub-element is anticipated, however, will not result in a change in WFD status to this sub-element. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	Minor and localised effect
6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	None identified	Receptor is insensitive to impact			Receptor is insensitive to impact	
7. Phosphate	Good	-		N/A	N/A	N/A	Yes (open span bridge, so there would be	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	N/A	N/A	Yes (open span bridge, so there would	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	N/A	N/A	Yes (open span bridge, so there would be	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	None identified	GREEN TO YELLOW. The removal of two viaducts crossing the canal reduces the cumulative impact on this waterbody. A minor overall impact on this physico-chemical sub-element is anticipated, however, will not result in a change in WFD status to this sub-element. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.			Minor and localised effect
8. Ammonia	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	None identified	Receptor is insensitive to impact			Receptor is insensitive to impact	
9. Temperature	-	-		N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	None identified	Receptor is insensitive to impact			Receptor is insensitive to impact	
10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	None identified	GREEN TO YELLOW. The removal of two viaducts crossing the canal reduces the cumulative impact on this waterbody. A minor overall impact on this physico-chemical sub-element is anticipated, however, will not result in a change in WFD status to this sub-element. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.			Minor and localised effect
Hydromorphological status																								Hydromorphology baseline
WFD classification elements			Predicted change to status elements (green = none, amber = possibly, red = likely)																					• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
11. Quantity and dynamics of river flow	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
12. Connection to Groundwater	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
13. River continuity	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
14. River depth and width variation bed	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
16. Structure of riparian zone	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen																						
Manage disturbance	-	In Place	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	There will be disturbance during construction although this will be minimised through CoCP measures.	None required.	None required.	Minor and localised effects	
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone.	-	In Place		Some loss of bankside habitat due to construction of viaduct					Some loss of bankside habitat due to construction of viaduct					Some loss of bankside habitat due to construction of viaduct					-	Some loss of bankside habitat due to construction of viaduct , although there will be enhancements associated with the diversion.	None required.	None required.	Minor and localised effects	
Avoid the need to dredge (e.g. minimise under-keel clearance; use fluid mud navigation; flow manipulation or training works)	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Prepare a dredging / disposal strategy	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Reduce impact of dredging	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Reduce sediment resuspension	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Alter timing of dredging / disposal	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Bank rehabilitation / reprofiling	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Site selection (dredged material disposal) (e.g. avoid sensitive sites)	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Awareness raising / information boards (boat wash / sources of fine sediment)	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Phased de-watering and other techniques	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Selective vegetation control regime	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Appropriate vegetation control technique	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Appropriate timing (vegetation control)	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Appropriate techniques (invasive species)	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Modify vessel design	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Vessel Management	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Sediment management	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	

GB109054044140

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Viaduct (clear span)					River Diversion			Culvert					Cutting		Impacts from other WFD water bodies-multiple scheme elements (GB109054044110 - R Itchen - confl R Stowe to confl R Leam)	OVERALL impact on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB109054044140			Description of scheme element impact	River Leam: 133-L1 - River Leam viaduct - CFA17-SW-011 (133+800)					Tributary of River Leam: CFA17-SW-007 - realignment to avoid Longholme viaduct abutment (129+600 approximately)			Tributary of the River Leam: Ash Beds culvert - CFA17-SW-010 (132+650) - 75 m to 100 m culvert					River Itchen: Offchurch cutting (131+000 approximately), Ash Beds cutting (135+000 approximately)						
River Leam - confluence River Itchen to confluence River Avon	Poor	Good Ecological Status by 2027	Identified biological impacts	Vibration leading to disturbance	Landtake (for bridge footings) leading to loss of habitat and reduced connectivity	Shading leading to loss of habitats/sensitive vegetation	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Run off from bridge span resulting in changes to water quality	Landtake	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Creation of new habitats	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	n/a	n/a	Construction	Operation	n/a	
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	Poor	Good by 2027	Predicted change to status elements (green = none, amber = possible, red = likely)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2. Macrophytes and phytobenthos - macrophytes	-	-		Receptor not sensitive to impact. No likely effect anticipated.	No footings within watercourse. No likely effect anticipated.	Very localised but permanent loss of macrophytes due to reduction in photosynthetic activity. The River Leam currently supports abundant macrophyte communities (HS2 baseline surveys). Very localised adverse effect anticipated.	No likely effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change to water quality that would affect macrophytes.	Temporary loss of habitats of the existing tributary of the River Leam that lie within the diverted section while the new channels re-establish. No baseline data available for the tributary, but aerial photographs suggest that it is an heavily modified and minor tributary (ES Ecology Volume 5). Effect on macrophytes likely to be very localised and negligible at the scale of the water body.	Potential reduction in flow rates with no significant effect at the scale of the water body. No baseline data available for the tributary, but aerial photographs suggest that it is an heavily modified and minor tributary (ES Ecology Volume 5). Effect on macrophytes likely to be very localised and negligible at the scale of the water body.	The realigned channel will incorporate meanders and natural banks (ES Ecology Chapter Volume 2). No baseline data available for the tributary, but aerial photographs suggest that it is an heavily modified and minor tributary (ES Ecology Volume 5). Therefore, new design is likely to constitute an improvement in habitat available to macrophytes. Localised beneficial effect anticipated.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to a localised (100 m max) but permanent loss of habitat. The tributary is locally heavily shaded by riparian vegetation and does not support any aquatic vegetation (HS2 baseline surveys). Effects on macrophytes are likely to be negligible.	Potential modification of macrophytes communities, due to reduction in photosynthetic activity. The tributary is locally heavily shaded by riparian vegetation and does not support any aquatic vegetation (HS2 baseline surveys). Effects on macrophytes are likely to be negligible.	Potential homogenised flow patterns and increase in flow velocities, with no effect at the scale of the water body. The tributary is locally heavily shaded by riparian vegetation and does not support any aquatic vegetation (HS2 baseline surveys). Effects on macrophytes are likely to be negligible.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect macrophytes.	No changes in flows expected. No likely effect anticipated on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.	No scheme elements on the upstream water body (GB109054044110) were identified as having a significant effect on this quality element.	Scheme elements present on the River Leam and its tributaries are identified as having only very localised adverse effect on this quality element. Therefore, no effect is anticipated at the scale of the water body. This quality element does not currently have a status.	No additional mitigation required	No additional mitigation required	-	
	3. Macroinvertebrates	Good	Good		Receptor not sensitive to impact. No likely effect anticipated.	No footings within watercourse. No likely effect anticipated.	Shade increase likely to lead to localised but permanent loss of potential macroinvertebrate habitat. The River Leam currently supports abundant aquatic vegetation present locally. Moderate macroinvertebrate quality within the stretch impacted (HS2 baseline surveys). Very localised adverse effect anticipated.	No likely effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change to water quality that would affect macroinvertebrates.	Temporary loss of habitats of the existing tributary of the River Leam that lie within the diverted section while the new channels re-establish. No baseline data available for the tributary, but aerial photographs suggest that it is an heavily modified and minor tributary (ES Ecology Volume 5). Effect on this quality element likely to be very localised and negligible at the scale of the water body.	Potential reduction in flow rates with no significant effect at the scale of the water body. No baseline data available for the tributary, but aerial photographs suggest that it is an heavily modified and minor tributary (ES Ecology Volume 5). Effect on this quality element likely to be very localised and negligible at the scale of the water body.	The realigned channel will incorporate meanders and natural banks (ES Ecology Chapter Volume 2). No baseline data available for the tributary, but aerial photographs suggest that it is an heavily modified and minor tributary (ES Ecology Volume 5). Therefore, new design is likely to constitute an improvement in habitat available to macroinvertebrates. Localised beneficial effect anticipated.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to localised (100 m max) but permanent loss of macroinvertebrate habitat. The River Leam currently supports abundant aquatic vegetation present locally. Moderate macroinvertebrate quality of tributary currently poor to moderate within the stretch impacted (HS2 baseline surveys). Effect likely to be localised and minor, with no degradation of the element status anticipated at the scale of the water body.	No additional effect anticipated (loss of habitat already included in the landtake impact).	Potential homogenised flow patterns and increase in flow velocities, with no effect at the scale of the water body. The River Leam currently supports high fish species diversity, including pike and lamprey and is a Freshwater Fish Directive designated watercourse (HS2 baseline surveys). However, although no fish data are available for the tributary, it is considered as being of poor spawning habitat quality for salmonid fish. Therefore, the effect of the culvert on this quality element will be considered as locally adverse, with no effect at the scale of the water body.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect fish.	No changes in flows expected. No likely effect anticipated on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.	No scheme elements on the upstream water body (GB109054044110) were identified as having a significant effect on this quality element.	Scheme element present on the River Leam (viaduct) is identified as having only very localised adverse effect on this quality element. On the tributaries, the river diversion is considered as having the potential for a temporary adverse effect that would be balanced by the creation of new habitat. The only permanent adverse effect identified is a culvert, which could constitute a barrier to fish migration. However, the culvert is located on a tributary of the River Leam which is considered to be of low spawning habitat value for fish. Therefore, although the River Leam is a designated salmonid fisheries, it is likely that the scheme has no potential to deteriorate the current WFD status (Good) and WFD status objectives (status to remain Good) for this quality element.	No additional mitigation required	No additional mitigation required		
	4. Fish	Good	Good		Localised and temporary adverse effect during construction. No deterioration of the water body status of the element is however expected.	No footings within watercourse. No likely effect anticipated.	Shade increase likely to lead to localised but permanent loss of fish habitats (i.e. riparian vegetation, marginal aquatic macrophytes). Abundant aquatic vegetation present locally. The River Leam supports high fish species diversity, including pike and lamprey (HS2 baseline surveys). Very localised adverse effect anticipated.	No likely effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change to water quality that would affect fish.	Temporary loss of habitats of the existing tributary of the River Leam that lie within the diverted section while the new channels re-establish. No baseline data available for the tributary, but aerial photographs suggest that it is an heavily modified and minor tributary (ES Ecology Volume 5). Effect on this quality element likely to be very localised and negligible at the scale of the water body.	Potential reduction in flow rates with no significant effect at the scale of the water body. No baseline data available for the tributary, but aerial photographs suggest that it is an heavily modified and minor tributary (ES Ecology Volume 5). Effect on this quality element likely to be very localised and negligible at the scale of the water body.	The realigned channel will incorporate meanders and natural banks (ES Ecology Chapter Volume 2). No baseline data available for the tributary, but aerial photographs suggest that it is an heavily modified and minor tributary (ES Ecology Volume 5). Therefore, new design is likely to constitute an improvement in habitat available to fish. Localised beneficial effect anticipated.	Localised and temporary adverse effect during construction. No deterioration of the water body status of the element is however expected.	Likely to lead to localised (100 m max) but permanent loss of fish habitat and reduced connectivity to the River Leam, as the culvert has the potential to act as a barrier to fish. The River Leam currently supports high fish species diversity, including pike and lamprey and is a Freshwater Fish Directive designated watercourse (HS2 baseline surveys). However, although no fish data are available for the tributary, it is considered as being of poor spawning habitat quality for salmonid fish. Therefore, the effect of the culvert on this quality element will be considered as localised and minor adverse.	No additional effect anticipated (loss of vegetation already included in the landtake impact).	Potential homogenised flow patterns and increase in flow velocities, with no effect at the scale of the water body. The River Leam currently supports high fish species diversity, including pike and lamprey and is a Freshwater Fish Directive designated watercourse (HS2 baseline surveys). However, although no fish data are available for the tributary, it is considered as being of poor spawning habitat quality for salmonid fish. Therefore, the effect of the culvert on this quality element will be considered as locally adverse, with no effect at the scale of the water body.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect fish.	No changes in flows expected. No likely effect anticipated on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.	No scheme elements on the upstream water body (GB109054044110) were identified as having a significant effect on this quality element.	Scheme element present on the River Leam (viaduct) is identified as having only very localised adverse effect on this quality element. On the tributaries, the river diversion is considered as having the potential for a temporary adverse effect that would be balanced by the creation of new habitat. The only permanent adverse effect identified is a culvert, which could constitute a barrier to fish migration. However, the culvert is located on a tributary of the River Leam which is considered to be of low spawning habitat value for fish. Therefore, although the River Leam is a designated salmonid fisheries, it is likely that the scheme has no potential to deteriorate the current WFD status (Good) and WFD status objectives (status to remain Good) for this quality element.	No additional mitigation required	No additional mitigation required		
Physico-Chemical status																								
WFD classification elements	5. Dissolved Oxygen	High		Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary decrease in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established improved habitat for macroinvertebrates and therefore a beneficial effect likely to be minor locally, with no degradation of the element status anticipated at the scale of the water body.	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	No changes in flows expected. No likely effect anticipated on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.	No scheme elements on the upstream water body (GB109054044110) were identified as having a significant effect on this quality element.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	No additional mitigation required	No additional mitigation required	Minor and localised effects	-
	6. pH	High			N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No changes in flows expected. No likely effect anticipated on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.	No scheme elements on the upstream water body (GB109054044110) were identified as having a significant effect on this quality element.				
	7. Phosphate	Moderate			N/A	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	No changes in flows expected. No likely effect anticipated on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.	No scheme elements on the upstream water body (GB109054044110) were identified as having a significant effect on this quality element.				
	8. Ammonia	High			N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No changes in flows expected. No likely effect anticipated on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.	No scheme elements on the upstream water body (GB109054044110) were identified as having a significant effect on this quality element.				
	9. Temperature	-	-		N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	No changes in flows expected. No likely effect anticipated on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.	No scheme elements on the upstream water body (GB109054044110) were identified as having a significant effect on this quality element.				
	10. Specific Pollutants (Annex VIII)	High			N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	No changes in flows expected. No likely effect anticipated on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.	No scheme elements on the upstream water body (GB109054044110) were identified as having a significant effect on this quality element.				
Hydromorphological status																								Hydromorphology Baseline
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings. • Overall, there would probably be no hydromorphological impact	N/A	• Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics • The watercourse is a minor tributary of the River Leam, and in practical terms represents a small proportion of the water body catchment. Therefore, the effect of lengthening the channel through the diversion is not far from the existing channel courses. • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of lengthening the watercourse still needs to be flagged as a risk	• The extent of new watercourse that would be created, and the possible negative effects of altering existing channel conditions, mean that there would be no significant habitat creation	N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity in river depth and width. • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities, due to increased channel gradients and decreased roughness. • The minor tributary of the River Leam is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	No changes in flows expected and therefore no likely effect anticipated on hydromorphology.	N/A	• No scheme elements on upstream water body identified as having a significant effect on hydromorphology and therefore no impact from upstream water body identified.	• River diversion (lengthening) may reduce flow rates in river although likely to be localised and therefore impacts on flow dynamics and hydromorphology are unlikely to be significant. • The culvert is unlikely to impact flows considering the size of the channel, but culverting will disconnect floodplains and cut-off bank flows, bank habitats and effectively sever existing flow and habitat continuity. Although the River Leam is designated as a salmonid fisheries, there would only be minor impact on a small proportion of the water body.	Undertake hydromorphological surveys to aid detailed design Incorporate hydromorphological measures into detailed design where practicable. Mitigation measures may include: • Create low flow channels in over-widened/over-deepened channels • Create reed fringes • Introduce riparian vegetation/green corridors where space allows • Recreate a sinuous reed channel (re-meandering) where space allows • Use of bio-engineering techniques • Use of engineering techniques to assist natural recovery • Use soft engineering techniques	Minor and localised effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A		N/A	N/A		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A		N/A						
	13. River continuity	-	-		N/A	N/A	N/A		N/A	• Lengthening the channel may result in increased channel storage and reduced floodplain connectivity, but the size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected		N/A	N/A	N/A	• The culvert would disconnect floodplains and cut-off bank flows, bank habitats and effectively sever existing flow and habitat continuity within the River Leam water body. Although the River Leam is designated as a salmonid fisheries, there would only be minor impact on a small proportion of the water body.	N/A		N/A						
	14. River depth and width variation bed	-	-		N/A	N/A	N/A		N/A	• The diversion would replicate existing channel geometry. Out of channel flow depths may decrease as a result of lengthening the channel, but in practical terms there would be no significant change		N/A	N/A	N/A	• Out of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge the culvert under extreme flows. • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A		N/A						
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A		N/A	• Lengthening a channel tends to reduce flow rates and increase deposition of sediment • Given the size of the watercourse there would probably be no measurable impact		N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or structure in the channel. • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk.	N/A		N/A						
	16. Structure of riparian zone	-	-		N/A	N/A	N/A		N/A	• Although channel capacity would increase, there is likely to be no net change to existing bank, riparian and floodplain structure and connectivity with channel		N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A		N/A						

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	Predicted change to status elements (green = none, amber = possible, red = likely)																							
NOT REQUIRED FOR THE ASSESSMENT OF THIS WATER BODY	-	-	-																							

Water Body ID	GB109054044140
Surface Water Body Name	River Leam - confluence River Itchen to confluence River Avon
CFAs covered by Waterbody	17

CFA	17
AP2 ID	AP2-017-001
AP2 Name	Review of HS2 drainage along top of Offchurch Cutting element 130-L3
AP2 Location	Offchurch and Cubbington
New/Replacement Scheme Element	REPLACEMENT
Scheme Element Type	Cutting
Original Scheme	Preliminary drainage design proposes HS2 land and highway drainage to outfall into a spinney via swale. This creates the possibility of HS2 land and highway drainage outfall into the Offchurch cutting and into the HS2 railway drainage system.
AP2 Description	The change addresses the issue of drainage to the east of the HS2 railway along the top of Offchurch Cutting. The AP consequently replaces the swale with a normal ditch. The ditch discharges into a drop culvert to go under the Offchurch Greenway that is in cutting. There is then a new ditch to connect to the existing ordinary watercourse located on the opposite side of the dismantled railway at approximately Ch131+810. Additional land is required to connect the HS2 land and highway drainage outfall to the watercourse.
AP2 Changes to Previously Assessed Elements	Cutting drainage
AP2 Additional Elements Assessment Requirement	Nione

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Viaduct (clear span)					River Diversion			Culvert					Cutting		OFFCHURCH CUTTING - Review of HS2 drainage along top of Offchurch Cutting element 130-L1 - AP2-017-001		Impacts from other WFD water bodies-multiple scheme elements (GB10905404A110 - R Itchen - conf R Stowe to conf R Leam)	OVERALL impact on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)
GB110905044140	Poor	Good Ecological Status by 2027	Description of scheme element impact	River Leam: 133-L1 - River Leam viaduct - CFA17-SW-011 (133+800)					Tributary of River Leam: CFA17-SW-007 - realignment to avoid Longholme viaduct abutment (129+000 approximately)			Tributary of the River Leam: Ash Beds culvert - CFA17-SW-010 (132+650) - 75 m to 100 m culvert					River Itchen: Offchurch cutting (131+000 approximately) full length cutting (131+000 approximately)		HS2 drainage will directly drain into the headwaters of an ordinary watercourse (a spinney) as opposed to infiltration as a swale. Potential for more direct impacts on water quality.					Construction	Operation	
River Leam - confluence River Itchen to confluence River Avon			Identified biological impacts	Vibration leading to disturbance	Landtake (for bridge footings) leading to loss of habitat and reduced connectivity	Shading leading to loss of habitats/sensitive vegetation	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Run off from bridge span resulting in changes to water quality	Landtake	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Creation of new habitats	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Changes in water quality due to discharge of groundwater to a surface water body	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body		Scheme elements present on the River Leam and its tributaries are identified as having only very localised (reduced or temporary river diversion) on this quality element. Therefore, no effect is anticipated at the scale of the water body. This quality element does not currently have a status.			
WFD classification elements			**Predicted change to status elements (green = none, amber = possible, red = likely)**																						
1. Macrophytes and phytobenthos - diatoms	Poor	Good by 2027		N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2. Macrophytes and phytobenthos - macrophytes				Receptor not sensitive to impact. No likely effect anticipated.	No footings within watercourse. No likely effect anticipated.	Very localised but permanent loss of macrophytes. Shade increase likely to lead to localised but permanent loss of macrophytes. Shade in River Leam currently supports abundant macrophyte communities (HS2 baseline survey). Very localised adverse effect anticipated.	No likely effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect macrophytes.	Temporary loss of habitats of the existing tributary of the River Leam that lie within the diverted section while the new channel is established. No baseline data available for the tributary, but aerial photographs suggest that it is an heavily modified and minor tributary (ES Ecology Volume 5). Effect on macrophytes likely to be very localised and negligible at the scale of the water body.	Potential reduction in flow rates with no significant effect at the scale of the water body. No baseline data available for the tributary, but aerial photographs suggest that it is an heavily modified and minor tributary (ES Ecology Volume 5). Therefore, new design is likely to constitute an improvement to habitat available to macrophytes. Localised beneficial effect anticipated.	The realigned channel will incorporate meanders and natural banks (ES Ecology Chapter Volume 2). No baseline data available for the tributary, but aerial photographs suggest that it is an heavily modified and minor tributary (ES Ecology Volume 5). Therefore, new design is likely to constitute an improvement to habitat available to macrophytes. Localised beneficial effect anticipated.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to a localised (100 m max) but permanent loss of macrophytes. Effects on macrophytes are likely to be negligible.	Potential modification of macrophytes communities, due to reduction in sediment deposition. Shade in River Leam currently supports abundant macrophyte communities (HS2 baseline survey). Effects on macrophytes are likely to be negligible.	Potential homogenised flow patterns and increase in flow velocities, with no effect at the scale of the water body. The River Leam currently supports high species diversity, including pike and lamprey (HS2 baseline survey). Effects on macrophytes are likely to be negligible.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect macrophytes.	No significant changes in flows expected. Effect likely to be negligible on this element.	Potential localised and minor changes in dissolved oxygen, phosphate, ammonia and pollutants concentrations. Baseline data indicated stressed macroinvertebrate communities, with presence of severe pollution tolerant taxa. Potential localised and very limited effects.	No scheme elements on the upstream water body (GB10905404A110) were identified as having a significant effect on ecology	The AF2 drainage amendment of the cutting will contribute slightly to the cumulative impact on this physico-chemical sub-element. However, it is not considered to be significant, and subsequently there will be no change in overall impact from the previous assessment.	No additional mitigation required	No additional mitigation required	Minor and localised effects
3. Macroinvertebrates	Good	Good		Receptor not sensitive to impact. No likely effect anticipated.	No footings within watercourse. No likely effect anticipated.	Shade increase likely to lead to localised but permanent loss of macroinvertebrate habitats (i.e. macrophytes and riparian vegetation). Abundant aquatic vegetation present locally. Moderate macroinvertebrate quality within the stretch impacted (HS2 baseline survey). Very localised adverse effect anticipated.	No likely effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect macroinvertebrates.	Temporary loss of habitats of the existing tributary of the River Leam that lie within the diverted section while the new channels re-established. No baseline data available for the tributary, but aerial photographs suggest that it is an heavily modified and minor tributary (ES Ecology Volume 5). Effect on this quality element likely to be very localised and negligible at the scale of the water body.	Potential reduction in flow rates with no significant effect at the scale of the water body. No baseline data available for the tributary, but aerial photographs suggest that it is an heavily modified and minor tributary (ES Ecology Volume 5). Therefore, new design is likely to constitute an improvement to habitat available to macroinvertebrates. Localised beneficial effect anticipated.	The realigned channel will incorporate meanders and natural banks (ES Ecology Chapter Volume 2). No baseline data available for the tributary, but aerial photographs suggest that it is an heavily modified and minor tributary (ES Ecology Volume 5). Therefore, new design is likely to constitute an improvement to habitat available to macroinvertebrates. Localised beneficial effect anticipated.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to localised (100 m max) but permanent loss of macroinvertebrate habitat (i.e. substrate, riparian vegetation). Macroinvertebrate quality of tributary currently poor to moderate within the stretch impacted (HS2 baseline survey). Effect likely to be localised and minor.	No additional effect anticipated (loss of habitat already included in the landtake impact).	Potential homogenised flow patterns and increase in flow velocities, with no effect at the scale of the water body. Macroinvertebrate quality of tributary currently poor to moderate within the stretch impacted (HS2 baseline survey). Effect likely to be localised and minor, although no data is available for the tributary. It is considered to be unlikely that the tributary is a barrier to fish dispersal. The River Leam currently supports high species diversity, including pike and lamprey and is a freshwater Fish Directive designated watercourse (HS2 baseline survey). However, although no fish data are available for the tributary, it is considered to be unlikely that it supports high quality or rheophilic fish. Therefore, the effect of the culvert on this quality element will be considered as localised and minor adverse.	Drainage (including balancing ponds) has designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect fish.	No significant changes in flows expected. Effect likely to be negligible on this element.	Potential localised and minor changes in dissolved oxygen, phosphate, ammonia and pollutants concentrations. Baseline data indicated stressed macroinvertebrate communities, with presence of severe pollution tolerant taxa. Potential localised and very limited effects.		Scheme element present on the River Leam (viaduct) is identified as having only very localised adverse effect on this quality element. On the tributaries, the river diversion is considered as having the potential for a temporary adverse effect that would be balanced by the creation of new habitat. The only permanent adverse effect identified is a culvert located on a tributary of the River Leam which supports low macroinvertebrate diversity. Therefore, the scheme is not considered as having the potential to lead to a deterioration of the current WFD status (Good) of this quality element. Achievement of the WFD status objectives (which are for the status to remain Good) for this quality element should not be compromised.			
4. Fish	Good	Good		Localised and temporary adverse effect on this quality element. The effect of deterioration of the water body status of the element is however expected.	No footings within watercourse. No likely effect anticipated.	Shade increase likely to lead to localised but permanent loss of fish habitats (i.e. riparian vegetation). Shade in River Leam currently supports high species diversity, including pike and lamprey (HS2 baseline survey). Very localised adverse effect anticipated.	No likely effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect fish.	Temporary loss of habitats of the existing tributary of the River Leam that lie within the diverted section while the new channels re-established. No baseline data available for the tributary, but aerial photographs suggest that it is an heavily modified and minor tributary (ES Ecology Volume 5). No fish data available for the tributary, but it is considered unlikely that it is a barrier to fish dispersal. Effect on this quality element likely to be very localised and negligible at the scale of the water body.	Potential reduction in flow rates with no significant effect at the scale of the water body. No baseline data available for the tributary, but aerial photographs suggest that it is an heavily modified and minor tributary (ES Ecology Volume 5). No fish data available for the tributary, but it is considered unlikely that it is a barrier to fish dispersal. Effect on this quality element likely to be very localised and negligible at the scale of the water body.	The realigned channel will incorporate meanders and natural banks (ES Ecology Chapter Volume 2). No baseline data available for the tributary, but aerial photographs suggest that it is an heavily modified and minor tributary (ES Ecology Volume 5). Therefore, new design is likely to constitute an improvement to habitat available to fish. Localised beneficial effect anticipated.	Localised and temporary adverse effect on this quality element. The effect of deterioration of the water body status of the element is however expected.	Likely to lead to localised (100 m max) but permanent loss of fish habitat and reduced connectivity to the River Leam, as the culvert has the potential to constitute a barrier to fish passage. The River Leam currently supports high species diversity, including pike and lamprey and is a freshwater Fish Directive designated watercourse (HS2 baseline survey). However, although no fish data are available for the tributary, it is considered to be unlikely that it supports high quality or rheophilic fish. Therefore, the effect of the culvert on this quality element will be considered as localised and minor adverse.	No additional effect anticipated (loss of vegetation already included in the landtake impact).	Potential homogenised flow patterns and increase in flow velocities, with no effect at the scale of the water body. The River Leam currently supports high species diversity, including pike and lamprey and is a freshwater Fish Directive designated watercourse (HS2 baseline survey). However, although no fish data are available for the tributary, it is considered to be unlikely that it supports high quality or rheophilic fish. Therefore, the effect of the culvert on this quality element will be considered as locally adverse, with no effect at the scale of the water body.	Drainage (including balancing ponds) has designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect fish.	No significant changes in flows expected. Effect likely to be negligible on this element.	Potential localised and minor changes in dissolved oxygen, phosphate, ammonia and pollutants concentrations. Baseline data indicated stressed macroinvertebrate communities, with presence of severe pollution tolerant taxa. Potential localised and very limited effects.		Scheme element present on the River Leam (viaduct) is identified as having only very localised adverse effect on this quality element. On the tributaries, the river diversion is considered as having the potential for a temporary adverse effect that would be balanced by the creation of new habitat. The only permanent adverse effect identified is a culvert, which could constitute a barrier to fish migration. However, the culvert is located on a tributary of the River Leam which is considered to be of low spawning habitat value (i.e. the River Leam is the main spawning habitat for the catchment). Therefore, the scheme is not considered to be detrimental to achievement the current WFD status (Good) and WFD status objectives (status to remain Good) for this quality element.			
Physico-Chemical status																									
WFD classification elements			**Predicted change to status elements (green = none, amber = possible, red = likely)**																						
5. Dissolved Oxygen	High			N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to be local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	N/A	N/A	The proposed HS2 drainage will directly discharge into an ordinary watercourse resulting in a slight increase in flows. The increase in flows is considered to be negligible and will have a negligible effect on this sub-element, therefore no change in status is anticipated.	• Potential changes in water quality of tributary of the River Leam, with no significant effect at the scale of the water body. This impact is likely to have a minor, local effect on this sub-element in relation to the overall waterbody. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	No scheme elements on the upstream water body (GB10905404A110) were identified as having a significant effect on water quality	The AF2 drainage amendment of the cutting will contribute slightly to the cumulative impact on these physico-chemical sub-elements. However, it is not considered to be significant, and subsequently there will be no change in overall impact from the previous assessment.	No additional mitigation required	No additional mitigation required	Minor and localised effects
6. pH	High			N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact		Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unenhanced discharge to the water body is required (i.e. when discharging mass balance), calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.			Receptor is insensitive to impact
7. Phosphate	Moderate			N/A	N/A	N/A	Relively an open span bridge, so there would be no	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and extent. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	N/A	N/A	The proposed HS2 drainage will directly discharge into an ordinary watercourse resulting in a slight increase in flows. The increase in flows is considered to be negligible and will have a negligible effect on this sub-element, therefore no change in status is anticipated.	• Potential changes in water quality of tributary of the River Leam, with no significant effect at the scale of the water body. This impact is likely to have a minor, local effect on this sub-element in relation to the overall waterbody. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.					
8. Ammonia	High			N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact					Minor and localised effects
9. Temperature	-	-		N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact					
10. Specific Pollutants (Annex VIII)	High			N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	N/A	N/A	The proposed HS2 drainage will directly discharge into an ordinary watercourse resulting in a slight increase in flows. The increase in flows is considered to be negligible and will have a negligible effect on this sub-element, therefore no change in status is anticipated.	• Potential changes in water quality of tributary of the River Leam, with no significant effect at the scale of the water body. This impact is likely to have a minor, local effect on this sub-element in relation to the overall waterbody. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.					
Hydromorphological status																									**Hydromorphology Baseline**
WFD classification elements			**Predicted change to status elements (green = none, amber = possible, red = likely)**																						
11. Quantity and dynamics of river flow	-	-					• Crossing is effectively an open span bridge, and therefore the impact on the hydrological regime has been no significant position change that could mean that the river erodes against viaduct footings. • Overall, there would probably be no hydromorphological impact		• Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics • The width of the River Leam is 5-10 m in open, and in practical terms represents a small proportion of the water body • Lengthening the channel may reduce flow rates although the effect is likely to be negligible in the context of the water body. • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of lengthening the watercourse still needs to be flagged as a risk.		• The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and current (boundaries would be smooth compared to natural ones). Smoothed boundaries and cut-off flows may result in homogenised flow patterns and increased flow velocities due to increased channel conveyance and reduced roughness • The minor tributary of the River Leam is effectively a drainage ditch within the water body and in practical terms the culvert would impact a small proportion of the water body		• The size of the tributary (less than 1m in width) means there is unlikely to be valuable river conferring. Altering the drainage network to discharge into the watercourse rather than using infiltration techniques is likely to result in a slight increase in flows, but the scale of impact is unlikely to be significant								
12. Connection to Groundwater				N/A	N/A	N/A			N/A	• Likely to be no significant relationship between hydromorphology and groundwater		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater			N/A	• Likely to be no significant relationship between hydromorphology and groundwater						
13. River continuity				N/A	N/A	N/A			N/A	• Lengthening the channel may result in increased channel complexity and connectivity between the River Leam and the watercourse and the extent of the diversion impact that continuity is unlikely to be significantly affected		N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively lower existing flow and habitat continuity, however, in wider body terms, this is a minor feature and the culvert will not impact on deterioration of the overall water body status			N/A	• The size of the tributary (less than 1m in width) means there is unlikely to be valuable river conferring. Altering the drainage network to discharge into the watercourse rather than using infiltration techniques is likely to result in a slight increase in flows, but the scale of impact is unlikely to be significant						
14. River depth and width variation bed	-	-		N/A	N/A	N/A			N/A	• The diversion would replicate existing channel geometry. Out of channel flow depths may decrease as a result of lengthening the channel, but in practical terms there would be no significant change	• The extent of new watercourse that would be created, and the possible negative effects of altering existing channel conditions, mean that there would be no significant habitat creation	N/A	N/A	N/A	• Out-of bank flows would be severed by the culvert, and in channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The size of the channel suggests there would not be significant impacts on river depth and width			N/A	• The size of the tributary (less than 1m in width) means there is unlikely to be significant impacts on river depth and width						
15. Structure and substrate of river bed	-	-		N/A	N/A	N/A			N/A	• Lengthening a channel tends to reduce flow rates and increase deposition of sediment • Given the size of the watercourse there would probably be no measurable impact		N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and some any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms there would be no deterioration of overall body status			N/A	• The size of the tributary (less than 1m in width) means there is unlikely to be significant impacts on bed substrate • Altering the drainage network to discharge into the watercourse rather than using infiltration techniques is likely to result in a slight increase in flows, but the scale of impact is unlikely to be significant						
16. Structure of riparian zone				N/A	N/A	N/A			N/A	• Although channel capacity would increase, there is likely to be no net change to existing bank, riparian and floodplain structure and connectivity with channel		N/A	N/A	N/A				N/A	• The existing riparian vegetation appears to be discontinuous and consists of a few trees and low-lying bushes, so is of little value • The indicative landscape mitigation planting plans for AF2 would offset any minor impacts						

B. Risk screening of potential to prevent future attainment of good Ecological status

| WFD measures to achieve objective (yet to be implemented or confirmed as implemented) | Current status | Status objective | Measure will happen | Will happen | Other WFD measures | | | | | | | | | | | | | | | | | | |

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Viaduct - Bourne Brook Viaduct (footings in or within riparian zone of watercourse)					Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
	GB104028047270	Good	Good Ecological Status by 2015	Description of scheme element impact	Construction of Bourne Brook viaduct at CFA22-SWC-072 with watercourse enhancements. 150m in length with maximum height of 13.95m above ground. Not river diversion apparent although in channel works as watercourse will receive drainage from balancing pond.										
	Bourne-Bilson Brook Catchment (tributary of Trent)			Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage			Construction	Operation		
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	-	-		- Receptor is insensitive to impact.	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats.	Baseline data indicate very limited macrophyte cover in the area due to shading from trees. Therefore shading from the viaduct will have no likely effects on macrophytes in this section.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	No affected upstream water body.	No effects identified.	None required.	None required.	No significant effects	-
	3. Macroinvertebrates	Good	-		- Receptor is insensitive to impact.	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats which may be important for macroinvertebrates.	No anticipated effects.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	No affected upstream water body.	No effects identified.	None required.	None required.	No significant effects	-
	4. Fish	-	-		- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). - Baseline data indicated moderate fish habitat and the presence of salmonids in this section of the river. - Effects are likely to be temporary and localised.	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats.	No anticipated effects.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	No affected upstream water body.	Only possible effects identified are temporary, localised and minor	None required.	None required.	Minor and localised effects	-
	Physico-Chemical status														
WFD classification elements	5. Dissolved Oxygen	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	Upstream water body not impacted by scheme	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	No significant effects	-
	6. pH	-	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream water body not impacted by scheme					
	7. Phosphate	-	-		N/A	N/A	N/A	• Crossing design is effectively an open span bridge, so there would be no impact on Phosphate.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	Upstream water body not impacted by scheme					
	8. Ammonia	-	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream water body not impacted by scheme					
	9. Temperature	-	-		N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream water body not impacted by scheme					
	10. Specific Pollutants (Annex VIII)	-	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	Upstream water body not impacted by scheme					
	Hydromorphological status														Hydromorphology Baseline
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	Upstream water body not impacted by scheme	• Footings in riparian zones or floodplains could cause some local turbulence at flood flows, but would not considered to be significant	None required.	None required.	No significant effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A		N/A	Upstream water body not impacted by scheme					
	13. River continuity	-	-		N/A	N/A	N/A		N/A	Upstream water body not impacted by scheme					
	14. River depth and width variation bed	-	-		N/A	N/A	N/A		N/A	Upstream water body not impacted by scheme					
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A		N/A	Upstream water body not impacted by scheme					
	16. Structure of riparian zone	-	-		N/A	N/A	N/A		N/A	Upstream water body not impacted by scheme					

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	-	-	-	-	-	-	-	-	-	-	-
NONE in RBMP Annex B	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Water Body ID	GB104028047270
Surface Water Body Name	Bourne-Bilson Brook Catchment (tributary of Trent)
CFAs covered by Waterbody	22

CFA	22
AP2 ID	AP2-022-001
AP2 Name	Alternative Access to Tuppenhurst Farm
AP2 Location	Whittington to Handsacre (Tuppenhurst Farm)
New/Replacement Scheme Element	NEW
Scheme Element Type	Culvert
Original Scheme	Shaw Lane will be stopped up between the WCML and Tuppenhurst Lane (see Volume 2: map CT-06-130a, D5 to D8) and a balancing pond and access will be provided south of Shaw Lane. A section of Shaw Lane of approximately 340m will be stopped up at the existing crossing of the West Coast Main Line with traffic diverted west to A515 Lichfield Road.
AP2 Description	The proposed amendment would comprise a new public highway commencing at the intersection of Tuppenhurst Lane and Shaw Lane, with Shaw Lane converted to form a T-junction. The extension of Tuppenhurst Lane eastwards from Shaw Lane would utilise the proposed HS2 balancing pond access and join A515 Lichfield Road at a new T-junction. The junction is provided at the point where the required forward visibility can be achieved through the adjacent Lichfield Road Underbridge.. The standard of the new road would be a single track 3.5m wide with passing places in accordance with the Roads DAS. The access to the HS2 balancing pond would be taken directly off the length of new highway. **Drawings show the new route would run across the Bourne Brook floodplain and require at least a single culvert (approximately 10m long) to the watercourse.**
AP2 Changes to Previously Assessed Elements	None
AP2 Additional Elements Assessment Requirement	Road access to be assessed, Bourne Brook crossed by culvert

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Viaduct - Bourne Brook Viaduct (footings in or within riparian zone of watercourse)					CULVERT - Alternative Access to Tuppenhurst Farm - AP2-022-001					Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB104028047270	Good	Good Ecological Status by 2015	Description of scheme element impact	Construction of Bourne Brook viaduct at CFA22-SWC-072 with watercourse enhancements. 150m in length with maximum height of 13.95m above ground. Not river diversion apparent although in channel works as watercourse will receive drainage from balancing pond.					*Drawings show the new route would run across the Bourne Brook floodplain and require at least a single culvert (approximately 10m long) to the Main River watercourse.*							Construction	Operation		
Bourne-Bilson Brook Catchment (tributary of Trent)			Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage						
WFD classification elements																			
1.Macrophytes and phytobenthos - diatoms	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
2. Macrophytes and phytobenthos - macrophytes	-	-		- Receptor is insensitive to impact.	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats.	Baseline data indicate very limited macrophyte cover in the area due to shading from trees. Therefore shading from the viaduct will have no likely effects on macrophytes in this section.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	Receptor is insensitive to impact.	Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. Baseline data indicate very limited macrophyte cover in the area due to shading from trees. Therefore shading from the viaduct will have no likely effects on macrophytes in this section.	Baseline data indicate very limited macrophyte cover in the area due to shading from trees. Therefore shading from the viaduct will have no likely effects on macrophytes in this section.	Potential localised changes, such as homogenised flow patterns and bed structure and increased velocities. Baseline data indicate very limited macrophyte cover in the area due to shading from trees. Therefore shading from the viaduct will have no likely effects on macrophytes in this section.	Potential temporary minor adverse effect on water quality. baseline data indicate very limited macrophyte cover in the area due to shading from trees. No anticipated effects on macrophytes in this section.	No affected upstream water body.	No effects identified. As the Bourne Brook is unlikely to support macrophytes, there was no change in the overall effect following the addition of a culvert on Bourne Brook.	None required.	None required.	No significant effects	-
3. Macroinvertebrates	Good	-		- Receptor is insensitive to impact.	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats which may be important for macroinvertebrates.	No anticipated effects.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	Receptor is insensitive to impact.	Landtake will reduce the availability of macroinvertebrate habitats within the culvert. Baseline data suggest that the watercourse is of very good macroinvertebrate quality, with communities likely to be sensitive to pollution and reduced flows. Potential localised adverse effect, with no likely effect on overall status at waterbody level, due to the highly localised extent of effect.	No additional effect anticipated. Shading effect already considered within landtake.	Potential localised changes, such as homogenised flow patterns and bed structure and increased velocities. Baseline data suggest that the watercourse is of very good macroinvertebrate quality, with communities likely to be sensitive to pollution and reduced flows. Potential localised adverse effect.	Potential temporary minor adverse effect on water quality. Baseline data suggest that the watercourse is of very good macroinvertebrate quality, with communities likely to be sensitive to pollution and reduced flows. Potential localised adverse effect.	No affected upstream water body.	GREEN TO YELLOW: ~~No effects identified.~~ Although the viaduct is likely to have negligible effect on macroinvertebrates, the addition of a culvert on Bourne Brook is likely to lead to localised and minor adverse effects on this quality element. As such, the overall effect was updated from negligible to minor and localised adverse with no overall effect on status at the level of the waterbody.	None required.	None required.	GREEN TO YELLOW: ~~No significant effects.~~ Only localised and minor adverse effects anticipated on this quality element.	-
4. Fish	-	-		- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). - Baseline data indicated moderate fish habitat and the presence of salmonids in this section of the river. - Effects are likely to be temporary and localised.	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats.	No anticipated effects.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). Baseline data indicated moderate fish habitat and the presence of salmonids in this section of the river. Adverse effects are likely to be temporary and localised.	Landtake will reduce the availability of fish habitats within the culvert. There is also the potential for impacts during construction (e.g. release of suspended solids), and the culvert would potentially constitute a barrier to fish movement. Due to the presence of salmonids (*Salmo trutta*) in this section of the river, potential adverse effect on this element at the scale of the waterbody.	No additional effect anticipated. Shading effect already considered within landtake.	Potential localised changes, such as homogenised flow patterns and bed structure and increased velocities. Baseline data indicated moderate fish habitat and the presence of salmonids in this section of the river. Localised adverse effect anticipated.	Potential temporary minor adverse effect on water quality. baseline data indicated moderate fish habitat and the presence of salmonids in this section of the river. Localised adverse effect anticipated.	No affected upstream water body.	YELLOW TO AMBER: ~~Only possible effects identified are temporary, localised and minor.~~ Although the viaduct is likely to have only minor and localised adverse effects during construction, the addition of a culvert on Bourne Brook, which supports migratory salmonids (*Salmo trutta*) has the potential to affect the status / objectives for this element. In order to reflect this risk, the overall effect was updated from minor and localised adverse to potentially adverse on the achievement of WFD objectives for this element.	~~None required.~~ Design should ensure that the culvert allows for fish passage.	~~None required.~~ The culvert on Bourne Brook should be maintained in a state that allows fish migration.	Minor and localised effects	-
Physico-Chemical status																			
WFD classification elements																			
5. Dissolved Oxygen	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	• The additional length of the proposed AP2 culvert will marginally increase the amount of shaded watercourse. Despite this, it is predicted to result in no more than a minor impact on this sub-element. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status from the previous assessment is anticipated.	• The construction of the proposed AP2 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	• The construction of the proposed AP2 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	Upstream water body not impacted by scheme	GREEN TO YELLOW. The combination of a viaduct and short culvert (10 m) will contribute to the cumulative impact on this sub-element. A minor overall impact is anticipated, however, will not result in a change in WFD status to this physico-chemical sub-element. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	Minor and localised effect	
6. pH	-	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream water body not impacted by scheme	Receptor is insensitive to impact			Receptor is insensitive to impact	
7. Phosphate	-	-		N/A	N/A	N/A	• Crossing design is effectively an open span bridge, so there would be no impact on Phosphate.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	N/A	Receptor is insensitive to impact	• The construction of the proposed AP2 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	Receptor is insensitive to impact	Upstream water body not impacted by scheme	GREEN TO YELLOW. The combination of a viaduct and short culvert (10 m) will contribute to the cumulative impact on this sub-element. A minor overall impact is anticipated, however, will not result in a change in WFD status to this physico-chemical sub-element. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.			Minor and localised effect	-
8. Ammonia	-	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream water body not impacted by scheme	Receptor is insensitive to impact			Receptor is insensitive to impact	
9. Temperature	-	-		N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	• The additional length of the proposed AP2 culvert will marginally increase the amount of shaded watercourse. Despite this, it is predicted to result in no more than a minor impact on this sub-element. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status from the previous assessment is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream water body not impacted by scheme	GREEN TO YELLOW. The combination of a viaduct and short culvert (10 m) will contribute to the cumulative impact on these physico-chemical sub-elements. A minor overall impact is anticipated, however, will not result in a change in WFD status to these sub-elements.			Minor and localised effect	
10. Specific Pollutants (Annex VIII)	-	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	N/A	Receptor is insensitive to impact	• The construction of the proposed AP2 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	• The construction of the proposed AP2 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	Upstream water body not impacted by scheme	Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.				
Hydromorphological status																			**Hydromorphology Baseline**
WFD classification elements																			
11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	N/A	N/A	N/A	• The brook varies from approximately 1-2m in width, with planform that suggests historical realignment of the channel. The channel is large enough to have significant diversity of flow and morphology, however historical realignment probably limits this at present. • A new culvert would mean that out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • Overall, it is considered that the impacts on flow dynamics are not considered to be significant, but the effect of the culvert is a risk that needs to be flagged as there could be significant diversity of flow dynamics.	N/A	Upstream water body not impacted by scheme	• Viaduct footings in riparian zones or floodplains could cause some local turbulence at flood flows, but would not considered significant • The culvert could have a detrimental impact • The cumulative effect of the AP2 proposals is therefore a risk of minor deterioration at waterbody scale, given that the waterbody is only 6.5 km in length and is already impacted by several other culverts	~~None required~~ Use Construction Environmental Management Plans and monitoring to limit construction impacts during channel works	~~None required~~ As a result of the proposed AP2 culvert, a hydromorphological surveys is recommended to aid detailed design development. Hydromorphological mitigation should be included into detailed design where practicable. Mitigation measures that might be incorporated include: • 'Over-sizing' the culvert to sustain flow and channel continuity • Setting the culvert base below the existing bed to sustain continuity in substrate transport • Retain marginal vegetation • Retain / replicate / enhance existing channel morphology • Use soft engineering techniques	No significant effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
12. Connection to Groundwater	-	-		N/A	N/A	N/A		N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	Upstream water body not impacted by scheme					
13. River continuity	-	-		N/A	N/A	N/A		N/A	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. In addition to the effects of existing culverts at the West Coast Main Line railway and B5014. • The Bourne-Bilson Brook waterbody is only 6.5 km in length, so even though a 10m culvert does not seem proportionally significant, it would be on the main watercourse, and culverts inevitably have some detrimental effect.	N/A	Upstream water body not impacted by scheme					
14. River depth and width variation bed	-	-		N/A	N/A	N/A		N/A	N/A	N/A	N/A	• The culvert would homogenise channel morphology. Out-of bank flows would be severed, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • Scour adjacent to the structure upstream and downstream could result in sharp changes in channel geometry and a stepped channel / perched culvert base • The size of the channel suggests there could be significant loss of diversity in river depth and width, and loss of this morphology should be considered to be a risk until the culvert and mitigation design is known.	N/A	Upstream water body not impacted by scheme					
15. Structure and substrate of river bed	-	-		N/A	N/A	N/A		N/A	N/A	N/A	N/A	• Aerial imagery suggests, but does not confirm, that the channel bed could be comprised of gravels, which could be scoured or trapped as a result of inappropriate culvert design. • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk.	N/A	Upstream water body not impacted by scheme					
16. Structure of riparian zone	-	-		N/A	N/A	N/A		N/A	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of waterbody status	N/A	Upstream water body not impacted by scheme					

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen																	
			-	-	-	-	-	-						-	-	-	-	-	-
NONE in RBMP Annex B	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A						N/A	N/A	N/A	N/A	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Viaduct - Pyford Brook Viaducts (footings in or within riparian zone of watercourse)					Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB104028047250	Moderate	Good Ecological Potential by 2027	Description of scheme element impact	*Pyford Brook crossing at Wood End Lane (CFA22-SWC-070). Construction of viaducts and footings and retaining structure within riparian area. Viaduct length 95m and between 14.75m and 11.75m above ground level.*							Construction	Operation		
Pyford Brook Catchment (tributary of Trent)			Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage						
WFD classification elements														
1.Macrophytes and phytobenthos - diatoms			Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
2. Macrophytes and phytobenthos - macrophytes	Good	-		- Receptor is insensitive to impact.	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats.	Baseline data not available within the vicinity of the crossing. There may be loss of macrophytes within the at the location of the viaduct because of shading, but this will be minor and localised.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	No affected upstream water body.	Only possible effects identified are temporary, localised and/or minor	None required.	None required.	Minor and localised effects	-
3. Macroinvertebrates	Bad	-		- Receptor is insensitive to impact.	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats which may be important for macroinvertebrates.	Very poor macroinvertebrate community within the area, not likely to be sensitive to any changes in macrophyte cover.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	No affected upstream water body.	No effects identified.	None required.	None required.	No significant effects	-
4. Fish	-	-		- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). - Baseline data indicated moderate fish habitat and the presence of mostly minor species in this section of the river. - Effects are likely to be temporary and localised.	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats.	Fish may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	No affected upstream water body.	Only possible effects identified are temporary, localised and/or minor	None required.	None required.	Minor and localised effects	-
Physico-Chemical status														
WFD classification elements														
5. Dissolved Oxygen	Bad	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	Upstream water body not impacted by scheme	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	No significant effects	-
6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream water body not impacted by scheme					
7. Phosphate	Bad	-		N/A	N/A	N/A	• Crossing design is effectively an open span bridge, so there would be no impact on Phosphate.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	Upstream water body not impacted by scheme					
8. Ammonia	Bad	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream water body not impacted by scheme					
9. Temperature	-	-		N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream water body not impacted by scheme					
10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	Upstream water body not impacted by scheme					
Hydromorphological status														**Hydromorphology Baseline**
WFD classification elements														
11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• Pyford Brook Viaduct crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	Upstream water body not impacted by scheme	Footings in riparian zones or floodplains could cause some local turbulence at flood flows, however, unlikely to be hydromorphological impacts.	None required.	None required.	No significant effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
12. Connection to Groundwater	-	-		N/A	N/A	N/A		N/A	Upstream water body not impacted by scheme					
13. River continuity	-	-		N/A	N/A	N/A		N/A	Upstream water body not impacted by scheme					
14. River depth and width variation bed	-	-		N/A	N/A	N/A		N/A	Upstream water body not impacted by scheme					
15. Structure and substrate of river bed	-	-		N/A	N/A	N/A		N/A	Upstream water body not impacted by scheme					
16. Structure of riparian zone	-	-		N/A	N/A	N/A		N/A	Upstream water body not impacted by scheme					

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen											
Retain marginal aquatic and riparian habitats (channel alteration)	-	In Place	Predicted change to status elements (green = none, amber = possibly, red = likely)	Minor loss of riparian habitat near viaduct.					-	Minor loss of riparian habitat near viaduct.	None required.	None required.	Minor and localised effects	-
Educate landowners on sensitive management practices (urbanisation)	-	Not In Place		-	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-	-	No impact on this objective.	None required.	None required.	No significant effects	-
Increase in-channel morphological diversity	-	Not In Place		-	-	-		-	-	No impact on this objective.	None required.	None required.	No significant effects	-

Water Body ID	GB104028047250
Surface Water Body Name	Pyford Brook Catchment (tributary of Trent)
CFAs covered by Waterbody	22

CFA	22	
AP2 ID	AP2-022-001	AP2-022-001
AP2 Name	Horizontal and vertical realignment near the Trent and Mersey Canal	Horizontal and vertical realignment near the Trent and Mersey Canal
AP2 Location	Whittington to Handsacre (Handsacre Connection)	Whittington to Handsacre (Handsacre Connection)
New/Replacement Scheme Element	REPLACEMENT	NEW
Scheme Element Type	Viaducts	Culvert
Original Scheme	In the November 2013 scheme, the Route runs on embankment northwards at around 8- 10m above GL to cross over Wood End Lane and the Trent & Mersey Canal, with junction for links to Handsacre that have paired viaducts over T&M Canal (twice) and Pyford Brook before descending to near ground level. Wood End Lane realigned to pass under HS2 to south of junction; drainage pumping station needed. Shaw Lane closed just south of Handsacre junction. Fulfen Wood stream passes under embankment in culvert at 184+200. Mare Brook passes under embankment in culverts at 185+600 and 186+200.	In the November 2013 scheme, the Route runs on embankment northwards at around 8- 10m above GL to cross over Wood End Lane and the Trent & Mersey Canal, with junction for links to Handsacre that have paired viaducts over T&M Canal (twice) and Pyford Brook before descending to near ground level. Wood End Lane realigned to pass under HS2 to south of junction; drainage pumping station needed. Shaw Lane closed just south of Handsacre junction. Fulfen Wood stream passes under embankment in culvert at 184+200. Mare Brook passes under embankment in culverts at 185+600 and 186+200.
AP2 Description	Further land and rights are required to enable the vertical realignment of the HS2 where it crosses the A38 and the Trent and Mersey Canal. New Curborough Viaduct replaces 2 Viaducts over Trent and Mersey Canals and 1 Viaduct over Pyford Brook.	Further land and rights are required to enable the vertical realignment of the HS2 where it crosses the A38 and the Trent and Mersey Canal. New culvert required at End Wood Lane diversion.
AP2 Changes to Previously Assessed Elements	None	None
AP2 Additional Elements Assessment Requirement	New: Curborough Viaduct	New: Curborough Culvert at End Wood Lane
Drawings (Original and AP2) Construction Phase (05) Proposed Scheme (06)		

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective
GB104028047250		
Pyford Brook Catchment (tributary of Trent)	Moderate	Good Ecological Potential by 2027

Viaduct - Pyford Brook Viaducts (footings in or within riparian zone of watercourse)

Description of scheme element impact: Pyford Brook crossing on Wood End Lane (CFA22-DNC-GTX). Construction of viaducts and footings and retaining structure within riparian zone. Viaduct length 95m and between 5-6.75m and 41.75m (short and long span).

CURBOROUGH VIADUCT - Horizontal and vertical realignment near the Trent and Mersey Canal - AP2-022-001 (Hansacre Connection)

New viaduct crossing over Pyford Brook located approximately 250m from original Pyford Brook Viaduct. No details of footings, but from AP2 drawings, appears to be effectively clear span and shorter in length than previously deceased viaduct.

CURBOROUGH CULVERT - Curborough Brook to be culverted under Wood End Lane - AP2-022-001 (Handsacre Connection)

New culvert at End Wood Lane diversion. The Volume 2 Community Area Forum Report CFA22 states that a culvert probably is required, but this will not be confirmed until the preferred option is selected, and as such indicative culvert details are not available. Refer to CFA22-2331-MINA.

Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures: Construction	Additional Proposed Mitigation Measures: Operation	RESIDUAL effect on element (following any additional mitigation measures)
N/A	N/A	N/A	N/A	N/A
No affected upstream water body.	Only possible effects identified are temporary, localised and/or minor. Overall effect unlikely to have the potential to degrade the status of this quality element or to compromise the achievement of status objectives. The AP2 change in viaduct over Pyford Brook will not lead to changes in effects on this quality element, which will remain minor. The addition of a culvert on Curborough Brook is likely to lead to localised and minor effects, that would not be significant at the waterbody scale, even combined with effects from viaduct. Therefore, no change in the overall effect on this quality element.	None required.	None required.	Minor and localised effects
No affected upstream water body.	GREEN TO YELLOW: No effects identified are temporary, localised and/or minor. Overall effect unlikely to have the potential to degrade the status of this quality element or to compromise the achievement of status objectives. The AP2 change in viaduct over Pyford Brook will not lead to changes in effects on this quality element, which will remain minor. The addition of a culvert on Curborough Brook is likely to lead to localised and minor effects, that would not be significant at the waterbody scale, even combined with effects from viaduct. Therefore, no change in the overall effect on this quality element.	None required.	None required.	No significant effects
No affected upstream water body.	Only possible effects identified are temporary, localised and/or minor. Overall effect unlikely to have the potential to degrade the status of this quality element or to compromise the achievement of status objectives. The AP2 change in viaduct over Pyford Brook will not lead to changes in effects on this quality element, which will remain minor. The addition of a culvert on Curborough Brook is likely to lead to localised and minor effects, that would not be significant at the waterbody scale, even combined with effects from viaduct. Therefore, no change in the overall effect on this quality element.	None required.	None required.	Minor and localised effects
Upstream water body not impacted by scheme	GREEN TO YELLOW: The AP2 additional culvert will contribute slightly to the cumulative impact on physico-chemical status, however there are no significant impacts anticipated at waterbody scale and will not result in a change in WFD status to this physico-chemical sub-element. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	GREEN TO YELLOW: Minor and localised effects
Upstream water body not impacted by scheme	Receiver is insensitive to impact			Receiver is insensitive to impact
Upstream water body not impacted by scheme	GREEN TO YELLOW: The AP2 additional culvert will contribute slightly to the cumulative impact on physico-chemical status, however there are no significant impacts anticipated at waterbody scale and will not result in a change in WFD status to this physico-chemical sub-element. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	GREEN TO YELLOW: Minor and localised effects
Upstream water body not impacted by scheme	Receiver is insensitive to impact			Receiver is insensitive to impact
Upstream water body not impacted by scheme	GREEN TO YELLOW: The AP2 additional culvert will contribute slightly to the cumulative impact on physico-chemical status, however there are no significant impacts anticipated at waterbody scale and will not result in a change in WFD status to this physico-chemical sub-element. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	GREEN TO YELLOW: Minor and localised effects
Upstream water body not impacted by scheme				
Upstream water body not impacted by scheme				Hydromorphology Baseline
Upstream water body not impacted by scheme	• Floodings in riparian zones or floodplains could cause some local turbulence at flood flows, however, unlikely to be hydromorphological impacts. • Culvert could have a small local impact on hydromorphology, however there are no significant impacts anticipated at waterbody scale	None required.	None required.	No significant effects • Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
Upstream water body not impacted by scheme				
Upstream water body not impacted by scheme				
Upstream water body not impacted by scheme				
Upstream water body not impacted by scheme				
Upstream water body not impacted by scheme				

Surface Water body	Description of scheme element impact	Identified biological impacts	Viaduct: Vibration	Viaduct: Landtake (for bridge footings)	Viaduct: Shading	Viaduct: Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Viaduct: Drainage	Curborough Viaduct: Vibration	Curborough Viaduct: Landtake (for bridge footings)	Curborough Viaduct: Shading	Curborough Viaduct: Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Curborough Viaduct: Drainage	Curborough Culvert: Vibration	Curborough Culvert: Landtake (for bridge footings)	Curborough Culvert: Shading	Curborough Culvert: Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Curborough Culvert: Drainage
Pyford Brook Catchment (tributary of Trent)	Pyford Brook crossing on Wood End Lane (CFA22-DNC-GTX). Construction of viaducts and footings and retaining structure within riparian zone. Viaduct length 95m and between 5-6.75m and 41.75m (short and long span).		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WFD classification elements	Predicted change to status elements (green = none, amber = possible, red = likely)																
1.Macrophytes and phytobenthos - diatoms			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2. Macrophytes and phytobenthos - macrophytes	Good	-	Receiver is insensitive to impact	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats.	Baseline data not available within the vicinity of the crossing. There may be loss of macrophytes within the at the vicinity of the viaduct, but this will be minor and localised.	No anticipated effects, due to insignificant changes in hydromorphological regime.	Receiver is insensitive to impact	Receiver is insensitive to impact	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats.	Baseline data not available within the vicinity of the crossing. There may be loss of macrophytes within the at the vicinity of the viaduct, but this will be minor and localised.	No anticipated effects, due to insignificant changes in hydromorphological regime.	Potential localised and minor changes in dissolved oxygen, phosphate and pollutants concentrations. Baseline data not available within the vicinity of the crossing. There may be loss of macrophytes within the at the vicinity of the culvert, but this will be minor and localised.	Receiver is insensitive to impact	Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. Baseline data not available within the vicinity of the crossing. There may be loss of macrophytes within the at the vicinity of the culvert, but this will be minor and localised.	Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. Baseline data not available within the vicinity of the crossing. There may be loss of macrophytes within the at the vicinity of the culvert, but this will be minor and localised.	Potential localised adverse effects due to channel morphology homogenisation, increases in flow velocities and reduction of habitat and flow continuity. Baseline data available in vicinity of the crossing. Potential localised adverse effect.	Potential localised and minor changes in dissolved oxygen and pollutants concentrations. Baseline data not available within the vicinity of the crossing. Potential localised adverse effect.
3. Macroinvertebrates	Bad	-	Receiver is insensitive to impact	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats.	Very poor macroinvertebrate community within the area, not likely to be sensitive to any changes in macrophyte cover.	No anticipated effects, due to insignificant changes in hydromorphological regime.	Receiver is insensitive to impact	Receiver is insensitive to impact	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats.	Very poor macroinvertebrate community within the area. Negligible effects anticipated on macroinvertebrate.	No anticipated effects, due to insignificant changes in hydromorphological regime.	Potential localised and minor changes in dissolved oxygen, phosphate and pollutants concentrations. Very poor macroinvertebrate community within the area. Negligible effects anticipated on macroinvertebrate.	Receiver is insensitive to impact	Landtake will lead to direct loss of macroinvertebrate habitats within the culvert. No baseline data available in vicinity of the crossing. Potential localised adverse effect.	No additional effect anticipated (loss of habitat already considered in the landtake impact).	Potential localised adverse effects due to channel morphology homogenisation, increases in flow velocities and reduction of habitat and flow continuity. No baseline data available in vicinity of the crossing. Potential localised adverse effect.	Potential localised and minor changes in dissolved oxygen and pollutants concentrations. No baseline data available in vicinity of the crossing. Potential localised adverse effect.
4. Fish	Bad	-	• Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). • Baseline data indicated moderate fish habitat and the presence of mostly minor species in this section of the river. • Effects are likely to be temporary and localised.	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats.	Fish may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor.	No anticipated effects, due to insignificant changes in hydromorphological regime.	Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). Baseline data indicated moderate fish habitat and the presence of mostly minor species in this section of the river. Effects are likely to be temporary and localised.	Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). However, effects are likely to be temporary and localised with no impact on the water body as a whole.	Fish may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor.	No anticipated effects, due to insignificant changes in hydromorphological regime.	Potential localised and minor changes in dissolved oxygen, phosphate and pollutants concentrations. Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). However, effects are likely to be temporary and localised with no impact on the water body as a whole.	Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). However, effects are likely to be temporary and localised with no impact on the water body as a whole.	Landtake will lead to direct loss of fish habitats within the culvert and the culvert would constitute a barrier to fish movements. No baseline data available in vicinity of the crossing on Curborough Brook. However, baseline surveys on Pyford Brook indicated only moderate fish quality and there was no records of migratory species. Potential localised adverse effect.	No additional effect anticipated (loss of habitat already considered in the landtake impact).	Potential localised adverse effects due to channel morphology homogenisation, increases in flow velocities and reduction of habitat and flow continuity. No baseline data available in vicinity of the crossing on Curborough Brook. However, baseline surveys on Pyford Brook indicated only moderate fish quality and there was no records of migratory species. Potential localised adverse effect.	Potential localised and minor changes in dissolved oxygen and pollutants concentrations. No baseline data available in vicinity of the crossing on Curborough Brook. However, baseline surveys on Pyford Brook indicated only moderate fish quality and there was no records of migratory species. Potential localised adverse effect.
Physico-Chemical status																	
WFD classification elements	Predicted change to status elements (green = none, amber = possible, red = likely)																
5. Dissolved Oxygen	Bad	-	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	• No change in width of the proposed AP2 viaduct, therefore no change in amount of shaded watercourse. Despite this, it is predicted to result in a negligible effect on this sub-element. Therefore, no change in status from the previous assessment is anticipated.	• The construction of the proposed AP2 viaduct is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	• The construction of the proposed AP2 viaduct is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	N/A	N/A	• The addition of the proposed AP2 culvert under Wood End Lane will increase the amount of shaded watercourse. Despite this, it is predicted to result in a negligible effect on this sub-element. Therefore, • This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status from the previous assessment is anticipated.	• The construction of the proposed AP2 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	• The construction of the proposed AP2 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	Upstream water body not impacted by scheme	GREEN TO YELLOW: The AP2 additional culvert will contribute slightly to the cumulative impact on physico-chemical status, however there are no significant impacts anticipated at waterbody scale and will not result in a change in WFD status to this physico-chemical sub-element. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	GREEN TO YELLOW: Minor and localised effects
6. pH	High	-	N/A	N/A	N/A	Receiver is insensitive to impact	Receiver is insensitive to impact	N/A	N/A	N/A	Receiver is insensitive to impact	Receiver is insensitive to impact	N/A	N/A	Receiver is insensitive to impact	Receiver is insensitive to impact	Receiver is insensitive to impact
7. Phosphate	Bad	-	N/A	N/A	N/A	• Minor design is effectively an open span bridge, so there would be no impact on phosphate.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	N/A	N/A	• The proposed AP2 viaduct crossing is effectively an open span bridge, so there would be no impact on this sub-element, and therefore no change in status from the previous assessment.	• The construction of the proposed AP2 viaduct is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	• The construction of the proposed AP2 viaduct is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	N/A	N/A	Receiver is insensitive to impact	• The construction of the proposed AP2 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	Receiver is insensitive to impact	Upstream water body not impacted by scheme	GREEN TO YELLOW: The AP2 additional culvert will contribute slightly to the cumulative impact on physico-chemical status, however there are no significant impacts anticipated at waterbody scale and will not result in a change in WFD status to this physico-chemical sub-element. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	GREEN TO YELLOW: Minor and localised effects
8. Ammonia	Bad	-	N/A	N/A	N/A	Receiver is insensitive to impact	Receiver is insensitive to impact	N/A	N/A	N/A	Receiver is insensitive to impact	Receiver is insensitive to impact	N/A	N/A	Receiver is insensitive to impact	Receiver is insensitive to impact	Receiver is insensitive to impact
9. Temperature	-	-	N/A	N/A	• Very minor impact (negligible effect)	Receiver is insensitive to impact	Receiver is insensitive to impact	N/A	N/A	N/A	Receiver is insensitive to impact	Receiver is insensitive to impact	N/A	N/A	Receiver is insensitive to impact	Receiver is insensitive to impact	Receiver is insensitive to impact
10. Specific Pollutants (Annex VIII)	High	-	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	N/A	N/A	• The construction of the proposed AP2 viaduct is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	• The construction of the proposed AP2 viaduct is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	N/A	N/A	Receiver is insensitive to impact	• The construction of the proposed AP2 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	• The construction of the proposed AP2 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	Upstream water body not impacted by scheme	GREEN TO YELLOW: The AP2 additional culvert will contribute slightly to the cumulative impact on physico-chemical status, however there are no significant impacts anticipated at waterbody scale and will not result in a change in WFD status to this physico-chemical sub-element. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	GREEN TO YELLOW: Minor and localised effects
Hydromorphological status																	
WFD classification elements	Predicted change to status elements (green = none, amber = possible, red = likely)																
11. Quantity and dynamics of river flow	-	-	N/A	N/A	N/A		N/A	N/A	N/A	N/A	• Pyford Brook Viaduct crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant platform change that could mean that the river erodes against viaduct footings. • Overall the risk of deterioration is considered to be low, assuming that hydromorphological mitigation is considered at design stage, so there would probably be no hydromorphological impact	N/A	N/A	N/A	N/A	• Pyford Brook has a sinuous platform (from End river the proposed culvert could result in a decrease in diversity of flow and sediment dynamics as the culvert would be a straight channel and would need to be widened to accommodate large flow events to manage flood risk. • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness.	N/A	Upstream water body not impacted by scheme				
12. Connection to Groundwater	-	-	N/A	N/A	N/A		N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater, especially at the structure	N/A	Upstream water body not impacted by scheme				
13. River continuity	-	-	N/A	N/A	N/A		N/A	N/A	N/A	N/A	• The impact of riparian footings is unlikely to be significant at waterbody scale	N/A	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in waterbody terms, this is a minor feature and the culvert would not impact on deterioration of the overall waterbody status.	N/A	Upstream water body not impacted by scheme				
14. River depth and width variation bed	-	-	N/A	N/A	N/A		N/A	N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant platform change that could mean that the river erodes against viaduct footings.	N/A	N/A	N/A	N/A	• Out-of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events. • The culvert would homogenise channel morphology. • Scour adjacent to the structure upstream and downstream could result in changes in channel geometry, creating stability issues. • The size and platform of the channel suggests there could be significant loss of diversity in river depth and width, and this is a risk	N/A	Upstream water body not impacted by scheme				
15. Structure and substrate of river bed	-	-	N/A	N/A	N/A		N/A	N/A	N/A	N/A	• The impact of riparian footings is unlikely to be significant on the channel bed	N/A	N/A	N/A	N/A	• The size of the channel and platform suggests that there is likely to be flow and morphological diversity (bed substrate or transport or scour a homogenised bed and bank structure could impact natural processes • If the culvert base is set below the channel bed the impacts on the bed should be minimal, but this is a risk	N/A	Upstream water body not impacted by scheme				
16. Structure of riparian zone	-	-	N/A	N/A	N/A		N/A	N/A	N/A	N/A	• The impact of riparian footings is unlikely to be significant at waterbody scale	N/A	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and on practical terms may not impact on deterioration of waterbody status	N/A	Upstream water body not impacted by scheme				

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as feasible)	Where RBMP measure will happen	When RBMP measure will happen	Viaduct: Vibration	Viaduct: Landtake (for bridge footings)	Viaduct: Shading	Viaduct: Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Viaduct: Drainage	Curborough Viaduct: Vibration	Curborough Viaduct: Landtake (for bridge footings)	Curborough Viaduct: Shading	Curborough Viaduct: Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Curborough Viaduct: Drainage	Curborough Culvert: Vibration	Curborough Culvert: Landtake (for bridge footings)	Curborough Culvert: Shading	Curborough Culvert: Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Curborough Culvert: Drainage	Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures: Construction	Additional Proposed Mitigation Measures: Operation	RESIDUAL effect on element (following any additional mitigation measures)
Restore/improve habitat for priority species			Minor loss of riparian habitat near viaduct.					Minor loss of riparian habitat near viaduct.					Minor loss of riparian habitat near viaduct.						Minor loss of riparian habitat near viaduct.	None required.	None required.	Minor and localised effects
Remain marginal aquatic and riparian habitats (channel alterations)	-	In Place	-	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but	-	-	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but	-	-	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but	-	-	No impact on this objective.	None required.	None required.	No significant effects
Educate landowners on sensitive management practices (urbanisation)	-	Not In Place	-	-	-		-	-	-	-		-	-	-	-		-	-	No impact on this objective.	None required.	None required.	No significant effects
Increase in channel morphological diversity	-	Not In Place	-	-	-		-	-	-	-		-	-	-	-		-	-				

GB104028047050

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Culvert - Fulfen Wood Culvert 184-S3					Culvert - Mare Brook No.1 Culvert 185-S3					Culvert - Fulfen Wood Culvert 184-S3					Impacts from other WFD water bodies (assessed separately) GB104028046440	OVERALL impact on element	Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB104028047050			Description of scheme element impact	*Tributary of Mare Brook at Birch Wood -Streetlay culverted under scheme (CFA22-SWC-064), short re-alignment for culvert and balancing pond discharge for railway drainage, no further details available*					*Mare Brook culverted under railway embankment, short re-alignment for culvert*					*Tributary of Mare Brook at East Hill - Hilllards (CFA22-SWC-067), culverted under scheme, short re-alignment for culvert and balancing pond discharge for railway drainage, no further details available no details available*										
River Tame Anker to Trent	Poor	Good by 2027	Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage			Construction	Operation		
WFD classification elements			Predicted change to status elements (green = none, amber = possible, red = likely)																					
1.Macrophytes and phytobenthos - diatoms	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
2. Macrophytes and phytobenthos - macrophytes	Moderate	-		Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. - No macrophyte data available, however, only relatively short distance of a minor upstream tributary (ditch) affected and there would be no conceivable effect on this element at a water body level. - Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the culvert).	- Shading of the channel from the culvert has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - There are no macrophyte data available, but there would only be a localised and minor effects on macrophyte communities, not affecting the status of this quality element.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert) may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediately downstream). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. - No macrophyte data available, however, only relatively short distance of the Mare Brook affected (but the main WFD water body) and there would be no conceivable effect on this element at a water body level. - Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the culvert).	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - There are no macrophyte data available, but would only be a localised and minor effects on macrophyte communities, not affecting the status of this quality element.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert) may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediately downstream). - This would only be affect a limited distance of the watercourse and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. - Survey data show that some macrophytes are present in the watercourse, but only a relatively short distance of this minor water body will be affected (not the main WFD water body) and there would be no conceivable effect on this element at a water body level. - Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the culvert).	Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - There would only be a localised and minor effects on macrophyte communities, not affecting the status of this quality element.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert) may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediately downstream). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	N/A	N/A	N/A	N/A	
3. Macroinvertebrates	Moderate	-		Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrates and reduce the habitats available for colonisation within the culvert. - No baseline macroinvertebrate data were available, but nearby watercourses were of poor overall quality - Given the relative contribution of this minor tributary and the invertebrate community present, there would be no conceivable effect on this element at a water body level. - Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the culvert).	- Shading may have indirect effects on macroinvertebrates (if macrophyte cover is lost) - These are likely to be negligible and within the context of the water body, with no anticipated effects on the wider water body.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert) may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediately downstream). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrates and reduce the habitats available for colonisation within the culvert. - No baseline macroinvertebrate data were available. - Given the relative contribution of Mare Brook to the overall water body and about half the culvert length there would be no likely effect on this element at a water body level. - Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the culvert).	- Shading may have indirect effects on macroinvertebrates (if macrophyte cover is lost) - These are likely to be minor (at the very worst) and given the relative contribution of Mare Brook to the Water Tame, no anticipated effects on the wider water body are anticipated.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert) may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediately downstream). - This would only be affect a limited distance of the watercourse and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrates and reduce the habitats available for colonisation within the culvert. - Baseline data indicates that the invertebrate community present is very poor, impacted by poor water quality and is dominated, with only highly tolerant groups present. - Given that this is a very small tributary, the short distance affected and high tolerance of the invertebrate community, there would be no likely measurable effect on invertebrates at a local or water body level.	- Given the extremely poor quality of macroinvertebrates in the location (highly tolerant taxa present only), no effect from shading is anticipated.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert) would not result in adverse effects to macroinvertebrate communities given the very poor quality of macroinvertebrates present and their high tolerance to impacts.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.		- Provided mitigation measures on upstream water bodies are implemented as recommended (see relevant spread sheets), there will be no effect on current or future status of biological elements of the River Tame from R Blythe to R Anker watercourse	Culverts will lead to the direct loss of macroinvertebrates on tributary water bodies. However, the contribution of the tributaries to the overall water body is considered to be minor. Furthermore, there will be enhancements to the tributaries at the up and downstream ends of the culverts. Overall, the effect is considered to be minor and localised.	None required.	- Measures to mitigate any adverse effects on macroinvertebrates form part of the embedded mitigation measures described previously. - These include channel habitat improvements to habitat within the proximity of the culverts and designing/positioning the culverts so that bed substrate can deposit. - It is important to ensure that these potential beneficial effects are maximised during the detailed design of the specific elements.	Minor and localised effects	
4. Fish	Moderate	-		- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - No data available on fish or fish habitat in the watercourse - However, effects are likely to be temporary and localised with no impact on the water body as a whole	- Landtake is unlikely to result in direct mortality of fish but there will be direct loss of fish habitats available for colonisation within the culvert. - No fish or fish habitat data available, however plans indicate that only a short length of this minor tributary of the Tame will be affected with no conceivable effects on the water body as a whole - Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the culvert).	Shading will only have negligible or no effects on fish.	- Localised changes in flow dynamics (potential increased flow due to the straightened channel in the culvert), although tributary considered to have only minor contribution from the overall water body. The culvert will be designed to avoid impacts on upstream passage of any migratory fish. - Effects are thus considered to be minor and localised.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - Fish and fish habitat data indicate that Mare Brook at this location is very poor for fish, with only minor species present and very poor potential for fish. - Given that the species present aren't highly sensitive and the effects are likely impacts are likely to be temporarily, low and highly localised, no measurable effects are anticipated	- Landtake is unlikely to result in direct mortality of fish but there will be direct loss of fish habitats available for colonisation within the culvert. - Fish and fish habitat data indicate that Mare Brook at this location is very poor for fish, with only minor species present and very poor potential for fish. The loss of habitat will be no conceivable effects on the water body as a whole - Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the culvert).	Shading will only have negligible or no effects on fish.	- Localised changes in flow dynamics (potential increased flow due to the straightened channel in the culvert) and the presence of the culvert have the potential to impede upstream passage of any migratory fish. - The fish baseline data indicate that this area of Mare Brook is of low value for fish and the effects of the impact would only be for minor and localised, with no likely effect on the fish population of the overall water body.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - Fish and fish habitat data indicate that the tributary location is very poor, with only minor species present and very poor potential for fish. - Given that the species present aren't highly sensitive and the effects are likely impacts are likely to be temporarily, low and highly localised, no measurable effects are anticipated	- Landtake is unlikely to result in direct mortality of fish but there will be direct loss of fish habitats available for colonisation within the culvert. - Fish and fish habitat data indicate that the tributary location is very poor for fish, with only minor species present and very poor potential for fish. The loss of habitat will only lead to very minor and localised effects, with no conceivable effects on the water body as a whole. - Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the culvert).	Shading will only have negligible or no effects on fish.	- Localised changes in flow dynamics (potential increased flow due to the straightened channel in the culvert) and the presence of the culvert have the potential to impede upstream passage of any migratory fish. - The fish baseline data indicate that this area of Mare Brook is of low value for fish and the effects of the impact would only be for minor and localised, with no likely effect on the fish population of the overall water body.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.			Culverts will lead to the direct loss of macroinvertebrates habitats on tributary water bodies. However, the contribution of the tributaries to the overall water body is considered to be minor. Furthermore, there will be enhancements to the tributaries at the up and downstream ends of the culverts. Overall, the effect is considered to be minor and localised.	None required.	- Measures to mitigate any adverse effects on fish form part of the embedded mitigation measures described previously. - These measures include channel improvements to habitat within the proximity of the culverts. - Although this tributary is not known to be of importance for migratory fish (no baseline habitat or fish data were collected) it is within the River Itchen, which is a designated salmond fishery. It is important to ensure that the culvert is designed and installed to allow fish passage. An assessment of the culvert with relation to flows and fish passage must be included as part of the detailed design development. - Further surveys to assess the value of the tributary for fish should be undertaken as part of the assessment. Further, construction and post-construction monitoring should be considered (if necessary) to assess any effects on fish migration.		
Physico-Chemical status																								
WFD classification elements			Predicted change to status elements (green = none, amber = possible, red = likely)																					
5. Dissolved Oxygen	Good	-		N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	No significant impacts predicted	
6. pH	High	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact						
7. Phosphate	Bad	-		N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact						
8. Ammonia	Good	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact						
9. Temperature	-	-		N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact						
10. Specific Pollutants [Annex VIII]	High	-		N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.						
Hydromorphological status																								**Hydromorphology Baseline**
WFD classification elements			Predicted change to status elements (green = none, amber = possible, red = likely)																					
11. Quantity and dynamics of river flow	-	-		N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • Tributary of Mare Brook at Birch Wood is effectively a drainage ditch within the catchment of the WFD water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • The tributary of Mare Brook is effectively a drainage ditch within the catchment of the WFD water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • The tributary of Mare Brook is effectively a drainage ditch within the catchment of the WFD water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	• Given the degree of hydromorphological impacts at water body scale upstream, it is highly unlikely that hydromorphological effects would cascade to connecting water bodies, especially if mitigation measures are put in place 'at source'.	• Although there may be small changes in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness, it is unlikely that there will be measurable impacts on the hydromorphology of the watercourse due to the size of the watercourse and the culverts would impact a small proportion of the water body. The three culverts are on separate tributaries so although there will inevitably be cumulative effects, there are not likely to be severe impacts on any single watercourse and the effects at water body scale are not likely to be significant.	None required.	None required.	No significant impacts predicted	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportionate to the relatively low sensitivity of the watercourses and their significance to the overall water body.
12. Connection to Groundwater	-	-		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A						
13. River continuity	-	-		N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A						
14. River depth and width variation bed	-	-		N/A	N/A	N/A	• Out of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even change in extreme events. • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A	N/A	N/A	N/A	• Out of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even change in extreme events. • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A	N/A	N/A	N/A	• Out of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even change in extreme events. • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A						
15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A						
16. Structure of riparian zone	-	-		N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A						

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen																					
NONE	-	-	Predicted change to status elements (green = none, amber = possible, red = likely)																				

Water Body ID	GB104028047050
Surface Water Body Name	River Tame Anker to Trent
CFAs covered by Waterbody	22

CFA	22				22		
AP2 ID	AP2-022-001 (Vertical Alignment)				AP-223-064		
AP2 Name	Diversion of unnamed watercourse	Culverts on watercourse	Culvert of watercourse	Revised vertical alignment of the railway			
AP2 Location	Parish of Fradley & Streethay Parish of Lichfield	Parish of Fradley & Streethay Parish of Lichfield	Parish of Fradley & Streethay Parish of Lichfield	Parish of Fradley & Streethay Parish of Lichfield	Whittington to Handsacre	Whittington to Handsacre	Whittington to Handsacre
New/Replacement Scheme Element	New	New	Replacement/New	New	New	Replacement / New	New
Scheme Element Type	Diversion	Culvert	Culvert	Cutting	Diversion	Culvert	Diversion
Original Scheme	Wood End Lane realigned to pass under HS2 to south of junction; drainage pumping station needed. Shaw Lane closed just south of Handsacre junction. Fulfen Wood stream passes under embankment in culvert at 184+200. Mare Brook passes under embankment in culverts at 185+600 and 186+200. False cutting earthworks included to south of Cappers Lane, to north of A38, by T&M Canal and by Shaw Lane. Lower slopes of embankments regraded to north of Cappers Lane, with noise barrier fences along embankment north to 184+200. Planting included on regraded earthworks and most of outer slopes of false cuttings. Large ecological compensation area on west side to north of Streethay. Large quantities of import for engineering and environmental fill require provision of Streethay construction sidings between A38 and route, with reception sidings to east alongside SSL and rail connection on temp bridge over Coventry Canal. Fulfen Wood stream culverted under sidings	Wood End Lane realigned to pass under HS2 to south of junction; drainage pumping station needed. Shaw Lane closed just south of Handsacre junction. Fulfen Wood stream passes under embankment in culvert at 184+200. Mare Brook passes under embankment in culverts at 185+600 and 186+200. False cutting earthworks included to south of Cappers Lane, to north of A38, by T&M Canal and by Shaw Lane. Lower slopes of embankments regraded to north of Cappers Lane, with noise barrier fences along embankment north to 184+200. Planting included on regraded earthworks and most of outer slopes of false cuttings. Large ecological compensation area on west side to north of Streethay. Large quantities of import for engineering and environmental fill require provision of Streethay construction sidings between A38 and route, with reception sidings to east alongside SSL and rail connection on temp bridge over Coventry Canal. Fulfen Wood stream culverted under sidings	Wood End Lane realigned to pass under HS2 to south of junction; drainage pumping station needed. Shaw Lane closed just south of Handsacre junction. Fulfen Wood stream passes under embankment in culvert at 184+200. Mare Brook passes under embankment in culverts at 185+600 and 186+200. False cutting earthworks included to south of Cappers Lane, to north of A38, by T&M Canal and by Shaw Lane. Lower slopes of embankments regraded to north of Cappers Lane, with noise barrier fences along embankment north to 184+200. Planting included on regraded earthworks and most of outer slopes of false cuttings. Large ecological compensation area on west side to north of Streethay. Large quantities of import for engineering and environmental fill require provision of Streethay construction sidings between A38 and route, with reception sidings to east alongside SSL and rail connection on temp bridge over Coventry Canal. Fulfen Wood stream culverted under sidings	Wood End Lane realigned to pass under HS2 to south of junction; drainage pumping station needed. Shaw Lane closed just south of Handsacre junction. Fulfen Wood stream passes under embankment in culvert at 184+200. Mare Brook passes under embankment in culverts at 185+600 and 186+200. False cutting earthworks included to south of Cappers Lane, to north of A38, by T&M Canal and by Shaw Lane. Lower slopes of embankments regraded to north of Cappers Lane, with noise barrier fences along embankment north to 184+200. Planting included on regraded earthworks and most of outer slopes of false cuttings. Large ecological compensation area on west side to north of Streethay. Large quantities of import for engineering and environmental fill require provision of Streethay construction sidings between A38 and route, with reception sidings to east alongside SSL and rail connection on temp bridge over Coventry Canal. Fulfen Wood stream culverted under sidings	In the November 2013 scheme, the Route runs on embankment northwards at around 8- 10m above GL to cross over Wood End Lane and the Trent & Mersey Canal, with junction for links to Handsacre that have paired viaducts over T&M Canal (twice) and Pyford Brook before descending to near ground level. Wood End Lane realigned to pass under HS2 to south of junction; drainage pumping station needed. Shaw Lane closed just south of Handsacre junction. Fulfen Wood stream passes under embankment in culvert at 184+200. Mare Brook passes under embankment in culverts at 185+600 and 186+200.	In the November 2013 scheme, the Route runs on embankment northwards at around 8- 10m above GL to cross over Wood End Lane and the Trent & Mersey Canal, with junction for links to Handsacre that have paired viaducts over T&M Canal (twice) and Pyford Brook before descending to near ground level. Wood End Lane realigned to pass under HS2 to south of junction; drainage pumping station needed. Shaw Lane closed just south of Handsacre junction. Fulfen Wood stream passes under embankment in culvert at 184+200. Mare Brook passes under embankment in culverts at 185+600 and 186+200.	In the November 2013 scheme, the Route runs on embankment northwards at around 8- 10m above GL to cross over Wood End Lane and the Trent & Mersey Canal, with junction for links to Handsacre that have paired viaducts over T&M Canal (twice) and Pyford Brook before descending to near ground level. Wood End Lane realigned to pass under HS2 to south of junction; drainage pumping station needed. Shaw Lane closed just south of Handsacre junction. Fulfen Wood stream passes under embankment in culvert at 184+200. Mare Brook passes under embankment in culverts at 185+600 and 186+200.
AP2 Description	Diversion of the unnamed watercourse that runs to Fulfen Wood – diverted substantially southwards from its outfall (with possible changes to the outfall location) east of the A38 and south of the WCML to pass under HS2 before returning north under the WCML to its existing course near Fulfen Wood; plus diversion of the section north of the WCML southwards under the railway to meet the southern diversion to Fulfen Wood culvert . Diversion to provide ecological mitigation in the form of woodland and grassland habitat creation in the vicinity of the Fulfen Wood watercourse diversion. North-west of the WCML extensive landscape earthworks will be provided to prevent potential surface water flow into the Streethay cutting.	Construction of Fulfen Wood culvert under WCML and Broad Lane underbridge. There are no specific details provided.	An embankment approximately 150m long extending from Capper's Lane viaduct with a height no higher than 1m, including a culvert for the diverted minor watercourse that currently runs through Fulfen Wood	Further land and rights are required to enable the vertical realignment of the HS2 where it crosses the A38 and the Trent and Mersey Canal. The vertical alignment of the railway (where it currently crosses over the A38, SSRL and WCML) is proposed to be lowered to pass under the transport corridors. This would delete the 16m high embankments (extending approximately 3km), lowering the railway into cutting with a maximum localised depth of 18m half way between the WCML crossing and the A38/SSRL crossing.	The Mare Brook south will be re-profiled and diverted north to culvert at 186+000 with associated land regrading. Planting included on regraded earthworks and outer slopes of false cuttings, with habitat creation and floodplain compensation areas along diverted stream.	The Mare Brook south will be re-profiled and diverted north to culvert at 186+000 with associated land regrading.	Realignment of Mare Brook North eastwards to stay clear of the HS2 earthworks, along with carriage of part of the flow from peripheral drainage ditches through Mare Brook North culvert to rejoin the existing channel
AP2 Changes to Previously Assessed Elements	Potential removal of orginal Fulfen culvert with diversion, AP2 text does not highlight removal	None	None	None	None	None	Potential removal of orginal Mare Brook North culvert with diversion
AP2 Additional Elements Assessment Requirement	Diversion	Culvert	Culvert	Cutting	Diversion	Culvert	Diversion

GB104028047050 AP2 Assessment

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Culvert - Fulen Wood Culvert 184-S3					Culvert - Mare Brook North Culvert 185-S3					Culvert - Mare Brook South Culvert 184-S3					Diversion - Tributary of the Mare Brook near Fulfen Wood - AP2-022-001 (Vertical Alignment)				Culvert - Fulfen Wood Culverts 183-480 - AP2-022-001 (Vertical Alignment)					FULFEN WOOD CULVERT - Tributary of the Mare Brook near Fulfen Wood - AP2-022-001 (Vertical Alignment)					Streethay Cutting - AP2-022-001 (Vertical Alignment)				Diversion - Mare Brook South			
GB104028047050	Poor	Good by 2027	Description of scheme element impact	Tributary of Mare Brook or Birch Brook: Stretches culverted under scheme (CFA25 SWC-005), risks to alignment for culvert and flattening pipe discharge for refreshed drainage, no further detail provided (CFA22-SWC-005) or broken structures to be replaced					Mare Brook culverted under railway embankment, risk to alignment for culvert					Tributary of Mare Brook to Fuel Mill - Hatlands (CFA22 SWC-004), culverted under railway, risk of alignment for culvert and balancing pond discharge for refresh drainage, no further detail provided on details changes					Tributary of Mare Brook near Fulfen Wood. Diversion to provide ecological mitigation in the form of floodbed and grassland habitat created in the vicinity of the Fulfen Wood watercourse diversion. North-east of the WCML extensive landscape earthworks will be provided to prevent potential before water flow into the Streethay cutting.				unnamed watercourse culverted under HS2 railway, WCML and broad Lane overbridge (CFA22-SWC-005), no further details provided.					An embankment approximately 150m long (see SD3 and AP2 E1 Volume 2: map CT-06-124; C6 to A6) extending from Clapper's Lane viaduct with a height no higher than 1m, including a culvert for the diverted minor watercourse that currently runs through Fulfen Wood					New significant effects are anticipated on groundwater levels, quality and receptors during construction as a result of the proposed deep cutting, which is likely to extend below the water table. Dewatering is likely to be required, particularly in the Sherwood Sandstone principal aquifer, which could reduce groundwater contributions to Fulfen Wood stream				Mare Brook South diversion and reprofiling north			
River Tame Anker to Trent	Poor	Good by 2027	Identified biological impacts	Noise and vibration	Landtake	Shading	Changes in water quality hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes in water quality hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes in water quality hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Changes in water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Creation of New habitat	Noise and vibration	Landtake	Shading	Changes in water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes in water quality hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge to flow reliacty and indicate due to de-watering	Change in water quality due to discharge of groundwater to a surface water body	Landtake	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream
WFD classification elements																																									
1. Macrophytes and phytobenthos - Volume	N/A	N/A	Predicted change to status elements (green = now, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2. Macrophytes and phytobenthos - Macrophytes	Moderate	-		Negligible interaction or no interaction	Localised alteration to flow rates, increased sedimentation and reduced turbidity. No baseline data available. Given the small contribution to the tributary or the scale of the waterbody, adverse effect likely to be localised	Localised reduction in flow rates, increased sedimentation and reduced turbidity. No baseline data available. Given the small contribution to the tributary or the scale of the waterbody, adverse effect likely to be localised	Changes in water quality and hydromorphology leading to changes in macrophytes and diatoms. Given the small contribution to the tributary or the scale of the waterbody, adverse effect likely to be localised	Localised changes in flow dynamics and reduced turbidity. Given the small contribution to the tributary or the scale of the waterbody, adverse effect likely to be localised.	Negligible interaction or no interaction	Localised alteration to flow rates, increased sedimentation and reduced turbidity. No baseline data available. Given the small contribution to the tributary or the scale of the waterbody, adverse effect likely to be localised	Localised reduction in flow rates, increased sedimentation and reduced turbidity. No baseline data available. Given the small contribution to the tributary or the scale of the waterbody, adverse effect likely to be localised	Changes in water quality and hydromorphology leading to changes in macrophytes and diatoms. Given the small contribution to the tributary or the scale of the waterbody, adverse effect likely to be localised	Localised changes in flow dynamics and reduced turbidity. Given the small contribution to the tributary or the scale of the waterbody, adverse effect likely to be localised

A. Risk screening of potential to cause deterioration of current WFD Ecolog

Surface Water body	Current status	Status objective	Scheme Elements	AP-223-064	Diversion - Mare Brook North - AP-223-064			MARE BROOK SOUTH CULVERT - Mare Brook South Culvert 186-000 - AP-223-064					Impacts from other WFD water bodies (assessed separately) GB104028046440	OVERALL impact on element	Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB104028047050	Poor	Good by 2027	Description of scheme element impact	crossing at 186-000	Mare Brook North diversion and reprofiling			Mare Brook culverted under HS2 (CFA22-SWC-006), no further details provided.							Construction	Operation		
River Tame Anker to Trent			Identified biological impacts	Creation of New habitat	Landtake	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Creation of New habitat	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage						
WFD classification elements																		
1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
2. Macrophytes and phytobenthos - macrophytes	Moderate	-		Design will also include marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. Potential minor localised beneficial effect.	There will be loss of marginal and channel macrophytes over the existing Mare Brook that lies within the diverted section. Survey data show that some macrophytes are present in the watercourse. Potential localised and temporary adverse effect.	Localised reduction in flow rates, increased sedimentation and reduced continuity. Survey data show that some macrophytes are present in the watercourse. Potential localised adverse effect.	Design will also include marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. Potential minor localised beneficial effect.	Receptor is insensitive to impact.	Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. Survey data show that some macrophytes are present in the watercourse, but only a relatively short distance of this minor water body will be affected (not the main WFD water body) and there would be no conceivable effect on this element at a water body level. Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the culvert).	Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. There would only be a localised and minor effects on macrophyte communities, not affecting the status of this quality element.	Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert) may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediately downstream). This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Potential localised and minor changes in dissolved oxygen and pollutants concentrations. Baseline data not available within the vicinity of the crossing. Survey data show that some macrophytes are present in the watercourse. Localised adverse effect anticipated.		Culverts will lead to the direct loss of macrophytes on tributary water bodies, but contributor and there will be enhancements to the tributaries at the up and downstream ends of the culverts. However, due to the lack of baseline data it is unclear how the Streethay Cutting and associated changes in water levels will affect the macrophytes in the Fulfen Wood Stream. Therefore, it is considered that there is the risk of degradation of this WFD element as a result of this AP2 design modification. CHANGE IN COLOUR FROM YELLOW TO AMBER.	None required.	- Measures to improve macrophyte habitat or mitigate any adverse effects form part of the embedded mitigation measures described previously, therefore no additional measures are required. - These include channel habitat improvements to habitat downstream of around culverts - It is important to ensure that these potential beneficial effects are maximised during the detailed design of the specific elements. - Construction monitoring should be considered as part of the CEMP for sensitive water bodies - Further baseline surveys on watercourses potentially affected by the Streethays Cutting would help understand whether there are potential anticipated effects on this element	Potential degradation in WFD status CHANGE IN COLOUR FROM YELLOW TO AMBER.	
3. Macroinvertebrates	Moderate	-		The river diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach. o baseline macroinvertebrate data were available, Potential minor localised beneficial effect.	There will be loss of macroinvertebrate habitat over the existing Mare Brook that lies within the diverted section. No baseline macroinvertebrate data were available, but nearby watercourses were of poor overall quality. Given the relative contribution of this minor tributary and the invertebrate community present, there would be no conceivable effect on this element at a water body level. Potential localised temporary adverse effect.	Localised reduction in flow rates, increased sedimentation and reduced continuity. No baseline macroinvertebrate data were available, but nearby watercourses were of poor overall quality. Given the relative contribution of this minor tributary and the invertebrate community present, there would be no conceivable effect on this element at a water body level. Potential localised adverse effect.	The river diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach. o baseline macroinvertebrate data were available, Potential minor localised beneficial effect.	Receptor is insensitive to impact.	Landtake will lead to direct loss of macroinvertebrates and reduce the habitats available for colonisation within the culvert. Baseline data indicates that the invertebrate community present is very poor, impacted by poor water quality and heavily sedimented, with only highly tolerant groups present. Given the relative contribution of Mare Brook to the overall water body and short distance affected, there would be no likely effect on this element at a water body level. Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the culvert).	Given the extremely poor quality of macroinvertebrates in the location (highly tolerant taxa present only), no effect from shading is anticipated.	There will be permanent loss of habitat within the culverted area. Baseline data indicates that the invertebrate community present is very poor, impacted by poor water quality and heavily sedimented, with only highly tolerant groups present. Given that this is a very small tributary, the short distance affected and high tolerance of the invertebrate community, there would be no likely measurable effect on invertebrates at a local or water body level.	Potential localised and minor changes in dissolved oxygen and pollutants concentrations. Baseline data not available within the vicinity of the crossing. Given that this is a very small tributary, the short distance affected and high tolerance of the invertebrate community, there would be no likely measurable effect on invertebrates at a local or water body level.		Culverts will lead to the direct loss of macroinvertebrate habitats on tributary water bodies. However, the contribution of the tributaries to the overall water body is considered to be minor. Furthermore, there will be enhancements to the tributaries at the up and downstream ends of the culverts. Overall, the effect is considered to be minor and localised. However, due to the lack of baseline data it is unclear how the Streethay Cutting and associated changes in water levels will affect the macroinvertebrates in the Fulfen Wood Stream. Therefore, it is considered that there is the risk of degradation of this WFD element as a result of this AP2 design modification. CHANGE IN COLOUR FROM YELLOW TO AMBER.	None required.	- Measures to mitigate any adverse effects on macroinvertebrates form part of the embedded mitigation measures described previously. - These include channel habitat improvements to habitat within the proximity of the culverts and designing/positioning the culverts so that bed substrate can deposit. - It is important to ensure that these potential beneficial effects are maximised during the detailed design of the specific elements. - Further baseline surveys on watercourses potentially affected by the Streethay Cutting would help understand whether there are potential anticipated effects on this element		
4. Fish	Moderate	-		The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities. Fish and fish habitat data indicate that Mare Brook at this location is very poor for fish, with only minor species present and very poor potential for fish. The loss of habitat will be no conceivable effects on the water body as a whole. Potential localised temporary adverse effect.	There will be loss of fish habitat over the existing Mare Brook that lies within the diverted section. Fish and fish habitat data indicate that Mare Brook at this location is very poor for fish, with only minor species present and very poor potential for fish. The loss of habitat will be no conceivable effects on the water body as a whole. Potential localised temporary adverse effect.	Localised reduction in flow rates, increased sedimentation and reduced continuity. Fish and fish habitat data indicate that Mare Brook at this location is very poor for fish, with only minor species present and very poor potential for fish. The loss of habitat will be no conceivable effects on the water body as a whole. Potential localised adverse effect.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities. Fish and fish habitat data indicate that Mare Brook at this location is very poor for fish, with only minor species present and very poor potential for fish. Potential minor localised beneficial effect.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - Fish and fish habitat data indicate that Mare Brook at this location is very poor for fish, with only minor species present and very poor potential for fish. - Given that the species present aren't' highly sensitive and the effects are likely impacts are likely to be temporally, low and highly localised, no measurable effects are anticipated	There will be permanent loss of habitat within the culverted area. The culvert could also constitute a barrier to fish movements. Fish and fish habitat data indicate that Mare Brook at this location is very poor for fish, with only minor species present and very poor potential for fish. The loss of habitat will be no conceivable effects on the water body as a whole Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the culvert)	Shading will only have negligible or no effects on fish.	Localised changes in flow dynamics (potential increased flow due to the straightened channel in the culvert), although tributary considered to have only minor contribution to overall water body. The culvert will be designed to avoid impacts on upstream passage of any migratory fish. Effects are thus considered to be minor and localised.	Potential localised and minor changes in dissolved oxygen and pollutants concentrations. Baseline data not available within the vicinity of the crossing. Fish and fish habitat data indicate that Mare Brook at this location is very poor for fish, with only minor species present and very poor potential for fish. Effects are thus considered to be minor and localised.		Culverts will lead to the direct loss of macroinvertebrate habitats on tributary water bodies. However, the contribution of the tributaries to the overall water body is considered to be minor. Furthermore, there will be enhancements to the tributaries at the up and downstream ends of the culverts. Overall, the effect is considered to be minor and localised. However, due to the lack of baseline data it is unclear how the Streethay Cutting and associated changes in water levels will affect the fish in the Fulfen Wood Stream. Therefore, it is considered that there is the risk of degradation of this WFD element as a result of this AP2 design modification. CHANGE IN COLOUR FROM YELLOW TO AMBER.	None required.	- Measures to mitigate any adverse effects on fish form part of the embedded mitigation measures described previously. - These measures include channel improvements to habitat within the proximity of the culverts - Although this tributary is not known to be of importance for migratory fish (no baseline habitat or fish data were collected) it is within the River Itchen, which is a designated salmonid fishery. It is important to ensure that the culvert is designed and installed to allow fish passage. An assessment of the culvert with relation to flows and fish passage must be included as part of the detailed design development. - Further surveys to assess the value of the tributary for fish should be undertaken as part of the assessment. Further, construction and post-construction monitoring should be considered (if necessary) to assess any effects on fish migration. - Further baseline surveys on watercourses potentially affected by the Streethay Cutting would help understand whether there are potential anticipated effects on this element		
Physico-Chemical status																		
WFD classification elements																		
5. Dissolved Oxygen	Good	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	• The construction of the proposed AP2 river diversion is predicted to result in no more than a temporary, minor impact on this sub-element. • Release of sediment during construction of new channel may cause a temporary drop in dissolved oxygen. But no change in status is anticipated. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	N/A	• The construction of the proposed AP2 river diversion is predicted to result in no more than a temporary, minor impact on this sub-element. • Release of sediment during construction of new channel may cause a temporary drop in dissolved oxygen. But no change in status is anticipated. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	• The construction of the proposed AP2 river diversion is predicted to result in no more than a temporary, minor impact on this sub-element. • Release of sediment during construction of new channel may cause a temporary drop in dissolved oxygen. But no change in status is anticipated. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	N/A	N/A	• The addition of the proposed AP2 culvert under HS2 will increase the amount of shaded watercourse. Despite this, it is predicted to result in no more than a minor impact on this sub-element. • This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status from the previous assessment is anticipated.	• The construction of the proposed AP2 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	• The construction of the proposed AP2 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	GREEN TO YELLOW. The AP2 river diversions, additional culverts and cutting will contribute to the cumulative impact on these sub-elements. A minor overall impact is anticipated, however, will not result in a change in WFD status to this physico-chemical sub-element. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	GREEN TO YELLOW. Minor and localised effects	-
6. pH	High	-		Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact		Receptor is insensitive to impact			Receptor is insensitive to impact	
7. Phosphate	Bad	-		Receptor is insensitive to impact	N/A	• The construction of the proposed AP2 river diversion is predicted to result in no more than a temporary, minor impact on this sub-element. • Release of sediment during construction of new channel may cause a temporary increase in phosphate levels. But no change in status is anticipated. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• The construction of the proposed AP2 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	Receptor is insensitive to impact						
8. Ammonia	Good	-		Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact		GREEN TO YELLOW. The AP2 river diversions, additional culverts and cutting will contribute to the cumulative impact on these sub-elements. A minor overall impact is anticipated, however, will not result in a change in WFD status to these physico-chemical sub-element. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.					
9. Temperature	-	-		Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	• The addition of the proposed AP2 culvert under HS2 will increase the amount of shaded watercourse. Despite this, it is predicted to result in no more than a minor impact on this sub-element. • This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status from the previous assessment is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact						
10. Specific Pollutants (Annex VIII)	High	-		Receptor is insensitive to impact	N/A	• The construction of the proposed AP2 river diversion is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• The construction of the proposed AP2 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	• The construction of the proposed AP2 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.						
Hydromorphological status																		Hydromorphology Baseline
WFD classification elements																		
11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	• The increase in open watercourse length / area means that in principle this is a habitat opportunity. However in practical terms diversions is so far removed from natural channel course it is unlikely that existing functional habitat could be maintained or enhanced . Overall this cannot be judged as a significant positive or negative at this stage and is therefore assessed as neutral.	N/A	• Review of aerial imagery shows that the Mare Brook is ca. 1m in width, with the appearance of modified (straightened) planform, so there is unlikely to be significant diversity of flow dynamics • The channel diversion is close to the existing channel route, although the path length may be shortened slightly. • Overall, the size of the watercourse and the extent of the diversion mean there is unlikely to be any detrimental impact at waterbody scale. • However, the nature of the channel should be confirmed, e.g. with site surveys, to be able to close out the potential risk with sufficient confidence.	• Review of aerial imagery shows that the Mare Brook is ca. 1m in width, but with the appearance of modified (straightened) planform • The proposed channel realignment is, in principle, a habitat creation opportunity if it includes hydromorphological design. • Realistically, the size of the channel mean that it may not be a significant enhancement opportunity, and a site visit is recommended to ascertain the benefits that could be gained.	N/A	N/A	N/A	• The size of the watercourse (estimated at approximately 1m in width from aerial imagery) means there is unlikely to be significant diversity of flow dynamics • A new culvert would mean that any out of bank flows would be cut off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • In practical terms, a new culvert is unlikely to have a significant impact at waterbody scale.	N/A	• Given the degree of hydromorphological impacts at water body scale upstream, as a result of a lengthy diversion and potentially significant impacts from cuttings it is likely that hydromorphological effects could cascade to connecting water bodies • Although several new minor potential impacts have been identified for the AP2 proposals, these are all set on small tributaries to the ca. 19km River Tame Anker to Trent waterbody, and it is considered unlikely that the AP2 effects would have a different cumulative effect on the waterbody than AP1 • The overall impact on the waterbody has not needed to be updated as a result of the AP2 assessments	• Although the proposed changes to flow patterns, decreased flow velocities due to decreased channel gradients and decreased roughness, it is likely that there could be significant impacts on the hydromorphology of the watercourse due to the approximate length of proposed diversions and of the culverts. • Although several new minor potential impacts have been identified for the AP2 proposals, these are all set on small tributaries to the ca. 19km River Tame Anker to Trent waterbody, and it is considered unlikely that the AP2 effects would have a different cumulative effect on the waterbody than AP1 • The overall impact on the waterbody has not needed to be updated as a result of the AP2 assessments	• No additional mitigation is required for culverts or aqueduct • Surveys are recommended to ascertain the nature of the watercourse, i.e. confirm that it is effectively a drainage ditch of little morphological value • Alternative designs to extreme lengthening of reaches at the diversions should be considered; • Hydromorphological mitigation should be included into detail design where practicable, and these could include: • Introduce riparian vegetation/green corridors • Maintain historic aquatic habitats • Maintain existing sinuosity • Retain marginal vegetation • Use soft engineering techniques	Minor and localised effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
12. Connection to Groundwater	-	-		• Likely to be no significant relationship between hydromorphology and groundwater	N/A	•Likely to be no significant relationship between hydromorphology and groundwater	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A						
13. River continuity	-	-		• The increase in open watercourse length / area means that in principle this is a habitat opportunity. However in practical terms diversions is so far removed from natural channel course it is unlikely that existing functional habitat could be maintained or enhanced . Overall this cannot be judged as a significant positive or negative at this stage and is therefore assessed as neutral.	N/A	• The proposed diversion of the Mare Brook North may result in a localised increase in gradient due to shortening, but the size of the watercourse and the extent of the diversion mean that continuity would not be affected significantly.	• The proposed channel realignment is, in principle, a habitat creation opportunity if it includes hydromorphological design. • Realistically, the size of the channel means that it may not be a significant enhancement opportunity, and a site visit is recommended to ascertain the benefits that could be gained.	N/A	N/A	N/A	• The culvert would impact downstream continuity and disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel, if any occur for a watercourse of this size. However, in water body terms, this is a minor feature, quite likely without significant out-of-channel flows or other significant morphological value.	N/A						
14. River depth and width variation bed	-	-		• The increase in open watercourse length / area means that in principle this is a habitat opportunity. However in practical terms diversions is so far removed from natural channel course it is unlikely that existing functional habitat could be maintained or enhanced . Overall this cannot be judged as a significant positive or negative at this stage and is therefore assessed as neutral.	N/A	• The diversion would presumably replicate existing channel geometry.	• The diversion would presumably replicate existing channel geometry.	N/A	N/A	N/A	• Out-of bank flows could be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • However, the size of the channel suggests that significant impacts are unlikely, and presumably the culvert would be sized appropriately. As such there should not be significant loss of diversity in river depth and width	N/A						
15. Structure and substrate of river bed	-	-		• The increase in open watercourse length / area means that in principle this is a habitat opportunity. However in practical terms diversions is so far removed from natural channel course it is unlikely that existing functional habitat could be maintained or enhanced . Overall this cannot be judged as a significant positive or negative at this stage and is therefore assessed as neutral.	N/A	• Channel shortening can increase gradients, flow velocities, and scour potential, but the diversion is close to the existing channel path. • The Mare Brook North is a small tributary of the River Tame, and the proposed diversion is would not have a measurable impact on hydromorphology at waterbody scale.	• The proposed channel realignment is, in principle, a habitat creation opportunity if it includes hydromorphological design. • Realistically, the size of the channel means that it may not be a significant enhancement opportunity, and a site visit is recommended to ascertain the benefits that could be gained.	N/A	N/A	N/A	• The size of the channel suggests that the bed is unlikely to have much morphological value. • If the culvert base is set below the channel bed, the impacts on the bed should be minimal.	N/A						
16. Structure of riparian zone	-	-		• The increase in open watercourse length / area means that in principle this is a habitat opportunity. However in practical terms diversions is so far removed from natural channel course it is unlikely that existing functional habitat could be maintained or enhanced . Overall this cannot be judged as a significant positive or negative at this stage and is therefore assessed as neutral.	N/A	• Initial plans indicate retention or improvement of existing riparian structure	• The proposed channel realignment is, in principle, a habitat creation opportunity if it includes hydromorphological design. • Realistically, the size of the channel means that it may not be a significant enhancement opportunity, and a site visit is recommended to ascertain the benefits that could be gained.	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A						

B. Risk screening of potential to prevent future attainment of good Ecologi

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen																
NONE	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

GB104028047000

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Black Brook Viaduct CFA21-SW-061					River Diversion				Roundhill Wood Culvert on Tributary of Black Brook (CFA21-SW-059 and CFA21-SW-060) and Hints Culvert on Tributary of Black Brook (CFA21-SW-058)					Cutting		Swinfen Cutting		Impacts from other WFD water bodies (assessed separately)	OVERALL impact on element	Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB104028047000	Moderate	Good Ecological Potential by 2027	Description of scheme element impact	*Viaduct over Black-Bourne Brook approximately 105m long with footings close to banks edge.*					*Diversion of Tributary of Black Brook into Roundhill Wood culvert (CFA21-SW-059 and CFA21-SW-060)*				*Culverts under Hints Embankment. Lengths of culverts appear to be less than 60 m each.*					*Hints Cutting*		*Cutting may interrupt groundwater flows and lead to the transfer of water from East Litchfield catchment to Black Bourne Brook catchment . There will also be loss of flow to a minor tributary of Black Bourne Brook (small trib and springs near Bucks Head Farm) but not affecting the catchment as a whole.*				Construction	Operation		
Black-Bourne Brook from source (confluence) to River Tame			Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	Poor	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	-	-	Receptor is insensitive to impact	No footings in river	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - Baseline data indicates macrophytes are relatively abundant in the watercourse. However, shading will be a minor and highly localised effect on Black Brook.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in macrophytes.	- There will be loss of marginal and channel macrophytes over the length of the existing tributary of Black Brook that lies within the diverted section. - The community will re-establish within 1 to 2 years of completion of the river diversion. - No baseline macrophyte data available, but effects would be short term, relatively minor with respect to the main WFD water body and wouldn't affect the status of the WFD element. Once, minor, temporary and localised effects are therefore anticipated.	- The new channel should incorporate (if possible) marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. The effect on this quality element is considered to be minor positive.	No hydromorphological effects anticipated and therefore no effect on macrophyte communities.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. - No baseline data available, but only a limited length of a minor tributary will be affected. - Embedded mitigation measures will include improved habitat upstream and downstream of culvert. - Minor and localised effects anticipated.	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - No baseline data available, but only a limited length of a minor tributary will be affected. - Minor and localised effects anticipated.	- Localised changes in flow dynamics may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediately downstream). This would only be affect a limited distance of the minor tributary and potential effects are considered to be minor and localised.	- No impact. Runoff will be collected by drainage to balancing pond.	N/A	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated.	Only negligible effects on surface water quality identified in groundwater assessment, no effects on this WFD element anticipated.	- Possible minor and localised effects on flows in minor tributary, but no overall adverse effect on flows in the main watercourse itself (there will be potentially be a minor increase due to transfer of water from East Litchfield catchment to Black Bourne Brook). Possible minor and localised effects on macrophytes in minor tributary.	Possible minor and localised effects on water quality in minor tributary, but no overall adverse effect on water quality in the main watercourse itself. Possible minor and localised effects on macrophytes in minor tributary.	Not required. Upstream water body not impacted by Scheme.	- Black Brook does not currently have a WFD status for macrophytes and is not known to be monitored for this element Limited data were collected on macrophytes within the Black Brook as part of the baseline survey. - The scheme will lead to loss of habitat and photosynthetic activity (in shaded areas). - The overall effect on the current and future status of this element is likely to be minor and localised. Minor mitigation measures are implemented, with no overall effect on WFD status of this element.	None required.	- Measures to improve macrophyte habitat or mitigate any adverse effects form part of the embedded mitigation measures described previously. - However, additional mitigation measures may be required, given the lack of data and length of the tributaries affected. These should include channel habitat improvements (e.g. marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species) for an extended distance either immediately upstream and downstream of the culvert. A further assessment of the watercourse should be undertaken to establish necessary habitat improvement measures within the tributary, or Black Brook itself. - Further, construction and post-construction monitoring should be considered (if necessary) to assess any effects on invertebrates	Minor and localised effects	-
	3. Macroinvertebrates	Poor	-	Receptor is insensitive to impact	No footings in river	- Shading has the potential to have indirect effects on macroinvertebrates (if macrophyte cover is lost), however as the macroinvertebrate community is of poor quality (and less sensitive to impacts) there would be no effects or negligible effects on macroinvertebrates	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in macroinvertebrates.	- Temporary loss of macroinvertebrates over the length of the existing tributary of Black Brook that lies within the diverted channel - Possible temporary effects associated with suspension of solids during the construction works (associated with reduced DO) - likely to lead to a short-term adverse effect on macroinvertebrate abundances and diversity. - No invertebrate baseline data available from the tributary, but invertebrate communities are likely to recover within several months to a year, given the proposed habitat creation in new river channel.	- The diversion should be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach. The effect on this quality element is considered to be minor positive.	No hydromorphological effects anticipated and therefore no effect on macroinvertebrate communities.	Receptor is insensitive to impact	- Landtake will reduce the availability of macroinvertebrate habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids). - No baseline data available, but only a limited length of a minor tributary will be affected. - Embedded mitigation measures will include improved habitat upstream and downstream of culvert. - Minor and localised effects anticipated.	- Loss of macrophytes may lead to indirect effects on macroinvertebrates, due to loss of habitat. - No baseline data available, but a significant length of two tributaries will be affected (not the main WFD water body) - It is anticipated that this will have a minor impact, not affecting the WFD status for this element	- Localised changes in flow dynamics may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediately downstream). This would only be affect a limited distance of the minor tributary and potential effects are considered to be minor and localised.	- No impact. Runoff will be collected by drainage to balancing pond.	N/A	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated.	Only negligible effects on surface water quality identified in groundwater assessment, no effects on this WFD element anticipated.	Possible minor and localised effects on flows in minor tributary, but no overall adverse effect on flows in the main watercourse itself (there will be potentially be a minor increase due to transfer of water from East Litchfield catchment to Black Bourne Brook). Possible minor and localised effects on few sensitive macroinvertebrates in minor tributary due to reduced base flows.	Possible minor and localised effects on water quality in minor tributary, but no overall adverse effect on water quality in the main watercourse itself. Possible minor and localised effects on macroinvertebrates in minor tributary.	Not required. Upstream water body not impacted by Scheme.	- Black Bourne Brook is currently of Poor status for macroinvertebrates. This is supported by the baseline data, although there is some variability. Although the scheme will lead to loss of habitat within the water body and its tributaries. - The overall effect on the current and future status of this element is likely to be neutral, if embedded mitigation measures are implemented, with no overall effect on WFD status of this element.	None required.	- Measures to improve macroinvertebrate habitat or mitigate any adverse effects form part of the embedded mitigation measures described previously. - However, additional mitigation measures may be required, given the lack of data and length of the tributaries affected. These should include channel habitat improvements (e.g. pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa for an extended distance other than immediately upstream and downstream of the culvert. A further assessment of the watercourse should be undertaken to establish necessary habitat improvement measures within the tributary, or Black Brook itself.	Minor and localised effects	-
	4. Fish	Moderate	-	Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). However, the baseline data suggests that Black Brook in this section is characterised by a species-poor coarse fishery and effects are likely to be temporary and localised with no impact on the water body as a whole.	No footings in river	Shading will only have negligible or no effects on fish.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in fish.	- Temporary loss of fish and fish habitat over the length of the existing tributary of Black Brook that lies within the diverted channel - Possible temporary effects associated with suspension of solids during the construction works (associated with reduced DO) - Likely to lead to a short-term adverse effect on fish while the new channel establishes. No fish data available, but given the small size of the tributary, it is not likely to be of high value to fish or contribute significantly to the fish population of the Black Bourne Brook WFD water body and will recover within several months. Only minor, temporary and localised effects are therefore anticipated.	- The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities.	- No hydromorphological effects anticipated and therefore no effect on fish communities.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). Effects are likely to be temporary and localised with no impact on the water body as a whole or designated salmonid fishery.	- Landtake will reduce the availability of fish habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids). - No baseline data available, but only a limited length of a minor tributary will be affected. - Embedded mitigation measures will include improved habitat upstream and downstream of culvert. - Minor and localised effects anticipated.	- Loss of macrophytes may lead to indirect effects on fish, due to loss of habitat. - No baseline data available, but a significant length of two tributaries will be affected (not the main WFD water body) - It is anticipated that this will have a minor impact, not affecting the WFD status for this element	- Localised changes in flow dynamics and the presence of the culvert will not impede upstream passage of any migratory fish provided the culvert is sized and designed appropriately. - There is very limited information on the design of the culvert and no data are available for fish on this tributary. - Only minor and localised effects are anticipated provided embedded mitigation measures are implemented (including the improvements to habitat upstream and downstream of the culverts, appropriate design of culvert for fish passage etc.)	- No impact. Runoff will be collected by drainage to balancing pond.	N/A	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated.	Only negligible effects on surface water quality identified in groundwater assessment, no effects on this WFD element anticipated.	Possible minor and localised effects on flows in minor tributary, but no overall adverse effect on flows in the main watercourse itself (there will be potentially be a minor increase due to transfer of water from East Litchfield catchment to Black Bourne Brook). Possible minor and localised effects on fish in minor tributary due to reduced base flows.	Possible minor and localised effects on water quality in minor tributary, but no overall adverse effect on water quality in the main watercourse itself.	Not required. Upstream water body not impacted by Scheme.	- Black Bourne Brook is of moderate status for fish. The baseline data suggests that Black Brook has the potential for barriers to salmonid fish migration from proposed culverting of a tributary of the Ichen. - The mitigation measures proposed (notably the design of the culvert to allow for fish passage) will mitigate for the potential deteriorations identified. - The overall effect on the current and future status of this element is likely to be minor and localised. If mitigation measures are implemented, with no overall effect on WFD status of this element.	None required.	- Measures to mitigate any adverse effects on fish form part of the embedded mitigation measures described previously. These measures include channel improvements to habitat within the proximity of the culvert on the minor tributary - Although this tributary is not known to be of importance for migratory fish (no baseline habitat or fish data were collected) it is important to ensure that the culvert is designed and installed to allow fish passage. An assessment of the culvert with relation to flows and fish passage must be included as part of the detailed design development. - Further, construction and post-construction monitoring of the tributary for fish should be undertaken as part of the assessment. Further, construction and post-construction monitoring should be considered (if necessary) to assess any effects on fish migration.	Minor and localised effects	-
Physico-Chemical status																											
WFD classification elements	5. Dissolved Oxygen	High	-	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor locally, with no degradation of the element status anticipated at the scale of the water body.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated	Only negligible effects on surface water quality identified in groundwater assessment, no effects on this WFD element anticipated	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	Possible minor and localised effects on water quality in minor tributary, but no overall adverse effect on water quality in the main watercourse itself.	Not required. Upstream water body not impacted by Scheme.	Depending on how much flow is lost, potential minor and localised effects on element. No overall adverse effect on water quality in the main water body as a whole.	None required.	None required.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be designed to include appropriate SuDS features (attenuation ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	Minor and localised effects	-
	6. pH	High	-	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated	Only negligible effects on surface water quality identified in groundwater assessment, no effects on this WFD element anticipated	Receptor is insensitive to impact	Receptor is insensitive to impact	Not required. Upstream water body not impacted by Scheme.	Receptor is insensitive to impact					
	7. Phosphate	Bad	-	N/A	N/A	N/A	a an open span bridge, so there would	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated	Only negligible effects on surface water quality identified in groundwater assessment, no effects on this WFD element anticipated	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Possible minor and localised effects on water quality in minor tributary, but no overall adverse effect on water quality in the main watercourse itself.	Not required. Upstream water body not impacted by Scheme.	Depending on how much flow is lost, potential minor and localised effects on element. No overall adverse effect on water quality in the main water body as a whole.					
	8. Ammonia	Good	-	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated	Only negligible effects on surface water quality identified in groundwater assessment, no effects on this WFD element anticipated	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Possible minor and localised effects on water quality in minor tributary, but no overall adverse effect on water quality in the main watercourse itself.	Not required. Upstream water body not impacted by Scheme.	Depending on how much flow is lost, potential minor and localised effects on element. No overall adverse effect on water quality in the main water body as a whole.					
	9. Temperature	-	-	N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated	Only negligible effects on surface water quality identified in groundwater assessment, no effects on this WFD element anticipated	Receptor is insensitive to impact	Receptor is insensitive to impact	Not required. Upstream water body not impacted by Scheme.	Receptor is insensitive to impact					
	10. Specific Pollutants (Annex VIII)	High	-	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated	Only negligible effects on surface water quality identified in groundwater assessment, no effects on this WFD element anticipated	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Possible minor and localised effects on water quality in minor tributary, but no overall adverse effect on water quality in the main watercourse itself.	Not required. Upstream water body not impacted by Scheme.	Depending on how much flow is lost, potential minor and localised effects on element. No overall adverse effect on water quality in the main water body as a whole.					
Hydromorphological status																											**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	• Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics. • The watercourse is a minor tributary of the Black Brook, and in practical terms represents a small proportion of the water body • The extent of the diversion is unlikely to be of a large enough magnitude. • Overall, it is considered that the impacts on flow dynamics are unlikely	N/A	N/A	• The watercourse is small (2m channel width or less) so there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness.	N/A	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated	Only negligible effects on surface water quality identified in groundwater assessment, no effects on this WFD element anticipated	• Possible effects on dry weather flow in minor tributary. This would not affect the Black Brook itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	N/A	Not required. Upstream water body not impacted by Scheme.	• The viaduct is unlikely to have any significant impact • The culverts are extensive and likely to cause deterioration • However, the culverts are on minor tributaries and overall would not cause deterioration to the principal watercourse of the water body and would not result in water body status change	Undertake hydromorphological surveys to aid detailed design development. Incorporate hydromorphological mitigation measures into detailed design where practicable. Mitigation measures might include • Bank reprofiling (rehabilitation) • Create reed fringes • Creation of shallow margin in front of hard defence • Install silt, sand or gravel traps • Introduce riparian vegetation/green corridors where space allows • Recreate a sinuous river channel (re-meandering) where space allows • Recreation of gravel bars and riffles using permanent and/or temporary bed structures (increase morphological diversity) • Retain marginal vegetation • Use of engineering techniques to assist natural recovery • Use soft engineering techniques	Minor and localised effects	• Hydromorphology baseline is derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated	Only negligible effects on surface water quality identified in groundwater assessment, no effects on this WFD element anticipated	• Possible effects on dry weather flow in minor tributary. This would not affect the Black Brook itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	N/A	Not required. Upstream water body not impacted by Scheme.					
	13. River continuity	-	-	N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggest that there has been no significant change in the channel that the river has meandered against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	N/A	N/A	• The size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in wider body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated	Only negligible effects on surface water quality identified in groundwater assessment, no effects on this WFD element anticipated	• Possible effects on dry weather flow in this minor tributary which could result in localised increases in sedimentation. This would not affect the Black Brook itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	N/A	Not required. Upstream water body not impacted by Scheme.					
	14. River depth and width variation bed	-	-	N/A	N/A	N/A		N/A	N/A	N/A	• The diversion would replicate existing channel geometry, and the extent of the diversion and size of the channel mean that in practical terms there would be no significant change	N/A	N/A	N/A	• Out-of bank flows would be severed by the culvert, and in-channel flows may become concentrated in the culvert flows, and may even surcharge in extreme events. • The culvert would homogenise channel morphology • Scour adjacent to the structure upstream and downstream could result in sharp changes in channel geometry and a stepped channel / perched culvert base • The size of the channel suggests there could be significant loss of diversity in river depth and width, and this is a risk	N/A	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated	Only negligible effects on surface water quality identified in groundwater assessment, no effects on this WFD element anticipated	• Possible effects on dry weather flow in minor tributary which could result in localised increases in flow depths. This would not affect the Black Brook itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	N/A	Not required. Upstream water body not impacted by Scheme.					
	15. Structure and substrate of river bed	-	-	N/A	N/A	N/A		N/A	N/A	N/A	• Given the size of the watercourse there is probably no diversity in bed conditions and there would probably be no measurable impact as a result of the minor diversion	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate diversity. The culvert, but bed structure could be homogenised • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated	Only negligible effects on surface water quality identified in groundwater assessment, no effects on this WFD element anticipated	• Possible effects on dry weather flow in minor tributary which could result in localised increases in sedimentation. This would not affect the Black Brook itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	N/A	Not required. Upstream water body not impacted by Scheme.					
	16. Structure of riparian zone	-	-	N/A	N/A	N/A		N/A	N/A	N/A	• There is likely to be no net change to existing bank, riparian and floodplain structure and connectivity with channel due to the diversion	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated	Only negligible effects on surface water quality identified in groundwater assessment, no effects on this WFD element anticipated	• Possible effects on dry weather flow in minor tributary which could result in localised decreases in flow depths and reduced channel - riparian connectivity. This would not affect the Black Brook itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	N/A	Not required. Upstream water body not impacted by Scheme.					

B. Risk screening of potential to prevent future attainment of good Ecological status

BBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where BBMP measure will happen	What BBMP measure will happen																							
NONE identified in Appendix B of BBMP	-	-	Predicted change to status elements (green = none, amber = possible, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Water Body ID	GB104028047000
Surface Water Body Name	Black-Bourne Brook from source (confluence) to River Tame
CFAs covered by Waterbody	21

CFA	21	
AP2 ID	AP2-021-004	
AP2 Name	Full review of HS2 drainage in the Swinfen Cutting area	
AP2 Location	Drayton Bassett, Hints and Weeford	
New/Replacement Scheme Element	New	Replacement
Scheme Element Type	Culvert	River Diversion
Original Scheme	The Bill provides for drainage infrastructure as part of the Proposed Scheme's design in order to	
AP2 Description	A culvert under the A5 and a carrier pipe east of HS2 to a ditch, leading to the Black Brook (north) attenuation pond. **Associated with River Diversion of Black Brook tributary diversion to avoid Swinfen Aqueduct as described in cell H15.**	Ground re-profiling to the east of HS2 (approximately 2m in height with a 1.5m wide crest, 350m in length), opposite Flats Lane auto transformer station, with perimeter cut off ditches, to avoid the need for the Swinfen Aqueduct over the Proposed Scheme as presented in the Bill. **A diversion of a small tributary of the Black Brook, along the east of HS2 towards Black Brook, flowing through culvert and carrier pipe as described in cell G15.**
AP2 Changes to Previously Assessed Elements	None	None
AP2 Additional Elements Assessment Requirement	New culvert and carrier pipe	New River Diversion

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Black Brook Viaduct CFA21-SW-061					River Diversion			Roundhill Wood Culvert on Tributary of Black Brook (CFA21-SW-059 and CFA21-SW-060) and Hints Culvert on Tributary of Black Brook (CFA21-SW-058)					Cutting		Swinfen Cutting			CULVERT AND CARRIER PIPE - Full review of HS2 drainage in the Swinfen Cutting area - AP2-021-004					RIVER DIVERSION - Full review of HS2 drainage in the Swinfen Cutting area - AP2-021-004				Impacts from other WFD water bodies (assessed separately)
GB104028047000	Moderate	Good Ecological Potential by 2027	Description of scheme element impact	Viaduct over Black Bourne Brook approximately 105m long with footing close to banks edge.					Diversion of Tributary of Black Brook into Roundhill Wood culvert (CFA21-SW-059 and CFA21-SW-060)			Culverts under Hints Embankment. Lengths of culverts appear to be less than 60 m each.					Hints Cutting		Cutting may interrupt groundwater flows and lead to the transfer of water from East Lichfield catchment to Black Bourne Brook catchment. There will also be loss of flow to a minor tributary of Black Bourne Brook (small trib and springs near Bucks Head Farm) but not affecting the catchment as a whole.			Associated with River Diversion of Black Brook tributary diversion to avoid Swinfen Aqueduct.					A diversion of a small tributary of the Black Brook, along the east of HS2 towards Black Brook, flowing through culvert and carrier pipe as described in cell G15.				
Black Bourne Brook from source (confluence) to River Tame			Identified biological impacts:	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	
WFD classification elements	1. Macrophytes and phytobenthos - diatoms	Poor	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	-	-	Receptor is insensitive to impact	No footings in river	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. Baseline data indicates macrophytes are relatively abundant in the Black Brook viaduct however, the would only be a minor and highly localised effect on Black Brook	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in macrophytes	There will be loss of marginal and channel macrophytes over the length of the new culvert. Baseline data shows that this will be the diverted section. - The community will re-establish within 1 to 2 years of completion of the new diversion. - No baseline macrophyte data available, but effects would be short term (less than 1 year) and localised. Effects on WFD water body and wouldn't affect the status of the WFD element. Only minor, temporary and localised effects are therefore anticipated.	- The new channel should incorporate (if possible) marginal berms to encourage emergent macrophyte growth. Baseline data indicates that the habitats suitable for colonisation by submerged species. The effect on this quality element is considered to be minor positive.	- No hydromorphological effects anticipated and therefore no effect on macrophyte communities.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Possible minor and localised effects on flows in minor tributary, but no overall adverse effect on flows in the main watercourse itself (there will be potentially a minor increase due to transfer of water from East Lichfield catchment to Black Bourne Brook). Possible minor and localised effects on macrophytes in minor tributary	Possible minor and localised effects on water quality in minor tributary, but no overall adverse effect on water quality in the main watercourse itself. Possible minor and localised effects on macrophytes in minor tributary.	Receptor is insensitive to impact	There will be permanent loss of habitat. No baseline data available, but the culvert would impact only a small length of the watercourse. By default, localised adverse effect.	Shading of the channel from the culvert has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. No baseline data available, but the culvert would impact only a small length of the watercourse. By default, localised adverse effect.	Potential localised flow pattern homogenisation, reduced habitat continuity and increase in flow velocities. No baseline data available, but as the hydromorphological impacts should be localised, minor localised adverse effect anticipated.	Potential localised minor changes in dissolved oxygen and pollutants concentrations. In the absence of baseline data, potential adverse effect locally.	There will be temporary loss of habitat within the diverted stretch of the tributary of Black Brook while the new channel re-establishes. No baseline data available. Localised and temporary adverse effect anticipated.	The new channel should incorporate (if possible) marginal berms to encourage emergent macrophyte growth. Baseline data indicates that the habitats suitable for colonisation by submerged species. The effect on this quality element is considered to be minor positive.	Potential localised hydromorphological changes, with notably reduced habitat continuity and modifications of channel morphology. No baseline data available. By default, localised adverse effect anticipated.	Not required. Upstream water body not impacted by Scheme.
	3. Macroinvertebrates	Poor	-	Receptor is insensitive to impact	No footings in river	- Shading has the potential to have indirect effects on macroinvertebrates (if macrophyte cover is lost), however as the macroinvertebrate community is of low ecological value (and therefore impacts) there would be no effects or negligible effects on macroinvertebrates	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in macroinvertebrates.	- Temporary loss of macroinvertebrates over the length of the existing tributary of Black Brook that lies within the diverted channel. Possible temporary effects associated with suspension of solids during the construction works (associated with reduced DO). - Likely to lead to a short term adverse effect on macroinvertebrate abundances and diversity. - No invertebrate baseline data available from the tributary, but macroinvertebrate communities are generally poor and pollution sensitive (mainly pollution tolerant species) and therefore short term adverse effect on macroinvertebrates is considered to be minor.	The diversion should be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the tributary. The effect on this quality element is considered to be minor positive.	- No hydromorphological effects anticipated and therefore no effect on macroinvertebrate communities.	- Localised changes in flow dynamics may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediately downstream). This would only be effect a limited distance of the minor tributary and potential effects are considered to be minor and localised.	- Localised changes in flow dynamics may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediately downstream). This would only be effect a limited distance of the minor tributary and potential effects are considered to be minor and localised.	- No impact. Runoff will be collected by drainage to balancing pond.	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated.	Only negligible effects on surface water quality identified in groundwater assessment, no effects on this WFD element anticipated.	Possible minor and localised effects on flows in minor tributary, but no overall adverse effect on flows in the main watercourse itself (there will be potentially a minor increase due to transfer of water from East Lichfield catchment to Black Bourne Brook). Possible minor and localised effects on macroinvertebrates in minor tributary due to reduced base flows.	Possible minor and localised effects on water quality in minor tributary, but no overall adverse effect on water quality in the main watercourse itself. Possible minor and localised effects on macroinvertebrates in minor tributary.	Receptor is insensitive to impact	There will be permanent loss of habitat. No baseline data available, but the culvert would impact only a small length of the watercourse. By default, localised adverse effect.	No additional effect, loss of macrophytes already considered within Landtake impact.	Potential localised flow pattern homogenisation, reduced habitat continuity and increase in flow velocities. No baseline data available, but as the hydromorphological impacts should be localised, minor localised adverse effect anticipated.	Potential localised minor changes in dissolved oxygen and pollutants concentrations. In the absence of baseline data, potential adverse effect locally.	There will be temporary loss of habitat within the diverted stretch of the tributary of Black Brook while the new channel re-establishes. No baseline data available. Localised and temporary adverse effect anticipated.	The diversion should be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the tributary. The effect on this quality element is considered to be minor positive.	Potential localised hydromorphological changes, with notably reduced habitat continuity and modifications of channel morphology. No baseline data available. By default, localised adverse effect anticipated.	Not required. Upstream water body not impacted by Scheme.
	4. Fish	Moderate	-	Possible temporary sub-lethal effects on fish (e.g. displacement from preferred areas). Although the baseline data suggests that Black Brook in this section is characterised by a species poor coarse fishery and effects are likely to be temporary and localised with no impact on the water body as a whole.	No footings in river	Shading will only have negligible or no effects on fish.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in fish.	- Temporary loss of fish and fish habitat over the length of the existing tributary of Black Brook that lies within the diverted channel. Possible temporary effects associated with suspension of solids during the construction works (associated with reduced DO). - Likely to lead to a short term adverse effect on fish while the new channel re-establishes. No fish data available, but given the small size of the tributary, it is not likely to be of high value to fish or contribute significantly to the fish population of the Black Bourne Brook WFS water body and will recover within several months. Only minor, temporary and localised effects are therefore anticipated.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities.	- No hydromorphological effects anticipated and therefore no effect on fish communities.	- Possible temporary sub lethal effects on fish (e.g. displacement from preferred areas). Effects are likely to be temporary and localised with no impact on the water body as a whole or designated salmonid fishery.	- Localised changes in flow dynamics and the presence of the culvert will not impede upstream passage of any migratory fish provided the culvert design is in accordance with DEFRA guidance. - There is very limited information on the design of the culvert and no data are available for fish on this tributary. - Only minor and localised effects are anticipated provided embedded mitigation measures are implemented (including the improvements to habitat upstream and downstream of the culverts, appropriate design of culvert for fish passage etc.)	- Localised changes in flow dynamics and the presence of the culvert will not impede upstream passage of any migratory fish provided the culvert design is in accordance with DEFRA guidance. - There is very limited information on the design of the culvert and no data are available for fish on this tributary. - Only minor and localised effects are anticipated provided embedded mitigation measures are implemented (including the improvements to habitat upstream and downstream of the culverts, appropriate design of culvert for fish passage etc.)	- No impact. Runoff will be collected by drainage to balancing pond.	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated.	Only negligible effects on surface water quality identified in groundwater assessment, no effects on this WFD element anticipated.	Possible minor and localised effects on flows in minor tributary, but no overall adverse effect on flows in the main watercourse itself (there will be potentially a minor increase due to transfer of water from East Lichfield catchment to Black Bourne Brook). Possible minor and localised effects on fish in minor tributary due to reduced base flows.	Possible minor and localised effects on water quality in minor tributary, but no overall adverse effect on water quality in the main watercourse itself. Possible minor and localised effects on fish in minor tributary	Possible temporary sub lethal effects on fish (e.g. displacement from preferred areas). No baseline data available, but as the area impacted will be short at the scale of the waterbody, potential localised and minor adverse effect.	There will be permanent loss of habitat and the culvert would impact on a small length of the watercourse. No baseline data available on this tributary but baseline surveys did not demonstrate the presence of migratory species in Black Brook. However, the waterbody is a Freshwater Fish Directive designated waterbody. By default, localised adverse effect.	No additional effect, loss of macrophytes already considered within Landtake impact.	Potential localised flow pattern homogenisation, reduced habitat continuity and increase in flow velocities. No baseline data available on the tributary but baseline surveys did not demonstrate the presence of migratory species in Black Brook. As the hydromorphological impacts should be localised, minor localised adverse effect anticipated.	Potential localised minor changes in dissolved oxygen and pollutants concentrations. In the absence of baseline data, potential adverse effect locally.	There will be temporary loss of habitat within the diverted stretch of the tributary of Black Brook while the new channel re-establishes. No baseline data available. Localised and temporary adverse effect anticipated.	The diversion should be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the tributary. The effect on this quality element is considered to be minor positive.	Potential localised hydromorphological changes, with notably reduced habitat continuity and modifications of channel morphology. No baseline data available. By default, localised adverse effect anticipated.	Not required. Upstream water body not impacted by Scheme.
Physico-Chemical status																														
WFD classification elements	5. Dissolved Oxygen	High	-	N/A	N/A	N/A	• GoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• GoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor positive, but this is temporary/local and not anticipated at the scale of the water body.	• GoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• GoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• GoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated.	Only negligible effects on surface water quality identified in groundwater assessment, no effects on this WFD element anticipated.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	Receptor is insensitive to impact	Possible minor and localised effects on water quality in minor tributary, but no overall adverse effect on water quality in the main watercourse itself.	N/A	N/A	• The construction of the proposed AP2 culvert and carrier pipe is predicted to result in no more than a temporary, minor impact on this sub-element. • GoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.

A. Risk screening of potential to cause deterioration of current WFD E

	Surface Water body	Current status	Status objective	Scheme Elements / Description of scheme element impact / Identified biological impacts	OVERALL impact on element	Proposed Mitigation Measures: Construction	Proposed Mitigation Measures: Operation	RESIDUAL effect on element (following any additional mitigation measures)	
	GB104028047000	Moderate	Good Ecological Potential by 2027						
	Black-Bourne Brook from source (confluence) to River Tame								
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	Poor	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	-	-		- Black Brook does not currently have a WFD status for macrophytes and is not known to be monitored for this element - Limited data were collected on macrophytes within the Black Brook and its tributaries as part of the baseline surveys. - The scheme will lead to loss of habitat and photosynthetic activity (in shaded areas). Temporary loss of habitat within the tributary of Black Brook will be compensated by the creation of new habitat. - The overall effect on the current and future status of this element is likely to be neutral effect, if embedded mitigation measures are implemented, with no overall effect on WFD status of this element. - The addition of AP2 elements (culvert and river diversion on a small tributary of Black Brook), while contributing slightly to the overall impact, is considered to be minor at the scale of the waterbody, even in combination with other scheme elements, and therefore, the overall effect on this quality element has not been updated.	None required.	- Measures to improve macrophyte habitat or mitigate any adverse effects form part of the embedded mitigation measures described previously. - However, additional mitigation measures may be required, given the lack of data and length of the tributaries affected. These should include channel habitat improvements (e.g. marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species) for an extended distance other than immediately upstream and downstream of the culvert. A further assessment of the watercourse should be undertaken to establish necessary habitat improvement measures within the tributary, or Black Brook itself. - Further, construction and post-construction monitoring should be considered (if necessary) to assess any effects on invertebrates	Minor and localised effects	
	3. Macroinvertebrates	Poor	-		- Black Bourne Brook is currently of Poor status for macroinvertebrates. This is supported by the baseline data, although there is some variability. There was no baseline data for the tributary affected by culvert and river diversion but adverse effects are likely to be localised (culvert) or temporary (river diversion) and will be balanced by creation of new habitats. ~~- Although the scheme will lead to loss of habitat within the water body and its tributaries,~~ - The overall effect on the current and future status of this element is likely to be neutral, if embedded mitigation measures are implemented, with no overall effect on WFD status of this element. - The addition of AP2 elements (culvert and river diversion on a small tributary of Black Brook), while contributing slightly to the overall impact, is considered to be minor at the scale of the waterbody, even in combination with other scheme elements, and therefore, the overall effect on this quality element has not been updated.	None required.	- Measures to improve macroinvertebrate habitat or mitigate any adverse effects form part of the embedded mitigation measures described previously. - However, additional mitigation measures may be required, given the lack of data and length of the tributaries affected. These should include channel habitat improvements (e.g. pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa for an extended distance other than immediately upstream and downstream of the culvert. A further assessment of the watercourse should be undertaken to establish necessary habitat improvement measures within the tributary, or Black Brook itself.	Minor and localised effects	
	4. Fish	Moderate	-		- Black Bourne Brook is of moderate status for fish. - The scheme will lead to loss of habitat and there is the potential for barriers to salmonid fish migration from proposed culverting of a tributary of the Itchen and a tributary of the Black Brook. There was no baseline data for the tributary affected by the culvert and the river diversion but baseline surveys did not demonstrate the presence of migratory species in Black Brook. Adverse effects are therefore likely to be localised (culvert) or temporary (river diversion) and will be balanced by creation of new habitats. - The mitigation measures proposed (notably the design of the culverts to allow for fish passage) will mitigate for the potential deteriorations identified. - The overall effect on the current and future status of this element is likely to be minor and localised, if mitigation measures are implemented, with no overall effect on WFD status of this element. - The addition of AP2 elements (culvert and river diversion on a small tributary of Black Brook) is, while contributing slightly to the overall impact, considered to be minor at the scale of the waterbody, even in combination with other scheme elements, and therefore, the overall effect on this quality element has not been updated.	None required.	- Measures to mitigate any adverse effects on fish form part of the embedded mitigation measures described previously. - These measures include channel improvements to habitat within the proximity of the culvert on the minor tributary - Although this tributary is not known to be of importance for migratory fish (no baseline habitat or fish data were collected) it is important to ensure that the culvert is designed and installed to allow fish passage. An assessment of the culvert with relation to flows and fish passage must be included as part of the detailed design development. - Further surveys to assess the value of the tributary for fish should be undertaken as part of the assessment. Further, construction and post-construction monitoring should be considered (if necessary) to assess any effects on fish	Minor and localised effects	
	Physico-Chemical status								
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	~~Depending on how much flow is lost,~~ Potential minor and localised effects on element. No overall adverse effect on water quality in the main water body as a whole. The addition of the river diversion, AP2 culvert and carrier pipe of the minor tributary will contribute slightly to the cumulative impact on physico-chemical status, however, it is not considered to be significant, and subsequently there will be no change in overall impact status from the previous assessment. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	~~None required.~~	~~None required.~~	Minor and localised effect.	-
	6. pH	High	-		Receptor is insensitive to impact			Receptor is insensitive to impact	
	7. Phosphate	Bad	-		~~Depending on how much flow is lost.~~ Potential minor and localised effects on element. Nine sewage discharge consents on tributaries and main water body of Black-Bourne Brook. The phosphate status cannot be deteriorated any further than 'Bad', therefore this effect will be presented in the prevention to future good status assessment. The addition of the river diversion, AP2 culvert and carrier pipe of the minor tributary will contribute slightly to the cumulative impact on physico-chemical status, however, it is not considered to be significant, and subsequently there will be no change in overall impact status from the previous assessment. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.			Minor and localised effects	
	8. Ammonia	Good	-		~~Depending on how much flow is lost,~~ Potential minor and localised effects on element. No overall adverse effect on water quality in the main water body as a whole. The addition of the river diversion, AP2 culvert and carrier pipe of the minor tributary will contribute slightly to the cumulative impact on these sub-elements, however, it is not considered to be significant, and subsequently there will be no change in overall impact status from the previous assessment. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.			Minor and localised effects	
	9. Temperature	-	-						
	10. Specific Pollutants (Annex VIII)	High	-						
	Hydromorphological status								**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	• The viaduct is unlikely to have any significant impact • The culverts are extensive and likely to cause deterioration • The current proposals for the watercourse diversion appear to take the already modified channel even further away from its natural conditions, although this could also be viewed as a design and enhancement opportunity. • Overall, the culvert and diversion are on a minor (less than 1m channel width) tributary to a 14.5 km waterbody, and although these are generally negative impacts, they would be unlikely to cause deterioration at waterbody scale. • The overall impact on the waterbody has not needed to be updated as a result of the AP2 assessments.	Undertake hydromorphological surveys to aid detailed design development. Incorporate hydromorphological mitigation measures into detailed design where practicable. Mitigation measures might include: • Bank reprofiling (rehabilitation) • Create reed fringes • Creation of shallow margin in front of hard defence • Install silt, sand or gravel traps • Introduce riparian vegetation/green corridors where space allows • Recreate a sinuous river channel (re-meandering) where space allows • Recreation of gravel bars and riffles using permanent and/or temporary bed structures (increase morphological diversity) • Retain marginal vegetation • Use of engineering techniques to assist natural recovery • Use soft engineering techniques		Minor and localised effects	• Hydromorphology baseline is derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-						
	13. River continuity	-	-						
	14. River depth and width variation bed	-	-						
	15. Structure and substrate of river bed	-	-						
	16. Structure of riparian zone	-	-						

B. Risk screening of potential to prevent future attainment of good Ec

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen						
NONE identified in Appendix B of RBMP	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-

GB104028046900

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Drayton Basset Viaduct 173-L1					Gallows Brook Culvert No1 172-S3 and Gallows Brook Culvert No2 172-S4					Impacts from other WFD water bodies (assessed separately)	OVERALL impact on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB104028046900	Moderate	Good by 2027	Description of scheme element impact	*Viaduct with the following dimensions: 247.5 m length, mean height 4.9 m and width 14.3 m,. Crosses a tributary of Langley Brook and a connected ditch no footings in watercourse or riparian zone, but nearby embankment and footings in flood plain.*					*Two box culverts (limited data) crossing Gallows Brook*							Construction	Operation		
Langley Brook from Middleton Hall Catch to River Tame			Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	Not assessed	-		Receptor is insensitive to impact	No footings in river or adjacent	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. -Baseline data suggests that macrophyte cover is very low in the watercourse, as it heavily shaded. -The would only be a minor and highly localised effect on this tributary of Langley Brook, which would not affect the status of this quality element.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert - However, only relatively short distance of a minor upstream tributary (ditch) affected with moderate macrophyte cover and there would be no conceivable effect on this element at a water body level. - Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the culvert).	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - There would only be a localised and minor effects on macrophyte communities, not affecting the status of this quality element.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert) may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	No significant effects identified on upstream water bodies	- Langley Brook does not currently have a WFD status for macrophytes and is not known to be monitored for this element. - Baseline data undertaken on the potentially affected upstream tributaries of Langley Brook indicated that macrophytes were not highly diverse or abundant, although some variability was recorded. - Although the scheme will lead to a loss of habitat and photosynthetic activity (in shaded areas) on these tributary, this is relatively minor within the context of the water body. - The overall effect on the current and future status of this element is likely to be neutral.	None required.	None required.	Minor and localised effects	
	3. Macroinvertebrates	Moderate	-		Receptor is insensitive to impact	No footings in river or adjacent	- Shading has the potential to have indirect effects on macroinvertebrates (if macrophyte cover is lost), however as macrophyte cover is currently very low there would be no effects or negligible effects on macroinvertebrates	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrates and reduce the habitats available for colonisation within the culvert. - Baseline survey data showed that the invertebrates to be of moderate diversity, but indicative of a stressed community - Given the relative contribution of this minor tributary and the invertebrate community present, there ltcher there would be no conceivable effect on this element at a water body level. - Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the culvert).	- Shading may have indirect effects on macroinvertebrates (if macrophyte cover is lost) -These are likely to be of no effect or negligible and given the relative importance of this tributary, with no anticipated effects on the wider water body.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert) may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably immediately downstream). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	No significant effects identified on upstream water bodies	- Langley Brook currently has a moderate WFD status for macroinvertebrates. - Data collected on the potentially affected tributaries were indicative of a stressed community - Although the scheme may lead to loss of habitat on these minor tributaries, this is negligible within the context of the water body. - The overall effect on the current and future status of this element is likely to be neutral.	None required.	None required.	Minor and localised effects	
	4. Fish	Not assessed	-		Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). However, effects are likely to be temporary and localised with no impact on the water body as a whole.	No footings in river or adjacent	Shading will only have negligible or no effects on fish.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - Survey data show that the ditch has poor fish habitat and is species poor (only stickleback recorded) - Effects are likely to be temporary and localised with no impact on the water body as a whole	- Landtake is unlikely to result in direct mortality of fish but there will be direct loss of fish habitats available for colonisation within the culvert. - Survey data show that the ditch has poor fish habitat and is species poor (only stickleback recorded) - Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the culvert).	Shading will only have negligible or no effects on fish.	- Localised changes in flow dynamics (potential increased flow due to the straightened channel in the culvert) and the presence of the culvert have the potential to impede upstream passage of any migratory fish. - Survey data show that the ditch has poor fish habitat and is species poor (only stickleback recorded) and the watercourse at this location is near the head of the watercourse and has no potential for migratory fish based on the habitat data collected - There would therefore be only very limited effects from changes to hydromorphology on fish populations, with no conceivable effects on migratory fish. Any effects would therefore be highly localised and minor.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	No significant effects identified on upstream water bodies	- Langley Brook does not currently have a WFD status for fish and is not known to be monitored for this element. - Baseline data undertaken on the potentially affected upstream tributaries of Langley Brook indicated that fish habitat was poor and there was a species poor within the potentially affected Gallows Brook - and there would only be very minor localised or no measurable effects - The overall effect on the current and future status of this element is likely to be neutral.	None required.	None required.	Minor and localised effects	
Physico-Chemical status																			**Hydromorphology Baseline**
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	No significant effects identified on upstream water bodies	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	No significant impacts predicted	-
	6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No significant effects identified on upstream water bodies				
	7. Phosphate	Bad	-		N/A	N/A	N/A	effectively an open span bridge, so there would be no	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	No significant effects identified on upstream water bodies				
	8. Ammonia	Good	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No significant effects identified on upstream water bodies				
	9. Temperature	High	-		N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	No significant effects identified on upstream water bodies				
	10. Specific Pollutants (Annex VIII)	-	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	No significant effects identified on upstream water bodies				
Hydromorphological status																			
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• Embankment in the floodplain would constrain peak flows and cause local increases in flow velocity and turbulence. • Overall, the size of the channel (2m width or less) is likely to mean there would be no detrimental hydromorphological effects	N/A	N/A	N/A	N/A	• Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in increased flow velocities due to increased channel gradients and decreased roughness. • Gallows Brook is a minor tributary of Langley Brook, and in practical terms the culvert would impact a small proportion of the water body	N/A	No significant effects identified on upstream water bodies	• No significant impacts for Drayton Brook Viaduct • For Gallows Brook, culvert could constrain flows, even though the brook is a minor feature	Hydromorphological surveys to be undertaken to aid detailed design development. Hydromorphological mitigation should be included into detailed design where practicable. Mitigation measures that might be incorporated include: • Create low flow channels in over-widened/over-deepened channels • Create reed fringes • Introduce riparian vegetation/green corridors where space allows • Recreate a sinuous river channel (re-meandering) • Retain marginal vegetation • Use of engineering techniques to assist natural recovery • Use soft engineering techniques		Minor and localised effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	• Not significant to hydromorphology	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	No significant effects identified on upstream water bodies	• Likely to be no significant relationship between hydromorphology and groundwater		No significant effects	
	13. River continuity	-	-		N/A	N/A	N/A	• Embankments in the floodplain would decrease natural continuity by the presence of physical obstacles • Size of channel means this would only be an issue at extreme flows, and overall is not considered significant	N/A	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity adjacent to both sides of the channel, • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A	No significant effects identified on upstream water bodies	• No significant impacts for Drayton Brook Viaduct • For Gallows Brook, culvert could alter in-channel continuity and sever out-of-bank continuity		Minor and localised effects	
	14. River depth and width variation bed	-	-		N/A	N/A	N/A	• Floodplain flows would be inhibited by the embankments • However, the size of the channel suggests there is unlikely to be significant diversity of river depth and width, and in practical terms there would be no significant effect	N/A	N/A	N/A	N/A	• Out-of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The culvert would homogenise channel morphology • Some scour may occur upstream and downstream of the structure as the river tries to regain flow and sediment regime equilibrium. This can create diversity, but can also create dead zones, and in some cases can result in the rigid culvert base becoming 'perched' if the base is not set at the correct gradient and below the bed as natural substrates are eroded adjacent to the culvert. This can create a stepped channel, which impedes continuity. • The size of the channel suggests there is unlikely to be significant diversity of river depth and width, but these impacts are still flagged as a risk	N/A	No significant effects identified on upstream water bodies	• No significant impacts for Drayton Brook Viaduct • For Gallows Brook, unlikely to be any significant effects, but the culvert is a risk to natural channel geometry		Minor and localised effects	
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• Size of channel means there is unlikely to be much diversity in bed conditions, and overall effects are not considered significant	N/A	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour. • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk as described above.	N/A	No significant effects identified on upstream water bodies	• No significant impacts for Drayton Brook Viaduct • For Gallows Brook, unlikely to be any significant effects on bed conditions because there appears to be little bed diversity in the small channel		No significant effects	
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	• Footings are set back from riparian zones	N/A	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	No significant effects identified on upstream water bodies	• No significant impacts for Drayton Brook Viaduct • For Gallows Brook, riparian zones would be severed		Minor and localised effects	

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen																	
None listed in RBMP. Reasons for failure include the following:	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
P1a - Phosphate or Total Phosphate	-	-		-	-	-	-	-	-	-	-	-	-	-	No effect anticipated	No additional mitigation required	No additional mitigation required	No effect anticipated	

Water Body ID	GB104028046900
Surface Water Body Name	Langley Brook from Middleton Hall Catch to River Tame
CFAs covered by Waterbody	20, 21

CFA	20	21
AP2 ID	AP-C223-113	AP2-021-001
AP2 Name	Lowering of HS2 alignment from Middleton northwards	Replace Drayton Bassett Viaduct with embankment and culverts
AP2 Location	Middleton	Parish of Drayton Bassett
New/Replacement Scheme Element	REPLACEMENT	REPLACEMENT
Scheme Element Type	Viaduct	Embankment
Original Scheme	The Proposed Scheme was designed to travel largely on embankment and over the Langley Brook on an approximately 90m viaduct, with 5 spans and a 3m noise barrier (later reported as 4m) on the west side of the viaduct. Two balancing ponds would be provided, one to the west of the viaduct and one to the east, with outfalls to Langley Brook. Clearance under the viaduct was designed to be 2.9m, with the brook passing through the second span from the north end.	The proposed Drayton Bassett Viaduct spans the Gallows Brook flood plain which comprises two watercourses. The proposed viaduct extends to 155m in length and 5.8m above ground level in height.
AP2 Description	The proposed amendment would result in a change to the Langley Brook viaduct and lowering of the Langley Brook river bank level to provide the 2.3m clearance required. There is also potential for changes to Gallows Brook and associated planting	The proposed amendment replaces Drayton Bassett viaduct with an embankment and two culverts, each spanning 10 m. The vertical alignment is anticipated to be lowered in this area by approximately 2.5 m. Culvert 1 (Ch. 173+237) would have 600mm headroom above design water level and would be approximately 1.5m below the lowest rail depth. Culvert 2 (Ch. 173+120) would have 700mm of headroom above design water level and a depth below rail level of 850mm. Due to the small depth below rail level this culvert will be designed as an underbridge. This culvert would provide a headroom of 2.8m, suitable as an agricultural underpass for the cattle similar to the Viaduct.
AP2 Changes to Previously Assessed Elements	Removal of Gallows Brook culverts	Removal of Drayton Bassett Viaduct downgrades
AP2 Additional Elements Assessment Requirement	Change from 2 x Culverts to a River Diversion	Change from Viaduct to 2 x Culverts

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Drayton Basset Viaduct 173-L1					Gallows Brook Culvert No1 172-S3 and Gallows Brook Culvert No2 172-S4					DRAYTON BASSET CULVERTS - Replace Drayton Bassett Viaduct with embankment and culverts - AP2-021-001					RIVER DIVERSION - Lowering of HS2 alignment from Middleton northwards - AP2-020-007			Impacts from other WFD water bodies (assessed separately)	OVERALL impact on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB104028046900	Moderate	Good by 2027	Description of scheme element impact	*Viaduct with the following dimensions: 247.5 m length, mean height 4.9 m and width 14.3 m, crosses a tributary of Langley Brook and a connected ditch no footings in watercourse or riparian zone, but nearby embankment and footings in flood plain.*					*Two box culverts (limited data) crossing Gallows Brook*					*Embankment and two culverts crossing two tributaries of Langley Brook, each spanning 10 m*					Gallows Brook, which discharges to the Langley Brook (GB104028046900) and then immediately into the Coventry and Ashby Canal (GB70910212), is to be diverted into other Langley Brook catchment to the south (GB104028046901). No real loss in flow to Langley Brook (GB104028046900) (as mostly discharges to canal), but additional beneficial flow to other Langley Brook catchment (GB104028046901). Two culverts removed as a result of this AP2 amendment.							
Langley Brook from Middleton Hall Catch to River Tame			Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Changes to waterbody hydromorphology leading to changes in river processes and habitats upstream and downstream	Creation of new habitats			Construction	Operation		
WFD classification elements	Predicted change to status elements (green = none, amber = possible, red = likely)																										
1. Macrophytes and phytoxenthos - diatoms	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
2. Macrophytes and phytoxenthos - macrophytes	Not assessed	-		Receptor is insensitive to impact	Receptor is insensitive to impact	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and hence reduce primary production. However, this suggests that macrophyte cover is very low in the watercourse, as it heavily shaded. The would only be a minor and highly localised effect on the quality of the tributary of Langley Brook, which would not affect the status of this quality element.	No impact anticipated	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and hence affect macrophyte communities present. There would only be a localised and minor effect to macrophyte communities, given the small size of the tributary of Langley Brook, which would not affect the status of this quality element.	Receptor is insensitive to impact	Receptor is insensitive to impact	Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities. However, there is very little macrophyte cover in very low in the watercourse, as it heavily shaded. There would only be a minor and highly localised effect on the tributary of Langley Brook, which would not affect the status of this quality element.	Potential localised adverse effects due to channel morphology homogenisation, increases in flow velocities and reduction of habitat and water continuity. However, there is very little macrophyte cover in very low in the watercourse, as it heavily shaded. There would only be a minor and highly localised effect on the tributary of Langley Brook, which would not affect the status of this quality element.	Potential localised and minor changes in dissolved oxygen and pollutants concentrations. Baseline data suggests that macrophyte cover is very low in the watercourse, as it heavily shaded. There would only be a minor and highly localised effect on the tributary of Langley Brook, which would not affect the status of this quality element.	There will be loss of marginal and emergent macrophyte cover along the Gallows Brook that lies within the diverted section. Gallows Brook has moderate macrophyte cover. Potential localised and temporary adverse effects.	Potential localised adverse effect through flow reductions. Gallows Brook has moderate macrophyte cover. Potential minor and localised adverse effect.	Design will also include marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. Gallows Brook has moderate macrophyte cover. Potential localised beneficial effect anticipated.	No significant effects identified on upstream water bodies	- Langley Brook does not currently have a WFD status for macrophytes and is not known to be monitored for this element. - Baseline data undertaken on the potentially affected upstream tributaries of Langley Brook indicated that macrophytes were not highly diverse or abundant, with a poor and there was a species poor within the potentially affected Gallows Brook. - Although the scheme will lead to a loss of habitat and physiosthetic activity (in shaded areas) on these tributaries, these are relatively minor within the context of the water body. The overall effect on the current and future status of this element is likely to be neutral. AP2 changes from a culvert to a river diversion will lead to less adverse effects on Gallows Brook, as there would be balanced in the long term by creation of new habitats. On the tributaries of Langley Brook, the new culverts will have very minor localised adverse effects, therefore cumulative effects are unlikely to have an adverse effect at the scale of the waterbody. Overall effect remains unchanged as part of this AP2 assessment.	None required.	None required.	Minor and localised effects	
3. Macroinvertebrates	Moderate	-		Receptor is insensitive to impact	Receptor is insensitive to impact	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and hence reduce primary production. However, this suggests that macrophyte cover is very low in the watercourse, as it heavily shaded. There would only be a minor and highly localised effect on the quality of the tributary of Langley Brook, which would not affect the status of this quality element.	No impact anticipated	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and hence affect macrophyte communities present. There would only be a localised and minor effect to macrophyte communities, given the small size of the tributary of Langley Brook, which would not affect the status of this quality element.	Receptor is insensitive to impact	Receptor is insensitive to impact	Shading has the potential to have indirect effects on macroinvertebrates through loss of habitat. However, as macrophyte cover is currently very low there would be no effects or negligible effects on macroinvertebrates	Potential localised adverse effects due to channel morphology homogenisation, increases in flow velocities and reduction of habitat and water continuity. No baseline data available. As only minor impacts on hydromorphology anticipated on a minor tributary, only localised adverse effect anticipated on this quality element.	Potential localised and minor changes in dissolved oxygen and pollutants concentrations. No baseline data available. As the drainage effects on water quality will be only temporary, localised and minor, only minor adverse effects anticipated on macroinvertebrates, which would not affect status at the level of the waterbody.	There will be loss of habitat over the existing Gallows Brook that lies within the diverted section. Survey data show that Gallows Brook has poor fish habitat and is species poor (only stickleback recorded). Potential localised and temporary adverse effect.	Potential localised adverse effect through flow reductions. Survey data show that Gallows Brook has poor fish habitat and is species poor (only stickleback recorded). Potential localised and temporary adverse effect.	The river diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to provide habitat for a range of macroinvertebrates taxa that currently characterise the reach. Baseline survey data showed the invertebrates to be of moderate diversity, but indicative of a stressed community. Potential localised and temporary adverse effect.	No significant effects identified on upstream water bodies	- Langley Brook currently has a moderate WFD status for macroinvertebrates - Data collected on **the potentially affected tributaries** Gallows Brook **were indicative of a stressed community.** No baseline available for other tributaries affected by culverts. - Although the scheme may lead to loss of habitat on these minor tributaries, there will be habitat creation as part of the river diversion and overall effect will be **negligible when viewed at the water body.** The overall effect on the current and future status of this element is likely to be neutral. AP2 changes from a culvert to a river diversion will lead to less adverse effects on Gallows Brook, as there would be balanced in the long term by creation of new habitats. On the tributaries of Langley Brook, the new culverts will have very minor localised adverse effects, therefore cumulative effects are unlikely to have an adverse effect at the scale of the waterbody. Overall effect remains unchanged as part of this AP2 assessment.	None required.	None required.	Minor and localised effects	-
4. Fish	Not assessed	-		Possible temporary sub-lethal effects - or fish (e.g. displacement from migratory areas). However, effects are likely to be temporary and localised with no impact on the water body as a whole	Receptor is insensitive to impact	Shading will not affect fish populations	No impact anticipated	Receptor is insensitive to impact	Possible temporary sub-lethal effects - or fish (e.g. displacement from migratory areas). However, effects are likely to be temporary and localised with no impact on the water body as a whole.	Potential temporary sub-lethal effects on fish (e.g. displacement from migratory areas). However, effects are likely to be temporary and localised with no impact on the water body as a whole. Surveys data show that the ditch has poor fish habitat and a species poor (only stickleback recorded) - effectively fish habitat is marginal and unsuitable for the water body as a whole	- Landtake is unlikely to which is deemed marginally of fish but there will be direct loss of fish habitat available for colonisation within the culvert. Survey data show that the ditch has poor fish habitat and is species poor (only stickleback recorded) - effectively fish habitat is marginal and unsuitable for the water body as a whole	- Shading has the potential to have indirect effects on fish through loss of habitat. However, as macrophyte cover is currently very low there would be no effects or negligible effects on macroinvertebrates	Potential localised adverse effects due to channel morphology homogenisation, increases in flow velocities and reduction of habitat and water continuity. No baseline data available. As only minor impacts on hydromorphology anticipated on a minor tributary, only localised adverse effect anticipated on this quality element.	Potential localised and minor changes in dissolved oxygen and pollutants concentrations. No baseline data available. As the drainage effects on water quality will be only temporary, localised and minor, only minor adverse effects anticipated on macroinvertebrates, which would not affect status at the level of the waterbody.	There will be loss of habitat over the existing Gallows Brook that lies within the diverted section. Survey data show that Gallows Brook has poor fish habitat and is species poor (only stickleback recorded). Potential localised and temporary adverse effect.	Potential localised adverse effect through flow reductions. Survey data show that Gallows Brook has poor fish habitat and is species poor (only stickleback recorded). Potential minor and localised adverse effect.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities. Survey data show that Gallows Brook has poor fish habitat and is species poor (only stickleback recorded). Potential localised beneficial effect anticipated.	No significant effects identified on upstream water bodies	- Langley Brook does not currently have a WFD status for fish and is not known to be monitored for this element. - Baseline data undertaken on the potentially affected upstream tributaries of Langley Brook indicated that fish habitat was poor and there was a species poor within the potentially affected Gallows Brook - There would be very minor localised or no measurable effects The overall effect on the current and future status of this element is likely to be neutral. AP2 changes from a culvert to a river diversion will lead to less adverse effects on Gallows Brook, as there would be balanced in the long term by creation of new habitats. On the tributaries of Langley Brook, the new culverts will have very minor localised adverse effects, therefore cumulative effects are unlikely to have an adverse effect at the scale of the waterbody. Overall effect remains unchanged as part of this AP2 assessment.	None required.	None required.	Minor and localised effects	
Physico-Chemical status																											
WFD classification elements	Predicted change to status elements (green = none, amber = possible, red = likely)																										
5. Dissolved Oxygen	High	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen	N/A	N/A	- Due to the length of the culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor local effect in relation to the water body. Therefore, no change in status is anticipated	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • The additional length of the proposed AP2 culverts is predicted to result in no more than a temporary, minor impact on this sub-element. • This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status from the previous assessment is anticipated.	N/A	• The construction of the proposed AP2 culverts is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	Receptor is insensitive to impact	• The construction of the proposed AP2 culverts is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	N/A	• The construction of the proposed AP2 river diversion is predicted to result in no more than a temporary, minor impact on this sub-element. • Release of sediment during construction of new channel may cause a temporary drop in dissolved oxygen. But no change in status is anticipated. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	• The construction of the proposed AP2 river diversion is predicted to result in no more than a temporary, minor impact on this sub-element. • Release of sediment during construction of new channel may cause a temporary drop in dissolved oxygen. But no change in status is anticipated. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	No significant effects identified on upstream water bodies	GREEN TO YELLOW: The change from a viaduct to two culverts on the Langley Brook, and the two culverts on the Gallow Brook to the river diversion, will contribute slightly to the cumulative impact on this physico-chemical sub-element. There is likely to be a minor overall impact on this sub-element, however no change in overall sub-element status is predicted. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.			GREEN TO YELLOW: Minor and localised effects	
6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No significant effects identified on upstream water bodies				Receptor is insensitive to impact
7. Phosphate	Bad	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. • The additional length of the proposed AP2 culverts is predicted to result in no more than a temporary, minor impact on this sub-element. • This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status from the previous assessment is anticipated.	Receptor is insensitive to impact	• The construction of the proposed AP2 culverts is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	Receptor is insensitive to impact	• The construction of the proposed AP2 river diversion is predicted to result in no more than a temporary, minor impact on this sub-element. • Release of sediment during construction of new channel may cause a temporary drop in dissolved oxygen. But no change in status is anticipated. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	No significant effects identified on upstream water bodies	GREEN TO YELLOW: The change from a viaduct to two culverts on the Langley Brook, and the two culverts on the Gallow Brook to the river diversion, will contribute slightly to the cumulative impact on this physico-chemical sub-element. There is likely to be a minor overall impact on this sub-element, however no change in overall sub-element status is predicted. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.			GREEN TO YELLOW: Minor and localised effects	-
8. Ammonia	Good	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No significant effects identified on upstream water bodies				Receptor is insensitive to impact
9. Temperature	High	-		N/A	N/A	N/A	• Low shading will not significantly impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No significant effects identified on upstream water bodies				
10. Specific Pollutants (Annex VIII)	-	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. • The additional length of the proposed AP2 culverts is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	Receptor is insensitive to impact	• The construction of the proposed AP2 culverts is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	Receptor is insensitive to impact	• The construction of the proposed AP2 river diversion is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	No significant effects identified on upstream water bodies				
Hydromorphological status																											Hydromorphology Baseline
WFD classification elements	Predicted change to status elements (green = none, amber = possible, red = likely)																										
11. Quantity and dynamics of river flow	-	-		N/A	N/A	N/A	• Culverts will be longer than current ditch and will alter local hydrodynamics and velocities • Culverts will be longer than current ditch and will alter local sediment transport	N/A	N/A	N/A	N/A	N/A	• Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow velocities. • Cut of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in increased flow velocities due to increased channel roughness. This would be an adverse impact on hydrodynamics. • Gallows Brook is a minor tributary of Langley Brook, and so a proportionally small amount of flow would impact a small proportion of the water body	N/A	N/A	N/A	• The channels of the tributaries are not visible from aerial imagery due to vegetation, but appear to be 2m wide or less, so there is unlikely to be significant diversity of flow velocities. • The channels are natural watercourses as opposed to cut field drains, but they do appear to have been modified (realigned / deepened) to improve land drainage of adjacent agricultural fields. Although it cannot be confirmed without field surveys, it is reasonable to assume the channels are not particularly valuable or dynamic morphological features. • New culverts would mean that cut of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in increased flow velocities due to increased channel roughness. This would be an adverse impact on hydrodynamics. Cut of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural pools flows, and may even surcharge in extreme events. • The culvert would homogenise channel morphology. • Some scour may occur upstream and downstream of the structure as the river tries to regain flow and sediment regime equilibrium. This can create diversity, but can also be problematic if the culvert outlet falls below the original culvert bed, becoming 'perched' if the bank or bed set to the correct gradient and below the bed as natural substrates are eroded adjacent to the culvert. This can create a stepped channel, which impedes continuity. • The size of the culverts suggests there is unlikely to be significant diversity of river depth and width, but these impacts are still flagged as a risk.	N/A	N/A	N/A	N/A	• The channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow velocities. • Cut of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in increased flow velocities due to increased channel roughness. This would be an adverse impact on hydrodynamics. • Gallows Brook is a minor tributary of Langley Brook, and so a proportionally small amount of flow would impact a small proportion of the water body	N/A	N/A/A	• The new section of the existing watercourse, and the extent of new watercourse that would be created by the diversion, mean that realistically there appear to be no significant habitat creation opportunities.	No significant effects identified on upstream water bodies			Minor and localised effects	
12. Connection to Groundwater	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	• Likely to be no significant relationship between hydromorphology and groundwater	No significant effects identified on upstream water bodies				No significant effects
13. River continuity	-	-		N/A	N/A	N/A	• Culverts will be longer than current ditch and will alter local hydrodynamics and velocities • Culverts will be longer than current ditch and will alter local sediment transport • Culverts will be longer than current ditch and will alter local fish and other aquatic species movement	N/A	N/A	N/A	N/A	N/A	• The culvert would disconnect floodplains and cut-off bank side habitats. This would be an adverse impact on aquatic flora and mammals which use the bank side habitats on both sides of the channel. • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the current water body status	N/A	N/A	N/A	N/A	• Lengthening the channel may result in increased channel roughness and hence slow down the conveyance of flow. The impact on the watercourse and the extent of the channel affected is considered to be unlikely to be significantly affected	N/A/A	• The new section of the existing watercourse, and the extent of new watercourse that would be created by the diversion, mean that realistically there appear to be no significant habitat creation opportunities.	No significant effects identified on upstream water bodies			Minor and localised effects	
14. River depth and width variation	-	-		N/A	N/A	N/A	• Excavation bed levels to be matched to bed profile of the channel upstream and downstream to ensure that the culvert invert does not become perched and affect aquatic species and sediment transport	N/A	N/A	N/A	N/A	N/A	• Cut of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural pools flows, and may even surcharge in extreme events. • The culvert would homogenise channel morphology. • Some scour may occur upstream and downstream of the structure as the river tries to regain flow and sediment regime equilibrium. This can create diversity, but can also be problematic if the culvert outlet falls below the original culvert bed, becoming 'perched' if the bank or bed set to the correct gradient and below the bed as natural substrates are eroded adjacent to the culvert. This can create a stepped channel, which impedes continuity. • The size of the culverts suggests there is unlikely to be significant diversity of river depth and width, but these impacts are still flagged as a risk.	N/A	N/A	N/A	N/A	• Out of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural pools flows, and may even surcharge in extreme events. • The culvert would homogenise channel morphology. • Some scour may occur upstream and downstream of the structure as the river tries to regain flow and sediment regime equilibrium. This can create diversity, but can also be problematic if the culvert outlet falls below the original culvert bed, becoming 'perched' if the bank or bed set to the correct gradient and below the bed as natural substrates are eroded adjacent to the culvert. This can create a stepped channel, which impedes continuity. • The size of the culverts suggests there is unlikely to be significant diversity of river depth and width, but these impacts are still flagged as a risk.	N/A	N/A/A	• The diversion would replicate existing channel geometry. Cut of channel length may increase as a result of lengthening the channel, but in practical terms there would be no significant change	N/A/A	• The new section of the existing watercourse, and the extent of new watercourse that would be created by the diversion, mean that realistically there appear to be no significant habitat creation opportunities.	No significant effects identified on upstream water bodies			Minor and localised effects	
15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• Excavation bed levels to be matched to bed profile of the channel upstream and downstream to ensure that the culvert invert does not become perched and affect aquatic species and sediment transport	N/A	N/A	N/A	N/A	N/A	• The size of the channel suggests there is unlikely to be significant diversity of bed substrate or transport or scour. • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk as described above.	N/A	N/A	N/A	N/A	• Lengthening a channel tends to reduce flow rates and increase deposition of sediment. However, the size of the watercourse there would probably be no measurable impact	N/A/A	• The new section of the existing watercourse, and the extent of new watercourse that would be created by the diversion, mean that realistically there appear to be no significant habitat creation opportunities.	No significant effects identified on upstream water bodies			No significant effects	
16. Structure of riparian zone	-	-		N/A	N/A	N/A	• Culverts will be longer than current ditch	N/A	N/A	N/A	N/A	N/A	• The Culvert would disconnect bed channels from the riparian/riparian corridor and alter aquatic species movement along the channel. But this is a minor feature, riparian vegetation is continuous although only extends 1-2 m from the channel edge, and in practical terms the impacts would accumulate to deterioration of water body status	N/A	N/A	N/A	N/A	• Although channel capacity would increase, there is likely to be no net change to existing bank, riparian and floodplain structure and connectivity with channel.	N/A/A	• The new section of the existing watercourse, and the extent of new watercourse that would be created by the diversion, mean that realistically there appear to be no significant habitat creation opportunities.	No significant effects identified on upstream water bodies			Minor and localised effects	

- Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body

Hydromorphological surveys to be undertaken to aid detailed design development
Hydromorphological Mitigation measures included into detailed design where practicable. Mitigation measures that might be incorporated include:
• Create low flow channels within over-deepened channels
• Create reed fringes
• Introduce riparian vegetation/green corridors where space allows
• Recreate a sinuous main channel (re-meandering)
• Retain marginal vegetation
• Use of engineering techniques to assist natural recovery
• Use soft engineering techniques

- There are considered to be no significant impacts for Drayton Brook Viaduct
- For Gallowes Brook, it is proposed to replace the culvert could affect (constraints) natural flows and existing boundary conditions, even though the brook is a minor feature
- The overall waterbody length is only ca. 5km , so even though impacts are minor, they could be significant at waterbody scale
- The overall impact on the waterbody has not needed to be updated as a result of the AP2 assessmenta

B. Risk screening of potential to prevent future attainment of good Ecological status

WRAP measures to achieve objective (which be implemented or confirmed by WFD programme)	Others WRAP measure will happen	When WRAP measure will happen																									
Phosphate (Source or Mitigation Measures for Failure include the following:	-	-	Predicted change to status elements (green = none, amber = possible, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Flow - Phosphate or Total Phosphate	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated	No additional mitigation required	No additional mitigation required	No effect anticipated

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Langley Brook Viaduct 171-S1					Culvert - Existing culvert under A4091 lengthened					Middleton Pool Cutting		Impacts from other WFD water bodies (assessed separately)	OVERALL impact on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB104028046890	Poor	Good Ecological Status by 2027	Description of scheme element impact	14.3 m wide, 183.5 m long, mean height 4.2 m, max height 5.25 m, no footings in watercourse or riparian zone					Short lengthening of culvert under A4091, no details available					Cutting may interrupt groundwater flows and lead to the transfer of water from Langley Brook catchment to Middleton Hall catchment (<10% of estimated Q95 of either catchment).							
Langley Brook from Source to Middleton Hall Catch			Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.			Construction	Operation		
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	Moderate	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	Not assessed	-		Receptor is insensitive to impact	No footings in watercourse or riparian zone	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. -The baseline data indicates that macrophytes (Ranunculus sp.) are present within this section. There would be a minor and highly localised effect on these macrophyte communities, but this would not affect the status of this quality element.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert (no macrophyte data available). - However, only a short increase is proposed and there would be no conceivable effect on this element at a water body level. - Mitigation measures described in the ES Water Chapter Volume 5 proposed will reduce most effects on this element (notably improvements along watercourse either side of the culvert).	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - There are no macrophyte data available, but there would only be a localised and minor effects on macrophyte communities, not affecting the status of this quality element.	No likely effects on macrophyte community from minor changes in water body hydromorphology.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Possible minor and localised changes to plant communities due to slight decrease in flows.	Minor and localised effects, no change in WFD class of element.	No effects identified.	- Langley Brook does not currently have a WFD status for macrophytes and is not known to be monitored for this element - Baseline data collected showed that macrophytes (Ranunculus) were present within the vicinity of the crossing, but detailed data were not available. - Although the scheme will lead to a small loss of flow and loss of habitat and photosynthetic activity (in shaded areas) these area relatively minor within the context of water body and measures included as part of the scheme will mitigate for the minor localised deteriorations identified. - The overall effect on the current and future status of this element is likely to be minor and highly localised (not affecting status), if embedded mitigation measures are implemented.	None required.	None required.	N/A	
	3. Macroinvertebrates	Poor	-		Receptor is insensitive to impact	No footings in watercourse or riparian zone	- Shading may have indirect effects on macroinvertebrates (if macrophyte cover is lost) - the baseline data suggest that the invertebrate community is locally of low quality, 'stressed' and not highly sensitive - the overall effect is likely to be of negligible magnitude or no effect, with no anticipated effects on the wider water body.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrates and reduce the habitats available for colonisation within the culvert. - The baseline macroinvertebrate data indicate that the invertebrate community is currently 'stressed' and therefore not highly sensitive to impacts, and given the extent of the proposed culvert extension there would be no conceivable effect on this element at a water body level. - Mitigation measures described in the ES Water Chapter Volume 5 proposed will reduce most effects on this element (notably improvements along watercourse either side of the culvert). - It is important that the culvert is positioned so that natural habitat substrate can deposit	- Shading may have indirect effects on macroinvertebrates (if macrophyte cover is lost) - These are likely to be negligible and within the context of the water body, with no anticipated effects on the wider water body.	No likely effects on invertebrate community from minor changes in water body hydromorphology.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Possible minor and localised changes to invertebrate communities due to slight decrease in flows. Invertebrate community present described as 'stressed' and therefore not highly sensitive to impacts. Only minor and localised effects anticipated.	Minor and localised effects, no change in WFD class of element.	No effects identified.	- Langley Brook is currently of Poor status for macroinvertebrates. This is supported by the baseline data. - Although the scheme will lead to loss of habitat this is relatively minor within the context of the water body and measures described will mitigate for the minor localised deteriorations identified. - The overall effect on the current and future status of this element is likely to be minor and highly localised (not affecting status), if embedded mitigation measures are implemented.	None required.	None required.	N/A	-
	4. Fish	Not assessed	-		Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). However, effects are likely to be temporary and localised with no impact on the water body as a whole or designated salmonid fishery	No footings in watercourse or riparian zone	Shading will only have negligible or no effects on fish.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - Effects are likely to be temporary and localised with no impact on the water body as a whole or designated salmonid fishery	- Landtake is unlikely to result in direct mortality of fish but there will be direct loss of fish habitats available for colonisation within the culvert. - Baseline fish data indicate that the watercourse is not of significant importance to fish and it isn't a designated salmonid fishery. - Mitigation measures described in the ES Water Chapter Volume 5 proposed will reduce most effects on this element (notably improvements along watercourse either side of the culvert). - It is important that the culvert is positioned so that natural habitat substrate can deposit.	Shading will only have negligible or no effects on fish.	- As there is an existing culvert, it is not likely that the extension will act as a significant barrier to fish migration - water body not designated salmonid fishery and baseline data show it is currently a mixed coarse fishery with no records of salmonid fish therefore only minor and localised effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Possible minor and localised changes to fish communities due to slight decrease in flows. Baseline data indicate that only minor species are present, it is not a designated fishery and therefore not highly sensitive to impacts. Only minor and localised effects anticipated.	Minor and localised effects, no change in WFD class of element.	No effects identified.	- Langley Brook does not currently have a WFD status for fish and is not known to be monitored for this element. - Langley Brook is not a designated cyprinid fishery and no salmonid species were identified during the baseline survey. - The scheme will lead to loss of habitat and there is the but is not deemed to act as a barrier to migrating fish - The mitigation measures proposed will mitigate for the potential deteriorations identified. - The overall effect on the current and future status of this element is likely to be minor and highly localised (not affecting status), if embedded mitigation measures are implemented.	None required.	None required.	N/A	
Physico-Chemical status																					
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	The lengthening of the existing culvert is likely to have a very minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	Minor and localised effects, no change in WFD class of element.	No effects identified.	Potential minor and localised effects on element.	None required.	None required.	N/A	-
	6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No effects identified.	Receptor is insensitive to impact			N/A	
	7. Phosphate	Bad	-		N/A	N/A	N/A	y an open span bridge, so there would	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	Minor and localised effects, no change in WFD class of element.	No effects identified.	Depending on how much flow is lost, potential minor and localised effects on element. Multiple sewage discharge consents on Langley Brook. The phosphate status cannot be deteriorated any further than 'Bad', therefore this effect will be presented in the prevention to future good status assessment.			N/A	
	8. Ammonia	Good	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Minor and localised effects, no change in WFD class of element.	No effects identified.	Potential minor and localised effects on element.			N/A	
	9. Temperature	High	-		N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	he lengthening of the existing culvert is likely to have a very minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact			N/A	
	10. Specific Pollutants (Annex VIII)	-	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Minor and localised effects, no change in WFD class of element.	No effects identified.	Potential minor and localised effects on element.			N/A	
Hydromorphological status																					**Hydromorphology baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• Crossing is effectively an open span bridge, channel width is approximately 2-3 m or less, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	N/A	N/A	N/A	• Lengthening the existing A4091 culvert westwards, where the channel at present is straight (probably artificially straight to align the channel with the culvert and adjacent ponds) would have probably have no measurable impact on existing conditions, but culverts and culvert extensions are still detrimental to river processes	N/A	• Potential localised decrease in flow quantity and dynamics	N/A	No effects identified.	• Realistically, a viaduct with footings set back from the channel and a short culvert extension would have little overall impact. The development opportunity should be used to implement mitigation measures to offset the impact of the existing culvert and possible channel straightening, but this should be kept proportional to the scale of impact	None required.	None required.	N/A	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A		N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	• Potential reduction in groundwater inflows due to cutting	N/A	No effects identified.				
	13. River continuity	-	-		N/A	N/A	N/A		N/A	N/A	N/A	N/A	• Culverts disconnect floodplains and out-of-bank flows, and bank and riparian habitats and can effectively sever flow, sediment, and habitat continuity • Extending the existing culvert is unlikely to have any measurable impact, but culverts and culvert extensions are still detrimental to river processes	N/A	• Flow depths and along-stream and lateral (riparian and floodplain) connectivity could be reduced in the depleted reach, sediment deposition could increase as a result	N/A	No effects identified.				
	14. River depth and width variation bed	-	-		N/A	N/A	N/A		N/A	N/A	N/A	N/A	• Out-of bank flows may be constrained by the culvert, but there would be no change from existing conditions	N/A	• Flow depths and widths could be decreased, with a reduction in wetted areas	N/A	No effects identified.				
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A		N/A	N/A	N/A	N/A	• Extending the existing culvert is unlikely to have any measurable impact on bed conditions, but culverts and culvert extensions are still detrimental to river processes	N/A	• Flow reductions could result in increased sedimentation and degradation of the channel bed	N/A	No effects identified.				
	16. Structure of riparian zone	-	-		N/A	N/A	N/A		N/A	N/A	N/A	N/A	• Culverts disconnect the channel from banks, riparian zones and floodplains. Extending the existing culvert would mean there minimal change from existing conditions, but culverts and culvert extensions are still detrimental to river processes	N/A	• Reduced flows could result in decreased flow depths and reduced channel - riparian connectivity	N/A	No effects identified.				

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NONE in Appendix B of RBMP	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Water Body ID	GB104028046890
Surface Water Body Name	Langley Brook from Source to Middleton Hall Catch
CFAs covered by Waterbody	20

CFA	20
AP2 ID	AP2-020-007
AP2 Name	Lowering of HS2 alignment from Middleton northwards
AP2 Location	Middleton
New/Replacement Scheme Element	REPLACEMENT and NEW
Scheme Element Type	Viaduct and River Diversion
Original Scheme	The Proposed Scheme was designed to travel largely on embankment and over the Langley Brook on an approximately 90m viaduct, with 5 spans and a 3m noise barrier (later reported as 4m) on the west side of the viaduct. Two balancing ponds would be provided, one to the west of the viaduct and one to the east, with outfalls to Langley Brook. Clearance under the viaduct was designed to be 2.9m, with the brook passing through the second span from the north end.
AP2 Description	The proposed amendment would result in a change to the Langley Brook viaduct and lowering of the Langley Brook river bank level to provide the 2.3m clearance required. Change from a 5-span 90m long viaduct to a 3-span 40m viaduct with 40m clear opening width across the floodplain, comprising one span across Langley Brook itself and two others within the floodplain to the south of the Brook as shown on sketch C223-CSI-CV-SKE-030-000131 P01. The raliway alignment would be lowered by approximately 1.38m at the southern end of the viaduct and provide a minimum of 600mm freeboard above flood level for 1 in 100 year event + climate change allowance. There may need to be a small realignment of the brook to suit the viaduct orientation and there would be works to improve the ecological interest of the watercourse to either side of the crossing
AP2 Changes to Previously Assessed Elements	Shortening of Langley Brook Viaduct
AP2 Additional Elements Assessment Requirement	River Diversion of Langley Brook

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Langley Brook Viaduct 171-S1					Culvert - Existing culvert under A4091 lengthened					Middleton Pool Cutting		LANGLEY BROOK VIADUCT - Lowering of HS2 alignment from Middleton northwards - AP2-020-007					LANGLEY BROOK RIVER DIVERSION - Lowering of HS2 alignment from Middleton northwards - AP2-020-007				Impacts from other WFD water bodies (assessed separately)	OVERALL impact on element	Additional Proposed Mitigation Measures		Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB104028046890	Poor	Good Ecological Status by 2027	Description of scheme element impact	14.9 m wide, 183.5 m long, mean height 4.2 m, that length 5.23 m; no footings in watercourse or riparian zone					Short lengthening of culvert under A4091, no details available					Cutting may interrupt groundwater flows and lead to the transfer of water from Langley Brook catchment to Middleton Hall catchment (<10% of estimated QBS of either catchment).		Change from a 5-span 90m long viaduct to a 3-span 40m viaduct with 40m clear opening width across the floodplain, comprising one span across Langley Brook itself and two others within the floodplain to the south of the Brook as shown on sketch C223-CS-CV-061-030131 P01. The railway alignment would be lowered by approximately 1.38m at the southern end of the viaduct and provide a minimum of 600mm freeboard above flood level for 1 in 100 year event + climate change allowance.					There may need to be a small realignment of the brook to suit the viaduct orientation and there would be works to improve the ecological interest of the watercourse to either side of the crossing										
Langley Brook from Source to Middleton Hall Catch			Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream				Construction	Operation	Construction	Operation		
1.Macrophytes and phytobenthos-diatoms	Moderate	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2. Macrophytes and phytobenthos-macrophytes	Not assessed	-		Receptor is insensitive to impact	No footings in watercourse or riparian zone	Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. The baseline data indicates that macrophytes (Ranunculus sp.) are present within this section. There would be a cumulative effect on these two surface water quality elements, but this would not affect the status of the quality element.	No footings in watercourse or riparian zone	Receptor is insensitive to impact	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change to water quality.	Possible minor and localised changes due to slight decrease in flows.	Minor and localised effects, no change in WFD class of element.	Receptor not sensitive to impact	No footings in watercourse or riparian zone	No significant hydromorphological changes. Negligible effect anticipated.	Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. The baseline data indicates that macrophytes (Ranunculus sp.) are present within this section. There would be a cumulative effect on these two surface water quality elements, but this would not affect the status of the quality element.	Potential localised and minor changes in dissolved oxygen, phosphate and pollutants concentrations. The baseline data indicates that macrophytes (Ranunculus sp.) are present within this section. There would be a cumulative effect on these two surface water quality elements, but this would not affect the status of the quality element.	N/A	There will be loss of marginal and channel macrophytes over the existing Langley Brook that lies within the diverted section. The baseline data indicates that macrophytes (Ranunculus sp.) are present within this section. Potential localised, minor and temporary adverse effect.	No significant hydromorphological changes. Negligible effect anticipated.	Design will also include marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. Give baseline data indicates that macrophytes (Ranunculus sp.) Potential localised beneficial effect anticipated.	No effects identified.	- Langley Brook does not currently have a WFD status for macrophytes and is not known to be monitored for this element. -Baseline data collected showed that macrophytes (Ranunculus) were present within the vicinite of the crossing, but detailed data were not available. - Although the scheme will lead to a small loss of flow and loss of habitat and photosynthetic activity (in shaded areas) these area relatively minor within the context of water body and measures will include a range of habitats for the minor localised deteriorations identified. - The overall effect on the current and future status of this element is likely to be minor and highly localised (not affecting status), if embedded mitigation measures are implemented. The AP2 change of viaduct design is not considered to lead to changes in effects on macrophytes and the river diversion of Langley Brook will have only temporary adverse effects that will be balanced in the long term by creation of new habitats. Therefore, no change in the overall effect on this quality element.	Construction	Operation	None required	None required	Minor and localised effect	
3. Macroinvertebrates	Poor	-		Receptor is insensitive to impact	No footings in watercourse or riparian zone	Shading may have indirect effects on macroinvertebrates (if macrophyte cover is lost). The baseline data suggest that the invertebrate community is currently 'stressed' and therefore not highly sensitive to impacts, and given the extent of the proposed culvert extension there would be a minor adverse effect on this element at a water body level. Mitigation measures described in the ES Water Chapter Volume 5 propose will reduce most effects on this element (notably improvements along watercourse either side of the culvert). It is important that the culvert is positioned so that natural habitat substrate can deposit.	No footings in watercourse or riparian zone	Receptor is insensitive to impact	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Possible minor and localised changes to invertebrate communities due to slight decrease in flows. Invertebrate data suggest that the community is 'stressed' and therefore not highly sensitive to impacts. Only minor and localised effects anticipated.	Minor and localised effects, no change in WFD class of element.	Receptor not sensitive to impact	No footings in watercourse or riparian zone	No significant hydromorphological changes. Negligible effect anticipated.	Shading may have indirect effects on macroinvertebrates (if macrophyte cover is lost). The baseline data suggest that the invertebrate community is currently 'stressed' and therefore not highly sensitive to impacts. The overall effect is likely to be of negligible magnitude or no effect, with no anticipated effects on the water water body.	Potential localised and minor changes in dissolved oxygen, phosphate and pollutants concentrations. The baseline data suggest that the invertebrate community is currently 'stressed' and therefore not highly sensitive to impacts. The overall effect is likely to be of negligible magnitude or no effect, with no anticipated effects on the water water body.	N/A	There will be loss of habitat over the existing Langley Brook that lies within the diverted section. Baseline survey data showed that the invertebrate community is locally of low quality, 'stressed' and not highly sensitive. Potential localised, minor and temporary adverse effect.	No significant hydromorphological changes. Negligible effect anticipated.	The river diversion will be designed to include a range of habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach. Baseline survey data showed that the invertebrate community is locally of low quality, 'stressed' and not highly sensitive. Potential localised beneficial effect anticipated.	No effects identified.	- Langley Brook is currently of Poor status for macroinvertebrates. This is supported by the data collected for the ES. - Although the scheme will lead to loss of habitat this is relatively minor within the context of the water body and measures described will mitigate for the minor localised deteriorations identified. - The overall effect on the current and future status of this element is likely to be minor and highly localised (not affecting status), if embedded mitigation measures are implemented. The AP2 change of viaduct design is not considered to lead to changes in effects on macroinvertebrates and the river diversion of Langley Brook will have only temporary adverse effects that will be balanced in the long term by creation of new habitats. Therefore, no change in the overall effect on this quality element.	Construction	Operation	None required	None required	Minor and localised effect	
4. Fish	Not assessed	-		Possible temporary sub lethal effects on fish (e.g. displacement from spawning/nursery areas) are likely to be temporary and localised with no impact on the water body as a whole or designated salmonid fishery	No footings in watercourse or riparian zone	Shading will only have negligible or no effects on fish.	No effects identified.	- Possible temporary sub lethal effects on fish (e.g. displacement from spawning/nursery areas) Effects are likely to be temporary and localised with no impact on the water body as a whole or designated salmonid fishery	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Possible minor and localised changes due to slight decrease in flows. Baseline data indicate that only minor species are present, it is not a designated fishery and therefore not highly sensitive to impacts. Only minor and localised effects anticipated.	Minor and localised effects, no change in WFD class of element.	Possible temporary sub lethal effects on fish (e.g. displacement from spawning/nursery areas) are likely to be temporary and localised with no impact on the water body as a whole or designated salmonid fishery	No significant hydromorphological changes. Negligible effect anticipated.	Potential localised and minor changes in dissolved oxygen, phosphate and pollutants concentrations. Baseline data indicate that only minor species are present, it is not a designated fishery and therefore not highly sensitive to impacts. Potential localised adverse effect.	Shading will only have negligible or no effects on fish.	N/A	There will be loss of habitat over the existing Langley Brook that lies within the diverted section. Baseline data indicate that only minor species are present, it is not a designated fishery and therefore not highly sensitive to impacts. Potential localised and temporary adverse effect.	No significant hydromorphological changes. Negligible effect anticipated.	The range of habitats incorporated into the diverted channel is considered to represent an improvement to the current situation. Baseline data indicate that only minor species are present and it is not a designated fishery. Potential localised beneficial effect anticipated.	No effects identified.	- Langley Brook does not currently have a WFD status for fish and is not known to be monitored for this element. - Langley Brook is not a designated cyprinid fishery and no salmonid species were identified during the baseline survey. - The scheme will lead to loss of habitat but is not deemed to act as a barrier to migrating fish - The mitigation measures proposed allow for the potential deteriorations identified. - The overall effect on the current and future status of this element is likely to be minor and highly localised (not affecting status), if embedded mitigation measures are implemented. The AP2 change of viaduct design is not considered to lead to changes in effects on fish and the river diversion of Langley Brook will have only temporary adverse effects that will be balanced in the long term by creation of new habitats. Therefore, no change in the overall effect on this quality element.	Construction	Operation	None required	None required	Minor and localised effect	
Physico-Chemical status																																	
5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	• Some shading will reduce DO levels	• CoCP measures (Section 16) implemented during construction and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	The lengthening of the existing culvert is likely to have a very minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to the reduced flow rates, turbulence and oxygenation.	Minor and localised effects, no change in WFD class of element.	N/A	N/A	• No change in width of the proposed AP2 bridge, therefore no change in amount of shaded environment. Some shading is expected, but likely to have no measurable effect on this sub-element. Therefore, no change in status from the previous assessment is anticipated.	• The construction of the proposed AP2 viaduct is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	• The construction of the proposed AP2 viaduct is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	N/A	• The construction of the proposed AP2 river diversion is predicted to result in no more than a temporary, minor impact on this sub-element. • Release of sediment during construction of new channel may cause a temporary drop in dissolved oxygen. But no change in status is anticipated. • CoCP measures (Section 16) implemented during construction and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	• The construction of the proposed AP2 river diversion is predicted to result in no more than a temporary, minor impact on this sub-element. • Release of sediment during construction of new channel may cause a temporary drop in dissolved oxygen. But no change in status is anticipated. • CoCP measures (Section 16) implemented during construction and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect.	Receptor is insensitive to impact	No effects identified.	Potential minor and localised effects on sub-element. The AP2 amendment to the viaduct and small river diversion on Langley Brook will contribute slightly to the cumulative impact on this physico-chemical sub-element; however, it is not considered to be significant, and subsequently there will be no change in overall impact status from the previous assessment.	Construction	Operation	Construction	Operation	Minor and localised effect	
6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No effects identified.	Receptor is insensitive to impact					Receptor is insensitive to impact	
7. Phosphate	Bad	-		N/A	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implement during construction and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	Minor and localised effects, no change in WFD class of element.	N/A	N/A	N/A	• The proposed AP2 viaduct crossing is effectively an open span bridge, so there would be no impact on this sub-element, and therefore no change in status from the previous assessment.	• The construction of the proposed AP2 viaduct is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	• The construction of the proposed AP2 viaduct is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	N/A	• The construction of the proposed AP2 river diversion is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect	Receptor is insensitive to impact	No effects identified.	**Depending on how much flow is lost, potential minor and localised effects on sub-element.** Multiple sewage discharge consents on Langley Brook. The phosphate status cannot be determined any further than 'Bad', therefore this effect will be presented in the prevention to future good status assessment. The AP2 amendment to the viaduct and small river diversion on Langley Brook will contribute slightly to the cumulative impact on this physico-chemical sub-element; however, it is not considered to be significant, and subsequently there will be no change in overall impact status from the previous assessment.	Construction	Operation	Construction	Operation	Minor and localised effect	
8. Ammonia	Good	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No effects identified.	Potential minor and localised effects on sub-element. The AP2 amendment to the viaduct and small river diversion on Langley Brook will contribute slightly to the cumulative impact on this physico-chemical sub-element; however, it is not considered to be significant, and subsequently there will be no change in overall impact status from the previous assessment.					Minor and localised effect	
9. Temperature	High	-		N/A	N/A	• Some shading will reduce temperatures	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	The lengthening of the existing culvert is likely to have a very minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	• No change in width of the proposed AP2 bridge, therefore no change in amount of shaded environment. Some shading is expected, but likely to have no measurable effect on this sub-element. Therefore, no change in status from the previous assessment is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No effects identified.	Receptor is insensitive to impact					Receptor is insensitive to impact	
10. Specific Pollutants (Annex VIII)	-	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and reoxgenation, and other possible effects	Minor and localised effects, no change in WFD class of element.	N/A	N/A	N/A	• The construction of the proposed AP2 viaduct is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	• The construction of the proposed AP2 viaduct is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	N/A	• The construction of the proposed AP2 river diversion is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect	Receptor is insensitive to impact	No effects identified.	Potential minor and localised effects on sub-element. The AP2 amendment to the viaduct and small river diversion on Langley Brook will contribute slightly to the cumulative impact on this physico-chemical sub-element; however, it is not considered to be significant, and subsequently there will be no change in overall impact status from the previous assessment.					Minor and localised effect	
Hydromorphological status																																	**Hydromorphology baseline**
11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	• Lengthening the existing A4091 culvert westwards, where the channel at present is straight (probably artificially straight to a degree) and the channel and adjacent ponds) would have probably have no measurable impact on existing conditions, but culverts and culvert extensions are still detrimental to river processes	N/A	• Potential localised decrease in flow quantity and dynamics	N/A	N/A	N/A	N/A	• Although the total culvert length would be reduced, there remains little direct impact on the watercourse and the split viaduct allows for reasonable floodplain connectivity. In this sense, the crossing is effectively an open span bridge, channel width is approximately 2.5 m or less, and comparison with historic maps suggests that there has been no significant plantform change that could mean that the river erodes against viaduct footings. • Overall, there would probably be no hydromorphological impact	N/A	N/A	• Minor realignment of the channel may affect flow dynamics, although it is reasonable to assume that any impacts would be offset by appropriate channel design	• Langley Brook has a sinuous plantform at the proposed crossing location, although land use has encroached to near the channel edge • From review of aerial imagery, the channel does not appear to have been modified, but there are opportunities to for quick wins to improve hydromorphology as part of any diversion works.	No effects identified.							
12. Connection to Groundwater	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	• Potential reduction in groundwater inflows due to cutting	N/A	N/A	N/A	N/A	• There is likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	• Minor realignment of the channel may affect flow dynamics, although it is reasonable to assume that any impacts would be offset by appropriate channel design	• Likely to be no significant relationship between hydromorphology and groundwater	No effects identified.							
13. River continuity	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	• Culverts disconnect floodplains and out-of-bank flows, and bank and riparian habitats and can affect sediment, flow, hydrology and habitat continuity. • Extending the existing culvert is unlikely to have any measurable impact, but culverts and culvert extensions are still detrimental to river processes	N/A	• Flow depths and along-stream and lateral (riparian and floodplain) connectivity could be reduced in the depleted reach, sediment deposition could increase as a result	N/A	N/A	N/A	N/A	• Although the total culvert length would be reduced, there remains little direct impact on the watercourse and the split viaduct allows for reasonable floodplain connectivity. In this sense, the crossing is effectively an open span bridge, channel width is approximately 2.5 m or less, and comparison with historic maps suggests that there has been no significant plantform change that could mean that the river erodes against viaduct footings. • Overall, there would probably be no hydromorphological impact	N/A	N/A	• Minor realignment of the channel may affect flow dynamics, although it is reasonable to assume that any impacts would be offset by appropriate channel design	• Langley Brook has a sinuous plantform at the proposed crossing location, although land use has encroached to near the channel edge • From review of aerial imagery, the channel does not appear to have been modified, but there are opportunities to for quick wins to improve hydromorphology as part of any diversion works.	No effects identified.							
14. River depth and width variation	-	-		N/A	N/A	N/A	• Prolonged reduction in flow depth and width, which could in turn affect habitat quality and diversity. Shading will also reduce flows and temperatures which may have an adverse impact on aquatic ecology. Culverts and culvert extensions are still detrimental to river processes. • Overall, there would probably be no opportunities to be lost.	N/A	• Out of bank flows may be constrained by the culvert. But there would be no change from existing conditions	N/A	N/A	• Flow depths and widths could be decreased, with a reduction in wetted areas	N/A	N/A	N/A	• Although the total culvert length would be reduced, there remains little direct impact on the watercourse and the split viaduct allows for reasonable floodplain connectivity. In this sense, the crossing is effectively an open span bridge, channel width is approximately 2.5 m or less, and comparison with historic maps suggests that there has been no significant plantform change that could mean that the river erodes against viaduct footings. • Overall, there would probably be no hydromorphological impact	N/A	N/A	• Minor realignment of the channel may affect flow dynamics, although it is reasonable to assume that any impacts would be offset by appropriate channel design	• Langley Brook has a sinuous plantform at the proposed crossing location, although land use has encroached to near the channel edge • From review of aerial imagery, the channel does not appear to have been modified, but there are opportunities to for quick wins to improve hydromorphology as part of any diversion works.	No effects identified.	• Realistically, a viaduct with footings set back from the channel and a short culvert extension would have little overall impact. The development opportunity should be used to implement mitigation measures to offset the impact of the existing culvert and possible channel straightening, but this should be kept proportional to the scale of impact • The overall impact on the waterbody has not needed to be updated as a result of the AP2 assessments	Construction	Operation	For the Construction Environmental Management Plans and monitoring of post-construction impacts during channel works	For the AP2 Langley Brook diversion, a hydromorphological survey is recommended to aid detailed design development. Hydromorphological mitigation should be included into detailed design where practicable. Mitigation measures that might be incorporated include: • Recreation of gravel bars and riffles using permanent and/or temporary structures (to encourage hydromorphological diversity) • Removal of bank engineering structures (e.g. naturalisation) • Retain marginal vegetation • Retain / replicate / enhance existing channel morphology • Use soft engineering techniques	N/A	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	• Extending the existing culvert is unlikely to have any measurable impact on bed conditions, but culverts and culvert extensions are still detrimental to river processes	N/A	• Flow reductions could result in increased sedimentation and degradation of the channel bed	N/A	N/A	N/A	N/A	• Although the total culvert length would be reduced, there remains little direct impact on the watercourse and the split viaduct allows for reasonable floodplain connectivity. In this sense, the crossing is effectively an open span bridge, channel width is approximately 2.5 m or less, and comparison with historic maps suggests that there has been no significant plantform change that could mean that the river erodes against viaduct footings. • Overall, there would probably be no hydromorphological impact	N/A	N/A	• Minor realignment of the channel may affect flow dynamics, although it is reasonable to assume that any impacts would be offset by appropriate channel design	• Langley Brook has a sinuous plantform at the proposed crossing location, although land use has encroached to near the channel edge • From review of aerial imagery, the channel does not appear to have been modified, but there are opportunities to for quick wins to improve hydromorphology as part of any diversion works.	No effects identified.							
16. Structure of riparian zone	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	• Culverts disconnect the channel from banks, riparian zones and floodplains. Extending the existing culvert would mean there minimal change from existing conditions, but culverts and culvert extensions are still detrimental to river processes	N/A	• Reduced flows could result in decreased flow depths and reduced channel -riparian connectivity	N/A	N/A	N/A	N/A	• Although the total culvert length would be reduced, there remains little direct impact on the watercourse and the split viaduct allows for reasonable floodplain connectivity. In this sense, the crossing is effectively an open span bridge, channel width is approximately 2.5 m or less, and comparison with historic maps suggests that there has been no significant plantform change that could mean that the river erodes against viaduct footings. • Overall, there would probably be no hydromorphological impact	N/A	N/A	• Minor realignment of the channel may affect flow dynamics, although it is reasonable to assume that any impacts would be offset by appropriate channel design	• Langley Brook has a sinuous plantform at the proposed crossing location, although land use has encroached to near the channel edge • From review of aerial imagery, the channel does not appear to have been modified, but there are opportunities to for quick wins to improve hydromorphology as part of any diversion works. • In particular, improvements could be made to riparian vegetation, especially on the southerly bank	No effects identified.							

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NONE in Appendix B of RBMP	-	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Surface water body name	Waterbody ID	Catchment	CFA	Additional Baseline Survey	No. of AP2 Amendments	Original Assessment	Risk to Overall Status: Post-Additonal Baseline survey	Risk to Overall Status: Post-AP2 Amendments	Risk to Overall Status: Assessment Summary
R Blythe from Patrick Bridge to R Tame	GB104028042572	Tame Anker and Mease	23, 24	Y	2				Original scheme + Baseline + AP2
R Blythe from Temple Balsall Brook to Patrick Bridge	GB104028042571	Tame Anker and Mease	23	Y	N/A			No AP2 updates	Original scheme + Baseline

Key for Baseline Assessment Changes:

	In audit trail, this cell indicates where the impact of a particular scheme element on a WFD sub-element has been changed as a result of baseline surveys
Red text	In assessment tab, where new text has been added describing why the assessment has changed
~~Strikethrough text~~	In assessment tab, where text from the previous assessment is no longer relevant/has been superseded and therefore has been removed (but is still visible to the reader).

Key for AP2 Assessment Changes:

	In AP2 Summary sheet, this cell indicates where assessment is required for the Scheme Element.
Red text	In assessment tab, where new assessment has been undertaken
	In assessment tab, where Main ES Scheme element has been removed or replaced by AP2 change

WFD Surface Water Survey Location Details **CFA 23-24**

Key to Survey ID
- EF Electro Fishing Survey
- HM Hydromorphology Survey
- MI Macroinvertabrate Survey
- MP Macrophyte Survey
- PA Preliminary Aquatic Survey

AP2-023-005 SES-C224-051

CFA	Upstream Easting	Upstream Northing	Downstream Easting	Downstream Northing	Survey ID	Map Reference	Surface Water Body Survey Name	Surface Water Body WFD ID	Surface Water Body WFD Name
23	421938	280889	421755	280840	WFD-PA1-0037	0037	Horn Brook, tributary of River Blythe, west of Kenilworth Road	GB104028042571	River Blythe from Temple Balsall to Patrick Bridge
23	421845	280866	-	-	WFD-HM1-0037				
23	424507	277711	424428	277887	WFD-PA1-0038a	0038	Bayleys Brook, north of Truggist Lane		
23	425379	277184	425241	277056	WFD-PA1-0038b				
23	424475	277800	-	-	WFD-HM1-0038a				
23	425322	277103	-	-	WFD-HM1-0038b				
23	422365	280155	422215	280147	WFD-PA1-0039	0039	Bayleys Brook, near Marsh Farm		
23	422243	280133	-	-	WFD-MI1-0039				
23	422170	280160	422186	280155	WFD-EF1-0039				
23	422294	280138	-	-	WFD-HM1-0039				
23	421342	281715	421514	281739	WFD-PA1-0040	0040	River Blythe, north of Meriden Road	GB104028042572	River Blythe from Patrick Bridge to River Tame
23	421791	281727	421853	281759	WFD-MP1-0040				
23	421795	281761	-	-	WFD-MI1-0040				
23	421791	281727	421853	281759	WFD-EF1-0040				
23	421433	281720	-	-	WFD-HM1-0040				
23	421041	282385	421219	282355	WFD-PA1-0041	0041	Shadow Brook, west of Didington Lane		
23	421133	282371	-	-	WFD-HM1-0041				
24	420458	283654	420615	283618	WFD-PA1-0042a	0042	Hollywell Brook, east of Middle Bickenhill Lane		
24	420123	284380	420296	284350	WFD-PA1-0042b				
24	420543	283643	-	-	WFD-HM1-0042a				
24	420202	284373	-	-	WFD-HM1-0042b				
22	414672	308982	414840	309060	WFD-PA1-0043	0043	Fisherwick Brook, west of Cappers Lane		
22	414770	308997	-	-	WFD-HM1-0043				
23	422116	280483	421952	280598	WFD-PA1-0044	0044	Bayleys Brook, east of Kenilworth Road	GB104028042571	River Blythe from Temple Balsall to Patrick Bridge
23	422032	280539	-	-	WFD-HM1-0044				

GB102603842572

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scenario [black text = proposed within groundwater body, grey text = not proposed within groundwater body]
GB104028042572			
River Blythe from Patrick Bridge to River Tame	Moderate	Good ecological status by 2027	

Description of scheme element impact	River Blythe Viaduct (289 m long, 15 m wide, 5 m above ground level)					Hollywell Brook River Diversion					Hollywell Brook Underbridge					Existing culvert removed - Hollywell Brook					People mover crossings (viaduct)					Shadow Brook Underbridge					Culvert and Diversion - Trib Hollywell
						Diversion of 330m of Hollywell Brook, including Hollywell Brook underbridge (see following column), and one people mover crossing - viaduct, approx. 5m wide)					Bridge over Hollywell Brook, a tributary of the Blythe. Bridge with footings/structures near to riparian zone but no within the channel or marginal zone. Bridge dimensions: 60 m long, 2.7 m high, 11.5 wide. Approximately 80 m length of diverted watercourse covered. Diversion is broken into sections to north and south of tracks to let mass later c					Removal of an existing culvert on Hollywell Brook (40 min length)					Two crossings of Hollywell Brook for people mover crossing, no footings in watercourse. Both crossings approx. 10 m long.					Bridge over Shadow Brook, a minor tributary of the Blythe. Bridge with footings/structures near to riparian zone but no within the channel or marginal zone. Bridge dimensions: 35 m long, 2 m high, 11.5 wide. Approximately 50 m length of watercourse covered, no modifications to course of Shadow Brook					Tributary of Hollywell Brook (100 m length, including culvert - easiway overbridge, detailed design not available, but will flow		
Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Creation of new habitats	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Landtake
WFD classification elements: 1. Macrophytes and phytobenthos - rivers	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2. Macrophytes and phytobenthos - macrophytes	Moderate	Good	Receptor not sensitive to impact. No likely effect anticipated.	No bridge footings within the watercourse or riparian zone. No likely effect anticipated.	Likely to lead to a very localised but permanent loss of macrophytes by reduction of photosynthetic activity. The River Blythe supports **greater** very good macrophyte diversity and overall ecological status. (Baseline surveys). Localised adverse effect anticipated.	No significant hydromorphological changes. No likely effect anticipated	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Temporary loss of 230 m of macrophyte habitat on the existing Hollywell Brook while the new channel fully establishes (Baseline surveys). Localised adverse effect is expected on the new channel. Minor, localised adverse effect expected.	Hydromorphological impacts are considered to be minor. The watercourse currently supports diverse and moderately diverse aquatic vegetation in the stretch inspected (Baseline surveys). Although there are some existing culverts, None of the species recorded are rare or notable, and it is anticipated that the macrophyte community will re-establish within 5 to 10 years of completion of the new channel. Minor, localised adverse effect expected.	The new channels will incorporate marginal berms to provide shallow marginal habitat for macrophytes. This will include a range of habitats suitable for colonisation by submerged species, excepted within the culverted area (Baseline survey). Overall beneficial effect anticipated, with the watercourse currently supports diverse and moderately diverse aquatic vegetation in the stretch inspected (Baseline survey). Overall beneficial effect anticipated, with no degradation of the element status at the scale of the water body.	Receptor not sensitive to impact. No likely effect anticipated.	Footings in or near to riparian zone, but with no anticipated effect on macrophyte habitats.	GREEN TO YELLOW - Potential localised but permanent loss of macrophytes due to shading. **Hollywell Brook currently supports diverse and moderately diverse aquatic vegetation in the stretch inspected (baseline survey). Potential localised adverse effect.**	No significant hydromorphological change anticipated. Effect likely to be negligible/neutral on macrophytes, with no deterioration of the status of this element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to localised increase in habitat available to macrophytes. Hollywell Brook currently supports diverse and moderately diverse aquatic vegetation in the stretch inspected (baseline surveys). Very localised beneficial effect expected.	Likely to lead to local decrease of the channel shading, and development of aquatic vegetation. Hollywell Brook currently supports diverse and moderately diverse aquatic vegetation in the stretch inspected (baseline surveys). Very localised beneficial effect expected. Increased on the status of the element at the scale of the water body.	Potential restoration of natural flow conditions. Likely to have a minor, localised beneficial effect on macrophytes locally in the long term.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Receptor not sensitive to impact. No likely effect anticipated.	No bridge footings within the watercourse or riparian zone. No likely effect anticipated.	Likely to lead to a very localised but permanent loss of macrophytes by reduction of photosynthetic activity. The watercourse currently supports diverse and moderately diverse aquatic vegetation and good macrophyte diversity (Baseline surveys). Localised minor adverse effect expected, with no deterioration of the status of the element at the scale of the water body.	Hydromorphological changes considered to be insignificant. No likely effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Receptor not sensitive to impact. No likely effect anticipated.	Footings in or near to riparian zone, but with no anticipated effect on macrophyte habitats.	GREEN TO YELLOW - **No significant effect on macrophytes anticipated (non-classed) therefore no mitigation required.** Potential localised and very minor adverse effect through the loss of habitat (new/replacement).	No significant hydromorphological change anticipated. Effect likely to be negligible/neutral on macrophytes, with no deterioration of the status of this element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	Receptor not sensitive to impact. No likely effect anticipated.	No additional effect anticipated (loss of vegetation already considered in the landtake impact).	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	Receptor not sensitive to impact. No likely effect anticipated.	**Particular modification of macrophytes communities due to reduction in photosynthetic activity. Non-classified available locally on the watercourse (agricultural ditch). By default, localised adverse effect expected, with no deterioration of the status of the element.** The tributary is a drainage ditch already heavily channelised, including over the entire 100m length. No likely effect anticipated.	**Temporary loss of 120 m of habitat on the tributary while the new channel re-establishes. Localised adverse effect expected. Non-classified available locally on the watercourse (agricultural ditch). By default, localised adverse effect expected, with no deterioration of the status of the element.** The tributary is a drainage ditch already heavily channelised, including over the entire 100m length. No likely effect anticipated.
WFD classification elements: 3. Macroinvertebrates	High	High	Receptor not sensitive to impact. No likely effect anticipated.	No bridge footings within the watercourse or riparian zone. No likely effect anticipated.	Likely to lead to a very localised but permanent loss of macroinvertebrate habitat (i.e. riparian vegetation, aquatic vegetation). The River Blythe supports **greater** very good macroinvertebrate diversity (based on the stretch inspected (baseline survey)). Minor and localised adverse effect anticipated	No significant hydromorphological changes. No likely effect anticipated	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Temporary loss of 230 m of macroinvertebrate habitat while the new channel establishes, although the new channel will be established prior to diversion of the existing channel. The watercourse currently supports diverse and moderately diverse macroinvertebrate assemblages (based on the stretch inspected (WSI) baseline survey). Temporary adverse effects on macroinvertebrates may occur.	Hydromorphological impacts are considered to be minor. The watercourse currently supports relatively diverse macroinvertebrate communities, adapted to slow to moderate flows and moderate sedimentation (WSI baseline survey). The predicted hydromorphological changes are considered to be insufficient to alter macroinvertebrate assemblages. Localised minor adverse effect expected.	The river diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of macroinvertebrates currently present in the stretch inspected (WSI baseline survey). The watercourse currently supports diverse and moderately diverse aquatic vegetation and good macroinvertebrate diversity (based on the stretch inspected (WSI baseline survey). Overall beneficial effect anticipated, with no degradation of the element status at the scale of the water body.	Receptor not sensitive to impact. No likely effect anticipated.	Footings in or near to riparian zone, but with no anticipated effect on macroinvertebrate habitats.	GREEN TO YELLOW - The watercourse currently supports diverse and moderately diverse aquatic vegetation in the stretch inspected (baseline survey). **Potential localised adverse effect through the loss of habitat (new/replacement).**	No significant hydromorphological change anticipated. Effect likely to be negligible/neutral on macroinvertebrates, with no deterioration of the status of this element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	Receptor not sensitive to impact.	Likely to lead to localised increase in habitat available to macroinvertebrates. Hollywell Brook locally supports good macroinvertebrate quality (baseline survey). Very localised beneficial effect expected.	Likely to lead to local decrease of the channel shading, and development of aquatic vegetation. Hollywell Brook locally supports good macroinvertebrate quality (baseline survey). Very localised beneficial effect expected.	Potential restoration of natural flow conditions, increase in bank continuity and riparian habitat (continuity is likely to have a minor and localised beneficial effect on macroinvertebrates in the long term, although potential increase in sediment deposition would be detrimental in the medium term.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Receptor not sensitive to impact. No likely effect anticipated.	No bridge footings within the watercourse or riparian zone. No likely effect anticipated.	Likely to lead to local and permanent loss of potential fish habitat (i.e. aquatic vegetation, riparian vegetation). The watercourse currently supports good macroinvertebrate diversity (baseline surveys). Localised minor adverse effect anticipated, with no deterioration of the status of the element at the scale of the water body.	Hydromorphological changes considered to be insignificant. No likely effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Receptor not sensitive to impact. No likely effect anticipated.	Footings in or near to riparian zone, but with no anticipated effect on fish habitats.	GREEN TO YELLOW - **Non-significant effect on macrophytes anticipated (non-classed) therefore no mitigation required.** Potential localised and very minor adverse effect through the loss of habitat (new/replacement).	No significant hydromorphological change anticipated. Effect likely to be negligible/neutral on macroinvertebrates, with no deterioration of the status of this element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	Receptor not sensitive to impact.	No additional effect anticipated (loss of vegetation already considered in the landtake impact).	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	Receptor not sensitive to impact. No likely effect anticipated.	**Localised and temporary adverse effect during construction. No deterioration of the status of the element.** The tributary is a drainage ditch already heavily channelised, including over the entire 100m length. No likely effect anticipated.	**Temporary loss of 120 m of habitat on the tributary while the new channel re-establishes. Localised adverse effect expected. Non-classified available locally on the watercourse (agricultural ditch). By default, localised adverse effect expected, with no deterioration of the status of the element.** The tributary is a drainage ditch already heavily channelised, including over the entire 100m length. No likely effect anticipated.
WFD classification elements: 4. Fish	High	High	Receptor not sensitive to impact. No likely effect anticipated.	No bridge footings within the watercourse or riparian zone. No likely effect anticipated.	Localised and temporary effect during construction. No deterioration of the status of the element is however expected.	No significant hydromorphological changes. No likely effect anticipated	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Temporary loss of 230 m of fish habitat within Hollywell Brook, although the new channel will be established prior to diversion of the existing channel. The watercourse currently supports diverse and moderately diverse macroinvertebrate assemblages (based on the stretch inspected (WSI) baseline survey). A localised adverse effect is expected on Hollywell Brook. However, as the watercourse is already channelised, the impact on fish is likely to be minor. It is unlikely to deteriorate the current element status at the scale of the water body.	Hydromorphological impacts are considered to be minor, although the watercourse currently supports a diverse fish community (based on the stretch inspected (WSI) baseline survey). Localised adverse effect is expected on Hollywell Brook. However, as the watercourse is already channelised, the impact on fish is likely to be minor. It is unlikely to deteriorate the current element status at the scale of the water body.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities (detailed design of diversion not available). The watercourse currently supports a diverse fish community (based on the stretch inspected (WSI) baseline survey). In addition, the River Blythe supports brown trout population (baseline survey). Overall beneficial effect anticipated, with no degradation of the element status at the scale of the water body.	Receptor not sensitive to impact. No likely effect anticipated.	Footings in or near to riparian zone, but with no anticipated effect on fish habitats.	GREEN TO YELLOW - The watercourse currently supports diverse and relatively diverse fish assemblages (based on the stretch inspected (baseline survey)). **Potential localised adverse effect through the loss of habitat (new/replacement).**	No significant hydromorphological change anticipated. Effect likely to be negligible/neutral on fish, with no deterioration of the status of this element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	Receptor not sensitive to impact.	Likely to lead to localised increase in habitat available to fish. Hollywell Brook locally supports good macroinvertebrate quality (baseline surveys). Very localised beneficial effect expected.	Likely to lead to local decrease of the channel shading, and development of aquatic vegetation. Hollywell Brook locally supports good macroinvertebrate quality (baseline surveys). Very localised beneficial effect expected.	Potential restoration of natural flow conditions and riparian habitat (continuity is likely to have a minor and localised beneficial effect on fish in the long term, although potential increase in sediment deposition would be detrimental in the medium term.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Receptor not sensitive to impact. No likely effect anticipated.	No bridge footings within the watercourse or riparian zone. No likely effect anticipated.	Likely to lead to local and permanent loss of potential fish habitat (i.e. aquatic vegetation, riparian vegetation). The watercourse currently supports good macroinvertebrate diversity (baseline surveys). Localised minor adverse effect anticipated, with no deterioration of the status of the element at the scale of the water body.	Hydromorphological changes considered to be insignificant. No likely effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Receptor not sensitive to impact. No likely effect anticipated.	Footings in or near to riparian zone, but with no anticipated effect on fish.	GREEN TO YELLOW - **Non-significant effect on macrophytes anticipated (non-classed) therefore no mitigation required.** Potential localised and very minor adverse effect through the loss of habitat (new/replacement).	No significant hydromorphological change anticipated. Effect likely to be negligible/neutral on fish, with no deterioration of the status of this element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	Receptor not sensitive to impact.	No additional effect anticipated (loss of vegetation already considered in the landtake impact).	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	Receptor not sensitive to impact. No likely effect anticipated.	**Localised and temporary adverse effect during construction. No deterioration of the status of the element.** The tributary is a drainage ditch already heavily channelised, including over the entire 100m length. No likely effect anticipated.	**Temporary loss of 120 m of habitat on the tributary while the new channel re-establishes. Localised adverse effect expected. Non-classified available locally on the watercourse (agricultural ditch). By default, localised adverse effect expected, with no deterioration of the status of the element.** The tributary is a drainage ditch already heavily channelised, including over the entire 100m length. No likely effect anticipated.

WFD classification elements: Physico-Chemical status — WFD-EQS-001 | WFD-EQS-002

5. Dissolved Oxygen	High	-	N/A	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	• The new channel can provide when re-established, improved habitat for macroinvertebrates which will have a beneficial effect to the water body, with no degradation of the element status anticipated at the scale of the water body.	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on dissolved oxygen. The culvert is already culverted under Stratford-upon-Avon Canal, so there would be no change in status. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	• Current removal would eliminate artificial shading on this section of the watercourse, returning to a natural temperature range. A minor beneficial effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A
6. pH	High	-	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A
7. Phosphate	Moderate	-	N/A	N/A	N/A	Likely an open span bridge, so there would be	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A
8. Ammonia	High	-	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A
9. Temperature	-	-	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Some shading from the viaduct and underbridge may have a minor impact on water temperature, but this is likely to be a small, localised effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. The culvert is already culverted under Stratford-upon-Avon Canal, so there would be no change in status. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• Current removal would eliminate artificial shading on this section of the watercourse, returning to a natural temperature range. A minor beneficial effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. The culvert is already culverted under Stratford-upon-Avon Canal, so there would be no change in status. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Some shading with negligible/no effect.
10. Specific Pollutants (Annexe VIII)	High	-	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A

WFD classification elements: Hydromorphological status

11. Quantity and dynamics of river flow	-	-	N/A	N/A	N/A	• Crossing design is effectively an open span bridge. • Footings in riparian zones or floodplains could cause some local turbulence at flood flows, but would not considered to be significant. • The River Blythe is to the north of the floodplain, so some floodplain continuity would be lost due to the embankment to the south of the crossing, but the crossing is so 120 m long that it is unlikely to significantly affect flow dynamics.	N/A	• Surveys report that channel width varies approximately from c. 1.5m, with evidence of increasing hydromorphological processes downstream (WSI baseline survey). • Diverting Hollywell Brook for this watercourse length will cause minor flow rates as a result of channel lengthening, although this is likely to be offset by the 1 in 30 gradient of the new channel. • The pond which presumably mitigate any effects of downstream resulting from culdrop. • The people mover crossing design is effectively an open span bridge. • Footings in riparian zones or floodplains could cause some local turbulence at flood flows, but not considered to be significant. • In practical terms the impacts on hydromorphology are considered to be minor as the culvert is relatively short, and the watercourses are small relative to the whole water body	• Surveys report that the channel width is approximately 1.5m, with evidence of increasing hydromorphological processes downstream (WSI baseline survey). Diversion of flow dynamics in any of the channels downstream of the culvert, due to the embankments, but the crossing is 120 m long wide compared to a c. 10 m wide channel, so it is unlikely to be significant. • Vegetation management may be required through the underbridge to decrease out-of-channel flow resistance and prevent blockage of conveyance, but the dimensions of the underbridge relative to the watercourse mean that hydromorphological impacts are unlikely to be significant. • In practical terms the impacts on hydromorphology are considered to be minor as the culvert is relatively short, and the watercourses are small in scale relative to the whole water body	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
12. Connection to Groundwater	-	-	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
13. River continuity	-	-	N/A	N/A	N/A	• Crossing design means there will be no footings in the watercourse. • Comparison of historic maps suggests that the watercourse is stable in the order of decades, so no impacts are anticipated.	N/A	N/A	• Lengthening the channel may result in reduced flow rates and depths and may promote some increased sediment deposition, so there are likely to be some localised impacts on continuity.	• Channel width, depth, sinuosity and bed structures would generally be maintained through the underbridge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
14. River depth and width variation	-	-	N/A	N/A	N/A	• Crossing design means there will be no footings in the watercourse. • Comparison of historic maps suggests that the watercourse is stable in the order of decades, so no impacts are anticipated.	N/A	N/A	• Lengthening the channel may result in decreased flow depths, although channel widths would be maintained.	• Channel width and sinuosity would generally be maintained through the underbridge, but lengthening the channel may result in decreased flow depths	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
15. Structure and substrate of river bed	-	-	N/A	N/A	N/A	• Crossing design is effectively an open span bridge, so there would be no impact on the channel bed	N/A	N/A	• Channel water surface at the crossing location is approximately 1.5 m wide, which already has existing culverts in have ditch characteristics meaning that it is unlikely that there is the potential for significant bed material sediment deposition. The bed should be minimal, but this is a risk. • The people mover crossing design is effectively an open span bridge so would not affect depth and width variation	• Channel water surface at the crossing location is 2.5-3 m wide, which already has existing culverts in have ditch characteristics meaning that it is unlikely that there is the potential for significant bed material sediment deposition. The bed should be minimal, but this is a risk. • It is assumed that there would be no losses to the underbridge so there should be no impacts on the bed	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
16. Structure of riparian zone	-	-	N/A	N/A	N/A	• Footings in the riparian zones would require minor land take but is considered to be significant.	N/A	N/A	• Riparian zones could generally be maintained along the diversion	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

B. Risk screening of potential to prevent future attainment of good Ecological status

Scheme elements to achieve objectives set out in the supplemental or confirmed application	Will these elements impact upon WFD?	Will these elements impact upon WFD?	Will these elements impact upon WFD?
NONE			

GB104028042572

A. Risk screening of potential to cause deterioration of current WFD Ecologic

Surface Water body	Current status	Status objective	Scheme Elements (black box = proposed within groundwater body, [illegible])	Brook				River Diversion (including culverts)					Diddington Cutting		Impacts from other WFD water bodies (assessed separately) - Multiple Scheme elements - River Blythe GB GB104028042571 (including River Blythe bypass culvert and Horn Brook diversion)	Impacts from other WFD water bodies (assessed separately) - Multiple Scheme elements - River Cole (overbridge and viaducts)	OVERALL impact on element	Proposed Mitigation Measures		Residual effect	
GB104028042572			Description of scheme element impact	w best practice for diversions and culverts, as set out in the general assumptions				Very minor unnamed tributary of River Blythe (a ditch running from A452 to Fish Pool Lane) - 600 m, including 4 culverts (175 m)					Cutting will lead to decreased dry weather flows to Hollywell Brook, as drainage from cutting, which currently discharges to a pond on Hollywell Brook, will discharge via an attenuation pond to Shadow Brook. There will be					Construction	Operation		
River Blythe from Patrick Bridge to River Tame	Moderate	Good ecological status by 2027	Identified biological impacts	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Creation of new habitats	Noise and vibration	Shading	Landtake	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Creation of new habitats	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.							
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	Moderate	Good	Hydromorphological changes considered to be insignificant. No likely effect anticipated	The new channels will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species, excepted within the culverted area (detailed design of diversion not available). No macrophyte data available locally on the watercourse (agricultural ditch). Minor/local overall beneficial effect anticipated	Receptor not sensitive to impact. No likely effect anticipated.	Potential modification of macrophytes communities, due to reduction in photosynthetic activity. No macrophyte data available locally on the watercourse (agricultural ditch). By default, localised adverse effect expected, with no deterioration of the status of the element.	Temporary loss of 600 m while the new channel re-establishes. In addition, the 4 culverts on the new channel will lead to the permanent loss of 175 m of habitat available to macrophytes. The ponded ditch currently supports moderately good macroinvertebrate quality (baseline survey). Localised adverse effect expected, with no deterioration of the status of the element at the scale of the water body.	Potential increase in flow velocities, reduction of habitat opportunity, disconnection between the channel and the floodplain, and sediment transport. Localised adverse effect at the scale of the water body. The ponded ditch currently supports moderately good macroinvertebrate quality (baseline survey). Hydromorphological changes are likely to lead to alterations of the communities present and have a localised adverse effect on macroinvertebrates. No change in the status of the element at the scale of the water body.	The new channels will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species, excepted within the culverted area. The ponded ditch is heavily shaded and currently supports very low quality macrophytes (baseline survey). Overall neutral effect anticipated, despite the creation of new habitat is reason of the presence of 175 m of culverts, with no degradation of the element status at the scale of the water body.	Potential to affect base flows on Hollywell Brook, especially during low flows. No wastewater consultee supports storm and moderately diverse aquatic vegetation in the stretch impacted (baseline survey). Effect is considered as being adverse locally, with no likely impact at the scale of the water body.	Potential adverse effects on water quality of Hollywell Brook and Shadow Brook, tributaries of the River Blythe. Hollywell Brook supports good macroinvertebrate quality in the stretch impacted, including highly pollution sensitive taxa (baseline survey). Shadow Brook supports moderate and moderately diverse aquatic vegetation in the stretch impacted (baseline survey). Effect is considered as being adverse locally, with no likely impact at the scale of the water body.	Given the distance between the scheme elements on the River Blythe GB104028042571 and the River Blythe GB104028042572 and that cumulative hydromorphological impacts may locally affect flows, but are considered to be negligible at the scale of the water body, no likely effect is anticipated.	Given the distance between the scheme elements on the River Cole and the River Blythe and the fact that hydromorphological changes are considered to be insignificant, no likely effect is anticipated on the status of this element at the scale of the water body.	Three scheme elements are identified as having adverse effects on macrophytes, the River Blythe viaduct, the culvert on the Hollywell Brook, the culvert on the Shadow Brook and two river diversions on tributaries, one of the Hollywell Brook and one of the Blythe. Removal of an existing culvert on the Hollywell Brook help to offset impacts of permanent. However, these adverse effects are likely to be only very localised around the scheme element (i.e. culverts, viaducts) and/or temporary with a few potential beneficial effects in the longer term (i.e. river diversions, culvert removal). Locally on habitat conditions. In addition, most of the scheme elements are impacting relatively small tributaries at the scale of the water body while the River Blythe main watercourse within this water body, is crossed by one 15 m wide clear span viaduct. Therefore, and as cumulative impacts are not considered as having a significant effect on hydromorphology, they are not considered to have the potential to demonstrate the macroinvertebrate current status of the water body. Overall, the scheme, as currently designed, is unlikely to lead to the degradation of the macroinvertebrate WFD status of the water body (currently High), even in the short term. In addition, the scheme is not believed to be able to compromise the achievement of the WFD macroinvertebrate status objectives in the longer term (which are for the status to remain High).	None required.	None required.	Culverts will be regularly maintained and kept in a functional state that allows fish movements. Construction and post-construction monitoring should be considered (if necessary) to assess any effects on fish migration. - Improvements to habitat within the proximity of culverts should be included in the detailed design designing and the culvert should be positioned so that bed substrate can deposit and/or artificial substrate included. - Further improvements to Hollywell Brook, including naturalisating the course (meanders), reconnection with the floodplain and improvements to the riparian zone, to help offset the upstream section is described as being currently 'overdeepened' (river corridor (baseline survey)) and would benefit from such improvements. This section of the watercourse currently falls into the construction boundary for the scheme and therefore further 'offsite' work would not be required. - The Environment Agency should be consulted during the detailed design of watercourse modifications (for diverted sections of Hollywell Brook in particular) to ensure habitat improvements are maximised.	Minor and localised effects	
	3. Macroinvertebrates	High	High	Hydromorphological changes considered to be insignificant. No likely effect anticipated	The river diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently inhabit the watercourse. The ponded ditch (the culverted area (detailed design of diversion not available). No macroinvertebrates data available locally on the watercourse (agricultural ditch). Minor/local overall beneficial effect anticipated.	Receptor not sensitive to impact. No likely effect anticipated.	No additional effect anticipated (loss of vegetation already considered in the landtake impact).	Temporary loss of 600 m of macroinvertebrate habitat while the new channel re-establishes. In addition, the 4 culverts on the new channel will lead to the permanent loss of 175 m of habitat available to macroinvertebrates. The ponded ditch currently supports moderately good macroinvertebrate quality (baseline survey). Localised adverse effect expected, with no deterioration of the status of the element at the scale of the water body.	Potential increase in flow velocities, reduction of habitat opportunity, disconnection between the channel and the floodplain, and sediment transport. Localised adverse effect at the scale of the water body. The ponded ditch currently supports moderately good macroinvertebrate quality (baseline survey). Hydromorphological changes are likely to lead to alterations of the communities present and have a localised adverse effect on macroinvertebrates. No change in the status of the element at the scale of the water body.	The river diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently inhabit the watercourse. The ponded ditch (the culverted area (detailed design of diversion not available). No macroinvertebrates data available locally on the watercourse (agricultural ditch). Overall neutral effect anticipated, despite the creation of new habitat is reason of the presence of 175 m of culverts, with no degradation of the element status at the scale of the water body.	Potential to affect base flows on Hollywell Brook, especially during low flows. Hollywell Brook supports good macroinvertebrate quality in the stretch impacted (baseline survey). Effect is considered as being adverse locally, with no likely impact at the scale of the water body.	Potential adverse effects on water quality of Hollywell Brook and Shadow Brook, tributaries of the River Blythe. Hollywell Brook supports good macroinvertebrate quality in the stretch impacted, including highly pollution sensitive taxa (baseline survey). Shadow Brook supports moderate and moderately diverse aquatic vegetation in the stretch impacted (baseline survey). Effect is considered as being adverse, with no likely impact at the scale of the water body.	Given the distance between the scheme elements on the River Blythe GB104028042571 and the River Blythe GB104028042572 and that cumulative hydromorphological impacts may locally affect flows, but are considered to be negligible at the scale of the water body, no likely effect is anticipated.	Given the distance between the scheme elements on the River Cole and the River Blythe and the fact that hydromorphological changes are considered to be insignificant, and that no culvert is located within the vicinity of the River Blythe, no likely effect is anticipated on the status of this element at the scale of the water body.						
	4. Fish	High	High	Hydromorphological changes considered to be insignificant. No likely effect anticipated	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities (detailed design of diversion not available). However, the culvert will also reduce habitat connectivity and constitute a barrier to fish movements. No fish data available locally on the watercourse (agricultural ditch). Overall, the scheme is expected to have a minor/local adverse effect at crossing point. Overall effect: likely to be neutral, with no degradation of the element status anticipated. Minor/ local beneficial effect expected locally.	Localised and temporary adverse effect during construction. No deterioration of the water body status of the element is however expected.	No additional effect anticipated (loss of vegetation already considered in the landtake impact).	Temporary loss of 600 m of fish habitat while the new channel re-establishes. In addition, the culverts on the new channel will lead to the permanent loss of 175 m of habitat available, and constitute a barrier to fish movements. No data available for fish on the ponded ditch. However, the River Blythe supports brown trout population (baseline survey). A localised adverse effect is expected on the tributary. However, as the watercourse is already culverted within the area, the culvert will not have the potential to deteriorate the current element status at the scale of the water body.	Potential increase in flow velocities, reduction of habitat opportunity, disconnection between the channel and the floodplain, and sediment transport. Localised adverse effect at the scale of the water body. No data available for fish on the ponded ditch. Hydromorphological changes are likely to lead to alterations of the communities present and have a localised adverse effect on fish. No change in the status of the element at the scale of the water body.	The new channel will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species, excepted within the culverted area. The ponded ditch is heavily shaded and currently supports very low quality macrophytes (baseline survey). Overall neutral effect anticipated, despite the creation of new habitat is reason of the presence of 175 m of culverts, with no degradation of the element status at the scale of the water body.	Potential to affect base flows on Hollywell Brook, especially during low flows. As Hollywell Brook currently supports diverse and relatively diverse aquatic vegetation, and River Blythe is recognised fisheries, supporting brown trout population (baseline survey), effect is considered as having the potential to be adverse at the scale of the water body.	Potential adverse effects on water quality of Hollywell Brook and Shadow Brook, tributaries of the River Blythe. Hollywell Brook supports good macroinvertebrate quality, including highly pollution sensitive taxa (baseline survey). Shadow Brook supports moderate and moderately diverse aquatic vegetation, which provide habitat for fish (i.e. shelter, spawning), a potential minor adverse effect on fish is possible. Potential to lead to a deterioration of the status of the fish element at the scale of the water body.	CHANGE FROM YELLOW TO ORANGE TO REFLECT WORDING "Potential to lead to a deterioration of fish element status." - The culvert present on the River Blythe bypass is likely to reduce connectivity to the River Blythe main channel. In addition, cumulative hydromorphological impacts (notably from the River Blythe bypass culvert and Horn Brook diversion) may locally affect flows, but are considered to be negligible at the River Blythe bypass and Horn Brook, and the effects of dewatering, and culverts present on minor tributaries are identified as having the potential to lead to a deterioration of the status of the fish element at the scale of the water body. This is because - prior to the bypass culvert - the River Blythe supports and is recognised as a fishery (brown trout) on the water body (which currently supports a population of brown trout) and may limit access to features of interest to fish (shelter and spawning) and to connectivity with other parts of the water body. Therefore, based on the limited design data available the scheme, the deterioration of the fish status of the River Blythe water body cannot be ruled out. In addition, it is also possible that these scheme elements would compromise the WFD objectives for this element (which are for the status to remain High).	Given the distance between the scheme elements on the River Cole and the River Blythe, the fact that hydromorphological changes are considered to be insignificant, and that no culvert is located within the vicinity of the River Blythe, no likely effect is anticipated on the status of this element at the scale of the water body.	None scheme element are described as having the potential to have an adverse effect on fish. While most of these effects are likely to be short term and/or localised around the scheme elements, the cumulative impacts of scheme elements present on the River Blythe GB GB104028042571 water body (notably culverts on the River Blythe bypass and on Horn Brook), the effects of dewatering, and culverts present on minor tributaries are identified as having the potential to lead to a deterioration of the status of the fish element at the scale of the water body. This is because - prior to the bypass culvert - the River Blythe supports and is recognised as a fishery (brown trout) on the water body (which currently supports a population of brown trout) and may limit access to features of interest to fish (shelter and spawning) and to connectivity with other parts of the water body. Therefore, based on the limited design data available the scheme, the deterioration of the fish status of the River Blythe water body cannot be ruled out. In addition, it is also possible that these scheme elements would compromise the WFD objectives for this element (which are for the status to remain High). - Surveys of the Hollywell Brook, Shadow Brook and tributaries of the R Blythe and the Hollywell Brook will be undertaken during the detailed design stage in order to establish the baseline fish population. An assessment of the culverts with relation to flows and fish passage must be included as part of the detailed design. Culverts should be designed so that they will be minimised as far as possible, and the design of the culvert boundaries (i.e. where they reconnect with the existing bed and banks) will be developed in detail. - Fish rescue will be carried out on any sections that will be dewatered (e.g. Hollywell Brook during construction of diverted section).	None required.	None required.	Minor and localised effects	Based on current information the effect remains amber (i.e. there is a risk that the scheme could result in the deterioration of this element). However, impact may be reduced to a 'yellow' if the additional mitigation measures (notably the improvements to Hollywell Brook) are maximised and in light of pre-construction surveys.
Physico-Chemical status																				
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possible, red = likely)	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Hydromorphological changes considered to be insignificant. No likely effect anticipated.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor locally, with no degradation of the element status anticipated at the scale of the water body.	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor locally, with no degradation of the element status anticipated at the scale of the water body.	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and reaeration.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from truck drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from truck drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	Potential minor and localised effects on element.	None required.	None required.	Minor and localised effects	
	6. pH	High	-		Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact			Receptor is insensitive to impact			No significant effects
	7. Phosphate	Moderate	-		• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Hydromorphological changes considered to be insignificant. No likely effect anticipated.	Receptor is insensitive to impact	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and reaeration.				Depending on how much flow is lost, potential minor and localised effects on element in Hollywell Brook. Two discharge consents for STW final effluent on Hollywell Brook.			Minor and localised effects	
	8. Ammonia	High	-		Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and reaeration, and other possible effects				Potential minor and localised effects on element.			Minor and localised effects	
	9. Temperature	-	-		Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Some shading from the culverts may have a minor impact on water temperature, but this is likely to be a small, localised effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact			Receptor is insensitive to impact			No significant effects	
	10. Specific Pollutants (Annex VIII)	High	-		• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Hydromorphological changes considered to be insignificant. No likely effect anticipated.	Receptor is insensitive to impact	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and reaeration, and other possible effects				Potential minor and localised effects on element.			Minor and localised effects	
Hydromorphological status																				Hydromorphology Baseline
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possible, red = likely)	• Channel widths appear to be 0.5m to 1m or less, so there is unlikely to be significant diversity of flow dynamics in any of the channels • The undertridge is effectively an open span bridge, so should not significantly affect hydromorphology • In practical terms the impacts on hydromorphology are considered to be minimal at water body scale, since these watercourses are very small in scale relative to the whole water body	N/A	N/A	N/A	• Channel widths appear to be 0.5m to 1m or less, so there is unlikely to be significant diversity of flow dynamics in any of the channels • However the 175m culvert affects a high proportion of this stream, would disconnect floodplain and sever lots of open watercourse • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to the vegetation lined channel, which may result in increased velocity, and sediment transport, channel instability, gradients and decreased roughness • In practical terms the impacts on hydromorphology are considered to be minimal at water body scale, since these watercourses are very small in scale relative to the whole water body	N/A	• Cumulative impacts on GB104028042571 the River Blythe Bypass at its downstream and due to the River Blythe Bypass Culvert and Horn Brook culvert and diversion, and existing A452 and Comets End Lane culverts and Comets End lane gravel works may cascade to GB104028042572. This may have an insignificant effect due to the relative size of these components of GB104028042571 and the scale of their contribution to GB104028042572, but there is still a risk to local flow dynamics around the confluence.	• The River Cole joins the River Blythe approximately 400m upstream of the River Tame, so in principle any impacts on the River Cole could cascade to the adjoining water body • The River Cole crossing designs near the River Blythe and the M42/M6 Toll are effectively open span bridges so would not affect the River Cole or the River Blythe • Footings in riparian zones or floodplains could cause some local turbulence at flood flows, but would not considered to be significant	• Culverts and diversions of tributaries mean that there is potential have adverse effects on flow and sediment dynamics at local scale • Viaducts and underbridges are unlikely to have any significant impacts • Dewatering associated with cuttings could negatively affect hydrological and sediment transport regimes • However, likely these adverse effects are likely to be only very localised around the scheme element (i.e. culverts, viaducts) and/or temporary with a few potential beneficial effects in the longer term (i.e. river diversions, culvert removal). Overall, hydromorphological risks are minor	• No additional mitigation is required for viaducts or underbridges • ~~Hydromorphological surveys to be undertaken in all detailed design development~~ • Hydromorphological mitigation should be included into detailed design where practicable, for example with respect to bank reprofiling (rehabilitation), bed morphology and use of soft engineering techniques • The reinstated riparian zones at the site of the culvert removal should be planned with the same species that exist in the adjacent areas to encourage natural recovery		Minor and localised effects	**River Blythe** Baseline walkover survey indicates that the channel has been historically realigned, straightened and over-widened, but there is evidence of a recovering and re-naturalising form with in-channel vegetation and woody debris present. The channel is dominated by fine sediment, but RSL photos did not show bed material. **Shadow Brook** Baseline walkover survey indicated that the channel has been historically straightened, with some floodplain connectivity in downstream sections. The contents woody debris and deeper pools caused by up-coated trees. There is evidence of sedimentation as a result of little variation in flow, and limited in-stream vegetation with growth observed during the survey. As the proposed crossing point, river channel begins to show a sinuous form. ~~• Hydromorphology baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.~~
	12. Connection to Groundwater	-	-		• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	• Flows could be reduced - see commentary on the cutting	N/A	• Reduction of flows in this tributary could cause a localised reduction in flow volumes, depths and dynamics, and consequent reductions in sediment transport (and increased deposition) downstream, but this is a minor feature and connectivity. The effect could be significant for this tributary, but would be buffered as soon as the tributary connects to the larger downstream watercourse so there would not be severe effects at water body scale	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and reaeration, and other possible effects.	• Likely to be no significant relationship between hydromorphology and groundwater	• Likely to be no significant relationship between hydromorphology and groundwater							
	13. River continuity	-	-		• Size of the tributary means that no significant effects would be anticipated	N/A	N/A	N/A	• The culvert would affect a large proportion of this stream, would disconnect floodplain and sever lots of open watercourse. Would cut off bed material and habitat continuity, but this is a minor feature and in practical terms would not impact on deterioration of overall water body status	N/A			• The cumulative effects on GB104028042571 and the scale of their contribution to GB GB104028042572 probably mean there would be no significant impacts on continuity	• Crossing designs mean there will be no footings in the watercourse • Footings in riparian zones or floodplains would not interrupt continuity							
	14. River depth and width variation	-	-		• Size of the tributary means that no significant effects would be anticipated	The extent of new watercourse that would be created, and the possible negative effects of altering existing channel conditions, mean that there would be no significant habitat creation	N/A	N/A	• Out-of bank flows may be constrained by the culvert, but the channel water surface at the crossing location is not wide enough to be visible or measurable from aerial imagery. Likely to be a slight or significant reduction in diversity of river depth and width, and the culvert is likely to be a barrier to fish movement. This would not require significant channel realignment or straightening. • Given the extent of the culvert and the loss of open watercourse, the impacts on channel width and depth are likely to be detrimental	N/A				• The cumulative effects on GB104028042571 and the scale of their contribution to GB104028042572 probably mean there would be no significant impacts on channel geometry	• Crossing designs mean there will be no footings in the watercourse • Comparison of historic maps suggests that channel alignment is stable in the order of decades, so no impacts are anticipated							
	15. Structure and substrate of river bed	-	-		• Size of the tributary means that no significant effects would be anticipated	N/A	N/A	N/A	• Channel water surface at the crossing location is not wide enough to be visible or measurable from aerial imagery. Likely to be a slight or significant bed sediment transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk • Given the extent of the culvert and the loss of open watercourse, the impacts on channel bed substrates are likely to be detrimental, especially as access for maintenance will presumably not be possible	N/A				• The cumulative effects on GB104028042571 and the scale of their contribution to GB104028042572 probably mean there would be no significant impacts on bed substrates	• Crossing designs are effectively open span bridges, so there would be no impacts on the channel bed							
	16. Structure of riparian zone	-	-		• Size of the tributary means that no significant effects would be anticipated	N/A	N/A	N/A	• The culvert would disconnect the channel from the existing well developed, mature vegetation riparian zone and sever any existing riparian habitat connectivity. This would cut off a lot of habitat, but feature and in practical terms would not impact on deterioration of water body status	N/A			• Cumulative impacts on flow processes would be highly unlikely to affect riparian qualities in GB104028042572	• Footings in the riparian zones would require minor land take but not considered to be significant							

B. Risk screening of potential to prevent future attainment of good Ecological

Action/ measures to achieve objective (yet to be implemented or confirmed by implementation)	Where Action/ measure will happen	Where Action/ measure will happen																		
NONE	-	-	Predicted change to status elements (green = none, amber = possible, red = likely)	-	-	-	-	-	-	-	-	-	-	-	No effect from scheme on measures to address reasons for failure.	-	-	No significant effect		

WFD Baseline Survey Details

Water Body ID		GB104028042572						
Surface Water Body Name		River Blythe from Patrick Bridge to River Tame						
Scheme Element		**River Blythe Viaduct (clear span)**	**Shadow Brook Underbridge**	**River Diversion, Underbridge, 2 x people mover crossings (viaduct) and Diddington Cutting - Hollywell Brook**	**River Diversion and Culvert - Trib Hollywell Brook**	**Diddington Cutting**	**OVERALL EFFECT**	**RESIDUAL EFFECT**
Surface Water Crossing ID		**SWC-CFA23-004**	**SWC-CFA23-005**	**SWC-CFA24-001**	**SWC-CFA24-002**	**N/A**		
Survey Site		River Blythe, north of Meriden Road	Shadow Brook, west of Didington Lane	Hollywell Brook, east of Middle Bickenhill Lane	Hollywell Brook, east of Middle Bickenhill Lane	Hollywell Brook, east of Middle Bickenhill Lane		
Survey ID		WFD-PA1-0040, WFD-MI1-0040, WFD-MP1-0040, WFD-EF1-0040	WFD-PA1-0041	WFD-PA1-0042a	WFD-PA1-0042b	WFD-PA1-0042a, WFD-PA1-0042b		
Objectives of the Survey		SES-C224-051	• Assess ecological habitat type. • Assess the local hydromorphology	• Assess ecological habitat type. • Assess the local hydromorphology	• Assess ecological habitat type. • Assess the local hydromorphology	• Assess ecological habitat type. • Assess the local hydromorphology		
Survey Scope		Ecological Walkover Survey Hydromorphological Survey Macrophyte Survey Macroinvertebrate Survey Fish Survey	Ecological Walkover Survey Hydromorphological Survey	Ecological Walkover Survey Hydromorphological Survey	Ecological Walkover Survey Hydromorphological Survey	Ecological Walkover Survey Hydromorphological Survey		
Medium Term Survey Results Summary	**Bio**	The River Blythe at WFD-PA1-0040, is an historically realigned, resectioned and over-widened watercourse, although re-naturalising. Well developed marginal and submerged macrophyte communities, with relatively high macrophyte diversity with 17 species recorded, although only common species at WFD-MP1-0040. Non-native invasive Himalayan balsam (*Impatiens glandulifera*) present in dense stands on banks. High macroinvertebrate quality at WFD-MP1-0040, with several pollution sensitive taxa, including mayfly and caddisfly. Moderate LIFE score, indicative of communities moderately sensitive to flow reductions and PSi score indicative of "Moderate" sedimentation. Good phytophilic fish habitat in places, and good potential refuges habitat (bankside roots etc.). Six fish species recorded (chub, perch, dace, gudgeon, roach and pike). Minor species included minnow, bullhead, stoneloach and stickleback in moderate to high abundances at WFD-EF1-0040	Shadow Brook at WFD-PA1-0041is an historically resectioned watercourse, slow flowing and heavily sedimented. Heavily shaded from bankside vegetation, although a few marginal and in-stream macrophytes were observed in places. Good mix of habitats for smaller fish species.	Hollywell Brook at WFD-PA1-0042a is an historically resectioned and realigned watercourse, with good marginal habitat, and flow/substrate diversity. Downstream of crossing point, dense sedge/reed riparian buffer. Overall, good potential for macrophytes, fish and macroinvertebrates.	The tributary at WFD-PA1-0042b is extensively culverted within survey reach, including at crossing point. Although series of pools were observed downstream of culvert, there was no flow connectivity at the time of the survey.	Hollywell Brook at WFD-PA1-0042a is an historically resectioned and realigned watercourse, with good marginal habitat, and flow/substrate diversity. Downstream of crossing point, dense sedge/reed riparian buffer. Overall, good potential for macrophytes, fish and macroinvertebrates.		
	Phys	At survey point **WFD-PA1-0040** the watercourse observed was lightly shaded (<30%), of medium flow and slightly turbid. Physico-chemical parameters measured at survey point WFD-EF1-0040: Dissolved Oxygen = 9 mg/l pH = 7.66 Temp = 17.3 deg C Conductivity = 601 uS	At survey point **WFD-PA1-0041** the watercourse observed was heavily shaded (>70%), low flowing and slightly turbid	At survey point **WFD-PA1-0042a** the watercourse observed was lightly shaded (<30%), of medium flow and slightly turbid.	At survey point **WFD-PA1-0042b** the watercourse observed was contained within an extensive piped culvert, including the proposed crossing point. A series of online pools downstream of culvert were observed, but no flow connectivity at observed levels.	At survey point **WFD-PA1-0042a** the watercourse observed was lightly shaded (<30%), of medium flow and slightly turbid.		
	Hydro	Baseline walkover survey indicated that the channel has been historically realigned, resectioned and over-widened, but there was evidence of recovery and re-naturalisation with in-channel vegetation and woody debris present, and that the bed is dominated by fine sediment, although photos did not show bed material.	Baseline walkover survey indicated that the channel has been historically resectioned with some floodplain connectivity in the downstream sections. The channel contains woody debris and deeper pools caused by up-rooted trees. There is evidence of sedimentation as a result of some variation in flow and the limited in-stream vegetation, some gravels were observed. At the proposed crossing point river channel begins to show a sinuous planform.	Baseline walkover survey indicated that the brook had been historically resectioned and realigned, with evidence of natural erosion and morphological diversification upstream of the proposed crossing, with promising flow/substrate diversity within the constricted channel. Downstream of the proposed crossing (and existing field culvert), more a sinuous planform is evident.	Baseline walkover survey WFD-PA1-OO42b indicates that the reach the channel is extensively culverted (Photo 0838) at the proposed crossing point, with impounding flows upstream. Further upstream the reach has the characteristics of an arable drainage ditch, having been re-sectioned and re-aligned. The uniform channel in this reach has associated laminar flows which are influenced by the impoundment effects of the culvert, which has encouraged fine sediment deposition.	Baseline walkover survey indicated that the brook had been historically resectioned and realigned, with evidence of natural erosion and morphological diversification upstream of the proposed crossing, with promising flow/substrate diversity within the constricted channel. Downstream of the proposed crossing (and existing field culvert), more a sinuous planform is evident.		

Audit Trail for the Update of the WFD Water Body Assessment with Baseline Data

		Nature of the Assessment Update and Justification						
	WFD Classification Elements Changed	**River Blythe Viaduct (clear span) (SWC-CFA23-004)**	**Shadow Brook Underbridge (SWC-CFA23-005)**	**River Diversion, Underbridge, 2 x people mover crossings (viaduct) and Diddington Cutting - Hollywell Brook (SWC-CFA24-001)**	**River Diversion and Culvert - Trib Hollywell Brook (SWC-CFA24-002)**	**Diddington Cutting**	**OVERALL IMPACT**	**RESIDUAL EFFECT**
Biological	**2. Macrophytes and phytobenthos - macrophytes**	No significant change in the baseline. Assessment unchanged.	As Shadow Brook is described as supporting aquatic macrophytes, assessment updated from green to yellow.	Although no additional baseline, "Shading" effect from culvert changed from green to yellow to correct previous mistake in assessment.	As tributary is already heavily culverted at crossing point, "Landtake" and "Shading" effects from culverts downgraded from minor to negligible.	No significant change in the baseline. Assessment unchanged.	No change in overall impact.	No change in residual effect.
	3. Macroinvertebrates	No significant change in the baseline. Assessment unchanged.	As Shadow Brook is described as supporting aquatic macrophytes, assessment updated from green to yellow, due to potential loss of macroinvertebrate habitat through shading.	Although no additional baseline, "Shading" effect from culvert changed from green to yellow to correct previous mistake in assessment.	As tributary is already heavily culverted at crossing point, "Landtake" effect from culverts downgraded from minor to negligible.	No significant change in the baseline. Assessment unchanged.	No change in overall impact.	No change in residual effect.
	4. Fish	No significant change in the baseline. Assessment unchanged.	As Shadow Brook is described as supporting aquatic macrophytes, assessment updated from green to yellow, , due to potential loss of fish habitat through shading.	Although no additional baseline, "Shading" effect from culvert changed from green to yellow to correct previous mistake in assessment.	As tributary is already heavily culverted at crossing point, "Landtake" and "Noise and vibration" effects from culverts downgraded from minor to negligible. "Creation of new habitat" upgraded from negligible to minor beneficial.	No significant change in the baseline. Assessment unchanged.	No change in overall impact.	No change in residual effect.
Physico-Chemical	**5. Dissolved Oxygen**	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	6. pH	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No change in overall impact.	No change in residual effect.
	7. Phosphate	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	8. Ammonia	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No change in overall impact.	No change in residual effect.
	9. Temperature	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	10. Specific Pollutants (Annex VIII)	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
Hydromorphological	**11. Quantity and dynamics of river flow**	No assessment update required. Temporary minor impacts remain unchanged	No assessment update required. Temporary minor impacts remain unchanged. Minor clarifications in text due to survey evidence	No assessment update required. Temporary minor impacts remain unchanged. Minor clarifications in text due to survey evidence	No assessment update required. Temporary minor impacts remain unchanged. Minor clarifications in text due to survey evidence	No assessment update required. Temporary minor impacts remain unchanged. Minor clarifications in text due to survey evidence	No change in overall impact.	No change in residual effect.
	12. Connection to Groundwater	No assessment update required. Temporary minor impacts remain unchanged	No assessment update required. Temporary minor impacts remain unchanged	No assessment update required. Temporary minor impacts remain unchanged	No assessment update required. Temporary minor impacts remain unchanged	No assessment update required. Temporary minor impacts remain unchanged	No change in overall impact.	No change in residual effect.
	13. River continuity	No assessment update required. Temporary minor impacts remain unchanged	No assessment update required. Temporary minor impacts remain unchanged	No assessment update required. Temporary minor impacts remain unchanged	No assessment update required. Temporary minor impacts remain unchanged	No assessment update required. Temporary minor impacts remain unchanged	No change in overall impact.	No change in residual effect.
	14. River depth and width variation bed	No assessment update required. Temporary minor impacts remain unchanged	No assessment update required. Temporary minor impacts remain unchanged	No assessment update required. Temporary minor impacts remain unchanged. Minor clarifications in text due to survey evidence	No assessment update required. Temporary minor impacts remain unchanged. Minor clarifications in text due to survey evidence	No assessment update required. Temporary minor impacts remain unchanged. Minor clarifications in text due to survey evidence	No change in overall impact.	No change in residual effect.
	15. Structure and substrate of river bed	No assessment update required. Temporary minor impacts remain unchanged	No assessment update required. Temporary minor impacts remain unchanged	No assessment update required. Temporary minor impacts remain unchanged. Minor clarifications in text due to survey evidence	No assessment update required. Temporary minor impacts remain unchanged. Minor clarifications in text due to survey evidence	No assessment update required. Temporary minor impacts remain unchanged. Minor clarifications in text due to survey evidence	No change in overall impact.	No change in residual effect.
	16. Structure of riparian zone	No assessment update required. Temporary minor impacts remain unchanged	No assessment update required. Temporary minor impacts remain unchanged	No assessment update required. Temporary minor impacts remain unchanged	No assessment update required. Temporary minor impacts remain unchanged	No assessment update required. Temporary minor impacts remain unchanged	No change in overall impact.	No change in residual effect.

Water Body ID	GB104028042572
Surface Water Body Name	River Blythe from Patrick Bridge to River Tame
CFAs covered by Waterbody	23, 24

CFA	23	
AP2 ID	AP2-023-005	AP2-023-006
AP2 Name	Realignment of Diddington Lane	Bridge over Shadow Brook
AP2 Location	Solihull Metropolitan Borough, Parish of Hampton-in-Arden	Diddington Lane
New/Replacement Scheme Element	NEW	NEW
Scheme Element Type	Culvert	Bridge
Original Scheme	Diddington Lane will be closed to traffic with local access to agricultural land retained with height restrictions beneath Shadow Brook underbridge. The route will pass over Diddington Lane and Shadow Brook on a bridge (Shadow Brook underbridge) which will provide 2.7m of clearance between ground level and the underside of the underbridge.	The Bill Scheme included the stopping up of Diddington Lane. The existing bridleway which runs along Diddington Lane would be retained with a diversion under the Shadow Brook Underbridge. Access to agricultural fields to the east of the route alignment was previously off Diddington Lane. With the Bill Scheme, this access would be achieved off the realigned bridleway, immediately south of its crossing of the Shadow Brook, and adjacent to the Shadow Brook Underbridge
AP2 Description	Diddington Lane would be realigned to the west of the route and will be on embankment and cross the route at Diddington cutting, via a new bridge. The new alignment would tie into the existing Diddington Lane. Shadow Brook will be in culvert under the Diddington lane diversion.	A new crossing of the Shadow Brook will be provided, approximately 150-200m east of the proposed crossing with the Bill Scheme. The crossing would have a track 3.5m wide with 0.6m wide verges on each side.
AP2 Changes to Previously Assessed Elements	None	None
AP2 Additional Elements Assessment Requirement	New Road realignment	New Road realignment

GB104028042572 AF2 Assessment

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements (black text = proposed within groundwater body, white text = not proposed)	Description of scheme element impact	River Blythe Viaduct (clear span)					Hollywell Brook River Diversion			Hollywell Brook Underbridge					Existing culvert removed - Hollywell Brook					People mover crossings (viaduct)					Shadow Brook Underbridge					Culvert and Diversion - Trib Hollywell		
GB104028042572	Moderate	Good ecological status by 2027			River Blythe Viaduct (399 m long, 15 m wide, 5 m above ground level)					Diversion of 330m of Hollywell Brook, including Hollywell Brook underbridge (see following column), and one people mover crossing – viaduct, approx. 5m wide)			Bridge over Hollywell Brook, a tributary of the Blythe. Bridge with footings/structures near to riparian zone but no within the channel or marginal zone. Bridge dimensions: 60 m long, 2.7 m high, 13.5 wide. Approximately 80 m length of diverted watercourse covered. Openings in bridge over watercourse to north and south of tracks to let more light in.			Removal of an existing culvert on Hollywell Brook (40 min length)					Two crossings of Hollywell Brook for people mover crossing, no footings in watercourse. Both crossings approx. 10 m long.					Bridge over Shadow Brook, a minor tributary of the Blythe. Bridge with footings/structures near to riparian zone but no within the channel or marginal zone. Bridge dimensions: 35 m long, 2.7 m high, 13.5 wide. Approximately 50 m length of watercourse covered, no modifications to course of Shadow Brook.					Tributary of Hollywell Brook (100 m length, including culvert - eastway overbridge, detailed design not available, but assumptions).		
River Blythe from Patrick Bridge to River Tame					Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Creation of new habitats	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Shading	Landtake
				Identified biological impacts	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WFD classification elements				Predicted change to status elements (green = some, amber = possible, red = likely)																																
2. Macrophytes and phytobenthos combined	N/A	N/A			Receptor not sensitive to impact. No likely effect anticipated.	No bridge footings within the watercourse or riparian zone. No likely effect anticipated.	Likely to lead to a very localised but permanent loss of macrophytes by reduction of photosynthetic activity. The watercourse currently supports moderately abundant and diverse aquatic vegetation (baseline survey). Localised adverse effect anticipated.	No significant hydromorphological changes. No likely effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Temporary loss of 330 m of macrophyte habitat on the existing Hollywell Brook within the new channel fully established (although the new channel will be created and some establishment will occur prior to loss of existing channel). The watercourse currently supports dense and moderately diverse aquatic vegetation (baseline survey). Hydromorphological impacts are considered to be minor. Localised adverse effect expected with no deterioration of the status of the element.	Hydromorphological impacts are considered to be minor. The watercourse currently supports relatively diverse macroinvertebrate communities, adapted to slow to moderate flows and moderate to coarse substrates (baseline survey). Hydromorphological regime in the diversion is expected to support similar macroinvertebrate assemblages. Localised minor adverse effect expected.	The new channels will incorporate marginal berms to encourage emergent macrophyte species and the channel will be lined with a mixture of coarse gravel, cobbles and submerged species, excepted within the culverted area (detailed design of diverted section not available). The new channel will provide a similar habitat to support a diverse aquatic vegetation in the stretch impacted (baseline survey). Overall beneficial effect anticipated, with no degradation of the element status at the scale of the water body.	N/A	N/A	GREEN TO YELLOW - Potential localised but permanent loss of macrophytes due to reduction in photosynthetic activity. However Shadow Brook currently heavily shaded and supporting very little aquatic vegetation. Therefore the impact is likely to be negligible or nil effect. The watercourse currently supports dense and moderately diverse aquatic vegetation in the stretch impacted (baseline survey). Potential localised adverse effect.	No significant hydromorphological change anticipated. Effect likely to be negligible/neutral on macrophytes, with no deterioration of the status of this element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Shading	Landtake
3. Macroinvertebrates	High	High			Receptor not sensitive to impact. No likely effect anticipated.	No bridge footings within the watercourse or riparian zone. No likely effect anticipated.	Likely to lead to a very localised but permanent loss of macroinvertebrate habitat (i.e. riparian vegetation, aquatic vegetation). The River Blythe locally supports a moderate to high macroinvertebrate quality within the stretch impacted (baseline survey). Minor and localised adverse effect anticipated.	No significant hydromorphological changes. No likely effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Temporary loss of 330 m of macroinvertebrate habitat while the new channel is established. The new channel will be established prior to diversion of the existing channel. The watercourse currently supports dense and moderately diverse macroinvertebrate communities (baseline survey) and good macroinvertebrate quality in the stretch impacted (baseline survey). Temporary adverse effects on macroinvertebrates may occur.	Hydromorphological impacts are considered to be minor. The watercourse currently supports relatively diverse macroinvertebrate communities, adapted to slow to moderate flows and moderate to coarse substrates (baseline survey). Hydromorphological regime in the diversion is expected to support similar macroinvertebrate assemblages. Localised minor adverse effect expected.	The river diversion will be designed to include a range of channel habitats, including where possible pools, riffle and glide sections, and a diverse substrate composition. The diversion can also that currently characterise the reach, excepted within the culverted area. The watercourse currently supports dense and moderately diverse aquatic vegetation and good macroinvertebrate quality in the stretch impacted (baseline survey). Overall beneficial effect anticipated, with no degradation of the element status at the scale of the water body.	N/A	N/A	GREEN TO YELLOW - The watercourse is assessed to be of good potential for macroinvertebrates. Localised temporary adverse effect through the loss of habitat (macrophytes).	No significant hydromorphological change anticipated. Effect likely to be negligible/neutral on macroinvertebrates, with no deterioration of the status of this element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Shading	Landtake
4. Fish	High	High			Localised and temporary effect during construction. No deterioration of the status of the element is however expected	No bridge footings within the watercourse or riparian zone. No likely effect anticipated.	Localised and temporary adverse effect through the loss of habitat (macrophytes). Localised minor adverse effect anticipated, with no deterioration of the status of the element.	No significant hydromorphological changes. No likely effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Temporary loss of 330 m of fish habitat within Hollywell Brook, although the new channel will be established prior to diversion of the existing channel. The watercourse currently supports diverse and relatively dense fish populations (baseline survey). Localised adverse effect expected. Temporary adverse effects on fish may occur.	Hydromorphological impacts are considered to be minor, although the watercourse currently supports diverse and relatively dense fish populations (baseline survey). In addition, the River Blythe supports brown trout population (baseline survey) and the diversion is expected to support similar fish populations. Localised adverse effect anticipated.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities (detailed design of diversion not available). The new channel will provide a similar habitat to support a diverse fish populations (baseline survey). In addition, the River Blythe supports brown trout population (baseline survey) and the diversion is expected to support similar fish populations. The element status at the scale of the water body.	N/A	N/A	GREEN TO YELLOW – The watercourse currently supports diverse and relatively dense fish populations (baseline survey). In addition, the River Blythe supports brown trout population (baseline survey) and the diversion is expected to support similar fish populations (baseline survey). Localised adverse effect through the loss of habitat (macrophytes).	No significant hydromorphological change anticipated. Effect likely to be negligible/neutral on fish, with no deterioration of the status of this element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Shading	Landtake
Physico-Chemical status																																				
WFD classification elements				Predicted change to status elements (green = some, amber = possible, red = likely)																																
5. Dissolved Oxygen	High	-			N/A	N/A	• Some shading with negligible/no effect.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary decrease in dissolved oxygen. This impact is likely to be a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in dissolved oxygen. This impact is likely to be a minor/temporary in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in dissolved oxygen. This impact is likely to be a minor/temporary in relation to the water body.	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on dissolved oxygen. The watercourse channel is locally heavily shaded and is already culverted under Haslington Lane. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	• Culvert removal would eliminate artificial shading on this section of the watercourse, increasing dissolved oxygen levels as a result of photosynthetic activity. A minor beneficial effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	• Some shading with negligible/no effect.	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A
6. pH	High	-			N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A
7. Phosphate	Moderate	-			N/A	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A
8. Ammonia	High	-			N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A
9. Temperature	-	-			N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	Some shading from the viaduct and underbridge may have a minor impact on water temperature, but this is likely to be a small, localised effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. The watercourse channel is locally heavily shaded and is already culverted under Haslington Lane. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	• Culvert removal would eliminate artificial shading on this section of the watercourse, increasing temperature range. A minor beneficial effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. The watercourse channel is locally heavily shaded and is already culverted under Haslington Lane. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	• Some shading with negligible/no effect.
10. Specific Pollutants (Annex VIII)	High	-			N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	N/A
Hydromorphological status																																				
WFD classification elements				Predicted change to status elements (green = some, amber = possible, red = likely)																																
11. Quantity and dynamics of river flow	-	-			N/A	N/A	N/A	• Crossing design is effectively an open span bridge. • Footings in riparian zones or floodplains could cause some local turbulence at fluvial flows, but would not considered to be significant. • The river is located to the north of the floodplain, so some floodplain continuity would be lost due to the embankment to the south of the crossing, but this is unlikely to significantly affect flow dynamics	N/A	N/A	• Surveys report that the channel widths are narrow: approximately 0.5m wide, and that the channel is shallow, with little variability of flow dynamics in any of the channels. • Extreme flood flows could be cut off by the proposed new channel, which is 5m wide, compared to c.a. 2.5 m wide watercourse, so this is unlikely to be significant. • Vegetation management may be required through the underbridge to decrease wind tunnelling effects and ensure birds can use it as a conveyance, but the dimensions of the underbridge relative to the watercourse mean that hydraulic conditions are unlikely to be significantly altered. • In practical terms the impacts on hydromorphology are considered to be minimal at water body scale, since these tributary watercourses are small relative to the whole water body	N/A	N/A	N/A	N/A	• Culverting is a major WFD benefit and would serve to reinstate natural use of bank flow dynamics, by removing flow constraints	N/A	N/A	N/A	N/A	• Channel widths appear to be 1m or less, so there is unlikely to be significant impact on the flow dynamics in any of the channels. • The people mover crossing design is effectively an open span bridge, so • Footings in riparian zones or floodplains could cause some local turbulence at fluvial flows, but would not considered to be significant. • In practical terms the impacts on hydromorphology are considered to be minimal at water body scale, since these watercourses are very small in scale relative to the whole water body	N/A	N/A	N/A	N/A	• Channel widths appears to be 1m or less, so there is unlikely to be significant impact on the flow dynamics in any of the channels. • The bridge would be 13.5m wide to permit flows to be conveyed through the structure. • Extreme floodplain flows could be cut off by embankments, but the bridge is wide enough that this is considered unlikely to be significant. • In practical terms the impacts on hydromorphology are considered to be minimal at water body scale.	N/A	N/A	N/A	N/A
12. Connection to Groundwater	-	-			N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A
13. River continuity	-	-			N/A	N/A	N/A	• Crossing design means there will be no footings in the watercourse • Footings in riparian zones or floodplains could cause some local turbulence. • The river appears to be to the north of the floodplain, so some floodplain continuity would be lost due to the embankment to the south of the crossing, but this is unlikely to have a detrimental effect at water body scale	N/A	N/A	• Lengthening the channel may result in reduced flow rates and depths and may promote some increased sediment deposition, so there are likely to be some localised impacts on continuity	N/A	N/A	N/A	N/A	• Channel width, depth, sinuosity and bed structures would be maintained through the underbridge	N/A	N/A	N/A	N/A	• Culvert removal would renaturalise floodplain and out of bank flows, and restore continuity of bank and riparian habitats.	N/A	N/A	N/A	N/A	• The people mover crossing design is effectively an open span bridge so would not affect continuity	N/A	N/A	N/A	N/A	• The underbridge is wide enough to effectively be considered open span, and so impacts on continuity are anticipated	N/A	N/A	N/A	N/A
14. River depth and width variation bed	-	-			N/A	N/A	N/A	• Crossing design means there will be no footings in the watercourse • Consultation of historic maps suggests the channel geometry is stable in the order of decades, so no impacts are anticipated	N/A	N/A	• Lengthening the channel may result in decreased flow depths, although channel widths would be maintained	N/A	N/A	N/A	N/A	• Channel width, depth and sinuosity would be maintained through the underbridge, but longitudinal profile changes would result in decreased flow depths.	N/A	N/A	N/A	N/A	• Culvert removal would renaturalise to channel and out of channel flow geometry • Removal of the existing structure may result in some channel vertical and lateral adjustment and allow recover of the channel geometry. However, given the size of the watercourse, adjustments would be minor and would not be expected to result in any significant change in channel planform or increase in channel complexity in the watercourse.	N/A	N/A	N/A	N/A	• The people mover crossing design is effectively an open span bridge so would not affect depth and width variation	N/A	N/A	N/A	N/A	• The underbridge is wide enough to have no significant impact on channel geometry	N/A	N/A	N/A	N/A
15. Structure and substrate of river bed	-	-			N/A	N/A	N/A	• Crossing design is effectively an open span bridge, so there would be no impact on the channel bed	N/A	N/A	• Natural water surface at the crossing location is approximately 5m wide, with improving diversity. • However, Lengthening the channel may result in decreased flow rates and some increased sediment deposition. • Footings in riparian zones could cause local impacts on the bed, but this is a risk. • The people mover crossing design is effectively an open span bridge so would not affect depth and width variation	N/A	N/A	N/A	N/A	• Channel water surface at the crossing location is 0.5 m wide, which already has existing culverts or bare ditch characteristics meaning that it is unlikely that there is the potential for dynamic flow to have developed in the channel. • It is assumed that there would be no harm to the underbridge so there should be no impacts on the bed	N/A	N/A	N/A	N/A	• Some local sediment mobilisation and deposition may occur, but this would be allowed to recover a natural form. This would probably be a short to medium term adjustment, and would be unlikely to exceed 1 year, since it is a small-flow perennial watercourse. • Given the size of the watercourse, any adjustments to channel grading would be minor, and would not be expected to reverse or upstream knick-point migration would be anticipated. • Vegetation management may be required and/or mass have been identified in the vicinity of the site that could be negatively affected by the potential increase in scour	N/A	N/A	N/A	N/A	• The people mover crossing design is effectively an open span bridge so would not affect depth and width variation	N/A	N/A	N/A	N/A	• The underbridge is wide enough to have no significant impact on flow or sediment dynamics	N/A	N/A	N/A	N/A
16. Structure of riparian zone	-	-			N/A	N/A	N/A	• Footings in the riparian zones would require some land take but not considered to be significant	N/A	N/A	• Riparian zones could generally be maintained along the diversion	N/A	N/A	N/A	N/A	• Riparian zones could generally be maintained through the wide underbridge, however at the crossing location there is a lack of riparian vegetation that exists either side of the culvert, although this would take several years to develop and encourage by planting	N/A	N/A	N/A	N/A	• Removal of the culvert would allow the channel to develop a natural form and vegetation that exists either side of the culvert, although this would take several years to develop and encourage by planting	N/A	N/A	N/A	N/A	• The people mover crossing design is effectively an open span bridge so would not affect depth and width variation	N/A	N/A	N/A	N/A	• The underbridge is wide enough to have no significant impact on riparian zones	N/A	N/A	N/A	N/A

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objectives (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen																																		
NONE	-	-	Predicted change to status elements (green = some, amber = possible, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

A. Risk screening of potential to cause deterioration of current WFD E

Surface Water body	Current status	Status objective	Scheme Elements (Black text = proposed within groundwater body, white text [] Brook = not proposed)		River Diversion (including culverts)						Diddington Cutting		DIDDINGTON LANE CULVERT - Realignment of Diddington Lane - AP2-023-005					Bridge over Shadow Brook - AP2-023-006					Impacts from other WFD water bodies (assessed separately) - Multiple Scheme elements - River Blythe GB GB104028042571 (including River Blythe bypass culvert and Horn Brook diversion)	Impacts from other WFD water bodies (assessed separately) - Multiple Scheme elements - River Cole (overbridge and viaducts)
GB104028042572	Moderate	Good ecological status by 2027	all follow best practice for diversions and culverts, as set out in the general		Very minor unnamed tributary of River Blythe (a ditch running from M42 to Fish Pool Lane) - 600 m, including 4 culverts (175 m)						Cutting will lead to decreased dry weather flows to Hollywell Brook, as drainage from cutting, which currently discharges to a pond on Hollywell Brook, will discharge via an alternation pond to Shadow Brook. There will be no effect on flows to the River Blythe, only to the two tributaries.		Shadow Brook will be in culvert under the Diddington lane diversion.					A new crossing of the Shadow Brook will be provided for bridleway access, approximately 150-200m east of the proposed crossing with the Bill Scheme. The crossing would have a track 3.5m wide with 0.6m wide verges on each side.						
River Blythe from Patrick Bridge to River Tame			Description of scheme element impact	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Creation of new habitats	Noise and vibration	Shading	Landtake	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Creation of new habitats	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage		
WFD classification elements	Identified biological impacts		Predicted change to status elements (green = none, amber = possible, red = likely)																					
1.Macrophytes and phytobenthos - diatoms	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2. Macrophytes and phytobenthos - macrophytes	Moderate	Good		Hydromorphological changes considered to be insignificant. No likely effect anticipated.	The new channels will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species, excepted within the culverted areas. (detailed design of diversion not available). No macrophyte data available locally on the watercourse (agricultural ditch). Minor/local overall beneficial effect anticipated.	Receptor not sensitive to impact. No likely effect anticipated.	Potential modification of macrophyte communities, due to reduction in macrophyte diversity. No macrophyte data available locally on the watercourse (agricultural ditch). By default, localised adverse effect expected, with no deterioration of the status of the element	Temporary loss of 600 m while the new channel is established. In addition, the 4 culverts on the new channel will be in the permanent loss of 75 m of habitat available for macrophytes. The ponded ditch is heavily shaded and currently supports very low aquatic vegetation. Localised adverse effect expected, with no deterioration of the status of the element at the scale of the water body.	Potential increase in flow velocities, reduction of habitat continuity and stranded alterations, with no effect on the status of the element. The ponded ditch is heavily shaded and currently supports very low aquatic vegetation in the stretch impacted. Effect likely to be negligible, with no deterioration of the status of the element at the scale of the water body.	The new channels will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species (detailed design of diversion not available). The ponded ditch is heavily shaded and currently supports very low aquatic vegetation. Localised adverse effect on macrophytes anticipated, despite the creation of new habitat, by reason of the presence of 175 m of culverts, with no degradation of the element status at the scale of the water body.	Potential to affect base flows on Hollywell Brook, especially during low flows. As Hollywell Brook currently supports diverse and relatively dense fish populations and as the River Blythe is a designated fisheries, supporting brown trout population (baseline survey). Localised adverse effect considered as being adverse locally, with no likely impact at the scale of the water body.	Potential adverse effects on water quality of Hollywell Brook and Shadow Brook, tributaries of the River Blythe. Hollywell Brook currently supports good macroinvertebrate quality, including highly pollution sensitive taxa (baseline survey). Effect is considered as being adverse, with no likely impact at the scale of the water body.	Receptor not sensitive to impact. No likely effect anticipated.	Footings in or near to riparian zone, but with no anticipated effect on macrophyte habitats.	No significant effect on macrophytes anticipated (see above) therefore no likely indirect on effects on fish.	Potential flow pattern and substrate homogenisation and downstream from the riparian vegetation that would have a localised adverse effect on macrophytes.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	Receptor not sensitive to impact. No likely effect anticipated.	Footings in or near to riparian zone, but with no anticipated effect on macrophyte habitats.	Potential localised but permanent loss of macrophytes due to shading and overhanging structure. Shadow Brook is currently heavily shaded and supporting a few aquatic vegetation within the area impacted. Potential localised and very minor adverse effect.	No significant hydromorphological change anticipated. Effect likely to be negligible/neutral on macrophytes, with no deterioration of the status of this element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. Only minor change in water quality anticipated, and due the relatively low macrophyte cover due to shading, no detectable effects anticipated	N/A	Given the distance between the scheme elements on the River Blythe GB104028042571 and the River Blythe GB104028042572 and that cumulative hydromorphological impacts may locally affect flows, but are considered to be negligible at the scale of the water body, no likely effect is anticipated.	Given the distance between the scheme elements on the River Cole and the River Blythe and the fact that hydromorphological changes are considered to be insignificant, no likely effect is anticipated on the status of this element at the scale of the water body.
3. Macroinvertebrates	High	High		Hydromorphological changes considered to be insignificant. No likely effect anticipated.	The river diversion will be designed to include a range of channel habitats, including where possible, riffles and runs in order to allow colonisation by the range of invertebrate taxa that currently characterise the reach, excepted within the culverted areas. (detailed design of diversion not available). No macroinvertebrate data available locally on the watercourse (agricultural ditch). Minor/local overall beneficial effect anticipated.	Receptor not sensitive to impact. No likely effect anticipated.	No additional effect anticipated (loss of vegetation already considered in the landtake impact).	Temporary loss of 600 m of macroinvertebrate habitat while the new channel is established. In addition, the 4 culverts on the new channel will be in the permanent loss of 75 m of habitat available for macroinvertebrates. The ponded ditch is heavily shaded and supports moderately good macroinvertebrate quality (baseline survey). Localised adverse effect expected, with no deterioration of the status of the element at the scale of the water body.	Potential increase in flow velocities, reduction of habitat continuity, disconnection between the channel and the riparian vegetation and stranded alterations, with no effect on the status of the element. The ponded ditch is heavily shaded and currently supports moderately good macroinvertebrate quality (baseline survey). Localised adverse effect on macroinvertebrates present, and have a localised adverse effect on macroinvertebrates. No change to the status of the element at the scale of the water body.	The river diversion will be designed to include a range of channel habitats, including where possible, pools, riffles and runs in order to allow colonisation by the range of invertebrate taxa that currently characterise the reach, excepted within the culverted areas. The ponded ditch is heavily shaded and currently supports moderately good macroinvertebrate quality (baseline survey). Overall neutral effect anticipated, despite the creation of new habitat to reason of the presence of 175 m of culverts, with no degradation of the element status at the scale of the water body.	Potential to affect base flows on Hollywell Brook, especially during low flows. As Hollywell Brook currently supports diverse and relatively dense fish populations and as the River Blythe is a designated fisheries, supporting brown trout population (baseline survey). Localised adverse effect considered as being adverse locally, with no likely impact at the scale of the water body.	Potential adverse effects on water quality of Hollywell Brook and Shadow Brook, tributaries of the River Blythe. Hollywell Brook currently supports diverse and relatively dense fish populations, which Shadow Brook is not a feature of importance (see A.2). Shadow Brook is currently impacted by poor water quality, with potential for to be adverse at the scale of the water body.	No significant effect on macrophytes anticipated (see above) therefore no likely indirect on effects on fish.	Potential flow pattern and substrate homogenisation and downstream from the riparian vegetation that would have a localised adverse effect on fish.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	No significant effect on macrophytes anticipated (see above) therefore no likely indirect on effects on fish. Potential localised and very minor adverse effect through the loss of habitat (macrophytes).	No significant hydromorphological change anticipated. Effect likely to be negligible/neutral on fish, with no deterioration of the status of this element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. Only minor change in water quality anticipated, and therefore only very minor, temporary and localised effects on fish anticipated.	Potential to lead to a deterioration of fish element status - The culvert present on the River Blythe bypass is likely to reduce connectivity to the River Blythe main channel. In addition, cumulative hydromorphological impacts (notably from the River Blythe bypass culvert and Horn Brook culvert and diversion, and crossing A452 and Lorrain Red Lane culverts and Cornets End lane gravel works) may cascade to GB104028042572. This may have an insignificant effect due to the relative size of these components of GB104028042572 and the scale of their contribution to GB104028042572, but there is still a risk to local flow dynamics around the confluence	Given the distance between the scheme elements on the River Cole and the River Blythe, the fact that hydromorphological changes are considered to be insignificant, and that no culvert is located within the vicinity of the River Blythe, no likely effect is anticipated on the status of this element at the scale of the water body.
4. Fish	High	High		Hydromorphological changes considered to be insignificant. No likely effect anticipated.	The range of habitats incorporated into the diverted channel is considered to represent an improvement on the existing channel (detailed design of diversion not available). However, the culvert will also reduce habitat connectivity and fragmentation of the channel. No fish data available locally on the watercourse (agricultural ditch). The tributary is a drainage ditch currently heavily culverted, notably at crossing point. Overall effect likely to be neutral/slightly beneficial, with no deterioration anticipated. Potential minor beneficial effect expected locally	Localised and temporary adverse effect during construction. No deterioration of the water body status of the element is however expected.	No additional effect anticipated (loss of vegetation already considered in the landtake impact).	Temporary loss of 600 m of fish habitat while the new channel is established. In addition, the culverts on the new channel will be in the permanent loss of 75 m of habitat available, and lead to a permanent barrier to movements. No data available for fish on the ponded ditch. However, the River Blythe supports brown trout population (baseline survey). A localised adverse effect on fish is expected, with no deterioration on the watercourse is already culverted within the area, the culvert will not have the potential to deteriorate the current element status at the scale of the water body.	Potential increase in flow velocities, reduction of habitat continuity, disconnection between the channel and the riparian vegetation and stranded alterations, with no effect on the status of the element. No data available for fish on the ponded ditch. However, the River Blythe supports brown trout population (baseline survey). A localised adverse effect on fish is expected, with no deterioration on the watercourse is already culverted within the area, the culvert will not have the potential to deteriorate the current element status at the scale of the water body.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish colonisation. No data available for fish on the ponded ditch. However, the River Blythe supports brown trout population (baseline survey). Overall neutral effect anticipated, despite the creation of new habitat to reason of the presence of 175 m of culverts, with no degradation of the element status at the scale of the water body.	Potential to affect base flows on Hollywell Brook, especially during low flows. As Hollywell Brook currently supports diverse and relatively dense fish populations and as the River Blythe is a designated fisheries, supporting brown trout population (baseline survey). Localised adverse effect considered as being adverse locally, with no likely impact at the scale of the water body.	Potential adverse effects on water quality of Hollywell Brook and Shadow Brook, tributaries of the River Blythe. Hollywell Brook currently supports diverse and relatively dense fish populations, which Shadow Brook is not a feature of importance (see A.2). Shadow Brook is currently impacted by poor water quality, with potential for to be adverse at the scale of the water body.	No significant effect on macrophytes anticipated (see above) therefore no likely indirect on effects on fish.	Potential flow pattern and substrate homogenisation and downstream from the riparian vegetation that would have a localised adverse effect on fish.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	No significant effect on macrophytes anticipated (see above) therefore no likely indirect on effects on fish. Potential localised and very minor adverse effect through the loss of habitat (macrophytes).	No significant hydromorphological change anticipated. Effect likely to be negligible/neutral on fish, with no deterioration of the status of this element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. Only minor change in water quality anticipated, and therefore only very minor, temporary and localised effects on fish anticipated.		Given the distance between the scheme elements on the River Cole and the River Blythe, the fact that hydromorphological changes are considered to be insignificant, and that no culvert is located within the vicinity of the River Blythe, no likely effect is anticipated on the status of this element at the scale of the water body.
Physico-Chemical status																								
WFD classification elements	AP2-023-005	AP2-023-003	Predicted change to status elements (green = none, amber = possible, red = likely)																					
5. Dissolved Oxygen	High	-		• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Hydromorphological changes considered to be insignificant. No likely effect anticipated.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the overall size of the water body. • The new channel will provide when re-established, similar/marginally improved habitats to the current channel. Therefore, no change in status is anticipated	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the overall size of the water body. Therefore, no change in status is anticipated	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the overall size of the water body. • The new channel can provide when re-established, similar/marginally improved habitats to the current channel. Therefore, no change in status locally, with no degradation of the element status anticipated at the scale of the water body.	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	N/A	N/A	• The additional length of the proposed A452 culvert will marginally increase the amount of shaded watercourse. Despite this, it is predicted to result in no more than a minor impact on this sub-element. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status from the previous assessment is anticipated	• The construction of the proposed A452 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	• The construction of the proposed A452 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	N/A	N/A	• The additional 5.7m width of the proposed AP2 Bridge will marginally increase the amount of shaded watercourse. Despite this, it is predicted to result in no more than a minor impact on this sub-element. • This impact is likely to have a minor, local effect in relation to the overall water body. Therefore, no change in status from the previous assessment is anticipated	• The construction of the proposed AP2 Bridge is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.	• The construction of the proposed AP2 Bridge is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated.		
6. pH	High	-		Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact		
7. Phosphate	Moderate	-		• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Hydromorphological changes considered to be insignificant. No likely effect anticipated	Receptor is insensitive to impact	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated	Receptor is insensitive to impact	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to the Hollywell Brook due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollutants. Two discharge consents for STW final effluent on Hollywell Brook. Overall water body (River Blythe) is affected as monitoring discharge is upstream of reach ponded to cutting	N/A	N/A	Receptor is insensitive to impact	• The construction of the proposed A452 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated	Receptor is insensitive to impact	N/A	N/A	N/A	• The proposed AP2 bridge crossing is effectively an open span bridge, so there would be no impact on this sub-element, and therefore no change in status from the previous assessment	• The construction of the proposed AP2 Bridge is predicted to result in no more than a temporary, minor impact on this sub-element.		Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In the case, impacts are temporary, spatially limited or none in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In the case, impacts are temporary, spatially limited or none in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.
8. Ammonia	High	-		Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact		
9. Temperature		-		Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Some shading from the culverts may have a minor impact on water temperature, but this is likely to be a small, localised effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	• The additional length of the proposed A452 culvert will marginally increase the amount of shaded watercourse. Despite this, it is predicted to result in no more than a minor impact on this sub-element. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status from the previous assessment is anticipated	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	• The additional 6.7m width of the proposed AP2 bridge will marginally increase the amount of shaded watercourse. Despite this, it is predicted to result in no more than a minor impact on this sub-element. • This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status from the previous assessment is anticipated	Receptor is insensitive to impact	Receptor is insensitive to impact		
10. Specific Pollutants (Annex VIII)	High	-		• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Hydromorphological changes considered to be insignificant. No likely effect anticipated	Receptor is insensitive to impact	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	N/A	N/A	Receptor is insensitive to impact	• The construction of the proposed A452 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated	• The construction of the proposed A452 culvert is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated	N/A	N/A	N/A	• The construction of the proposed AP2 bridge is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated	• The construction of the proposed AP2 bridge is predicted to result in no more than a temporary, minor impact on this sub-element. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are limited to minor impacts with negligible effect. Therefore, no change in status from the previous assessment is anticipated		
Hydromorphological status																								
WFD classification elements	AP2-023-005	AP2-023-003	Predicted change to status elements (green = none, amber = possible, red = likely)																					
11. Quantity and dynamics of river flow	-	-		• Channel widths appear to be 0.5m to 1m or less, so there is unlikely to be significant diversity of flow dynamics in any of the channels. • The culvert will effectively act as open span bridge and would not significantly affect hydromorphology. • In practical terms the impacts on hydromorphology are considered to be minimal at water body scale, since these watercourses are very small in scale relative to the whole water body	N/A	N/A	N/A	• Channel widths appear to be 0.5m to 1m or less, so there is unlikely to be significant diversity of flow dynamics in any of the channels. • However the 175m culvert affects a high proportion of this stream and would result in a severe loss of open watercourse. • Out of bank flows would be cut off and culvert would concentrate flows, which may result in increased flow velocities due to increased channel gradients and decreased roughness. • In practical terms the impacts on hydromorphology are considered to be minimal at water body scale, since these watercourses are very small in scale relative to the whole water body	N/A	N/A	N/A	N/A	N/A	• Shadow Brook at the proposed AP2 crossing point has a sinuous form with a ca. 5m channel width, and hydromorphological surveys report significant flow diversity due to channel bars, woody debris and floodplain connectivity. The survey describes other parts of the brook as being straighted, reactivated and bars diverse, indicating the possible impacts of the crossing. The proposed AP2 crossing would have a significant impact on hydromorphology. • The previous AP of a 12.5m wide underbridge was assessed as not having a significant impact on hydromorphology. • The A452 proposal of a new narrow bridge (5.5m track width and 8.6m verges) is unlikely to have a significant impact on hydromorphology, assuming the crossing is an open span bridge.	N/A	• Cumulative impacts on GB104028042571 the River Blythe Bypass at its downstream end due to the River Blythe Bypass Culvert and Horn Brook culvert and diversion, and crossing A452 and Lorrain Red Lane culverts and Cornets End lane gravel works may cascade to GB104028042572. This may have an insignificant effect due to the relative size of these components of GB104028042571 and the scale of their contribution to GB104028042572, but there is still a risk to local flow dynamics around the confluence	• The River Cole joins the River Blythe approximately 400m upstream of the River Tame, so in principle any impacts on the River Cole could cascade to the adjoining water body. • The River Cole crossing design near the River Blythe and the M42/M6 Toll are effectively open span bridges and would not significantly affect the River Blythe. • Footings in riparian zones or floodplains would cause some local turbulence at flood flows, but would not considered to be significant
12. Connection to Groundwater	-	-		• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	• Flows could be reduced - see commentary on the cutting	N/A	• Reduction of flows in this tributary could cause a localised reduction in flow volumes, depths and dynamics, and consequent reduction in habitat suitability and availability. However, this effect could be significant for this tributary, but would be buffered as soon as the tributary converts to the larger downstream watercourse so then would not be severe effects at water body scale • Water quality could be reduced in the depleted reaches due to the relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects.|	N/A	N/A	N/A	• There is likely to be no significant relationship between hydromorphology and groundwater.	N/A	N/A	N/A	N/A	• There is likely to be no significant relationship between hydromorphology and groundwater.	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	• Likely to be no significant relationship between hydromorphology and groundwater
13. River continuity	-	-		• Size of the tributary means that no significant effects would be anticipated	N/A	N/A	N/A	• The culvert would affect a large proportion of this stream, would disconnect channel and out of bank flows, both habitats and effectively sever any existing habitat continuity, but this a minor tributary and in practical terms would not impact on deterioration of overall water body status	N/A		N/A	N/A	N/A	• The culvert would disconnect floodplains, out of bank flows, and bank habitats, and effectively sever existing river corridor continuity within and adjacent to both sides of the crossing. • The culvert would also result in discontinuity of existing, diverse morphological diversity. • The culvert would also result in a channel much that does not appear to have been significantly modified, whereas other parts of the brook are straighted and reactivated, and lack existing valuable morphological quality. Overall therefore be fragmented, which could have cumulative impacts on contributed morphology.	N/A	N/A	N/A	N/A	• The AP2 proposal of a new narrow bridge (3.5m track width and 0.6m verges) is unlikely to have a significant impact on hydromorphology, assuming the crossing is an open span bridge. • The proposed AP2 crossing is within a channel much that does not appear to have been significantly modified, whereas other parts of the brook are straighted and reactivated, and lack existing valuable morphological quality. Overall therefore be fragmented, which could have cumulative impacts on contributed morphology. • The size of the crossing means there is unlikely to be significant discontinuity of existing diverse morphological diversity.	N/A	• The cumulative effects on GB104028042571 and the scale of their contribution to GB GB104028042572 probably mean there would be no significant impacts on continuity	• Crossing designs mean there will be no footings in the watercourse • Footings in riparian zones or floodplains would not interrupt continuity
14. River depth and width variation bed	-	-		• Size of the tributary means that no significant effects would be anticipated	N/A	N/A	N/A	• Out of bank flows may be constrained by the culvert, but the channel water surface at the crossing location is not wide enough to be stable or sustainable from an hydraulic perspective, and would be prone to bank instability, as there is unlikely to be significant diversity of river depth and width, and the culvert is unlikely to cause significant impacts. The culvert would not require maintenance, and would be a fixed feature. • Given the extent of the culvert and the loss of open watercourse, the impacts on channel width and depth are likely to be detrimental	N/A		N/A	N/A	N/A	• The culvert would homogenise stream geometry, whereas the hydromorphological survey reports strong channel diversity in the A452 and Lorrain Red Lane culverts. • Out of bank flows would be severed by the culvert, and channel flows may become deeper than natural pool flows, and homogenise channel geometry. • The culvert would be a fixed feature and maintenance would result in sharp changes in channel geometry and a cropped channel / perched culvert base	N/A	N/A	N/A	N/A	• The AP2 proposal of a new narrow bridge (3.5m track width and 0.6m verges) is unlikely to have a significant impact on hydromorphology, assuming the crossing is an open span bridge.	N/A	• The cumulative effects on GB104028042571 and the scale of their contribution to GB104028042572 probably mean there would be no significant impacts on channel geometry	• Crossing designs mean there will be no footings in the watercourse • Comparison of historic maps suggest Shadow Brook is stable in the order of decades, so no impacts are anticipated
15. Structure and substrate of river bed	-	-		• Size of the tributary means that no significant effects would be anticipated	N/A	N/A	N/A	• Channel water surface at the crossing location is not wide enough to be stable or sustainable from an hydraulic perspective, and would be prone to bank instability and substrate transport or scour. • If the culvert base is set below the channel bed, the culvert would be a fixed feature and would be a barrier. • Given the extent of the culvert and the loss of open watercourse, the impacts on channel bed substrates are likely to be detrimental, especially as access for maintenance will presumably not be possible	N/A		N/A	N/A	N/A	• The hydromorphological survey suggests a high quality channel bed component of gravels at the proposed AP2 crossing location. • Bed structure could be homogenised in the culverted section, and would be a fixed feature (unlike the channel bed). Bed impacts are hard to be exact, however. • However, available design information indicates a circular culvert which would have greater morphological impact	N/A	N/A	N/A	N/A	• The AP2 proposal of a new narrow bridge (3.5m track width and 0.6m verges) is unlikely to have a significant impact on hydromorphology, assuming the crossing is an open span bridge.	N/A	• The cumulative effects on GB104028042571 and the scale of their contribution to GB104028042572 probably mean there would be no significant impacts on bed substrates	• Crossing designs are effectively open span bridges, so there would be no impacts on the channel bed
16. Structure of riparian zone	-	-		• Size of the tributary means that no significant effects would be anticipated	N/A	N/A	N/A	• The culvert would disconnect the channel from the existing well developed, mature vegetation riparian zone, and would be a barrier to movement of animals along the channel. But in practical terms distance and in practical terms would not impact on deterioration at water body status	N/A		N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever the existing mature and continuous riparian habitat along the channel.	N/A	N/A	N/A	N/A	• The new crossing would disconnect the existing mature and continuous riparian habitat along the channel, but the size of the crossing means the impact is unlikely to be significant	N/A	• Cumulative impacts on flow processes would be highly unlikely to affect riparian qualities in GB104028042572	• Footings in the riparian zones would require minor land take but not considered to be significant

B. Risk screening of potential to prevent future attainment of good Eco

RBMP measures to achieve objectives (yet to be implemented or confirmed as implemented)	Where RBMP measures will happen	When RBMP measures will happen	Predicted change to status elements (green = none, amber = possible, red = likely)																					
NONE	-	-																						

A. Risk screening of potential to cause deterioration of current WFD E

	Surface Water body	Current status	Status objective	Scheme Elements (black text = proposed within groundwater body, white text = not proposed)	OVERALL impact on element	Proposed Mitigation Measures: Construction	Proposed Mitigation Measures: Operation	Residual effect	
	GB104028042572	Moderate	Good ecological status by 2027	Description of scheme element impact					
	River Blythe from Patrick Bridge to River Tame			Identified biological impacts					
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	
	2. Macrophytes and phytobenthos - macrophytes	Moderate	Good		Three scheme elements are identified as having adverse effects on macrophytes, the River Blythe viaduct, the culvert on the Hollywell Brook, the culverts on the Shadow Brook and two river diversions on tributaries, one of the Hollywell Brook and one of the Blythe. Removal of an existing culver on the Hollywell Brook help to offset impacts of permanent. However, these adverse effects are likely to be only very localised around the scheme element (i.e. culverts, viaducts) and/or temporary with a few potential beneficial effects in the longer term (i.e. river diversions, culvert removal), notably via habitat creations. In addition, most of the scheme elements are impacting relatively small watercourses at the scale of the water body while the River Blythe main channel main watercourse within this water body is crossed by one 15 m wide clear span viaduct. Therefore, cumulative impacts are not considered to have the potential to lead to the deterioration of the status of the macrophytes WFD element at the water body scale. Overall, the scheme, as currently designed, is unlikely to lead to the degradation of the macrophytes WFD status of the water body (currently moderate), even in the short term. In addition, the scheme is not believe to have the potential to compromise the achievement of the WFD macrophytes Good status objective in the longer term, and is unlikely to participate to the achievement of this Good status. Shadow Brook is of poor quality at location of the crossings, heavily shaded, heavily sedimented and was considered to be of poor value for macrophytes during walkover additional surveys (2014). . Therefore cumulative effects from these two elements are likely to be minor overeall and would not present risk for WFD status of biological elements.	None required.	Culverts will be regularly maintained and kept in a functional state that allows fish movements. -Construction and post-construction monitoring should be considered (if necessary) to assess any effects on fish migration. - Improvements to habitat within the proximity of culverts should be included in the detailed design designing and the culvert should be positioned so that bed substrate can deposit and/or artificial substrate included. - Further improvements to Hollywell Brook, including renaturalising the course (meanders), inclusion of improved marginal and channel habitats (riffles, berms etc.). An area of the upstream section is described as being currently 'overdeepened' (river corridor baseline surveys) and would benefit from such improvements. This section of the watercourse currently falls into the construction boundary for the scheme and therefore further 'offsite' work would not be required. - The Environment Agency should be consulted during the detailed design of watercourse modifications (for diverted sections of Hollywell Brook in particular) to ensure habitat improvements are maximised.	Minor and localised effects	
	3. Macroinvertebrates	High	High		Six scheme elements are identified as having the potential to have adverse effects on macroinvertebrates. However, these adverse effects are likely to be only very localised around the scheme element (i.e. culverts, viaducts) and/or temporary with also a few potential beneficial effects in the longer term (i.e. river diversions, culvert removal). In addition, most of the scheme elements are impacting relatively small tributaries at the scale of the water body, while the River Blythe, main watercourse within this water body, is crossed by one 15 m wide clear span viaduct. Therefore, and as cumulative impacts are not considered as having a significant effect on hydromorphology, they are not considered to have the potential to deteriorate the macroinvertebrate current status of the water body. Overall, the scheme, as currently designed, is unlikely to lead to the degradation of the macroinvertebrate WFD status of the water body (currently High), even in the short term. In addition, the scheme is not believe to be able to compromise the achievement of the WFD macroinvertebrate status objectives in the longer term (which are for the status to remain High). Shadow Brook is of poor quality at location of the crossings, heavily shaded, heavily sedimented and was considered to be of poor value for invertebrates during walkover additional surveys (2014). Previous surveys (2012-2013) showed invertebrate communities with pollution tolerant taxa and poor biotic scores and adapted to slow flows and high sedimentation. Therefore cumulative effects from these two elements are likely to be minor overeall and would not present risk for WFD status of biological elements.	None required.		Minor and localised effects	
	4. Fish	High	High		Nine scheme element are described as having the potential to have an adverse effect on fish. While most of these effects are likely to be short term and/or localised around the scheme elements, the cumulative impacts of scheme elements present on the River Blythe GB GB104028042571 water body (notably culverts on the River Blythe bypass and on Horn Brook), the effects of dewatering, and culverts present on minor tributaries are identified as having the potential to lead to a deterioration of the current fish status at the scale of the water body. This is because culverts on the River Blyth bypass and Horn Brook may constitute an obstruction to fish migration within the water body (which currently supports a population of brown trout) and may limit access to features of interest to fish (shelter and spawning) and because flow reductions in Hollywell Brook may reduce its value for fish. Therefore, based on the limited design data available the scheme, the deterioration of the fish status of the River Blythe water body cannot be ruled out. In addition, it is also possible that these scheme elements would compromise the WFD objectives for this element (which are for the status to remain High). Additional AP2 scheme elements contribute to the cumulative effects on Shadow Brook, Shadow Brook is of poor quality at location of the crossings heavily shaded, heavily sedimented and was considered to be of poor value for fish during walkover additional surveys (2014). Fish surveys showed poor fish quality with bullhead and 3-spined stickleback only. Therefore cumulative effects from these two elements are likely to be minor overeall and would not present risk for WFD status of biological elements.	- Surveys of the Hollywell Brook, Shadow Brook and tributaries of the R Blythe and the Hollywell Brook will be undertaken during the detailed design stage in order to establish the baseline fish population. An assessment of the culverts with relation to flows and fish passage must be included as part of the detailed design development. Culvert lengths will be minimised as far as possible, and the design of the culvert boundaries (i.e. where they connect with the existing bed and banks) will be developed in detail. - Fish rescue will be carried out on any sections that will be dewatered (e.g. Hollywell Brook during construction of diverted section).		Based on current information the effect remains amber (i.e. there is a risk that the scheme could result in the deterioration of this element). However, the impact may be reduced to a 'yellow' if the additional mitigation measures (notably the improvements to Hollywell Brook) are maximised and in light of pre construction surveys.	
		AP2-023-005	SES-C224-051						
	Physico-Chemical status								
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	Minor and localised effects on this sub-element.The addition of the AP2 culvert and bridge will contribute slightly to the cumulative impact on this physico-chemical sub-element, however, it is not considered to be significant, and subsequently there will be no change in overall impact from the previous assessment. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	Minor and localised effects	
	6. pH	High	-		Receptor is insensitive to impact			No significant effects	
	7. Phosphate	Moderate	-		~~Depending on how much flow is lost~~ Minor and localised effects on this sub-element element in Hollywell Brook. Two discharge consents for STW final effluent on Hollywell Brook. The addition of the AP2 culvert and bridge will contribute slightly to the cumulative impact on this physico-chemical sub-element, however, it is not considered to be significant, and subsequently there will be no change in overall impact from the previous assessment. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.			Minor and localised effects	
	8. Ammonia	High	-		Potential minor and localised effect on sub-elements.The addition of the AP2 culvert and bridge will contribute slightly to the cumulative impact on these physico-chemical sub-elements, however, it is not considered to be significant, and subsequently there will be no change in overall impact from the previous assessment. Implementation of CoCP and Best Practice Measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where unattenuated discharge to the water body is required (i.e. over a floodplain), mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.			Minor and localised effects	
	9. Temperature		-						
	10. Specific Pollutants (Annex VIII)	High	-						
	Hydromorphological status								**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	• Culverts and diversions of tributaries mean that there is potential have adverse effects on flow and sediment dynamics at local scale • Viaducts and underbridges are unlikely to have any significant impacts • Dewatering associated with cuttings could negatively affect hydrological and sediment transport regimes • However, these adverse effects are likely to be localised around the scheme element (i.e. culverts, viaducts) and/or temporary with a few potential beneficial effects in the longer term (i.e. river diversions, culvert removal). • Overall, hydromorphological risks are significant due to the existing high morphological quality, and impacts are considered to be minor detrimental at waterbody scale.	• No additional mitigation is required for viaducts or underbridges • Hydromorphological surveys to be undertaken to aid detailed design development • Natural recovery in the formerly realigned channel should be allowed to continue • Hydromorphological mitigation should be included into detailed design where practicable, for example with respect to bank reprofiling (rehabilitation), bed morphology and use of soft engineering techniques • The reinstated riparian zones at the site of the culvert removal should be planted with the same species that exist in the adjacent areas to encourage natural recovery		Minor and localised effects	**River Blythe** Baseline walkover survey indicates that the channel has been historically realigned, resectioned and over-widened, but there is evidence of a recovering and re-naturalising form with in-channel vegetation and woody debris present. The bed is dominated by fine sediment, but the photos did not show bed material. **Shadow Brook** Baseline walkover survey indicated that the channel has been historically resectioned. with some floodplain connectivity in downstream sections. The brook contains woody debris and deeper pools caused by up-rooted trees. There is evidence of sedimentation as a result of little variation in flow, and limited in-stream vegetation with gravels observed during the survey. At the proposed crossing point river channel begins to show a sinuous form. • Hydromorphology baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-						
	13. River continuity	-	-						
	14. River depth and width variation bed	-	-						
	15. Structure and substrate of river bed	-	-						
	16. Structure of riparian zone	-	-						

B. Risk screening of potential to prevent future attainment of good Ec

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen					
NONE	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	No effect from scheme on measures to address reasons for failure.	-	-	No significant effect

GB104028042571

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective
GB104028042571		
River Blythe from Temple Balsall Brook to Patrick Bridge	Moderate	Good Ecological Status by 2027

Scheme Elements	River Blythe Bypass Culvert					Horn Brook and Horn Brook Trib - River Diversion			Horn Brook Culvert					Bayleys Brook River Diversions				Marsh Farm Viaduct					Balsall Common Viaduct (footings in or within riparian zone of watercourse)							
Description of scheme element impact	Culvert of 'River Blythe Bypass' watercourse - a tributary of the River Blythe (Culvert: 4.1 m wide, approximately 40 m in length, precise design details not available)					Diversion of Horn Brook (approx. 150 m) and tributary of Horn Brook (approx. 75 m) - precise details of diversion not available. Horn Brook is a minor secondary trib. of the Blythe, connected via the R. Blythe Bypass.			Horn Brook, a minor tributary of the Blythe (1.8 m long, 1.8 m wide). Precise culvert design details not available, but scheme designs indicate it will be approximately 40 m in length.					Including Bayleys Brook (80 m at Balsall Common viaduct), tributary of Bayleys Brook (100 m, Lavender Hall Lane), tributary of Bayleys Brook (2 short diversion Kenilworth Greenway) and Tributary of Bayleys Brook (1500 m diversion - due to construction of Marsh Farm viaduct: precise details not available)					March Farm Viaduct - Viaduct over Bayleys Brook (15 m wide, 5 m above ground level) - precise design details not available, but footings unlikely to be within watercourse. Plans indicate that structures may be near to marginal areas (<10 m)					Balsall Common viaduct (footings in watercourse or riparian zone) over Bayleys Brook (a tributary of the Blythe). No footings in watercourse (due to diversion), but footings in/near to riparian zone (precise design details not available).					Multiple Culverts - Bayleys Brook (3 culverts (60m) at Lavender Ha	
Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Creation of new habitats	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake leading to loss of habitat	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Creation of new habitats	Vibration leading to disturbance	Landtake (for bridge footings) leading to habitat and reduced connectivity	Shading leading to loss of habitats/sensitive vegetation	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Run off from bridge span resulting in changes to water quality	Vibration leading to disturbance	Landtake (for bridge footings) leading to habitat and reduced connectivity	Shading leading to loss of habitats/sensitive vegetation	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Run off from bridge span resulting in changes to water quality	Noise and vibration	Landtake
Physical changes to status elements (green = cross, amber = possible, red = likely)																														
2. Macrophytes and phytobenthos - diatoms	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2. Macrophytes and phytobenthos - macrophytes	Good	Good	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to a localised but permanent loss of macroinvertebrates habitat (i.e. amenities, riparian vegetation). Macroinvertebrate quality of the watercourse currently low within the stretch impacted and currently supports very low quality vegetation (baseline survey). Effects on macrophytes are likely to be locally negligible. No deterioration of the element status anticipated.	Potential modification of macrophytes communities, due to reduction in photosynthetic activity. Receptor is heavily shaded by riparian vegetation in the stretch impacted and currently supports very low quality vegetation (baseline survey). Effects on macrophytes are likely to be locally negligible. No deterioration of the element status anticipated.	Potential increase in flow velocities and reduction of habitat diversity may affect macroinvertebrate communities in the stretch impacted and currently supports very low quality vegetation (ecology baseline survey). Effects on macrophytes are likely to be locally negligible. No deterioration of the element status anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in WFD element.	Temporary loss of approximately 225 m of habitats of the existing Horn Brook and its tributary that lie within the proposed diversion. Horn Brook is a minor tributary of the Blythe Brook and its tributary are currently heavily shaded, and support low quality vegetation within the stretch impacted (ecology baseline survey). Effect on macrophytes likely to be negligible. No deterioration of the element status anticipated.	Potential reduced flows locally, with no significant connectivity with no significant effect. Receptor is heavily shaded and support low quality vegetation within the stretch impacted. Effect on macrophytes likely to be negligible to locally beneficial, with no deterioration of the element status anticipated.	The new channels will incorporate marginal berms to create large shallow areas for aquatic flora to grow and will include a range of habitats suitable for colonisation by submerged species (precise design details not available). Effects on macrophytes are likely to be locally beneficial (vegetation within the stretch impacted (ecology baseline survey) will be less shaded).	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to a localised but permanent loss of macroinvertebrate habitat (i.e. substrate, riparian vegetation). Macroinvertebrate quality of Horn Brook currently poor and Horn Brook currently supports very low quality vegetation (baseline survey). Effects on macrophytes are likely to be negligible. No deterioration of the element status anticipated.	Potential modification of macrophytes communities, due to reduction in photosynthetic activity. Receptor is heavily shaded by riparian vegetation in the stretch impacted and currently supports very low quality vegetation (baseline survey). Effects on macrophytes are likely to be negligible. No deterioration of the element status anticipated.	Potential increase in flow velocities within Horn Brook, with no significant effect on habitat diversity (ecology baseline survey). Receptor effect on macrophytes anticipated. No deterioration of the element status anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in WFD element.	Temporary loss of approximately 1800 m (precise details not available) of habitats of the existing Bayleys Brook and its tributaries (agricultural ditches) within the new channels or diversion. Bayleys Brook currently supports moderate macroinvertebrate quality and Bayleys Brook and its tributaries currently supports very low quality vegetation (baseline survey). Effects on macrophytes are likely to be negligible. No deterioration of the element status anticipated.	Cumulative impacts likely to affect flow depths within Bayleys Brook. Macroinvertebrate quality of Bayleys Brook currently moderate and Bayleys Brook currently supports moderate macroinvertebrate quality (ecology baseline survey). Effect on macrophytes anticipated with hydromorphological changes. No deterioration of the element status anticipated. Bayleys Brook and minor, temporary and localised effects on tributaries. No deterioration of the element status anticipated.	The new channels will incorporate marginal berms to create large shallow areas for aquatic flora to grow and will include a range of habitats suitable for colonisation by submerged species (precise design details not available). Effects on macrophytes are likely to be locally beneficial (vegetation within the stretch impacted (baseline survey). Re-sites available on tributaries (agricultural ditches). Bayleys Brook currently heavily shaded and culverted at crossing point. Tributary at Kenilworth Greenway is currently heavily shaded and culverted at crossing point. Effects on tributaries will be temporary/localised and minor. No deterioration of other tributaries. The effect on this quality element is considered to be beneficial.	Receptor not sensitive to impact. No likely effect anticipated.	Footings in or near to riparian zone, but with no anticipated effect on macrophyte habitats.	YELLOW TO GREEN Potential loss of macrophytes due to reduction in photosynthetic activity. Receptor does currently support moderate macroinvertebrate quality. Bayleys Brook and minor, temporary and localised effects on tributaries. No deterioration of the element status anticipated.	Potential localised flow turbulences and disturbance of the stream, by changes in hydrology and loss of riparian vegetation, but unlikely to impact on the overall ecology of the watercourse. Bayleys Brook and minor, temporary and localised effects on tributaries. No deterioration of the element status anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect macrophytes.	Receptor not sensitive to impact. No likely effect anticipated.	The short diversion of Bayleys Brook underneath the viaduct would mean footings in the watercourse will be avoided. Footings near to riparian zone, but with no anticipated effect on this WFD element.	Potential localised flow turbulences on Bayleys Brook and downstream of the viaduct, by changes in hydrology and loss of riparian vegetation, but unlikely to impact on the overall ecology of the watercourse. Bayleys Brook and minor, temporary and localised effects on tributaries. No deterioration of the element status anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect macrophytes.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to permanent loss of 200 m of macrophyte habitat at various locations on Bayleys Brook and its tributaries. No data available locally on macrophytes on these watercourses. Bayleys Brook currently supports moderate macroinvertebrate quality. Bayleys Brook and its tributaries currently supports moderate macroinvertebrate quality. Bayleys Brook and its tributaries are in poor condition (based on habitat quality assessment). Bayleys Brook and its tributaries are in poor condition (based on habitat quality assessment). Although an additional habitat assessment is available for Bayleys Brook and a number of other tributaries in the River Blythe, no deterioration of the element status anticipated. Although an additional habitat assessment is available for Bayleys Brook and a number of other tributaries in the River Blythe, no deterioration of the element status anticipated. Bayleys Brook supports brown trout (representative species for the River Cole sub-catchment). Bayleys Brook supports brown trout (representative species for the River Cole sub-catchment). Although brown trout are of poor value for recreational fishing,

A. Risk screening of potential to cause deterioration of current WFD Ecolog

Surface Water body	Current status	Status objective	Scheme Elements				Cutting		Cutting		Impacts from other WFD water bodies (assessed separately)	OVERALL impact on element	Additional Mitigation Measures		Residual impact
			Bayleys Brook/tributaries Culverts				Park Lane cutting - Bayleys Brook		Burton Green retaining wall - Bayleys Brook				Construction	Operation	
GB104028042571			Description of scheme element impact	ll Lane diversion, new culvert (50 m at Mercote Lane/Kenilworth Road), Tributary of Bayleys Brook (90m Culvert Beechwood underpass											
River Blythe from Temple Balsall Brook to Patrick Bridge	Moderate	Good Ecological Status by 2027	Identified biological impacts	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.					
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	Good	Good		Likely to lead to the loss of macrophytes, due to reduction in photosynthetic activity as various locations on Bayleys Brook and its tributaries. ~~No data available locally on macrophytes. By default, effect anticipated as locally adverse. Given the small contribution of the tributaries to the River Blythe, no deterioration of the element status.~~ Tributary at Beechwood underpass is heavily shaded. No additional data for Bayleys Brook at Lavender Hall Lane. At Mercote Lane crossing, Bayleys Brook runs through woodland and is unlikely to support macrophytes. Potential temporary and localised adverse effects on Bayleys Brook, with no deterioration of the element status anticipated.	Potential reduction of habitat continuity, with no significant effect. ~~No data available locally on macrophytes. By default, effect anticipated as locally adverse. Given the small contribution of the tributaries to the River Blythe, no deterioration of the element status.~~ Tributary at Beechwood underpass is heavily shaded. No additional data for Bayleys Brook at Lavender Hall Lane. At Mercote Lane crossing, Bayleys Brook runs through woodland and is unlikely to support macrophytes. Potential temporary and localised adverse effects on Bayleys Brook, with no deterioration of the element status anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	Only minor effects anticipated on base flows of Bayleys Brook. Bayleys Brook currently heavily shaded and supporting low aquatic vegetation within the area impacted. Effect likely to be negligible.	Potential minor adverse effects on water quality of Bayleys Brook. Bayleys Brook currently heavily shaded and supporting low aquatic vegetation within the area impacted. Effect likely to be negligible.	Only minor and temporary effects anticipated on base flows of Bayleys Brook. Bayleys Brook currently heavily shaded and supporting low aquatic vegetation within the area impacted. Effect likely to be only localised and negligible, with no further effect at the water body level.	Potential localised adverse effects on water quality of Bayleys Brook. Bayleys Brook currently heavily shaded and supporting low aquatic vegetation within the area impacted. Effect likely to be only localised and negligible, with no further effect at the water body level.	No scheme elements on upstream water bodies	Three scheme elements are identified as having adverse effects on macrophytes. However, these adverse effects are likely to be only very localised around the scheme element (i.e. culverts, viaducts) and/or temporary with a few potential beneficial effects in the longer term (i.e. river diversions, culvert removal), notably via habitat creations. In addition, most of the scheme elements are impacting relatively small watercourses at the scale of the water body while the River Blythe, main watercourse within this water body is crossed by one 15 m wide clear span viaduct and will be affected by a short river diversion. Therefore, cumulative impacts are not considered to have the potential to lead to the deterioration of the status of the macrophytes WFD element at the water body scale.	No additional mitigation required	No additional mitigation required	Minor and localised effects
	3. Macroinvertebrates	Good	Good		No additional effect anticipated (loss of vegetation already included in the landtake impact), locally or at the scale of the waterbody.	Potential reduction of habitat continuity and disconnection between channel and riparian vegetation. As Bayleys Brook culvert will be effectively replacing existing culverts, no significant effect anticipated at the scale of the waterbody. ~~Moderate macroinvertebrate quality on Bayleys Brook on the stretch impacted, but no data available for the tributaries (baseline survey). Localised adverse effects anticipated on Bayleys Brook and its tributaries. Given the small contribution of the tributaries to the River Blythe, no deterioration of the element status. Tributary to the River Blythe, no deterioration of the element status anticipated.~~ Although no additional baseline is available for Bayleys Brook at Lavender Hall Lane, and although tributaries are of poor value for invertebrates, Bayleys Brook supports Good macroinvertebrate within the reach of Mercote Lane culvert. Potential localised adverse effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	Only minor effects anticipated on base flows of Bayleys Brook. ~~No local data on macroinvertebrates habitats / quality available in the stretch impacted.~~ Bayleys Brook is of good macroinvertebrate quality downstream of Park Lane, with communities likely to be moderately sensitive to reduced flows. Potential localised and minor adverse effect expected, with no further effect at on the status of this element.	Potential minor adverse effects on water quality of Bayleys Brook. ~~No local data on macroinvertebrates habitats / quality available in the stretch impacted.~~ Bayleys Brook is of good macroinvertebrate quality downstream of Park Lane, with presence of pollution sensitive taxa. Potential localised and minor adverse effect expected, not affecting the overall status of this element.	Only minor and temporary effects anticipated on base flows of Bayleys Brook. ~~No local data on macroinvertebrates habitats / quality available in the stretch impacted.~~ Bayleys Brook is of good macroinvertebrate quality downstream of Park Lane, with communities likely to be moderately sensitive to reduced flows. Potential localised and minor adverse effect expected, with no further effect at the water body level.	Potential localised adverse effects on water quality of Bayleys Brook. ~~No local data on macroinvertebrates habitats / quality available in the stretch impacted.~~ Bayleys Brook is of good macroinvertebrate quality downstream of Park Lane, with presence of pollution sensitive taxa. Potential localised and minor adverse effect expected, with no further effect at the water body level.	No scheme elements on upstream water bodies	Nine scheme elements are identified as having potential adverse effects on macroinvertebrates. However, these adverse effects are likely to be only very localised around the scheme element (i.e. culverts, viaducts, cutting) and/or temporary (river diversion, retaining wall), with also a few potential beneficial effects in the longer term (i.e. river diversions, culvert removal). In addition, most of the scheme elements are impacting relatively small tributaries at the scale of the water body, while the River Blythe, main watercourse within this water body, is crossed by one 15 m wide clear span viaduct and will be affected by a short river diversion. Therefore, and as cumulative impacts are not considered as having a significant effect on hydromorphology at the scale of the waterbody, the scheme, as currently designed, is unlikely to lead to the deterioration of the macroinvertebrate WFD status of the water body.	No additional mitigation required	No additional mitigation required	Minor and localised effects
	4. Fish	High	High		No additional effect anticipated (loss of vegetation already included in the landtake impact).	Likely to lead to reduction of habitat continuity and disconnection between channel and riparian vegetation. Culverts also have the potential to act as obstructions to fish movements. However, as Bayleys Brook culvert will be effectively replacing existing culverts, no significant effect anticipated at the scale of the waterbody. ~~Although the River Blythe supports brown trout population (baseline survey), Bayleys Brook only supports moderate fish abundances and low fish diversity and habitat, with no migratory fish (baseline survey). Therefore only localised adverse effects anticipated on Bayleys Brook and its tributaries are anticipated, with no effects on migratory fish or the main River Blythe. Given the fact that Bayleys Brook and its tributaries are already culverted in several location within the area, no likely deterioration of the element status is anticipated.~~ Although no additional baseline is available for Bayleys Brook at Lavender Hall Lane, and although tributaries are of poor value for invertebrates, Bayleys Brook supports brown trout spawning habitat and brown trout populations upstream of the Mercote Lane culvert. Potential localised adverse effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	Only minor effects anticipated on base flows of Bayleys Brook. ~~Bayleys Brook currently supports moderate fish abundances and low fish diversity, with no migratory fish (baseline survey).~~ Although Bayleys Brook is of poor value for fish in its upstream reach, it supports good spawning habitat and brown trout populations on the downstream reach surveyed. Potential localised adverse effect expected, with no further effect at the water body level.	Potential minor adverse effects on water quality of Bayleys Brook. ~~Bayleys Brook currently supports moderate fish abundances and low fish diversity, with no migratory fish (baseline survey).~~ Although Bayleys Brook is of poor value for fish in its upstream reach, it supports good spawning habitat and brown trout populations on the downstream reach surveyed. Potential localised adverse effect expected, not affecting the status of this element.	Only minor and temporary effects anticipated on base flows of Bayleys Brook. ~~Bayleys Brook currently supports moderate fish abundances and low fish diversity, with no migratory fish (baseline survey).~~ Although Bayleys Brook is of poor value for fish in its upstream reach, it supports good spawning habitat and brown trout populations on the downstream reach surveyed. Potential localised adverse effect expected, with no further effect at the water body level.	Potential localised adverse effects on water quality of Bayleys Brook. ~~Bayleys Brook currently supports moderate fish abundances and low fish diversity, with no migratory fish (baseline survey).~~ Although Bayleys Brook is of poor value for fish in its upstream reach, it supports good spawning habitat and brown trout populations on the downstream reach surveyed. Potential localised adverse effect expected, with no further effect at the water body level.	No scheme elements on upstream water bodies	Nine scheme elements (3 culverts, 2 river diversions, 2 viaduct footings, one cutting and one retaining wall) and are described as having the potential for adverse effects on fish. Of these, 2 culverts, on the River Blythe bypass, assessed to support few trout spawning habitat, and Horn Brook, for which no additional baseline is available, are considered to have the potential for adverse effects which may affect the status class for the fish sub element. This is because they will have the potential to obstruct fish migration. Although culverts are only on tributaries and river diversions will be designed to maximise habitat connectivity there remains a risk that in combination the structures will impede fish migration, particularly given the sensitivity of fish populations on the River Blythe (which currently supports a population of brown trout). These effects are most likely to occur during the construction stage whilst the new channel and bed habitats are establishing. Therefore, the deterioration of the fish status of the River Blythe water body cannot be ruled out.	~~Survey of the R Blythe bypass channel and the Horn Brook will be undertaken during the detailed design stage in order to establish the baseline fish population.~~ An assessment of the culverts on the River Blythe bypass and Horn Brook with relation to flows and fish passage must be included as part of the detailed design development. Culvert lengths will be minimised as far as possible, and the design of the culvert boundaries (i.e. where they connect with the existing bed and banks) will be developed in detail. Culvert designs will be agreed with the Environment Agency. Consideration will be given to culvert designs that are not obstructive to fish (e.g. open arch culverts, to maintain a natural bed). During dewatering of water bodies, fish rescue to be carried out.	- Culverts on Horn Brook, the River Blythe bypass and Bayleys Brook and its tributaries to be regularly maintained and kept in a functional state that allows fish movements. Construction and post-construction monitoring should be considered (if necessary) to assess any effects on fish migration.	Provided that mitigation measures are implemented as described, there would not be an affect on the WFD status of this element at the water body level.
	Physico-Chemical status	AP2-023-005	SES-C224-051												
	5. Dissolved Oxygen	High	-		Due to the length of the culvert, there is likely to be a minor impact on dissolved oxygen. The watercourse channel is locally heavily shaded and is already culverted under Diddington Lane. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	Potential localised and minor adverse effect expected, not affecting the overall status of this element.	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	Potential localised and minor adverse effect expected, not affecting the overall status of this element.	No scheme elements on upstream water bodies	Potential minor and localised effects on element.	No additional mitigation required	No additional mitigation required	Minor and localised effects
	6. pH	High	-		Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No scheme elements on upstream water bodies	Receptor is insensitive to impact		No significant effects
	7. Phosphate	Moderate	-		Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution (localised and minor effect)	Potential localised and minor adverse effect expected, not affecting the overall status of this element.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution. STW with discharge consent at Berkswell.	Potential localised and minor adverse effect expected, not affecting the overall status of this element.	No scheme elements on upstream water bodies	Depending on how much flow is lost, potential minor and localised effects on element. Water quality could be reduced in the depleted reaches of Bayleys Brook due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution. STW with discharge consent at Berkswell on Bayleys Brook.			Minor and localised effects
	8. Ammonia	High	-		Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Potential localised and minor adverse effect expected, not affecting the overall status of this element.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Potential localised and minor adverse effect expected, not affecting the overall status of this element.	No scheme elements on upstream water bodies	Potential minor and localised effects on element.			Minor and localised effects
	9. Temperature	-	-		Due to the length of the culvert, there is likely to be a minor impact on temperature. The watercourse channel is locally heavily shaded and is already culverted under Diddington Lane. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact.	Receptor is insensitive to impact.	Receptor is insensitive to impact	Receptor is insensitive to impact	No scheme elements on upstream water bodies	Receptor is insensitive to impact		No significant effects
	10. Specific Pollutants (Annex VIII)	High	-		Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Potential localised and minor adverse effect expected, not affecting the overall status of this element.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Potential localised and minor adverse effect expected, not affecting the overall status of this element.	No scheme elements on upstream water bodies	Potential minor and localised effects on element.			Minor and localised effects
	Hydromorphological status														**Hydromorphology Baseline**
	11. Quantity and dynamics of river flow	-	-		N/A	**Bayleys Brook - two access road culverts and Kenilworth Road culvert** • Channel width appears to vary from approximately 1-1.5 m with naturally restoring features (bar deposits, exposed bank-side roots, riffle-pool sequence and LWD). Diversity of flow types and substrates were shown in the walkover survey • Culverting could have adverse impacts on current flow characteristics (base flow and flood flows) • In practical terms the impacts on hydromorphology are considered to be minimal at water body scale, since Bayleys Brook culverts (Kenilworth) will be replacing an existing 50m culvert and the 2 additional culverts are 20m or less in length **Tributaries culverts** • Channel width appears to vary from approximately 0.5-0.8 m, with low flow and bed diversity with multiple culverts observed during the survey, except for discrete areas with riffle habitat • In practical terms the impacts on hydromorphology are considered to be minimal at water body scale.	N/A		N/A	No scheme elements on upstream water bodies	The cumulative impacts of channel diversions, culverts, dewatering are likely to result in localised deteriorations in hydromorphology, but these are only likely to be minor. It may be that the distance between the impacts means that they do not cascade into each other and there are no cumulative effects, but the number of design elements within the water body means this needs to be flagged as a risk to hydrological and sediment regimes	• No additional mitigation is required for viaducts or underbridges • Hydromorphological surveys to be undertaken to aid detailed design development • Hydromorphological mitigation should be included into detailed design where practicable, for example with respect to bank regrofiling (rehabilitation), bed morphology and use of soft engineering techniques • The reinstated riparian zones at the site of the culvert removal should be planted with the same species that exist in the adjacent areas to encourage natural recovery		Minor and localised effects	**Horn Brook** **The survey reports a** realigned and resectioned channel and banks; some embankment on right bank. Silt dominated, no variation in flow observed at survey. Flow was often non-perceptible through the reach. **Bayleys Brook** The survey indicates that the channel is an historically resectioned watercourse with recovering natural features (bar deposits, exposed bank-side roots, riffle-pool sequence and LWD). Diversity of flow types and substrates provide a range of macrohabitats suitable for lithophilic fish and macroinvertebrate species in particular. There is potential for future scour over the operational lifetime of the proposed scheme as the channel continues to re-naturalise. **Tributaries** Survey indicates that the channel was realigned and over-deepened ditch (drainage channel character), with multiple culverts (including a major culvert under old railway embankment), and low flow/substrate diversity. Some very limited discrete riffle habitat were present ~~• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossing, the scale of the watercourses and their significance to the overall water body.~~
	12. Connection to Groundwater	-	-		N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	• Reduction of flows in Bayley's Brook could cause a localised reduction in flow volumes, depths and dynamics, and consequent reductions in sediment transport (and increased sediment deposition) and reduced out-of-channel habitat connectivity. The effect could be significant for this watercourse, but given its size it would be buffered as soon as the tributary connects to the larger downstream watercourse so there would not be severe effects at water body scale	N/A	• Reduction of flows in Bayley's Brook could cause a localised reduction in flow volumes, depths and dynamics, and consequent reductions in sediment transport (and increased sediment deposition) and reduced out-of-channel habitat connectivity. The effect could be significant for this watercourse, but given its size it would be buffered as soon as the tributary connects to the larger downstream watercourse so there would not be severe effects at water body scale	N/A	No scheme elements on upstream water bodies				
	13. River continuity	-	-		N/A	• The culverts would potentially disrupt out of bank flows interacting with the floodplain, bank habitats and effectively sever any existing habitat continuity, but this is a minor tributary and in practical terms would not impact on deterioration of water body status	N/A		N/A		N/A	No scheme elements on upstream water bodies			
	14. River depth and width variation bed	-	-		N/A	• Channel width and depth characteristics could be impacted as a result of culverting however given the length of the culverts (Bayley culverts) and the diversity of flow recorded during the surveys there is unlikely to be significant on channel cross section. • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A		N/A		N/A	No scheme elements on upstream water bodies			
	15. Structure and substrate of river bed	-	-		N/A	• Surveys report minor channel where there is unlikely to be significant bed substrate transport or scour. • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A		N/A		N/A	No scheme elements on upstream water bodies			
	16. Structure of riparian zone	-	-		N/A	• The culverts would disconnect the channel from the existing well developed, mature vegetation riparian zone and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms would not impact on deterioration of water body status	N/A		N/A		N/A	No scheme elements on upstream water bodies			

B. Risk screening of potential to prevent future attainment of good Ecologi

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen													
Biological sub-elements currently at high status, so no mitigation measures. Water body at moderate status due to Phosphate or Total Phosphate (P1c).	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	N/A	N/A	N/A	N/A	N/A

WFD Baseline Survey Details

Water Body ID		GB104028042571								
Surface Water Body Name		River Blythe from Temple Balsall Brook to Patrick Bridge								
Scheme Element		**3 x River Diversions and 3 x Culverts - tributary of Bayleys Brook (3 short diversions, Kenilworth Greenway)**	**Balsall Common Viaduct and River Diversion - Bayleys Brook**	**River Diversion - tributary of Bayleys Brook (100 m, Lavender Hall Lane)**	**Marsh Farm Viaduct - Bayleys Brook**	**River Diversion and Culvert - Bayleys Brook (new culvert 50 m at Mercote Lane/Kenilworth Road and 90m Culvert Beechwood underpass)**	**Culvert - River Blythe Bypass Culvert**	**River Diversion and Culvert - Horn Brook (approx. 150 m) and tributary of Horn Brook (approx. 75 m) under diverted Kenilworth Road. Existing culvert under original Kenilworth Road to be retained.**	**OVERALL EFFECT**	**RESIDUAL EFFECT**
Surface Water Crossing ID		**No ID**	**SWC-CFA23-001**	No surveys proposed or undertaken	**SWC-CFA23-002**	**SWC-CFA23-002**	**SWC-CFA23-003**			
Survey Site		Bayleys Brook and Berskwell Marsh 1 (Crossing 2)	Bayleys Brook, north of Truggist Lane	No surveys proposed or undertaken	Bayleys Brook, near Marsh Farm	Bayleys Brook, near Marsh Farm	Horn Brook, tributary of River Blythe, west of Kenilworth Road	Horn Brook, tributary of River Blythe, west of Kenilworth Road		
Survey ID		WFD-PA1-0038b	WFD-PA1-0038a	No surveys proposed or undertaken	WFD-PA1-0039, WFD-M1-0039, WFD-EF1-0039	WFD-PA1-0039, WFD-M1-0039, WFD-EF1-0039	WFD-PA1-0037	WFD-PA1-0037		
Objectives of the Survey		SES-C224-051	• Assess ecological habitat type. • Assess the local hydromorphology	No surveys proposed or undertaken	• Assess ecological habitat type. • Assess the local hydromorphology	• Assess ecological habitat type. • Assess the local hydromorphology	• Assess ecological habitat type. • Assess the local hydromorphology	• Assess ecological habitat type. • Assess the local hydromorphology		
Survey Scope		Ecological Walkover Survey Hydromorphological Survey	Ecological Walkover Survey Hydromorphological Survey	No surveys proposed or undertaken	Ecological Walkover Survey Hydromorphological Survey Macroinvertebrate Survey Fish Survey	Ecological Walkover Survey Hydromorphological Survey Macroinvertebrate Survey Fish Survey	Ecological Walkover Survey Hydromorphological Survey	Ecological Walkover Survey Hydromorphological Survey		
Medium Term Survey Results Summary	**Bio**	Tributary of Bayleys Brook is a drainage ditch type watercourse at WFD-PA1-0038b, realigned and over-deepened at the crossing point. It is heavily shaded, with low flow and substrate diversity and is culverted in several places.	Bayleys Brook is a realigned and over-deepened watercourse at the crossing point. It is heavily shaded, with low flow and substrate diversity. It is culverted by multiple culverts at the crossing point.	No detailed survey or photos were possible.	Bayleys Brook is an historically resectioned watercourse, although natural bed features were observed. Overall good diversity of habitats. Runs through wooded areas in the survey reach, unlikely to support macrophytes (no macrophyte survey was recommended after walkover survey). Good macroinvertebrate quality (RICT class Good), with presence of pollution sensitive mayfly (Ephemerellidae) and caddisfly (Leptoceridae, Glossosomatidae, Psychomyidae), although abundances of pollution tolerant Chironomidae and Oligochaeta were quite elevated. Relatively high LIFE score, indicative of communities likely to be moderately sensitive to flow reductions and PSI score indicative of "Moderate" sedimentation. Excellent gravel spawning habitat for brown trout. Presence of salmonid species, with several specimen of brown trout (*Salmo trutta*) recorded. Other minor fish species included bullhead and minnow in moderate abundances. Presence of the invasive non-native signal crayfish *Pacifastacus leniusculus* .	Bayleys Brook is an historically resectioned watercourse, although natural bed features were observed. Overall good diversity of habitats. Runs through wooded areas in the survey reach, unlikely to support macrophytes (no macrophyte survey was recommended after walkover survey). Good macroinvertebrate quality (RICT class Good), with presence of pollution sensitive mayfly (Ephemerellidae) and caddisfly (Leptoceridae, Glossosomatidae, Psychomyidae), although abundances of pollution tolerant Chironomidae and Oligochaeta were quite elevated. Relatively high LIFE score, indicative of communities likely to be moderately sensitive to flow reductions and PSI score indicative of "Moderate" sedimentation. Excellent gravel spawning habitat for brown trout. Presence of salmonid species, with several specimen of brown trout (*Salmo trutta*) recorded. Other minor fish species included bullhead and minnow in moderate abundances. Presence of the invasive non-native signal crayfish *Pacifastacus leniusculus* .	The river Blythe bypass has a drainage ditch character and a realigned and resectioned channel. It is heavily shaded and heavily silted, with homogeneous low flows. No in channel vegetation observed at the time of the survey although some marginal reeds and sedges were present. Assessed to be of low value for fish and invertebrates.	No survey was undertaken on Horn Brook, only the River Blythe bypass was surveyed.		
	Phys	At survey point WFD-PA1-0038b the watercourse observed was a heavily shaded (>70%) drainage ditch, of medium flow and slightly turbid.	At survey point WFD-PA1-0038a the watercourse observed was a heavily shaded (>70%) drainage ditch, low flowing and slightly turbid.	No detailed survey or photos were possible.	At survey point WFD-PA1-0038a the watercourse observed was heavily shaded (>70%), of medium flow and slightly turbid. Physico-chemical parameters measured at survey point WFD-EF1-0039: Dissolved Oxygen = 8.7mg/l pH = 7.17 Temp = 15.7 deg C Conductivity = 267 µS	At survey point WFD-PA1-0038a the watercourse observed was heavily shaded (>70%), of medium flow and slightly turbid. Physico-chemical parameters measured at survey point WFD-EF1-0039: Dissolved Oxygen = 8.7mg/l pH = 7.17 Temp = 15.7 deg C Conductivity = 267 µS	At survey point WFD-PA1-0037 the watercourse observed was a heavily shaded (>70%) drainage ditch, low flowing but with good water clarity.	At survey point WFD-PA1-0037 the watercourse observed was a heavily shaded (>70%) drainage ditch, low flowing but with good water clarity.		
	Hydro	Survey indicates that the channel is a realigned and over-deepened ditch (drainage channel character), with multiple culverts (including a major culvert under old railway embankment), and low flow/substrate diversity. Some very limited riffle habitats were present	The detailed survey indicated that the channel was a historically resectioned watercourse with recovering natural features (bar deposits, exposed bank-side roots, riffle-pool sequence and LWD). Diversity of flow types and substrates provided a range of microhabitats suitable for lithophilic fish and macroinvertebrate species in particular. There is potential for future scour over the operational lifetime of the proposed scheme as the channel continues to re-naturalise.	No detailed survey or photos were possible.	The detailed survey indicated that the channel was a historically resectioned watercourse with recovering natural features (bar deposits, exposed bank-side roots, riffle-pool sequence and LWD). Diversity of flow types and substrates provided a range of microhabitats suitable for lithophilic fish and macroinvertebrate species in particular. There is potential for future scour over the operational lifetime of the proposed scheme as the channel continues to re-naturalise.	The survey reports a historically resection watercourse with recovering natural features (bar deposits, exposed bank-side roots, riffle-pool sequence and LWD). Diversity of flow types and substrates were observed as providing a range of microhabitats suitable for lithophilic fish and macroinvertebrate species in particular. There is potential for future scour over the operational lifetime of the proposed scheme as the channel continues to re-naturalise.	Surveys report a realigned and resectioned channel and banks with some embankment on right bank. The channel bed is silt dominated, with no variation in flow observed at the time of the survey. Flow was often non-perceptible through the reach.	No survey was undertaken, therefore no updated assessment can be made for the river diversion		

Audit Trail for the Update of the WFD Water Body Assessment with Baseline Data

		Nature of the Assessment Update and Justification								
	WFD Classification Elements Changed	**3 x River Diversions and 3 x Culverts - tributary of Bayleys Brook (3 short diversions, Kenilworth Greenway)**	**Balsall Common Viaduct and River Diversion - Bayleys Brook (SWC-CFA23-001)**	**River Diversion - tributary of Bayleys Brook (100 m, Lavender Hall Lane)**	**Marsh Farm Viaduct - Bayleys Brook (SWC-CFA23-002)**	**River Diversion and Culvert - Bayleys Brook (new culvert 50 m at Mercote Lane/Kenilworth Road and 90m Culvert Beechwood underpass) (SWC-CFA23-002)**	**Culvert - River Blythe Bypass Culvert (SWC-CFA23-003)**	**River Diversion and Culvert - Horn Brook (approx. 150 m) and tributary of Horn Brook (approx. 75 m) under diverted Kenilworth Road. Existing culvert under original Kenilworth Road to be retained.**	**OVERALL IMPACT**	**RESIDUAL EFFECT**
Biological	**2. Macrophytes and phytobenthos - macrophytes**	River diversions on Bayleys Brook and tributaries were assessed together, as were culverts. Baseline data showed that the tributaries and Bayleys Brook in the upstream reach are of poor ecological value. Bayleys Brook is of good fish and macroinvertebrate quality on its downstream reach. In addition, additional baseline not available for some of the crossing. Overall, due to these elements, no change in assessment, which remains yellow.	No significant change in the baseline. Assessment remains unchanged.	No additional baseline available. Assessment remains unchanged.	Although Bayleys Brook is shaded at the location of the crossing, in reason of potential changes in flows up to 500 m upstream of the viaduct and lack of data on macrophytes on these 500 m, "Changes in hydromorphology" effect remains unchanged. "Shading effect" downgraded from yellow to green.	River diversions on Bayleys Brook and tributaries were assessed together, as were culverts. Baseline data showed that the tributaries and Bayleys Brook in the upstream reach are of poor ecological value. Bayleys Brook is of good fish and macroinvertebrate quality on its downstream reach. In addition, additional baseline not available for some of the crossing. Overall, due to these elements, no change in assessment, which remains yellow.	Baseline confirmed low macrophyte quality of the bypass, assessment remains unchanged.	No update possible, as Horn Brook was not surveyed.	No change in overall impact.	No change in residual effect.
	3. Macroinvertebrates	River diversions on Bayleys Brook and tributaries were assessed together, as were culverts. Baseline data showed that the tributaries and Bayleys Brook in the upstream reach are of poor ecological value. Bayleys Brook is of good fish and macroinvertebrate quality on its downstream reach. In addition, additional baseline not available for some of the crossing. Overall, due to these elements, no change in assessment, which remains yellow.	No significant change in the baseline. Assessment remains unchanged.	No additional baseline available. Assessment remains unchanged.	Due to potential changes in flows up to 500 m upstream of the viaduct and good macroinvertebrate quality at crossing point, "Changes in hydromorphology" effect remains unchanged. "Shading effect" downgraded from yellow to green as Bayleys Brook is unlikely to support macrophytes at crossing point.	River diversions on Bayleys Brook and tributaries were assessed together, as were culverts. Baseline data showed that the tributaries and Bayleys Brook in the upstream reach are of poor ecological value. Bayleys Brook is of good fish and macroinvertebrate quality on its downstream reach. In addition, additional baseline not available for some of the crossing. Overall, due to these elements, no change in assessment, which remains yellow.	No significant change in baseline, no update in the assessment.	No update possible, as Horn Brook was not surveyed.	No change in overall impact.	No change in residual effect.
	4. Fish	River diversions on Bayleys Brook and tributaries were assessed together, as were culverts. Baseline data showed that the tributaries and Bayleys Brook in the upstream reach are of poor ecological value. Bayleys Brook is of good fish and macroinvertebrate quality on its downstream reach. In addition, additional baseline not available for some of the crossing. Overall, due to these elements, no change in assessment, which remains yellow.	No significant change in the baseline. Assessment remains unchanged.	No additional baseline available. Assessment remains unchanged.	Due to potential changes in flows up to 500 m upstream of the viaduct and presence of brown trout spawning habitat and brown trout population at crossing point, "Changes in hydromorphology" effect remains unchanged. "Shading effect" downgraded from yellow to green as Bayleys Brook is unlikely to support macrophytes at crossing point.	River diversions on Bayleys Brook and tributaries were assessed together, as were culverts. Baseline data showed that the tributaries and Bayleys Brook in the upstream reach are of poor ecological value. Bayleys Brook is of good fish and macroinvertebrate quality on its downstream reach. In addition, additional baseline not available for some of the crossing. Overall, due to these elements, no change in assessment, which remains yellow.	Although the River Blythe bypass channel is assessed of to be of poor value for fish, as it has isolated pockets of trout spawning habitat, assessment remains unchanged.	No update possible, as Horn Brook was not surveyed.	No change in overall impact.	No change in residual effect.
Physico-Chemical	**5. Dissolved Oxygen**	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No additional baseline available. Assessment remains unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	6. pH	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No additional baseline available. Assessment remains unchanged.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No change in overall impact.	No change in residual effect.
	7. Phosphate	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No additional baseline available. Assessment remains unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	8. Ammonia	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No additional baseline available. Assessment remains unchanged.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No assessment update required. Receptor remains insensitive to impact.	No change in overall impact.	No change in residual effect.
	9. Temperature	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No additional baseline available. Assessment remains unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
	10. Specific Pollutants (Annex VIII)	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No additional baseline available. Assessment remains unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No assessment update required. Temporary minor impacts remain unchanged.	No change in overall impact.	No change in residual effect.
Hydromorphological	**11. Quantity and dynamics of river flow**	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No survey was completed, therefore original assessment will remain unchanged. No increase in confidence.	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No assessment update possible due to lack of detailed observations.	No change in overall impact.	No change in residual effect.
	12. Connection to Groundwater	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No survey was completed, therefore original assessment will remain unchanged. No increase in confidence.	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No assessment update possible due to lack of detailed observations.	No change in overall impact.	No change in residual effect.
	13. River continuity	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No survey was completed, therefore original assessment will remain unchanged. No increase in confidence.	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No assessment update possible due to lack of detailed observations.	No change in overall impact.	No change in residual effect.
	14. River depth and width variation bed	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No survey was completed, therefore original assessment will remain unchanged. No increase in confidence.	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No assessment update possible due to lack of detailed observations.	No change in overall impact.	No change in residual effect.
	15. Structure and substrate of river bed	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No survey was completed, therefore original assessment will remain unchanged. No increase in confidence.	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No assessment update possible due to lack of detailed observations.	No change in overall impact.	No change in residual effect.
	16. Structure of riparian zone	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No survey was completed, therefore original assessment will remain unchanged. No increase in confidence.	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No assessment update required. Temporary minor impacts remain unchanged. Minor changes in text	No assessment update possible due to lack of detailed observations.	No change in overall impact.	No change in residual effect.

Annex B

WR-001-000-Annex B: Groundwater Body Assessments

Water Body ID	Groundwater Body Name	CFA	River Basin District	WFD Baseline Survey *	AP2 Summary	AP2 Assessment	Current WFD Status		Changes from Baseline or AP2
							Quantitative	Qualitative	
GB40602G602800	Radlett Tertiaries	5, 6, 7, 8	Thames	-	-	-	Poor	Poor	No surveys or elements requring assessment
GB40601G601200	Mid-Chilterns Chalk	7, 8, 9, 10	Thames	-	Y	AP2-007-003	Poor	Poor	None
GB40601G604100	Chiltern Chalk Scarp	10, 11	Thames	Y	-	-	Poor	Good	None
GB40602G600700	Headington Corallian	11, 12	Thames	-	Y	none required	Good	Good	None
GB40501G402300	Upper Bedford Ouse Oolite Principal	13, 14, 15	Anglian	Y	-	-	Good	Poor	None
GB40502G401300	Upper Bedford Ouse Oolite Secondary	13, 14, 15	Anglian	-	Y	AP2-015-002	Good	Good	None
GB40602G604200	Byfield Jurassic	15	Thames	Y	Y	AP2-015-006	Good	Good	None
GB40602G600200	Banbury Jurassic	15, 16	Thames	Y	-	-	Good	Good	None
GB40902G990900	Warwickshire Avon - Secondary Mudrocks	16, 17, 18	Severn	-	-	-	Good	Good	No surveys or elements requring assessment
GB40901G300700	Warwickshire Avon - PT Sandstone Warwick/Avon Confined	17, 18	Severn	-	-	-	Poor	Good	No surveys or elements requring assessment
GB40902G302200	Warwickshire Avon - Coal Measures Coventry	17, 18, 23	Severn	-	Y	AP2-018-004	Poor	Poor	None
GB40401G302700	Tame Anker & Mease - PT Sandstone Nuneaton & Meriden	23	Humber	Y	-	-	Good	Good	None
GB40402G990800	Tame Anker Mease - Secondary Combined	19, 20, 21, 22, 23, 24, 25, 26	Humber	Y	Y	AP2-022-001, AP2-021-001	Good	Poor	None
GB40401G301000	Tame Anker Mease - PT Sandstone Birmingham Lichfield	21, 22, 26	Humber	Y	-	-	Poor	Poor	None
GB40402G300300	Staffordshire Trent Valley - Mercia Mudstone East & Coal Measures	22	Humber	-	Y	AP2-022-001	Good	Good	None
GB40603G000300	Lower Thames Gravels	Off-route	Thames	-	Y	AP2-000-001	Good	Poor	New Assessment. Remains at Good Status

* 2014 Survey site locations are provided in full on the next sheet

Key for Baseline Assessment Changes:

	In audit trail, this cell indicates where the impact of a particular Scheme Element on a WFD sub-element has been changed as a result of baseline surveys.
Red text	In assessment tab, where new text has been added describing why the assessment has changed
~~Strikethrough text~~	In assessment tab, where text from the previous assessment is no longer relevant/has been superseded and therefore has been removed (but is still visible to the reader).

Key for AP2 Assessment Changes:

	In AP2 Summary sheet, this cell indicates where assessment is required for the Scheme Element.
Red text	In assessment tab, where new assessment has been undertaken
	In assessment tab, where Main ES Scheme element has been removed or replaced by AP2 change

WFD Groundwater Survey Location Details

CFA	Easting	Northing	Survey ID	Map Reference	Relevant Groundwater Bodies	Groundwater Body ID
CFA10	486254	208533	WFD-GW1-0001b	0001b	Chilterns Chalk Scarp	GB40601G604100
CFA10	484418	208560	WFD-GW1-0001d	0001d		
CFA14	459781	237216	WFD-GW1-0002b	0002b	Upper Bedford Ouse Oolite Principal 1	GB40501G402300
CFA14	458526	239261	WFD-GW1-0003a	0003a	Upper Bedford Ouse Oolite Principal 1	GB40501G402300
CFA14	459051	239389	WFD-GW1-0003b	0003b		
CFA15	455846	242606	WFD-GW1-0004a	0004a	Upper Bedford Ouse Oolite Principal 1	GB40501G402300
CFA15	457424	242189	WFD-GW1-0004b	0004b		
CFA15	456285	242009	WFD-GW1-0004c	0004c		
CFA15	456437	241240	WFD-GW1-0004d	0004d		
CFA15	457869	241396	WFD-GW1-0004e	0004e		
CFA14	457881	240789	WFD-GW1-0004f	0004f		
CFA15	457900	240029	WFD-GW1-0004g	0004g		
CFA15	455946	243961	WFD-GW1-0004i	0004i		
CFA15	454246	245112	WFD-GW1-0005a	0005a	Byfield Jurassic	GB40602G604200
CFA15	453834	244697	WFD-GW1-0005b	0005b		
CFA15	450476	249740	WFD-GW1-0006	0006	Byfield Jurassic, Banbury Jurassic	GB40602G604200, GB40602G600200
CFA23	423650	279315	WFD-GW1-0007a	0007a	Tame Anker & Mease - PT Sandstone Nuneaton & Meriden	GB40401G302700
CFA23	423444	279581	WFD-GW1-0007b	0007b		
CFA23	422873	279862	WFD-GW1-0007c	0007c		
CFA23	424025	279066	WFD-GW1-0007d	0007d		
CFA24	420291	286456	WFD-GW1-0008a	0008a	Tame Anker Mease - Secondary Combined	GB40402G990800
CFA24	420993	285977	WFD-GW1-0008b	0008b		
CFA24	420277	285567	WFD-GW1-0008c	0008c		
CFA24	419824	285692	WFD-GW1-0008d	0008d		
CFA21	414291	305715	WFD-GW1-0009	0009	Tame Anker Mease - PT Sandstone Birmingham Lichfield	GB40401G301000

Water Body ID	GB40602G601200
Groundwater Body Name	Mid Chilterns Chalk
CFAs covered by Waterbody	7, 8, 9, 10

No Groundwater WFD surveys carried out on water body

CFA	7
AP2 ID	AP2-007-003
AP2 Location	Bucks Golf Club, Denham
New/Replacement Scheme Element	NEW
AP2 Scheme Element Type	Bridge
Original Scheme	Original scheme provides a temporary access/utilities construction zone along Denham Court Drive, past the Bucks Golf Course club house, along the west bank of the River Colne and across the River Colne via a temporary bridge to the location of the National Grid overhead cable diversion works on the east side of the River Colne.
AP2 Description	Revised scheme - Re-routing of the temporary access in order to avoid disruption to the Bucks Golf Course club house. The new temporary access leaves Denham Court Drive via an existing car park, crosses a minor water course, crosses the River Colne via a temporary or permanent (to be determined) bridge, and runs around the boundary of the driving range to reach the location of the National Grid overhead cable diversion works.
Changes to Previously assessed elements	None
AP2 Assessment Requirements	River Colne Bridge construction and operation

Requires Assessment

GB40601G6012200 AP2 Assessment

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Bored Tunnel		Cutting								Embankment	Green Tunnel		Retaining Wall		Tunnel Portal		Viaduct		Other Major Structures	Overall Impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Chiltern Tunnel (C247, C248, C249)		Thirlwaye Lane Cutting (C247)	Chiltern Tunnel South Approach Cutting (C247)		Chiltern tunnel north approach cutting (C249)		South Heath Cutting (C249)		Rocky Lane South Cutting (C249, C250)	Embankments in vicinity of Chiltern Tunnel and South Heathfield (C247)	South Heath cut and cover tunnel (C249)		Chiltern south approach retaining wall (C247)		Chiltern Tunnel north and south Portals (C247 and C249)		Colne Valley Viaduct (C247)	Windover Dean viaduct and embankments (C249)	River Colne Diversionge (C247)				
					Phase	Construction	Construction & Operation	Construction & Operation	Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	WFJ 007-003 Construction & Operation				
GB40601G6012200																													
Mid-Chilterns Chalk	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Lowering of groundwater levels and reduction in groundwater contributions to springs, wetlands, SSSIs, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions

GB40601G604100

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Cutting				Embankment			Green Tunnel		Viaduct	Other Key Structures	Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Wendover north cutting (CFA10)		Rocky Lane South Cutting (CFA10)		Small Dean Viaduct Southern Approach Embankment (CFA10)	Small Dean Viaduct Northern Approach Embankment (CFA10)	Stoke Mandeville South Embankment (CFA10)	Wendover cut-and-cover tunnel (CFA10)		Small Dean Viaduct and embankments (CFA10)	B4009 Nash Lee Road Overbridge (CFA10)				
GB40601G604100					Phase	055-L1		051-L2		051-L3	053-L1	056-L1	053-L2		052-L1	056-S1				
Chiltern Chalk Scarp	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation		Construction & Operation	Construction & Operation				
WFD classification elements																				
1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Probably Not At Risk	Good Ecological Status by 2015	Predicted change to status elements (green = none, amber = possibly, red = likely)	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Reduction in groundwater contributions	Reduction in groundwater contributions	Reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions				
						No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impact	Remains Good Status	None required	Remains Good Status
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Good	Low	At Risk	Good Ecological Status by 2015		Minor change in baseflow to nearby springs and Stoke Brook predicted. Discharge of dewatering abstractions to surface water (Stoke Brook) 1km downstream of springs; there is no suitable discharge point further upstream. Spring and surface water flows potentially affected locally thus influencing surface water quality elements. Majority of Stoke Brook downstream of discharge point is on unproductive strata so probably surface water dominated. CoCP and best practice for design, construction and operations reduce risks to surface waters. Implementation of monitoring regime during construction.	Minor change in baseflow to nearby springs and associated streams predicted. Spring and surface water flows potentially affected locally thus influencing surface water quality elements. CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	Scheme element is at least 30m above maximum recorded groundwater levels. No impacts identified as result of scheme element.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Minor change in baseflow to nearby springs and associated stream (primarily Bear Brook / Wendover Brook) predicted. Discharge of dewatering abstractions during construction to Stoke Brook. Dewatering will be during construction prior to backfilling around tunnel. Spring and surface water flows potentially affected locally during construction, thus influencing surface water quality elements. ES estimates reduction in spring flow to be 20%. CoCP and best practice for design, construction and operations reduce risks to water quality. Implementation of monitoring regime during construction.	No measurable impacts on flow are anticipated since a sealed box will be constructed to form the green tunnel. There will be sufficient residual aquifer thickness to avoid permanent impacts on spring flows. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impacts predicted.	Groundwater-fed spring 380m north east of scheme. Shallow groundwater in head deposits but is not considered to be in direct hydraulic continuity with groundwater in bedrock. Scheme element predicted to be predominantly above groundwater level in bedrock. Any dewatering required during construction will be temporary and localised. CoCP and best practice for design, construction and operations reduce risks to water. No significant residual impacts predicted.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Combined impacts have the potential to have an adverse effect on the WFD element.	Remains Good Status	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater to maximise potential for recharge back to groundwater. Monitoring during construction	Remains Good Status
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs). To assess the impact of groundwater abstractions on the condition of GWDTEs.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		Minor change in baseflow to nearby springs and associated streams predicted. Discharge of dewatering abstractions during construction to surface water downstream of springs; there is no suitable discharge point further upstream. Dewatering will be during construction prior to backfilling around tunnel. Spring and surface water flows potentially affected locally thus influencing associated GWDTEs (Fen in LWS at World's End). CoCP and best practice for design, construction and operations reduce risks to GWDTEs. Implementation of monitoring regime during construction.	Minor change in baseflow to nearby springs and associated streams predicted. Spring and surface water flows potentially affected locally thus influencing associated GWDTEs (e.g. Fen in LWS at World's End). Impact downstream at Weston Turville Reservoir SSSI further downstream is assessed as being negligible. CoCP and best practice for design, construction and operations reduce risks to GWDTEs. Implementation of monitoring regime during construction.	Scheme element is at least 30m above maximum recorded groundwater levels. No impacts identified as result of scheme element.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Minor change in baseflow to nearby springs and associated streams predicted. Discharge of dewatering abstractions during construction to surface water downstream of springs. Dewatering will be during construction prior to backfilling around tunnel. South end of tunnel above water table. Spring and surface water flows. Impact downstream at Weston Turville Reservoir SSSI further downstream is assessed as being negligible in ES as the tributary fed by springs that might be affected by tunnel only feed into Reservoir during high flow periods. Fen in LWS at World's End may be influenced by combined effects with Wendover North Cutting. CoCP and best practice for design, construction and operations reduce risks to GWDTEs. Implementation of monitoring regime during construction.	No measurable impacts on flow at GWDTEs (e.g. Fen in LWS at World's End and Weston Turville Reservoir SSSI further downstream) are anticipated since a sealed box will be constructed to form the green tunnel. There will be sufficient residual aquifer thickness to avoid permanent impacts on spring flows. CoCP and best practice for design, construction and operations reduce risks to GWDTEs. Negligible impacts predicted.	Groundwater-fed spring 380m north east of scheme. Shallow groundwater in head deposits but is not considered to be in direct hydraulic continuity with groundwater in bedrock. Scheme element predicted to be predominantly above groundwater level in bedrock. Any dewatering required during construction will be temporary and localised. CoCP and best practice for design, construction and operations reduce risks to water. No significant residual impacts predicted.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Combined impacts have the potential to have an adverse effect on the WFD element.	Remains Good Status	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater to maximise potential for recharge back to groundwater. Monitoring during construction	Remains Good Status
4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Poor	Low	Probably At Risk	Good Ecological Status by 2015		Cutting extends below water table and dewatering will be required. Dewatering during construction and operations. Water abstracted during dewatering will be returned to surface water (Stoke Brook) 1km down from springs and at very edge of GW body; there is no suitable discharge point further upstream. Adverse effect on water balance of groundwater body. No impact to PWS or private abstractions predicted as none located within 1km of scheme element.	Potential impact to groundwater flows will be a local impact that is unlikely to significantly affect the hydrogeological regime. No impact to PWS or private abstractions as none located within 1km of scheme element.	Scheme element is at least 30m above maximum recorded groundwater levels and therefore there is no potential for impact on water balance or groundwater flow.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	South end of tunnel above water table. Water abstracted during dewatering will be returned to surface water (Stoke Brook) 1km down from springs and at very edge of GW body. There could be localised disruption to private abstractions. Dewatering will be during construction prior to backfilling around tunnel. Track drainage will be discharge to the south of the tunnel. Adverse effect on water balance of groundwater body during construction. Implementation of monitoring to indicate if further mitigation for abstractions required.	Potential to impact groundwater flow at the northern part of the tunnel at approximately the cricket ground at Wendover northwards. Impact to groundwater flows will be locally impacted but unlikely to significantly affect the hydrogeological regime.	Shallow groundwater in head deposits but is not considered to be in direct hydraulic continuity with groundwater in bedrock. Scheme element predicted to be predominantly above groundwater level in bedrock. Any dewatering required during construction will be temporary and localised. Localised mounding of groundwater levels around piles may occur. There could be localised disruption to private abstractions with moderate impact. CoCP and best practice for design, construction and operations reduce risks to water. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	Combined impacts have the potential to have an adverse effect on the WFD element, which is already at Poor status.	No Significant Deterioration	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater to maximise potential for recharge back to groundwater. Monitoring during construction	No Significant Deterioration
Quantitative status	Poor																	Poor		Poor

Groundwater body					Scheme Elements	Cutting				Embankment			Green Tunnel		Viaduct	Other Key Structures	Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Wendover north cutting (CFA10)		Rocky Lane South Cutting (CFA10)		Small Dean Viaduct Southern Approach Embankment (CFA10)	Small Dean Viaduct Northern Approach Embankment (CFA10)	Stoke Mandeville South Embankment (CFA10)	Wendover cut-and-cover tunnel (CFA10)		Small Dean Viaduct and embankments (CFA10)	B4009 Nash Lee Road Overbridge				
GB40601G604100					Phase	055-L1		051-L2		051-L3	053-L1	056-L1	053-L2		052-L1	056-S1				
Chiltern Chalk Scarp	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation		Construction & Operation	Construction & Operation				
WFD classification elements																				
1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Probably Not At Risk	Good Chemical Status by 2015	Predicted change to status elements (green = none, amber = possibly, red = likely)	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	None identified.	None identified.	None identified.	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate				
						No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impact	Remains Good Status	None required	Remains Good Status
2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Good	Low	At Risk	Good Chemical Status by 2015		Minor change in baseflow to nearby springs and associated streams predicted. Discharge of dewatering abstractions to Stoke Brook 1km downstream of springs. Spring and surface water chemistry potentially affected locally thus influencing ecology. CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	Minor change in baseflow to nearby springs and associated streams predicted. Spring and surface water chemistry potentially affected locally thus influencing ecology. CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	Scheme element is at least 30m above maximum recorded groundwater levels. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Minor change in baseflow to nearby springs and associated streams predicted. Discharge of dewatering abstractions to Stoke Brook 1km downstream of springs. Spring and surface water chemistry potentially affected locally thus influencing ecology. CoCP and best practice for design, construction and operations reduce risks to water quality. Implementation of monitoring regime during construction.	Minor change in baseflow to nearby springs and associated streams predicted. Discharge of dewatering abstractions to Stoke Brook 1km downstream of springs. Spring and surface water chemistry potentially affected locally thus influencing ecology. CoCP and best practice for design, construction and operations reduce risks to water quality. Implementation of monitoring regime during construction.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Local influence on surface water chemistry due to minor changes to spring flows.	Remains Good Status	None required	Remains Good Status
3. GWDTEs. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTEs.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		Minor change in baseflow to nearby springs and associated streams predicted. Discharge of dewatering abstractions to surface water (Stoke Brook) 1km downstream of springs. Spring and surface water chemistry potentially affected locally thus influencing associated GWDTEs. CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	Minor change in baseflow to nearby springs and associated streams predicted. Spring and surface water chemistry potentially affected locally thus influencing associated GWDTEs. CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	Scheme element is at least 30m above maximum recorded groundwater levels. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Minor change in baseflow to nearby springs and associated streams predicted. Discharge of dewatering abstractions to surface water (Stoke Brook) 1km downstream of springs. Spring and surface water chemistry potentially affected locally thus influencing associated GWDTEs. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Implementation of monitoring regime during construction.	Minor change in baseflow to nearby springs and associated streams predicted. Discharge of dewatering abstractions to surface water (Stoke Brook) 1km downstream of springs. Spring and surface water chemistry potentially affected locally thus influencing associated GWDTEs. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Implementation of monitoring regime during construction.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Local influence on GWDTEs due to minor changes to spring flows.	Remains Good Status	None required	Remains Good Status
4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	Low	Probably At Risk	Good Chemical Status by 2015		In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA and SPZ3. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	In DrWPA and SPZ2. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	In DrWPA and SPZ3. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA and near private abstractions. There could be localised disruption to private abstractions. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Implementation of monitoring to indicate if further mitigation for abstractions required. Negligible impact following mitigation.	In DrWPA and near private abstractions. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA and near private abstractions. There could be localised disruption to private abstractions. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Implementation of monitoring to indicate if further mitigation for abstractions required. Negligible impact following mitigation.	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Potential localised effect. No change in status predicted.	Remains Good Status	None required	Remains Good Status
5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Potential localised effect. No change in status predicted.	Remains Good Status	None required	Remains Good Status
Chemical status	Good																	Good		Good
Overall status	Poor																	Poor		Poor

B. Risk screening of potential to prevent future attainment of good WFD status

WFD classification element currently at less than good status	Current status			Status objective	Scheme Elements	Cutting				Embankment			Green Tunnel		Viaduct	Other Key Structures	Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Wendover north cutting (CFA10)		Rocky Lane South Cutting (CFA10)		Small Dean Viaduct Southern Approach Embankment (CFA10)	Small Dean Viaduct Northern Approach Embankment (CFA10)	Stoke Mandeville South Embankment (CFA10)	Wendover cut-and-cover tunnel (CFA10)		Small Dean Viaduct and embankments (CFA10)	B4009 Nash Lee Road Overbridge				
4. Water balance (quantitative)	Poor			Good Status by 2015	Phase	055-L1		051-L2		051-L3	053-L1	056-L1	053-L2		052-L1	056-S1				
RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	**Where RBMP measure will happen**			**When RBMP measure will happen**	**Identified chemical impacts**	Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation		Construction & Operation	Construction & Operation				
						Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Reduction in groundwater contributions	Reduction in groundwater contributions	Reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions				
Investigation to improve confidence in groundwater quantitative status result.	Chiltern Chalk Scarp			2010	Predicted change to status elements (green = none, amber = possibly, red = likely)	Impacts on groundwater body water balance and surface water flows locally due to dewatering.	Potential impact to groundwater flows will be a local impact that is unlikely to significantly affect the hydrogeological regime.	Scheme element is at least 30m above maximum recorded groundwater levels and therefore there is no potential for impact on water balance or groundwater flow.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Impacts on groundwater body water balance and surface water flows locally during construction due to dewatering.	Potential impact to groundwater flows will be a local impact that is unlikely to significantly affect the hydrogeological regime.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Impacts on groundwater body water balance and surface water flows locally due to dewatering.	Local impacts	Monitoring to confirm status	Local impacts
Investigation to verify risk of deterioration in groundwater quantitative status.	Chiltern Chalk Scarp			2011		Impacts on groundwater body water balance and surface water flows locally due to dewatering.	Potential impact to groundwater flows will be a local impact that is unlikely to significantly affect the hydrogeological regime.	Scheme element is at least 30m above maximum recorded groundwater levels and therefore there is no potential for impact on water balance or groundwater flow.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Impacts on groundwater body water balance and surface water flows locally during construction due to dewatering.	Potential impact to groundwater flows will be a local impact that is unlikely to significantly affect the hydrogeological regime.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Impacts on groundwater body water balance and surface water flows locally due to dewatering.	Local Impacts	Monitoring to confirm status	Local impacts

Ref:
Environment Agency (2007) Thame and South Chilterns catchment abstraction licensing strategy - WRMU2 - Thame Unconfined Chalk and Upper Greensand
Environment Agency website; What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx
Environment Agency (2009) River Basin Management Plan - Thames River Basin District - Annex C Actions to deliver objectives

WFD Baseline Survey Details

Water Body ID	GB40601G604100
Groundwater Body Name	Chilterns Chalk Scarp
Scheme Element	**Wendover North Cutting/Wendover Green Tunnel**
Key Receptors	GWDTE - Worlds End LWS GWDTE - Turnville Reseroir SSSI Stoke Brook Wendover Brook/Bear Brook
Objectives of the Survey	• Confirmation that Worlds End LWS is definitely a GWDTE and condition survey to assess any existing damage/pressures. • Assessment of background variation in spring flows (including temporal / seasonal variation) • Assessment of flow regime in Stoke Brook headwaters • Confirmation of flow regime for Turville Reservoir SSSI (springs closest to scheme are assumed to bypass reservoir except during high flows) • Assessment of GW levels and aquifer properties along line of route to refine drawdown and dewatering rate estimates. • Establishment of long-term monitoring network (GW, SW & Ecology)
Survey Scope	• Vegetation survey (NVC & geostatistical survey & condition assessment) at World's End LWS • Vegetation survey (NVC & geostatistical survey & condition assessment) at Turville Reservoir SSSI • Hydrological survey of springs / tributaries feeding Stoke Brook • (Hydrological survey of springs/tributaries feeding Turville Reservoir SSSI to verify findings from ES) • Spring flow monitoring • Monitoring bores: 1 between A413 and Worlds End LWS outside CCB • Groundwater level logger • Water quality sampling (GW & SW) • In situ aquifer property testing
Medium Term Survey Results Summary	At survey point WFD-GW1-0001b information suggests the stream (previously identified as spring fed stream 3) is unlikely to be groundwater dependent, however the source of the stream would need to be located to confirm this. No visible signs such as gas bubbles were observed to indicate a groundwater source and the temperature of the water is too high to be indicative of a groundwater source. Flow velocity of 0.2128 m/s recorded on 08/08/2014 13:00. The aquatic ecology of the feature identified as in unfavourable condition, this is based on its absence over the majority of the site and species poor composition where it was present. Open Water Transition fen vegetation noted at 10%. **Identification of source of stream is recommended to rule out groundwater dependence** At survey point WFD-GW1-0001d information provided suggests the stream is unlikely to be groundwater dependent, however the source of the stream would need to be located to confirm this. No visible signs such as gas bubbles were observed to indicate a groundwater source and the temperature of the water is too high to be indicative of a groundwater source. Moat nearby may require additional assessment. Flow velocity of 0.2 m/s recorded on 08/08/2014 14:15. The minimal aquatic ecology recorded, instream watercress Rorippa nasturtium-aquaticum recorded at a break in the woodland was what may be expected within a surface water feature of this nature. **The stream is of low ecological value, however if further investigations were required it is recommended for these to include the identification of the source of the stream.**
Medium Term Survey Results Conclusions in relation to previous assessment	Information collected during medium term survey indicates that the two streams visited are unlikely to be groundwater dependent, however the source of neither has been located. NVC survey has not been undertaken in 2014 for Worlds End LWS or Turville Reservoir SSSI. It is also recommended that the source of the stream in Worlds End be located to identify if likely to be groundwater dependent (red circle added).
Additional Comments	Need to liaise with Natural England re Turville Reservoir SSSI Need to liaise with local wildlife trust/local authorities re Worlds End LWS.

Blue - included in medium term survey
Black - would be covered in long term survey

dark blue - Recommendations additional to those provided in survey reports

Audit Trail for the Update of the WFD Water Body Assessment with Baseline Data

WFD Classification Elements Changed	Nature of the Assessment Update and Justification
Wendover north cutting (CFA10)	
2. Surface water.	**Quantity** - No assessment update at this stage Information collected during medium term survey indicates that the stream visited (d) is unlikely to be groundwater dependent, however the source has not been located. As such the assumptions made in the previous WFD assessment that a Minor change in baseflow to nearby springs and Stoke Brook is predicted cannot be changed at this stage. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as locating stream sources.**
	Quality - No assessment update at this stage Information collected during medium term survey indicates that the stream visited (d) is unlikely to be groundwater dependent, however the source has not been located. As such the assumptions made in the previous WFD assessment that a Minor change in baseflow to nearby springs and Stoke Brook is predicted, potentially affecting Spring and surface water chemistry and thus ecology cannot be changed at this stage. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as locating stream sources.**
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs).	**Quantity** - No assessment update at this stage Information collected during medium term survey indicates that the stream visited (b) is unlikely to be groundwater dependent, however the source has not been located. As such the assumptions made that minor change in baseflow to nearby springs and associated streams predicted thereby potentially affecting the GWDTEs cannot be changed at this stage. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as locating stream sources.**
	Quality - No assessment update at this stage Information collected during medium term survey indicates that the stream visited (b) is unlikely to be groundwater dependent, however the source has not been located. As such the assumptions made that minor change in baseflow to nearby springs and associated streams predicted thereby potentially affecting the GWDTEs cannot be changed at this stage. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as locating stream sources.**
4. Water balance.	Quantity - No assessment update at this stage as survey data collected does not relate to assumptions made on water balance: Water abstracted during dewatering will be returned to surface water (Stoke Brook) 1km down from springs and at very edge of GW body; there is no suitable discharge point further upstream. Adverse effect on water balance of groundwater body.
Wendover cut-and-cover tunnel (CFA10)	
2. Surface water.	**Quantity** - No assessment update at this stage Information collected during medium term survey indicates that the stream visited (b) is unlikely to be groundwater dependent, however the source has not been located. As such the assumptions made in the previous WFD assessment that a Minor change in baseflow to nearby springs and associated stream (primarily Bear Brook / Wendover Brook) predicted cannot be changed at this stage. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as locating stream sources.**
	Quality - No assessment update at this stage Information collected during medium term survey indicates that the two streams visited are unlikely to be groundwater dependent, however the source of neither has been located. As such the assumptions made in the previous WFD assessment that a Minor change in baseflow to nearby springs and associated streams predicted and discharge of dewatering abstractions to Stoke Brook 1km downstream of springs. will potentially affect Spring and surface water chemistry and thus influencing ecology cannot be changed at this stage. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as locating stream sources.**
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs).	**Quantity** - No assessment update at this stage Information collected during medium term survey indicates that the stream visited (b) is unlikely to be groundwater dependent, however the source has not been located. As such the assumptions made that minor change in baseflow to nearby springs and associated streams predicted thereby potentially affecting the GWDTEs cannot be changed at this stage. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as locating stream sources.**
	Quality - No assessment update at this stage Information collected during medium term survey indicates that the two streams visited are unlikely to be groundwater dependent, however the source of neither has been located. As such the assumptions made in the previous WFD assessment that a Minor change in baseflow to nearby springs and associated streams predicted and discharge of dewatering abstractions to Stoke Brook 1km downstream of springs. will potentially affect Spring and surface water chemistry and thus influencing the GWDTEs cannot be changed at this stage. Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as locating stream sources.
4. Water balance.	Quantity - No assessment update at this stage as survey data collected does not relate to assumptions made on water balance: Water abstracted during dewatering will be returned to surface water (Stoke Brook) 1km down from springs and at very edge of GW body; there is no suitable discharge point further upstream. Adverse effect on water balance of groundwater body.

There are no AP2 changes relevant to this Groundwater Body

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Cutting						Embankment			Other Key Structures	Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Thames Valley Viaduct North Cutting (CFA11)		Waddesdon South Cutting (CFA12)		Waddesdon North Cutting (CFA12)		Bicester Road Embankment (CFA11 and CFA12)	Waddlesdon Embankment (CFA12)	Quainton South Embankment (CFA12)	A41 Bicester Road Overbridge				
GB40602G600700					Phase	Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
Headington Corallian	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTE's or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTE's or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTE's or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Reduction in groundwater contributions	Reduction in groundwater contributions	Reduction in groundwater contributions	Damming of groundwater flow and reduction in groundwater contributions				
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)														
1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions	Good	Low	Not At Risk	Good Ecological Status by 2015		Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element.	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element.	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impacts identified.	Remains Good Status	None required	Remains Good Status
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Good	High	Not At Risk	Good Ecological Status by 2015		Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element.	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element.	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element.	No impacts identified as result of scheme element	Surface water bodies are culverted where crossed by scheme element. Perched groundwater may be present in head deposits. No significant impacts identified as result of scheme element.	No impacts identified as result of scheme element	Scheme element located on unproductive strata. Surface water bodies are culverted where crossed by scheme element. No significant impacts identified.	Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element.	No significant impacts identified.	Remains Good Status	None required	Remains Good Status
3. Groundwater Dependent Terrestrial Ecosystems (GWDTE's). To assess the impact of groundwater abstractions on the condition of GWDTE'S.	Good	Low	Probably At Risk	Good Ecological Status by 2015		Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element	No impacts identified as result of scheme element	Majority of scheme element is on unproductive strata. Perched groundwater may be present in head deposits. No known GWDTEs in vicinity. No impacts identified as a result of scheme element.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element	No significant impacts identified.	Remains Good Status	None required	Remains Good Status
4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element	No significant impacts identified.	Remains Good Status	None required	Remains Good Status
Quantitative status	**Good**																**Good**		**Good**

Groundwater body					Scheme Elements	Cutting						Embankment			Other Key Structures	Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Putlowes (Thames Valley Viaduct North) Cutting (CFA11)		Waddesdon South Cutting (CFA12)		Waddesdon North Cutting (CFA12)		Bicester Road Embankment (CFA11 and CFA12)	Waddlesdon Embankment (CFA12)	Quainton South Embankment (CFA12)	A41 Bicester Road Overbridge				
GB40602G600700					Phase	Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
Headington Corallian	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	None identified	None identified	None identified	Creating or altering of pathways along which existing poor quality groundwater can migrate				
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)														
1. Saline or other intrusions. To identify groundwater bodies where intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions	Good	Low	Not At Risk	Good Chemical Status by 2015		Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering required. No impacts identified as result of scheme element.	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering required. No impacts identified as result of scheme element.	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering required. No impacts identified as result of scheme element.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impacts identified.	Remains Good Status	None required	Remains Good Status
2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Good	Low	Not At Risk	Good Chemical Status by 2015		Scheme element will penetrate unproductive strata and not intercept groundwater. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	Majority of scheme element is on unproductive strata. Shallow groundwater may be present in head deposits and adjacent to watercourse. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element.	No impacts identified as result of scheme element	Majority of scheme element is on unproductive strata. Shallow groundwater may be present in superficial deposits along watercourse. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element.	In catchment of Fleet Marston Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No significant impacts identified.	Remains Good Status	None required	Remains Good Status
3. GWDTE's. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTE's.	Good	Low	Probably At Risk	Good Chemical Status by 2015		Scheme element will penetrate unproductive strata and not intercept groundwater. No known GWDTEs in hydraulic continuity. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. No known GWDTEs in hydraulic continuity. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. No known GWDTEs in hydraulic continuity. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	Majority of scheme element is on unproductive strata. Shallow groundwater may be present in head deposits and adjacent to watercourse. No known GWDTEs in vicinity. No impacts identified as a result of scheme element.	Scheme element is on unproductive strata. No known GWDTEs in hydraulic continuity. No significant impacts identified as result of scheme element	Majority of scheme element is on unproductive strata. Shallow groundwater may be present in superficial deposits along watercourse. LWSs located downstream. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No significant impacts identified.	Remains Good Status	None required	Remains Good Status
4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		In DrWPA. Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	No impacts identified as result of scheme element	In DrWPA. Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	No impacts identified as result of scheme element	In DrWPA. Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	No impacts identified as result of scheme element	In DrWPA. Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	In DrWPA. Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	In DrWPA. Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No significant impacts identified.	Remains Good Status	None required	Remains Good Status
5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	No impacts identified as result of scheme element	Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	No impacts identified as result of scheme element	Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	No impacts identified as result of scheme element	Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No significant impacts identified.	Remains Good Status	None required	Remains Good Status
Chemical status	**Good**																**Good**		**Good**
Overall status	**Good**																**Good**		**Good**

Ref:
Environment Agency (2007) Thame and South Chilterns abstraction licensing strategy - WRMU1 River Thame and unconfined Chalk
Environment Agency website; What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx

Water Body ID	GB40602G600700
Groundwater Body Name	Headington Corallian
CFAs covered by Waterbody	11,12

No WFD Surveys provided on this water body

CFA	11	12		
AP2 ID	No Scoped in APs in CFA	AP2-012-001	AP-C222-145	AP-C222-158
AP2 Location	N/A	Quainton	Crossroads Farm Culvert	Adam's Underbridge
New/Replacement Scheme Element	N/A	NEW	REPLACEMENT	NEW
AP2 Scheme Element Type	N/A	None	None	None
Original Scheme	N/A	Original scheme has no provision for regrading the ditch downstream of Footbridge QUA/26 accommodation underbridge, down to the private access road to Doddershall House.	Railway drainage hybrid pond located at 072+550 to the north of the proposed scheme with volume 3,351 m3. Railway drainage hybrid pond located at approximately 071+600 to the south of the proposed scheme.	The section of railway drainage north of Adam's accommodation underbridge is shown to cross the underbridge and discharge into an attenuation pond at ch 73+430.
AP2 Description	N/A	Revised scheme shows the landtake limits extended on the west side of the HS2 alignment at ch. 73+200 to enable regrading of the ditch downstream of Footbridge QUA/26 accommodation underbridge.	The track drainage outfall at 071+670 is to be moved south, upstream of Crossroad Farm Culvert, to avoid clash with the culvert. Part of railway catchment originally draining at 071+670 to be redirected to drainage hybrid pond at 072+550. The drainage hybrid pond at 072+550 to be increased in capacity by 250m3 to accommodate additional drainage. In addition, the drainage hybrid pond to the south of the alignment to be relocated closer to the alignment. Proposed turning head associated with this pond to be removed. Culvert at Crossroads Farm to be re-graded.	An additional outfall and rail drainage attenuation pond with volume of 187 m3 to be added immediately upstream of Adam's accommodation underbridge. The railway drainage pond at ch. 73+650 is reduced in size.
Changes to Previously assessed elements	N/A	None	None	None
AP2 Assessment Requirements	N/A	AP located on unproductive strata no assessment required	AP changes apply to surface water only, not requiring assessment for groundwater	AP located on unproductive strata no assessment required

GB405010402300

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Cutting						Embankment						Viaduct		Other Key Structures		Overall Impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Mixbury Cutting (CFA014)		Turweston Cutting (CFA014)		Brackley South Cutting (CFA014)		Brackley North Cutting (CFA014)		Greatworth South Cutting (CFA015)		Mixbury Embankment (CFA014)	Westbury Embankment (CFA014)	Growthill Embankment (CFA014)	Turweston Embankment (CFA014)	Brackley Embankment (CFA014)	Greatworth South Embankment (CFA015)	Westbury Viaduct (CFA014)	Turweston Viaduct (CFA014)	A421 Croton Road Overbridge	A43 Oxford Road Overbridge				
						091-L2		093-L1		097-L1		098-L1		099-L2		091-L1	092-L1	092-L2	095-L1	097-L1	098-L1	092-L2	095-L1	089-S2	096-S2				
GB405010402300					Phase	Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
Upper Bedford Ouse Oolite Principal 1	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions

WFD Baseline Survey Details

Water Body ID	GB40501G402300		
Groundwater Body Name	Upper Bedford Ouse Oolite Principal 1		
Scheme Element	Turweston Cutting, Embankment & Viaduct	Brackley South Cutting	Greatworth South Cutting
Key Receptors	GWDTE – Turweston Manor Carr LWS GWDTE – Turweston Carr & Wetland Tributary of Ouse	(Helmdon Disused Railway SSSI) Tributary of River Great Ouse located to south of cutting	Radstone Brook
Objectives of the Survey	• Confirmation that Turweston Manor Carr LWS is definitely a GWDTE and condition survey to assess any existing damage/pressures. • Confirmation that Turweston Carr & Wetland is definitely a GWDTE and condition survey to assess any existing damage/pressures. • Assessment of spring flows (including temporal / seasonal variation) • Assessment of GW levels and aquifer properties along line of route to refine drawdown and dewatering rate estimates. • Refine understanding of local interactions between GW bodies • Establishment of long-term monitoring network (GW, SW & Ecology)	• Confirmation that Helmdon Railway SSSI is definitely NOT a GWDTE. If it is, condition survey to assess any existing damage/pressures. • Assessment of spring flows (including temporal / seasonal variation) • Hydrological (and ecological) assessment of tributary of Great Ouse to south of cutting • Assessment of GW levels and aquifer properties along line of route to refine drawdown and dewatering rate estimates. • Refine understanding of local interactions between GW bodies • Establishment of long-term monitoring network (GW, SW & Ecology)	• Assessment of spring flows (including temporal / seasonal variation) • Assessment of GW levels and aquifer properties along line of route to refine drawdown and dewatering rate estimates. • Refine understanding of local interactions between GW bodies • Establishment of long-term monitoring network (GW & SW)
Survey Scope	• Vegetation survey (NVC & geostatistical survey & condition assessment) at Turweston Manor Carr LWS • Vegetation survey (NVC & geostatistical survey & condition assessment) at Turweston Carr & Wetland • Hydrological survey of springs / tributaries feeding GWDTEs and Ouse. • Spring flow monitoring • Monitoring bores: 3 no. o 1 pair (shallow and deep) in Turweston Manor Carr LWS o 1 at Turweston Carr & Wetland (could monitor springs instead if suitable) • Groundwater level logger • Groundwater quality sampling	• Vegetation survey (NVC & geostatistical survey & condition assessment) at Helmdon Disused Railway SSSI • Hydrological survey of springs / tributary of Ouse to south of cutting. • Spring flow monitoring • Monitoring bores: 2 no. o 1 between Hall Farm and SSSI outside CCB. o 1 between SSSI, A43 and tributary of Great Ouse outside CCB • Groundwater level logger • Groundwater quality sampling	• Hydrological survey of springs / tributaries feeding Radstone Brook. • Spring flow monitoring • Monitoring bores: 2 no. o 1 (nested or multilevel group) to S in Ouse (Beds) catchment outside CCB (could replace with springs where suitable) o 1 (nested or multilevel group) to N in Radstone Brook catchment outside CCB near Halse Copse (could replace with springs where suitable) • Groundwater level logger
Medium Term Survey Results Summary	Survey point **WFD-GW1-0002b** was reported as a spring and stream and was visited on 08/08/2014 10:12. A flow rate of 0.0285 m^3/s was reported for the stream, but no flow was evident from the spring. The stream and spring are identified as both likely to be groundwater dependent as evident by the relatively low temperature of the surface water. There are localised superficial head deposits in the area and the area is underlain by a Principal Aquifer. There is a geological fault in the area. The habitats recorded at the foot of the slope and valley bottom, fen meadow & standing water aquatic, indicate they are permanent and groundwater fed with support from surface water run-off. NVC survey is recommended along with water level and flow monitoring. No other information appears to have been collected regarding other springs in the area identified for survey, these should be accessed when possible for the long term surveys. An NVC survey was undertaken on the area downstream of WFD-GW1-0002b on 08/08/2015 and identified broad communities of Tall herbs (OV26), Glyceria maxima swamp (S5a) (in the valley bottom) & standing water aquatic community. The communities identified are not in the UKTAG list of communities likely to be groundwater dependent, indicating that the area is not GWD. No NVC surveys have been carried out at the Turweston Manor Carr LWS.	Survey point **WFD-GW1-0003a** was reported as a stream and pond visited on 18/07/2014 12:55. It was not possible to access the stream for a flow rate, there was no evidence of a spring feeding the stream. Vegetation of W21– Crataegus monogyna - Hedera helix scrub is quoted, which is not identified under NVC as being groundwater dependent, and is noted as being surface water reliant. The site was reported as being very wet and despite the dry weather conditions there was flowing water, suggesting possible groundwater influence, however, the source could not be identified during the site visit. No further ecology survey is recommended. Survey point **WFD-GW1-0003b** looked at the disused railway on 15/07/2014 11:30. The report identifies that the presence of shallow standing water in the disused railway cutting could be groundwater fed from the Bilsworth Limestone Formation (Principal Aquifer). The wet feature, was heavily vegetated with a dominant community, S22a, noted. This community is not identified under NVC as groundwater dependent. No detailed NVC surveys have been carried out on the SSSI in 2014. Groundwater monitoring is recommended at the site.	Survey point**WFD-GW1-0004a** was reported as a stream (SP 55846 42606) visited on 08/07/2014 09:55. A flow rate of 3.54l/s was recorded . The stream is reported to be unlikely to be groundwater dependent, however the source of the stream would need to be located to confirm this. Vegetation of W21– Crataegus monogyna - Hedera helix scrub is quoted, which is not identified under NVC as being groundwater dependent, and is noted as being surface water reliant. No further ecology survey is recommended, although identification of the source of the stream is noted as required. Survey point**WFD-GW1-0004b** looked at a ditch (SP57424 42189) on 20/08/2014 11:45. The report identifies still water, and assess that the watercourse looks to be ephemeral (flow occurring following periods of rainfall). An inspection of the upstream location (SP 57294, 42553) confirmed that the channel is dry, and channels in the adjacent woodland (SP 57246, 42378; and SP 57190, 42445) also dry. No vegetation was recorded within the feature. It is stated that rises in groundwater levels may lead to flows occurring in areas where the ground surface intersects the water table. The report suggests any reduction in groundwater level will not impact this ecological feature. No further monitoring is recommended. Survey point**WFD-GW1-0004c** looked at a stream at SP 56285 42009 on 08/07/2014 11:34. The report identifies that there was imperceptible flow in the stream, with no vegetation identified. The report stated that the stream is unlikely to be groundwater dependent, with the source of stream accessible on site and found to be a culvert. However some groundwater input not ruled out in report. No further monitoring is recommended as no ecology of concern. Survey point**WFD-GW1-0004d** looked at a stream and lake at SP 56437 41240 on 08/07/2014 15:19. The report states a measured flow of 2.13l/s in the stream, and that the stream appears to be sourced by the lake, however the lake could not be accessed. A pond at SP 56580, 41336 was dry and identified as likely to be surface water fed. The report concludes the stream is unlikely to be groundwater dependent, however the source of the stream could not be identified on site. It wasn't possible to robustly understand whether the ecology community recorded is groundwater dependant. Identification of source of stream is recommended to rule out groundwater dependence, with surface water monitoring recommended for the ecological community. Survey point**WFD-GW1-0004e** looked at a watercourse at SP 57869 41396 on 20/08/2014 13:25. The report states that the watercourse drains the adjacent Halse Copse Woodland to the north west. The upper section (upstream) of the watercourse is dry and flow (recorded at 0.00073m3/s) is not continuous along the entire length of the watercourse. An issue/drain (at NGR: SP 57861, 41388) is seen flowing into the watercourse from the adjacent land. Vegetation of W21– Crataegus monogyna - Hedera helix scrub is quoted, which is not identified under NVC as being groundwater dependent, and is noted as being surface water reliant. The report concludes that springs are likely to emerge where the Great Oolite Group has geological contacts with the underlying Rutland Formation Mudstone, and that the issues and land drains feeding the watercourse are evidence of flows from the underlying Great Oolite Group. The report states that no further botanical monitoring is justified due to the lack of botanical ecology recorded within the feature. A white-clawed crayfish survey for the feature is recommended due to the presence of a number of suitable habitats. No further groundwater monitoring is recommended in report. Survey point**WFD-GW1-0004f l**ooked at a ditch/watercourse at SP 57881 40789 on 02/08/2014 11:40. No water was present within the ditch. Vegetation of W21– Crataegus monogyna - Hedera helix scrub is quoted, which is not identified under NVC as being groundwater dependent, and is noted as being surface water reliant. The report concludes that there is the potential for groundwater flow to the ditch when groundwater levels are high. No further monitoring is recommended as any reduction in groundwater will not impact this ecological feature. Survey point**WFD-GW1-0004g** looked at a stream at SP 57900 40029 on 18/08/2014 14:03. The stream was dry at the time of the visit. Vegetation of W21– Crataegus monogyna - Hedera helix scrub is quoted, which is not identified under NVC as being groundwater dependent, and is noted as being surface water reliant. No springs were observed with the report noting that a culvert outlet is present at the location where issues are marked on OS maps (photo reference: WFD-GW1-004f_2376-18082014-18082014 SP 457900 240029) and is most likely linked to a field drainage network. No further monitoring is recommended as any reduction in groundwater is unlikely to impact this ecological feature. Survey point**WFD-GW1-0004i** looked at a watercourse at SP 55946 43961 on 29/07/2014 15:34. A flow of 0.0025 m3/s was reported at SP 55946, 43961 downstream. Vegetation of W21– Crataegus monogyna - Hedera helix scrub is quoted, which is not identified under NVC as being groundwater dependent, and is noted as being surface water reliant. A small spring is noted at SP5552444025, allowing a small localised wetland community to grow. The report concludes that the watercourse is likely to be groundwater dependent, with possible additional runoff from the surrounding arable land contributing to flows during wet winter months. However no further monitoring is recommended as any reduction in groundwater will not impact either ecological feature.
Medium Term Survey Results Conclusions in relation to previous assessment	The stream monitored is likely to be groundwater dependent, suggesting the Turweston Carr and Wetland area also has at least an element of groundwater dependency. Water level and flow monitoring is recommended at point 2b, and should be taken forwards. An NVC survey should be carried out at Tureston Manor Carr LWS.	Information suggests that Helmdon Disused Railway SSSI could have an element of groundwater dependence, therefore boreholes should be installed.	An element of groundwater dependency could be present in areas, especially at WFD-GW1-004e, where springs are identified. Point e was not previously identified for spring monitoring. Points d and i could also have groundwater dependency. The remaining survey points have been identfied as any reduction in groundwater will not affect the ecology.
Additional Comments	Need to liaise with local wildlife trust/local authorities re Turweston Manor Carr LWS.	Need to liaise with Natural England re Helmdon Disused Railway SSSI.	Consider incorporating GW assessment into geotechnical investigation programme and monitoring into general environmental monitoring plan

Blue - included in medium term survey
Black - would be covered in long term survey

dark blue - Recommendations additional to those provided in survey reports

Audit Trail for the Update of the WFD Water Body Assessment with Baseline Data

WFD Classification Elements Changed	**Nature of the Assessment Update and Justification**		
	Turweston Cutting, Embankment & Viaduct (CFA14)	**Brackley South Cutting (CFA14)**	**Greatworth South Cutting (CFA14)**
2. Surface water.	**Quantity** - No assessment update at this stage Information collected during medium term survey indicates that the stream visited is likely to be groundwater dependent. As such the assumptions made in the previous WFD assessment that baseflow may be locally affected over 1km stretch holds **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as assessment of other locations.**	**Quantity** - No assessment update at this stage Information collected during medium term survey indicates that the stream visited is likely to be groundwater dependent. As such the assumptions made in the previous WFD assessment that Potential for reduction in spring flows to tributary of Ouse to SW of cutting and Tributary affected by up to 60% reduction in spring flow, which may have water quality consequences during low flows, holds. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as assessment of other locations.**	**Quantity** - No assessment update at this stage Information collected during medium term survey indicates that most of the streams visited are unlikely to be groundwater dependent, with the exception of stream e. As such the assumptions made in the previous WFD assessment that the base of the cutting is estimated to be close to the water table, and there could be a minor influence on spring flows and baseflow of tributaries but the effects will be localised hold. **Assessment is to be revisited following collection of long term survey data.**
	Quality - No assessment update at this stage Information collected during medium term survey indicates that the stream visited is likely to be groundwater dependent. As such the assumptions made in the previous WFD assessment that baseflow may be locally affected over 1km stretch holds **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as assessment of other locations.**	**Quality** - No assessment update at this stage Information collected during medium term survey indicates that the stream visited is likely to be groundwater dependent. As such the assumptions made in the previous WFD assessment that Potential for reduction in spring flows to tributary of Ouse to SW of cutting and Tributary affected by up to 60% reduction in spring flow, which may have water quality consequences during low flows, holds. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as assessment of other locations.**	**Quality** - No assessment update at this stage Information collected during medium term survey indicates that most of the streams visited are unlikely to be groundwater dependent, with the exception of stream e. As such the assumptions made in the previous WFD assessment that the base of the cutting is estimated to be close to the water table, and there could be a minor influence on spring flows and baseflow of tributaries but the effects will be localised hold. **Assessment is to be revisited following collection of long term survey data.**
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs).	**Quantity** - No assessment update at this stage Information collected during medium term survey indicates that the stream visited is likely to be groundwater dependent. As such the assumptions made in the previous WFD assessment that Turweston Manor Grassland LWS is a groundwater dependent terrestrial ecosystem holds **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as assessment of other locations.**	**Quantity** - No assessment update at this stage Information collected during medium term survey indicates that the stream visited is could be groundwater dependent, and that existing railway cutting is close to water table. As such the assumptions made in the previous WFD assessment that groundwater levels beneath Helmdon Disused Railway SSSI will be lowered locally holds. **Assessment is to be revisited following collection of NVC, and long term surveys.**	**Not Required**
	Quality - No assessment update at this stage Information collected during medium term survey indicates that the stream visited is likely to be groundwater dependent. As such the assumptions made in the previous WFD assessment that Turweston Manor Grassland LWS is a groundwater dependent terrestrial ecosystem holds **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as assessment of other locations.**	**Quality** - No assessment update at this stage Information collected during medium term survey indicates that the stream visited is could be groundwater dependent, and that existing railway cutting is close to water table. As such the assumptions made in the previous WFD assessment that there are GWDTE in the radius of dewatering influence holds. **Assessment is to be revisited following collection of NVC, and long term surveys.**	**Not Required**
4. Water balance.	Quantity - No assessment update at this stage as survey data collected does not relate to assumptions made on water balance: Water transferred from UBOO Secondary to UBOO Principal by track drainage.	Quantity - No assessment update at this stage as survey data collected does not relate to assumptions made on water balance: Water transferred from UBOO Secondary to UBOO Principal by track drainage.	Quantity - No assessment update at this stage as survey data collected does not relate to assumptions made on water balance: base of cutting estimated to be close to water table. Abstracted water will be discharged to surface waters at southern end.

There are no AP2 Changes in this water body requiring assessment

Water Body ID	GB40502G401300
Groundwater Body Name	Upper Bedford Ouse Oolite Secondary
CFAs covered by Waterbody	13, 14, 15

No WFD Surveys provided directly on this water body only those related to Upper Bedford Ouse Oolite Principal

CFA	14	15			
AP2 ID	AP-C222-209	AP2-015-002	AP-C222-191	AP-C222-204	AP2-015-009
AP2 Location	Northamptonshire	Greatworth Hall	Lower Thorpe	Northamptonshire	Chipping Warden
New/Replacement Scheme Element	NEW	NEW	NEW	NEW	NEW
AP2 Scheme Element Type	None	Relocated access road	None	Road works for turning circles	Road extension and permanent presence
Original Scheme	The Bill provides for re-grading the ditch downstream of Newton Purcell Culvert.	The Bill provides for planted landscape bunds along both sides of the HS2 route to provide landscape integration and visual screening to mitigate visual impacts on Greatworth, Greatworth Hall and users of the PRoW. The bund was to have a gap at Greatworth Hall to allow for a disused railway crossing of the HS2 route. Two land drainage areas were provided with the eastern area being approximately 1.2ha with an average depth of approximately 2m and the western area being approximately 0.3ha at an average depth of 2.7m . Maintenance access tracks were provided on the eastern side of the HS2 route	The Bill provides for the use of Banbury Lane to service the Lower Thorpe Viaduct Satellite Construction Compound. In addition, the access would be required for the purpose of constructing the maintenance access to the balancing pond located south of Banbury Lane and west of the HS2 route	The Bill provides for temporary closure of Banbury Lane with a temporary alternative route via Banbury Road, for a period of approximately one to two months during construction. This will allow construction associated with the Lower Thorpe viaduct. Banbury Lane will then be permanently reinstated along its existing alignment	The Bill provides for a temporary realignment of the A361 Byfield Road, east of Chipping Warden, to approximately 150m north for a period of approximately three years whilst the green tunnel past Chipping Warden is built. This would divert construction traffic around Chipping Warden rather than through the village. The road would then be permanently reinstated along its existing alignment over the green tunnel
AP2 Description	The revised scheme will lower Newton Purcell Culvert to avoid the track drainage pipes. Minor deepening and widening of the existing watercourse will be carried out.	• extension of the landscape bund on the east of the HS2 route and west of Greatworth Hall; • replacement of the two land drainage areas with a single land drainage area approximately 1ha in size with an average depth of 1.5m; and • revised access arrangements to the pond to be taken from the tunnel portal access track, and routed between the realigned Welsh Road and rear of the tunnel portal and over the landscape bund. New maintenance access and tunnel portal/pond access road on the south side of the HS2 route will be shared with the landowner for farm use by combining a farm access track to Greatworth Hall farm with construction and operation access. The road will be widened and two passing points will be added.	A new temporary 300 m long construction access road will be constructed adjacent to the route of the original scheme from Banbury Lane to the Lower Thorpe Viaduct Satellite Construction Compound, to reduce traffic levels on Banbury Lane.	the need to add turning heads to Banbury Lane when it is closed during construction has been identified, east and west of the route of the Proposed Scheme. The turning heads will allow vehicles to turn safely at the end of the stopped up Banbury Lane	the need to make the temporary alignment of the A361 Byfield Road permanent and to extend the road extended southwards to the west of Chipping Warden has been identified. It will be used by construction traffic as well as providing a permanent bypass for Chipping Warden
Changes to Previously assessed elements	None	None	None	None	None
AP2 Assessment Requirements	Not a significant structure relating to groundwater so no assessment required	Access Road works to be assessed	located on Byfield Jurassic no assessment required for groundwater	located on Byfield Jurassic no assessment required for groundwater	On Tame Anker Mease - Secondary Combined, assessment not required

Requires Assessment

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Cutting						Embankment			Green Tunnel		Other Key Structures				Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Chetwode Cutting (CFA13)		Barton to Mixbury Cutting (CFA13 and CFA14)		Greatworth North Cutting (CFA15)		Barton Hartshorne Embankment (CFA13)	Helmdon Embankment (CFA14)	Greatworth North Embankment (CFA15)	Greatworth Green Tunnel (CFA15)		A4421 Buckingham Road Overbridge	A422 Brackley Road Overbridge	Helmdon Road Realignment	Greatworth Hall Access Road (CFA15)				
						084-L2		087-L2		101-L2		086-L1	095-L3	101-L1	101-L3		088-S1	093-S2	101-S2	AP2-015-002				
GB40502G401300					Phase	Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
Upper Bedford Ouse Oolite Secondary	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Reduction in groundwater contributions	Reduction in groundwater contributions	Reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Damming of groundwater flow and reduction in groundwater contributions	Damming of groundwater flow and reduction in groundwater contributions	Damming of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions				
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)																			
1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Not At Risk	Good Ecological Status by 2015		No likely saline or other intrusion of poor quality water as a result of dewatering.	No impacts identified as result of scheme element	No likely saline or other intrusion of poor quality water as a result of dewatering.	No impacts identified as result of scheme element	No likely saline or other intrusion of poor quality water as a result of dewatering.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No likely saline or other intrusion of poor quality water as a result of dewatering.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impacts predicted	Remains at Good Status	None required	Remains at Good Status
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Good	High	Not At Risk	Good Ecological Status by 2015		Majority of cutting expected to be above water table. Close to tributary of Padbury Brook (GB105033038210). Minor impact to flow in groundwater fed spring south-west of Rosehill Farm, Chetwode as a result of dewatering superficial and bedrock aquifers. Localised impact on flow regime. Water intercepted in the cutting will be collected by track drainage and discharged to nearby detention ponds or to watercourses.	Close to tributary of Padbury Brook (GB105033038210). Majority of cutting expected to be above water table. Minor impact to flow in groundwater fed spring south-west of Rosehill Farm, Chetwode as a result of dewatering superficial and bedrock aquifers. Localised impact on flow regime. Water intercepted in the cutting will be collected by track drainage and discharged to nearby detention ponds or to watercourses.	Majority of cutting above water table. Southern part of cutting in Padbury Brook catchment. Northern part of cutting in River Ouse catchment. Intercepted groundwater during construction would be discharged into the minor watercourses at both ends. Track drainage will discharge at N end of cutting, moving water from Padbury Brook catchment to River Ouse catchment. Groundwater flow to springs to the north of Manor Farm, Barton Hartshorn and issues south west of Garden Cottages will not be disturbed by the cutting as they will be fed from the higher groundwater to the north.	Southern part of cutting in Padbury Brook catchment. Northern part of cutting in River Ouse catchment. Majority of cutting expected to be above water table. Intercepted groundwater during construction would be discharged into the minor watercourses at both ends. Track drainage will discharge at N end of cutting, moving water from Padbury Brook catchment to River Ouse catchment. Groundwater flow to springs to the north of Manor Farm, Barton Hartshorn and issues south west of Garden Cottages will not be disturbed by the cutting as they will be fed from the higher groundwater to the north.	In catchment of Ouse (Beds). Cutting expected to be predominantly above water table. May extend locally up to 4m below water table. Potential for flow in spring located 150m south-west of the route to be reduced as groundwater that would naturally flow to these springs would be drawn towards the cutting. Track and land drainage will be discharged to the spring 150m south-west of the route via attenuation ponds. Implementation of monitoring plan, with appropriate remedial action being taken if required.	Cutting expected to be predominantly above water table. May extend locally up to 4m below water table. However, unlikely to influence wider flow regime and no receptors identified within calculated RoI. Track and land drainage will be discharged to the spring 150m south-west of the route via attenuation ponds. Implementation of monitoring plan, with appropriate remedial action being taken if required.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Located on catchment divide between Radstone Brook, Ouse Beds, Cherwell and Farthinghoe. During construction, dewatering may reduce spring flows at Painters Spinney, in catchment of Helmdon Brook. Possible slight temporary influence on other springs downhill from tunnel during construction, although these springs are all outside predicted RoI. No permanent dewatering required post-construction. Minor influence on geometry of catchment divide. Implementation of water monitoring plan, with appropriate remedial action being taken if required.	Following construction and backfilling around the cut-and-cover tunnel, impact on spring flows will be reduced. Route generally follow a ridgeline and therefore anticipated that the route will be close to the line of a natural groundwater divide. In most cases obstruction to groundwater flow unlikely to have significant impact on spring flows. Implementation of monitoring plan, with appropriate remedial action being taken if required.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Localised / temporary impacts predicted. Further assessment of combined impacts on surface water catchments, in conjunction with assessment for adjacent UBOOP1 GWB, required, particularly for Radstone Brook and Ouse.	Remains at Good Status	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater to maximise potential for recharge back to groundwater. Monitoring during construction	Remains at Good Status
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs). To assess the impact of groundwater abstractions on the condition of GWDTEs.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		No groundwater dependent ecosystems (GWDTEs) identified in vicinity of scheme element so no impact identified.	No groundwater dependent ecosystems (GWDTEs) identified in vicinity of scheme element so no impact identified.	No groundwater dependent ecosystems (GWDTEs) identified in vicinity of scheme element so no impact identified.	No groundwater dependent ecosystems (GWDTEs) identified in vicinity of scheme element so no impact identified.	No groundwater dependent ecosystems (GWDTEs) identified in vicinity of scheme element so no impact identified.	No groundwater dependent ecosystems (GWDTEs) identified in vicinity of scheme element so no impact identified.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Reduction of groundwater flow to groundwater fed streams within catchment of River Cherwell during construction. River Cherwell has been identified as a groundwater dependent habitat. However, drainage from the cutting during construction likely to be discharged to nearby watercourses which feed into the River Cherwell. No significant impacts on Cherwell predicted.	Contribution to groundwater fed springs which feed into the River Cherwell are likely to be reinstated following the covering of the cut-and-cover tunnel.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	No groundwater dependent ecosystems (GWDTEs) identified in vicinity of scheme element so no impact identified.	Localised / temporary impacts	Remains at Good Status	None required	Remains at Good Status
4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		Majority of cutting expected to be above water table. No licensed abstractions within 1km. Drainage from the cutting will be discharged to local surface watercourses via detention ponds.	Majority of cutting expected to be above water table. No significant impacts predicted.	Majority of cutting expected to be above water table. Intercepted groundwater would be discharged into attenuation pond then the minor watercourses. Groundwater may be transferred from UBOO Secondary to UBOO Principal GW body by track drainage systems.	Majority of cutting expected to be above water table. Groundwater may be transferred from UBOO Secondary to UBOO Principal GW body by track drainage systems.	Cutting expected to be predominantly above water table. May extend locally up to 4m below water table. Track and land drainage will be discharged to the spring 150m south-west of the route via attenuation ponds.	Cutting expected to be predominantly above water table. May extend locally up to 4m below water table. However, unlikely to influence wider groundwater regime.	Potential reduction in groundwater recharge due to deposition of material minimal and will be mitigated by collection of route drainage to ditches and swales for infiltration back to groundwater.	Potential reduction in groundwater recharge due to deposition of material minimal and will be mitigated by collection of route drainage to ditches and swales for infiltration back to groundwater.	Potential reduction in groundwater recharge due to deposition of material minimal and will be mitigated by collection of route drainage to ditches and swales for infiltration back to groundwater.	Groundwater is likely to be intercepted as base of cutting is below anticipated groundwater level. Dewatering during construction will have a local impact on water balance; water returned to ground via SuDS. Water from N end likely to be discharged into Byfield Jurassic GWB. Reduction in spring flows at Painters Spinney predicted.	No significant impacts predicted post-backfilling.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	Localised / temporary impacts predicted. Transfer of groundwater between UBOOS and UBOOP1 & Byfield Jurassic GWBs plus disposal of abstracted groundwater to surface water; GWB current water balance considered to have sufficient capacity to avoid change in status.	Remains at Good Status	None required	Remains at Good Status
Quantitative status	Good																					Good		Good

Groundwater body					Scheme Elements	Cutting						Embankment			Green Tunnel		Other Key Structures				Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Chetwode Cutting (CFA13)		Barton to Mixbury Cutting (CFA13 and CFA14)		Greatworth North Cutting (CFA15)		Barton Hartshorne Embankment (CFA13)	Helmdon Embankment (CFA14)	Greatworth North Embankment (CFA15)	eatworth Cut-and-cover tunnel (CFA15)		A4421 Buckingham Road Overbridge	A422 Brackley Road Overbridge	Helmdon Road Realignment	Greatworth Hall Access Road (CFA15)				
						084-L2		087-L2		101-L2		086-L1	095-L3	101-L1	101-L3		088-S1	093-S2	101-S2	AP2-015-002				
GB40502G401300					Phase	Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
Upper Bedford Ouse Oolite Secondary	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	None identified	None identified	None identified	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate				
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)																			
1. Saline or other intrusions. To identify groundwater bodies where intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Not At Risk	Good Chemical Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impacts predicted	Remains at Good Status	None required	Remains at Good Status
2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Good	High	Not At Risk	Good Chemical Status by 2015		Local impacts on spring flows into tributaries. Water intercepted in the cutting will be collected by track drainage and discharged to nearby detention ponds or to watercourses. CoCP and best practice for design, construction and operations reduce risks to water quality.	Water intercepted in the cutting will be collected by track drainage and discharged to nearby detention ponds or to watercourses. CoCP and best practice for design, construction and operations reduce risks to water quality.	Intercepted groundwater would be discharged into the minor watercourses. Implementation of CoCP will mitigate against any pollutant link to surface water during construction.	The Barton to Mixbury cutting is likely to intercept groundwater in the Oolite and superficial deposits and draw groundwater into the cutting instead of discharging as baseflow in minor watercourses. Intercepted groundwater would be discharged into the minor watercourses. CoCP and best practice for design, construction and operations reduce risks to water quality.	Track and land drainage would be discharged to minor watercourse via attenuation ponds. CoCP and best practice for design, construction and operations reduce risks to water quality.	Track and land drainage would be discharged to minor watercourse via attenuation ponds. CoCP and best practice for design, construction and operations reduce risks to water quality.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	During construction, dewatering may reduce spring flows at Painters Spinney, in catchment of Helmdon Brook. Implementation of monitoring plan. CoCP and best practice for design, construction and operations reduce risks to water quality.	Following construction and backfilling around the cut-and-cover tunnel, impact on spring flows will be reduced. Route generally follow a ridgeline and therefore anticipated that the route will be close to the line of a natural groundwater divide. In most cases obstruction to groundwater flow unlikely to have significant impact on spring flows. Implementation of monitoring plan. CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In catchment of River Ouse. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In catchment of Helmdon Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Localised / temporary impacts	Remains at Good Status	None required	Remains at Good Status
3. GWDTEs. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTEs.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		No groundwater dependent ecosystems (GWDTEs) identified in vicinity of scheme element so no impact identified.	No groundwater dependent ecosystems (GWDTEs) identified in vicinity of scheme element so no impact identified.	No groundwater dependent ecosystems (GWDTEs) identified in vicinity of scheme element so no impact identified.	No groundwater dependent ecosystems (GWDTEs) identified in vicinity of scheme element so no impact identified.	No groundwater dependent ecosystems (GWDTEs) identified in vicinity of scheme element so no impact identified.	No groundwater dependent ecosystems (GWDTEs) identified in vicinity of scheme element so no impact identified.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Reduction of groundwater flow to groundwater fed streams likely to impact contribution to River Cherwell during construction which has been identified as a groundwater dependent habitat. CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No groundwater dependent ecosystems (GWDTEs) identified in vicinity of scheme element so no impact identified.	Localised / temporary impacts	Remains at Good Status	None required	Remains at Good Status
4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	Low	Probably At Risk	Good Chemical Status by 2015		In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA and private abstraction from a spring source located 600m from the route. During construction the green tunnel will act as a sink drawing in water which may alter the groundwater divide between the cutting and the abstraction, however it will no longer act as a sink once complete. Potential for impact to groundwater quantity and quality at the abstraction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality.	Backfill around tunnel. In DrWPA and private abstraction from a spring source located 600m from the route. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Localised / temporary impacts	Remains at Good Status	None required	Remains at Good Status
5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Localised / temporary impacts	Remains at Good Status	None required	Remains at Good Status
Chemical status	Good																					Good		Good
Overall status	Good																					Good		Good

Ref:
Environment Agency (2005) Upper Ouse and Bedford Ouse catchment abstraction licensing strategy - Oolite Unconfined GWMU2, AP17 - Tove, AP19 - Buckingham and AP20 - Twins
Environment Agency website; What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx

WFD Baseline Survey Details

Water Body ID	GB40602G604200	
Groundwater Body Name	Byfield Jurassic	
Scheme Element	Thorpe Mandeville Cutting	Edgcote Cutting Chipping Warden Green Tunnel
Key Receptors	Potential GWDTE at Costow House River Cherwell catchment (Culworth Brook) Water balance	River Cherwell Highfurlong Brook Water balance
Objectives of the Survey	• Confirmation that site at Costow House is definitely a GWDTE and condition survey to assess any existing damage/pressures. • Assessment of spring flows (including temporal / seasonal variation) • Assessment of GW levels and aquifer properties along line of route to refine drawdown and dewatering rate estimates. • Establishment of long-term monitoring network (GW, SW & Ecology)	• Assessment of spring flows (including temporal / seasonal variation) • Assessment of GW levels and aquifer properties along line of route to refine drawdown and dewatering rate estimates. • Refine understanding of local interactions between GW bodies • Establishment of long-term monitoring network (GW & SW)
Survey Scope	• Vegetation survey (NVC & geostatistical survey & condition assessment) at Costow House • Hydrological survey of flows/levels in springs / tributaries feeding Culworth Brook catchment to assess proportional contribution of each spring. • Regular spring flow monitoring to assess seasonal or other long-term trends • Monitoring bores: 3 no. (c.20 m deep) o 1 near S end of cutting near Greatworth Green Tunnel outside CCB (ideally near road to aid regular access but within Byfield Jurassic GWB), o 1 in potential GWDTE to W of cutting at Costow House (could use spring instead if suitable), o 1 to NE of cutting across road to Magpie Farm (could use spring instead if suitable) • Groundwater level logger – daily readings • Groundwater quality monitoring (GW & SW) • In situ aquifer testing	• Hydrological survey of springs / tributaries feeding Cherwell and Highfurlong Brook. • Spring flow monitoring • Monitoring bores: 3 no. o 1 at S end near tributary confluence with Cherwell outside CCB o 1 in central area near headwaters of tributary near Welsh Road (could use spring instead if suitable) • Groundwater level logger • In situ aquifer testing
Medium Term Survey Results Summary	At survey point **WFD-GW1-0005b** it is reported that the stream is fed by springs and runs into ponds around 1 km to the north east of Thorpe Mandeville. A spring discharge was noted at SP 53835 44658, and flow is described as fast flowing but overgrown with vegetation (no measurement was possible) observed on 02/07/2014 14:00. The stream feature was reported as shallow, c 1cm deep, cool, with the swamp appearing to be groundwater dependant to a degree as it is in hydraulic connectivity with the stream which is considered to be fed by springs. Surface water runoff from the surrounding valley slopes is likely to support water inputs to the stream. The stream feature supported a species poor macrophyte community, where there were breaks in the predominant treecover, characterised by fools watercress Apium nodiflorum. The swamp adjacent to the downstream extent of the stream feature was characterised by meadowsweet Filipendula ulmaria and lesser pond sedge Carex acutiformis which indicate S7 Carex acutiformis swamp (moderately Groundwater dependent) using the NVC system. The swamp feature is in favourable condition, not impacted by poaching or grazing. The macrophyte community recorded within the stream feature in in unfavourable condition, mainly due to significant overshading leading to poor species diversity **It is stated that NVC is recommended for the swamp area and adjacent habitats. Groundwater monitoring is recommended in order to ensure ecological quality is maintained and not impacted by changes to groundwater level or flow**. An NVC survey was undertaken on 02/07/2014, identifying the habitats as Mire (M27) and Tall herb (OV26) community. The presence of M27 indicates that the site (at Costow House) is moderately groundwater dependent. At survey point **WFD-GW1-0005a** it is reported that a possible spring was observed, identified as potentially seeping from points at the base of the Northampton Sand Secondary aquifer. The flow obsereved on 02/07/2014 15:30 was very low and not measureable. In places, no water was visible but the soil was moist. Towards the lowermost point of the site is a pool feature which appears to be fed by a number of small ditch-like watercourses. The vegetation at the spring feature and immediately downstream is characterised as species-poor marshy grassland, predominantly hard rush Juncus inflexus and bare ground. Vegetation with the treeline feature to the north is characteristic of a permanently wet, aquatic community characterised by reed sweet grass Glyceria maxima & fools water cress Apium nodiflorum. To the north, at the foot of the valley, the open water fen community is characterised by reed sweet grass with duckweed Lemna minor. The marshy grassland is in unfavourable condition, mainly due to poaching & grazing. Downstream of that, the treeline stream feature is in unfavourable condition due to extensive shading the trees provide. The fen pool at the northern extent is in favourable condition, demonstrated by the abundant aquatic macrophytes recorded which indicate a stable community structure. **It is stated that Groundwater monitoring is not recommended from a WFD perspective.**	At survey point **WFD-GW1-0006** visited on 02/07/2014 09:30 **t**he site was reported as a recently resectioned drainage ditch, connecting 2 areas of arable land. It was culverted for 20% of its length and essentially dry with minimal occasional ponded areas. The ponded area was described as being c25cm depth. The pond is described as being likely to be groundwater dependent, with runoff from the surrounding arable land contributing during wet seasons as there does not appear to be significant surface water inflow to the pond. The pond's botanical wetland ecology is believed to be linked to groundwater at this site. The dominant community, S28, is a widespread community, but is not classed as groundwater dependent under NVC. The pond is in unfavourable ecological condition and is a medium ecological value feature. Any reduction in groundwater may impact this ecological feature. The botanical wetland ecology within the ditch is not believed to be linked to groundwater at this site. The dominant community, OV26, is a widespread community relying predominantly on surface water for hydration. The ditch is in unfavourable ecological condition and is a low ecological value feature. Any reduction in groundwater will not impact this ecological feature. **It is stated that Groundwater monitoring is not recommended from a WFD perspective.**
Medium Term Survey Results Conclusions in relation to previous assessment	The survey at WFD-GW1-0005b recommends further monitoring as groundwater dependence is indicated.	Other spring points in the area - around Aston le Walls and Edgcote do not appear to have been surveyed at this stage, if access has not been possible these should be surveyed Post-Royal Ascent.
Additional Comments		Consider incorporating boreholes into geotechnical investigation programme and monitoring into general environmental monitoring plan

Blue - included in medium term survey
Black - would be covered in long term survey

dark blue - Recommendations additional to those provided in survey reports

Audit Trail for the Update of the WFD Water Body Assessment with Baseline Data

WFD Classification Elements Changed	**Nature of the Assessment Update and Justification**	
	Thorpe Mandeville Cutting (CFA15)	**Edgcote Cutting (CFA15)**
2. Surface water.	**Quantity** - No assessment update required The information collected during medium term survey indicates that the stream visited (b) is likely to be groundwater dependent, and as such the assumptions made in the previous WFD assessment that the cutting may affect springs and spring fed watercourses either side of the route holds. **Further monitoring was recommended including the spring discharge and the assessment is to be revisited following the collection of this data.**	**Quantity** - No assessment update at this stage Information collected during medium term survey indicates that the pond visited (6) is likely to be groundwater dependent. No other springs have been surveyed as part of the medium term surveys. As such the assumptions made in the previous WFD assessment that there is the potential for cutting to affect flows in the Marlstone Rock / Dyrham, with interception of springs feeding local surface water courses cannot be changed at this stage. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as locating stream sources.**
	Quality - No assessment update required The information collected during medium term survey indicates that the stream visited (b) is likely to be groundwater dependent, and as such the assumptions made in the previous WFD assessment that the changes in springs and baseflow in headwaters from the cuttings may influence surface water chemistry locally. **Further monitoring was recommended including the spring discharge and the assessment is to be revisited following the collection of this data.**	**Quality**- No assessment update at this stage Information collected during medium term survey indicates that the pond visited (6) is likely to be groundwater dependent. No other springs have been surveyed as part of the medium term surveys. As such the assumptions made in the previous WFD assessment that changes in baseflow may influence surface water chemistry locally cannot be changed at this stage. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as locating stream sources.**
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs).	**Quantity** - No assessment update required The information collected during medium term survey indicates that the stream visited (b) is likely to be groundwater dependent, and the NVC classification provided by the walkover identifies moderatrely groundwater dependent ecology, and as such the assumptions made in the previous WFD assessment that the Costow Fields are a fen habitat and so are potential GWDTE (not designated site) holds. **Further monitoring was recommended including an NVC survey and the spring discharge and the assessment is to be revisited following the collection of this data.**	**Quantity** - No assessment update at this stage Information collected during medium term survey indicates that the pond visited (6) is likely to be groundwater dependent. No other springs have been surveyed as part of the medium term surveys. As such the assumptions made in the previous WFD assessment that there is the potential for cutting to affect flows in the downhill Trafford Bridge Marsh LWS cannot be changed at this stage. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as locating stream sources.**
	Quality - No assessment update required The information collected during medium term survey indicates that the stream visited (b) is likely to be groundwater dependent, and the NVC classification provided by the walkover identifies moderatrely groundwater dependent ecology, and as such the assumptions made in the previous WFD assessment that changes in spring flow may influence water quality in fen habitat locally hold. **Further monitoring was recommended including an NVC survey and the spring discharge and the assessment is to be revisited following the collection of this data.**	**Quality** - No assessment update at this stage Information collected during medium term survey indicates that the pond visited (6) is likely to be groundwater dependent. No other springs have been surveyed as part of the medium term surveys. As such the assumptions made in the previous WFD assessment that there is the potential for water quality reaching the downhill Trafford Bridge Marsh LWS from cutting drainage discharge via attenuation ponds cannot be changed at this stage. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as locating stream sources.**
4. Water balance.	**Quantity** - No assessment update required at this stage as survey data collected does not relate to assumptions made on water balance: Dewatering of cutting may have adverse impact on water balance of local aquifers as water to be discharged to surface waters (Cherwell catchment) via attenuation pond.	**Quantity** - No assessment update required at this stage as survey data collected currently does not relate to assumptions made on water balance: Cutting is in Marlstone. Abstracted water discharged to surface waters. Abstracted water discharged to surface waters via attenuation pond within Banbury Jurassic GWB so may have adverse impact on water balance of local aquifers. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as locating stream sources.**
		Chipping Warden Green Tunnel (CFA15)
2. Surface water.		**Quantity** - No assessment update at this stage Information collected during medium term survey indicates that the pond visited (6) is likely to be groundwater dependent. No other springs have been surveyed as part of the medium term surveys. As such the assumptions made in the previous WFD assessment that there is the potential for cutting to affect flows in the Marlstone Rock / Dyrham, with interception of springs feeding local surface water courses (tributaries of Highfurlong Brook and River Cherwell) cannot be changed at this stage. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as locating stream sources.**
		Quality- No assessment update at this stage Information collected during medium term survey indicates that the pond visited (6) is likely to be groundwater dependent. No other springs have been surveyed as part of the medium term surveys. As such the assumptions made in the previous WFD assessment that changes in water chemistry may be affected by tunnel dewatering (combined with dewatering of Edgcote Cutting) cannot be changed at this stage. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as locating stream sources.**
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs).		**Quantity** - No assessment update at this stage Information collected during medium term survey indicates that the pond visited (6) is likely to be groundwater dependent. No other springs have been surveyed as part of the medium term surveys. As such the assumptions made in the previous WFD assessment that tunnel dewatering (combined with dewatering of Edgcote Cutting) may reduce local spring flows into the downhill Trafford Bridge Marsh LWS cannot be changed at this stage. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as locating stream sources.**
		Quality- No assessment update at this stage Information collected during medium term survey indicates that the pond visited (6) is likely to be groundwater dependent. No other springs have been surveyed as part of the medium term surveys. As such the assumptions made in the previous WFD assessment that changes in water chemistry may be affected by tunnel dewatering (combined with dewatering of Edgcote Cutting) into the downhill Trafford Bridge Marsh LWS cannot be changed at this stage. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as locating stream sources.**
4. Water balance.		**Quantity** - No assessment update required at this stage as survey data collected currently does not relate to assumptions made on water balance: Cutting is in Marlstone. Abstracted water discharged to surface waters. Abstracted water discharged to surface waters via attenuation pond within Banbury Jurassic GWB so may have adverse impact on water balance of local aquifers. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as locating stream sources.**

Water Body ID	GB40602G604200
Groundwater Body Name	Byfield Jurassic
CFAs covered by Waterbody	15

CFA	15			
AP2 ID	AP2-015-002	AP-C222-191	AP2-015-006	AP2-015-009
AP2 Location	Greathworth Hall	Lower Thorpe	Northamptonshire	Chipping Warden
New/Replacement Scheme Element	NEW	NEW	NEW	NEW
AP2 Scheme Element Type	Relocated access road	None	Road works for turning circles	Road extension and permanent presence
Original Scheme	The Bill provides for planted landscape bunds along both sides of the HS2 route to provide landscape integration and visual screening to mitigate visual impacts on Greatworth, Greatworth Hall and users of the PRoW. The bund was to have a gap at Greatworth Hall to allow for a disused railway crossing of the HS2 route. Two land drainage areas were provided with the eastern area being approximately 1.2ha with an average depth of approximately 2m and the western area being approximately 0.3ha at an average depth of 2.7m . Maintenance access tracks were provided on the eastern side of the HS2 route	The Bill provides for the use of Banbury Lane to service the Lower Thorpe Viaduct Satellite Construction Compound. In addition, the access would be required for the purpose of constructing the maintenance access to the balancing pond located south of Banbury Lane and west of the HS2 route	The Bill provides for temporary closure of Banbury Lane with a temporary alternative route via Banbury Road, for a period of approximately one to two months during construction. This will allow construction associated with the Lower Thorpe viaduct. Banbury Lane will then be permanently reinstated along its existing alignment	The Bill provides for a temporary realignment of the A361 Byfield Road, east of Chipping Warden, to approximately 150m north for a period of approximately three years whilst the green tunnel past Chipping Warden is built. This would divert construction traffic around Chipping Warden rather than through the village. The road would then be permanently reinstated along its existing alignment over the green tunnel
AP2 Description	• extension of the landscape bund on the east of the HS2 route and west of Greatworth Hall; • replacement of the two land drainage areas with a single land drainage area approximately 1ha in size with an average depth of 1.5m; and • revised access arrangements to the pond to be taken from the tunnel portal access track, and routed between the realigned Welsh Road and rear of the tunnel portal and over the landscape bund. New maintenance access and tunnel portal/pond access road on the south side of the HS2 route will be shared with the landowner for farm use by combining a farm access track to Greatworth Hall farm with construction and operation access. The road will be widened and two passing points will be added.	A new temporary 300 m long construction access road will be constructed adjacent to the route of the original scheme from Banbury Lane to the Lower Thorpe Viaduct Satellite Construction Compound, to reduce traffic levels on Banbury Lane.	the need to add turning heads to Banbury Lane when it is closed during construction has been identified, east and west of the route of the Proposed Scheme. The turning heads will allow vehicles to turn safely at the end of the stopped up Banbury Lane	the need to make the temporary alignment of the A361 Byfield Road permanent and to extend the road extended southwards to the west of Chipping Warden has been identified. It will be used by construction traffic as well as providing a permanent bypass for Chipping Warden
Changes to Previously assessed elements	None	None	None	None
AP2 Assessment Requirements	AP located on Upper Bedford Ouse Oolite Secondary Water Body No assessment required	Access road is just moved to opposite side of HS2 rail line, so no assessment required for groundwater	Road works for turning circles	On Tame Anker Mease - Secondary Combined, assessment not required

Requires Assessment

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Cutting								Embankment				Green Tunnel		Viaduct	Other Major Structures	Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Thorpe Mandeville Cutting (CFA015)		Lower Thorpe South Cutting (CFA015)		Lower Thorpe North Cutting (CFA015)		Culworth Cutting (CFA015)		Thorpe Mandeville Embankment (CFA015)	Lower Thorpe Embankment (CFA015)	Edgcote Battlefield Embankment (CFA015)	Edgcote Embankment South (CFA015)	Chipping Warden Green Tunnel (CFA015)		Lower Thorpe Viaduct (CFA015)	Banbury Road Turning Circles				
						104-L1		105-L2		105-L4		107-L1		104-L2	105-L3	106-L1	107-L2	109-L1		105-L1	AP2-015-006				
GB40602GE004200					Phase	Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation		Construction & Operation	Construction & Operation				
Byfield Jurassic	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	None identified	None identified	None identified	None identified	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions				
WFD classification elements					**Predicted change to status elements (green = none, amber = possibly, red = likely)**																				
1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions	Good	High	Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impacts identified	Remains at Good Status	None required	Remains at Good Status
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Good	High	Not At Risk	Good Ecological Status by 2015		Close to River Cherwell (GB106039037350) including minor tributaries. The cutting may affect springs and spring fed watercourses either side of the route. These springs are generally along the outcrop of the underlying Whitby Mudstone. Flow in springs near Costow House likely to be influenced, affecting Culworth Brook. Drainage water would be discharged to Culworth Brook downstream, meaning effects would be localised. No change in status of Cherwell expected. However, flows in upper 800mof watercourse may be affected. Implementation of monitoring plan.	Route of cutting will isolate a small area of Northampton Sand Formation (secondary aquifer), cutting it off from flow regime in rest of aquifer. This may affect local spring flows and thus watercourses. Drainage from cutting to be discharged to surface waters, so impacts localised.	Close to River Cherwell (GB106039037350) including a minor tributary. Shallow (1.4m) cutting in Whitby Mudstone Formation. Contribution of mudstone to local baseflow expected to be limited. Limited dewatering requirements anticipated. No significant impacts identified.	Cutting is in mudstone. Possible localised influence on flow regime. No significant impacts identified.	Close to a minor tributary of the River Cherwell (GB106039037350). Cutting predominantly in Whitby Mudstone Formation. Contribution of mudstone to local baseflow expected to be limited. Track drainage transfers water from upstream to downstream part of same catchment.	Cutting is in mudstone. Possible localised influence on flow regime. No significant impacts identified.	Close (200m) to a tributary of the River Cherwell (GB106039037350) but cutting is in mudstone. Contribution of mudstone to local baseflow expected to be limited. Limited dewatering expected to be required. No significant impacts identified.	Cutting is in mudstone. Possible localised influence on flow regime. No significant impacts identified.	Cutting is 300m from River Cherwell (GB106039037350) and <100m from a tributary. Potential for cutting to affect flows in the Marlstone Rock / Dyrham, with interception of springs feeding local surface water courses. Baseflow and spring flow to the tributary of the Cherwell to the northeast of the cutting may be reduced. Track drainage will be discharged to the River Cherwell and some of its tributaries via attenuation ponds. No impact on flows in Cherwell itself predicted.	Cutting will have localised influence on groundwater flow regime, which will influence spring flows and baseflow in adjacent watercourses.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Potential to affect flows in the Marlstone Rock & Dyrham Formations, with interception of springs feeding local surface water courses (tributaries of Highfurlong Brook and River Cherwell). Groundwater divide is located towards northern end of tunnel. Baseflow and spring flow to the tributary of the Cherwell to the northeast of the cutting may be reduced. Pond close to Calves Close Spinney may be influenced by local drawdowns in water table. Track drainage will be discharged to the River Cherwell and some of its tributaries via attenuation ponds. Impacts associated with tunnel dewatering are temporary during construction.	No impacts identified as result of scheme element	Excavation will be backfilled around tunnel. Minor local influence on groundwater flow regime due to presence of tunnel. No significant impact on surface water flows predicted.	No impacts identified as result of scheme element	Crosses River Cherwell (GB106039037350). On Whitby Mudstone, and possible local alluvium with shallow groundwater near river. Dewatering, if required, will be temporary and localised. Abstracted water returned to groundwater via infiltration or re-injection or to adjacent stretch of surface water body. Localised mounding of groundwater around piles may occur. Impact temporary and localised	Close to River Cherwell (GB106039037350) and tributary from Lower Thorpe Lake. Limited dewatering requirements anticipated. No significant impacts identified.	Local or temporary impacts predicted. However, combined impacts have the potential to have an adverse effect, particularly with respect to combined effects on River Cherwell.	Remains at Good Status	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater to maximise potential for recharge back to groundwater. Monitoring during construction	Remains at Good Status
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs). To assess the impact of groundwater abstractions on the condition of GWDTEs.	Good	High	Not At Risk	Good Ecological Status by 2015		Flow in springs near Costow House likely to be influenced, affecting Culworth Brook. Drainage water would be discharged to Culworth Brook downstream. Costow Fields are a fen habitat and so are potential GWDTE (not designated site). Changes in spring flow and downstream discharge to watercourse may locally influence water levels within the fen.	Flow in springs near Costow House likely to be influenced, affecting Culworth Brook. Costow Fields are a fen habitat and so are potential GWDTE. Changes in spring flow may locally influence water levels within the fen.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Trafford Bridge Marsh LWS is downhill from this cutting but probably not in direct hydraulic connection with scheme elements via groundwater as cutting is within Whitby Mudstone Formation. Upper Cherwell at Trafford House SSSI is 1.2km upstream from scheme element.	Cutting is in mudstone. Possible localised influence on flow regime. No significant impacts identified.	Trafford Bridge Marsh LWS is downhill from the cutting. Cutting dewatering may reduce local spring flows into marsh. Impact will be partially offset by cutting and track drainage being discharged to the River Cherwell and some of its tributaries via attenuation ponds. CoCP and best practice for design, construction and operations reduce risks to GWDTE. No significant residual impacts identified as result of scheme element.	Cutting will have localised influence on groundwater flow regime, which will influence spring flows and baseflow in adjacent watercourses.	No impacts identified as result of scheme element	Pond habitat at Lower Thorpe partially lost to scheme. Mitigation through creation of replacement pond and drainage design.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Trafford Bridge Marsh LWS is downhill from the tunnel. Tunnel dewatering (combined with dewatering of Edgcote Cutting) may reduce local spring flows into marsh. Impact will be partially offset by drainage being discharged to the River Cherwell and some of its tributaries via attenuation ponds. Pond close to Calves Close Spinney may be influenced by local drawdowns in water table. CoCP and best practice for design, construction and operations reduce risks to GWDTE. No significant residual impacts identified as result of scheme element. Impacts associated with tunnel dewatering are temporary during construction.	No impacts identified as result of scheme element	Pond habitat at Lower Thorpe partially lost to scheme. Mitigation through creation of replacement pond and drainage design.	No impacts identified as result of scheme element	Localised effects on GWDTEs predicted.	Remains at Good Status	Reassess once site investigation & monitoring data available Monitoring during construction	Remains at Good Status
4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		Cutting intersects Horsehay Sand Formation and Northampton Sand Formation (secondary aquifers), with Whitby Mudstone at or near base level. Dewatering of cutting may have adverse impact on water balance of local aquifers as water to be discharged to surface waters (Cherwell catchment) via attenuation pond.	Route of cutting will isolate a small area of Northampton Sand Formation (secondary aquifer), cutting it off from flow regime in rest of aquifer.	Shallow (1.4m) cutting in Whitby Mudstone Formation, designated as unproductive strata. Limited dewatering requirements anticipated. No significant impacts identified.	Cutting is in mudstone. Possible localised influence on flow regime. No significant impacts identified.	Cutting predominantly in Whitby Mudstone Formation (unproductive strata) but central stretch is adjacent to hill of Northampton Sand Formation (Secondary bedrock aquifer) to the northeast. Abstracted water discharged to surface water body. Slight adverse impact on water balance.	Cutting is in mudstone. Possible localised influence on flow regime. No significant impacts identified.	Cutting is in Whitby Mudstone Formation, designated as unproductive strata. Limited dewatering expected to be required. Abstracted water discharged to surface water body. No significant impact predicted.	Cutting is in mudstone. Possible localised influence on flow regime. No significant impacts identified.	Cutting is in Marlstone. Abstracted water discharged to surface waters. Abstracted water discharged to surface waters via attenuation pond within Banbury Jurassic GWB so may have adverse impact on water balance of local aquifers.	Cutting will have localised influence on groundwater flow regime. No significant impacts identified	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Dewatering during construction from Marlstone Rock and Dyrham Formations (secondary aquifers). Abstractions along the ridge at Appletree Farm that abstract from Dyrham Formation. During construction there could be an impact to flows. Implement groundwater monitoring regime during construction to determine if further mitigation required (alternative water source for farm). CoCP and best practice for design, construction and operations reduce risks to groundwater. Abstracted water discharged to surface waters via attenuation pond so temporary adverse impact on water balance of local aquifers.	Excavation will be backfilled around tunnel. Tunnel will have localised influence on groundwater flow regime. No significant impacts identified	On Whitby Mudstone, and possible local alluvium with shallow groundwater near river. Dewatering, if required, will be temporary and localised. Abstracted water returned to groundwater via infiltration or re-injection or to adjacent stretch of surface water body. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified following mitigation.	No impacts identified as result of scheme element	Local or temporary impacts predicted. Combined impacts have the potential to have an adverse effect on the WFD element as some groundwater being discharged to surface waters or to other groundwater bodies. Current water balance for GWB is at Good status but has limited spare capacity.	Remains at Good Status	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater to maximise potential for recharge back to groundwater. Monitoring during construction	Remains at Good Status
Quantitative status	Good																						Good		Good

Groundwater body					Scheme Elements	Cutting								Embankment				Green Tunnel		Viaduct	Other Major Structures	Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Thorpe Mandeville Cutting (CFA015)		Lower Thorpe South Cutting (CFA015)		Lower Thorpe North Cutting (CFA015)		Culworth Cutting (CFA015)		Thorpe Mandeville Embankment (CFA015)	Lower Thorpe Embankment (CFA015)	Edgcote Battlefield Embankment (CFA015)	Edgcote Embankment South (CFA015)	Chipping Warden Green Tunnel (CFA015)		Lower Thorpe Viaduct (CFA015)	Banbury Road Turning Circles				
						104-L1		105-L2		105-L4		107-L1		104-L2	105-L3	106-L1	107-L2	109-L1		105-L1	AP2-015-006				
GB40602GE004200					Phase	Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation		Construction & Operation	Construction & Operation				
Byfield Jurassic	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate				
WFD classification elements					**Predicted change to status elements (green = none, amber = possibly, red = likely)**																				
1.Saline or other intrusion. To identify groundwater bodies where intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstraction	Good	High	Not At Risk	Good Chemical Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impacts identified	Remains at Good Status	None required	Remains at Good Status
2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Good	Low	Not At Risk	Good Chemical Status by 2015		Changes in springs and baseflow in headwaters may influence surface water chemistry locally. Dewatering will be discharged to Culworth Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Potential for cutting to affect flows in Culworth Brook, with interception of springs. Changes in baseflow may influence surface water chemistry locally in upper 800m of watercourse. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Discharge of abstracted water may create pathway. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant residual impacts identified as result of scheme element	Discharge of abstracted water may create pathway. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant residual impacts identified as result of scheme element	Discharge of abstracted water may create pathway. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant residual impacts identified as result of scheme element	Discharge of abstracted water may create pathway. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant residual impacts identified as result of scheme element	Potential for cutting to affect flows in the Marlstone Rock / Dyrham, with interception of springs feeding local surface water courses. Cutting and track drainage will be discharged to the River Cherwell and some of its tributaries via attenuation ponds. Changes in baseflow may influence surface water chemistry locally. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant residual impacts identified as result of scheme element	Potential for cutting to affect flows in the Marlstone Rock / Dyrham, with interception of springs feeding local surface water courses. Changes in baseflow may influence surface water chemistry locally. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant residual impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Tunnel dewatering (combined with dewatering of Edgcote Cutting) may reduce local spring flows. Impact will be partially offset by drainage being discharged to the River Cherwell and some of its tributaries via attenuation ponds. CoCP and best practice for design, construction and operations reduce risks to surface waters. No significant residual impacts identified as result of scheme element.	No impacts identified as result of scheme element	Excavation will be backfilled around tunnel. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Localised or temporary effects	Remains at Good Status	None required	Remains at Good Status
3. GWDTEs. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTEs.	Good	High	Not At Risk	Good Chemical Status by 2015		Flow in springs near Costow House likely to be influenced, affecting Culworth Brook. Costow Fields are a fen habitat and so are potential GWDTE (not designated site). Drainage water would be discharged to Culworth Brook downstream of current springs. Changes in spring flow may influence water quality in fen habitat locally. CoCP and best practice for design, construction and operations reduce risks to GWDTE. No significant impacts identified as result of scheme element	Costow Fields are a fen habitat and so are potential GWDTE. Drainage water would be discharged to Culworth Brook downstream from current springs. CoCP and best practice for design, construction and operations reduce risks to GWDTE. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Trafford Bridge Marsh LWS is downhill from this cutting but probably not in direct hydraulic connection via groundwater as cutting is within Whitby Mudstone Formation. However, discharge of abstracted water may create pathway. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Trafford Bridge Marsh LWS is downhill from this cutting but probably not in direct hydraulic connection via groundwater as cutting is within Whitby Mudstone Formation. However, discharge of abstracted water may create pathway. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Trafford Bridge Marsh LWS is downhill from the cutting. Cutting and track drainage will be discharged to the River Cherwell and some of its tributaries via attenuation ponds. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant residual impacts identified as result of scheme element.	Trafford Bridge Marsh LWS is downhill from the cutting. Cutting and track drainage will be discharged to the River Cherwell and some of its tributaries via attenuation ponds. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant residual impacts identified as result of scheme element.	No impacts identified as result of scheme element	Pond habitat at Lower Thorpe partially lost to scheme. Mitigation through creation of replacement pond and drainage design.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Trafford Bridge Marsh LWS is downhill from the tunnel. Tunnel dewatering (combined with dewatering of Edgcote Cutting) may reduce local spring flows into marsh. Impact will be partially offset by drainage being discharged to the River Cherwell and some of its tributaries via attenuation ponds. CoCP and best practice for design, construction and operations reduce risks to GWDTE. No significant residual impacts identified as result of scheme element	Excavation will be backfilled around tunnel. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Pond habitat at Lower Thorpe partially lost to scheme. Mitigation through creation of replacement pond and drainage design.	No impacts identified as result of scheme element	Localised or temporary effects	Remains at Good Status	None required	Remains at Good Status
4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. Abstractions along the ridge at Appletree Farm that abstract from Dyrham Formation may be affected during construction. Implement groundwater monitoring regime during construction to determine if further mitigation required (alternative water source for farm). CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA with nearby groundwater abstractions. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Localised or temporary effects	Remains at Good Status	None required	Remains at Good Status
5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Localised or temporary effects	Remains at Good Status	None required	Remains at Good Status
Chemical status	Good																						Good		Good
Overall status	Good																						Good		Good

Ref:
Environment Agency (2005) Cherwell catchment abstraction licensing strategy - WRMU1 - Upper Cherwell and WRMU2 - Lower Cherwell
Environment Agency website; What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx

GB40602G600200

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Cutting				Embankment				Viaduct		Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Lower Boddington Cutting (CFA015)		Boddington Cutting (CFA015 / CFA016)		Edgcote Embankment North (CFA015)	Aston Le Walls Embankment (CFA015)	Highfurlong Brook Embankment	Lower Boddington Embankment (CFA015)	Edgcote Viaduct (CFA015)	Highfurlong Brook Viaduct (CFA015)				
						113-L2		113-L2		108-L2	112-L2	113-L1	114-L1	108-L1	112-L3				
GB40602G600200					Phase	Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
Banbury Jurassic	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	None identified	None identified	None identified	None identified	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions				
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)														
1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	Low	Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified	Remains Good Status	None required	Remains Good Status
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Good	Low	Not At Risk	Good Ecological Status by 2015		Cutting crosses minor tributary of the Boddington Feeder of the Oxford Canal. Cutting is 600m from the Highfurlong Brook (GB106039042660). Cutting is shallow (3m) and in Charmouth Mudstone, designated as unproductive strata. Limited dewatering may be required. No significant impacts predicted.	No significant impacts as cutting is in mudstone.	Southern section is adjacent (<100m) to minor tributaries of the Boddington Feeder to the Oxford Canal. Northern section is close (350m) to headwaters of tributary of River Itchen (GB109054044070] watercourse is in Warwickshire Avon - Secondary Mudstone GWB]. Oxford Canal is assumed not to be in hydraulic connection with groundwater. Potential to affect watercourses and two ponds with in the vicinity of the cutting but impact will be limited as the cutting is in mudstone.	No significant impacts as cutting is in mudstone.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Viaduct is over River Cherwell (GB106039037350) and its tributaries. Groundwater likely to be in alluvium and in bedrock aquifers. Dewatering will be temporary and localised. Abstracted water returned to groundwater via infiltration or re-injection or to adjacent stretch of surface water body. Localised mounding of groundwater around piles may occur. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Viaduct is over Highfurlong Brook (GB106039042660). Groundwater likely to be present in alluvium. Bedrock is mudstone. Dewatering will be temporary and localised. Abstracted water returned to groundwater via infiltration or re-injection or to adjacent stretch of surface water body. Localised mounding of groundwater around piles may occur. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Localised /temporary effects	Remains Good Status	None required	Remains Good Status
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs). To assess the impact of groundwater abstractions on the condition of GWDTEs.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Close to Trafford Bridge Marsh LWS. No significant impacts to groundwater body status identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Close to/ crosses Trafford Bridge Marsh LWS. Upper Cherwell at Trafford House SSSI is 1.4km from scheme element (upstream). Groundwater likely to be in alluvium and in bedrock aquifers. Dewatering will be temporary and localised. Abstracted water returned to groundwater via infiltration or re-injection or to adjacent stretch of surface water body. Localised mounding of groundwater around piles may occur. CoCP and best practice for design, construction and operations reduce risks to GWDTE. Negligible impact following mitigation.	No impacts identified as result of scheme element	Localised /temporary effects	Remains Good Status	None required	Remains Good Status
4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		Cutting is shallow (3m) and in Charmouth Mudstone, designated as unproductive strata. Limited dewatering may be required. No significant impacts predicted.	No impacts identified as result of scheme element	Cutting in Charmouth Mudstone, designated as unproductive strata. Cutting crosses into Warwickshire Avon Secondary Mudrocks GWB. No significant impacts predicted.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Groundwater likely to be in alluvium and in bedrock aquifers. Dewatering will be temporary and localised. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Groundwater likely to be present in alluvium. Bedrock is mudstone. Dewatering will be temporary and localised. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Localised /temporary effects	Remains Good Status	None required	Remains Good Status
Quantitative status	Good																Good		Good

Groundwater body					Scheme Elements	Cutting				Embankment				Viaduct	Viaduct	Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Lower Boddington Cutting (CFA015)		Boddington Cutting (CFA015 / CFA016)		Edgcote Embankment North (CFA015)	Aston Le Walls Embankment (CFA015)	Highfurlong Brook Embankment	Lower Boddington Embankment (CFA015)	Edgcote Viaduct (CFA015)	Highfurlong Brook Viaduct (CFA015)				
						113-L2		113-L2		108-L2	112-L2	113-L1	114-L1	108-L1	112-L3				
GB40602G600200					Phase									Construction & Operation	Construction & Operation				
Banbury Jurassic	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate				
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)														
1. Saline or other intrusions. To identify groundwater bodies where intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	Low	Not At Risk	Good Chemical Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified	Remains Good Status	None required	Remains Good Status
2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Good	Low	Not At Risk	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Creation of new preferential pathways between alluvium and bedrock aquifers due to piling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. Changes in groundwater quality may lead to local and temporary impact on surface water quality. CoCP and best practice for design (particularly selection of piling method), construction and operations reduce risks to water quality. No significant effect on river predicted.	Creation of new preferential pathways due to piling although underlying bedrock is mudstone. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. Changes in groundwater quality may lead to local and temporary impact on surface water quality. CoCP and best practice for design (particularly selection of piling method), construction and operations reduce risks to water quality. No significant effect on river predicted.	Localised /temporary effects	Remains Good Status	None required	Remains Good Status
3. GWDTEs. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTEs.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Close to Trafford Bridge Marsh LWS. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Close to/ crosses Trafford Bridge Marsh LWS. Upper Cherwell at Trafford House SSSI is 1.4km from scheme element (upstream). Creation of new preferential pathways between alluvium and bedrock aquifers due to piling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. Changes in groundwater quality may lead to local and temporary impact on GWDTEs. CoCP and best practice for design (particularly selection of piling method), construction and operations reduce risks to GWDTEs. No significant residual impacts predicted.	No impacts identified as result of scheme element	Localised /temporary effects	Remains Good Status	None required	Remains Good Status
4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		In DrWPA but in unproductive strata. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA but in unproductive strata. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA but in unproductive strata. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA but in unproductive strata. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA but in unproductive strata. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA but in unproductive strata. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA but in unproductive strata. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. Creation of new preferential pathways between alluvium and bedrock aquifers due to piling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. Creation of new preferential pathways due to piling although underlying bedrock is mudstone. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Localised /temporary effects	Remains Good Status	None required	Remains Good Status
5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater/	Good	Low	Varies by Parameter	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Localised /temporary effects	Remains Good Status	None required	Remains Good Status
Chemical status	Good																Good		Good
Overall status	Good																Good		Good

Ref:
Environment Agency (2005) The Cherwell Catchment Abstraction Management Strategy - Upper Cherwell WRMU
Environment Agency website; What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx

WFD Baseline Survey Details

Water Body ID	GB40602G6040200
Groundwater Body Name	Banbury Jurassic
Scheme Element	Edgcote Cutting Chipping Warden Green Tunnel
Key Receptors	River Cherwell Highfurlong Brook Water balance
Objectives of the Survey	• Assessment of spring flows (including temporal / seasonal variation) • Assessment of GW levels and aquifer properties along line of route to refine drawdown and dewatering rate estimates. • Refine understanding of local interactions between GW bodies • Establishment of long-term monitoring network (GW & SW)
Survey Scope	• Hydrological survey of springs / tributaries feeding Cherwell and Highfurlong Brook. • Spring flow monitoring • Monitoring bores: 3 no. o 1 at S end near tributary confluence with Cherwell outside CCB o 1 in central area near headwaters of tributary near Welsh Road (could use spring instead if suitable) • Groundwater level logger • In situ aquifer testing
Medium Term Survey Results Summary	At survey point **WFD-GW1-0006** visited on 02/07/2014 09:30 the site was reported as a recently resectioned drainage ditch, connecting 2 areas of arable land. It was culverted for 20% of its length and essentially dry with minimal occasional ponded areas. The ponded area was described as being c25 cm depth. The pond is described as being likely to be groundwater dependent, with runoff from the surrounding arable land contributing during wet seasons as there does not appear to be significant surface water inflow to the pond. The pond's botanical wetland ecology is believed to be linked to groundwater at this site. The dominant community, S28, is a widespread community, but is not classed as groundwater dependent under NVC. The pond is in unfavourable ecological condition and is a medium ecological value feature. Any reduction in groundwater may impact this ecological feature. The botanical wetland ecology within the ditch is not believed to be linked to groundwater at this site. The dominant community, OV26, is a widespread community relying predominantly on surface water for hydration. The ditch is in unfavourable ecological condition and is a low ecological value feature. Any reduction in groundwater will not impact this ecological feature.
Medium Term Survey Results Conclusions in relation to previous assessment	Other spring points in the area - around Aston le Walls and Edgcote do not appear to have been surveyed at this stage, if access has not been possible these should be surveyed Post-Royal Ascent.
Additional Comments	Consider incorporating boreholes into geotechnical investigation programme and monitoring into general environmental monitoring plan

Blue - included in medium term survey
Black - would be covered in long term survey

dark blue - Recommendations additional to those provided in survey reports

Audit Trail for the Update of the WFD Water Body Assessment with Baseline Data

WFD Classification Elements Changed	
	Edgcote Cutting (CFA15)
2. Surface water.	**Quantity** - No assessment update at this stage Information collected during medium term survey indicates that the pond visited (6) is likely to be groundwater dependent. No other springs have been surveyed as part of the medium term surveys. As such the assumptions made in the previous WFD assessment that there is the potential for cutting to affect flows in the Marlstone Rock / Dyrham, with interception of springs feeding local surface water courses cannot be changed at this stage. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as locating stream sources.**
	Quality- No assessment update at this stage Information collected during medium term survey indicates that the pond visited (6) is likely to be groundwater dependent. No other springs have been surveyed as part of the medium term surveys. As such the assumptions made in the previous WFD assessment that changes in baseflow may influence surface water chemistry locally cannot be changed at this stage. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as locating stream sources.**
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs).	**Quantity** - No assessment update at this stage Information collected during medium term survey indicates that the pond visited (6) is likely to be groundwater dependent. No other springs have been surveyed as part of the medium term surveys. As such the assumptions made in the previous WFD assessment that there is the potential for cutting to affect flows in the downhill Trafford Bridge Marsh LWS cannot be changed at this stage. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as locating stream sources.**
	Quality - No assessment update at this stage Information collected during medium term survey indicates that the pond visited (6) is likely to be groundwater dependent. No other springs have been surveyed as part of the medium term surveys. As such the assumptions made in the previous WFD assessment that there is the potential for water quality reaching the downhill Trafford Bridge Marsh LWS from cutting drainage discharge via attenuation ponds cannot be changed at this stage. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as locating stream sources.**
4. Water balance.	**Quantity** - No assessment update required at this stage as survey data collected currently does not relate to assumptions made on water balance: Cutting is in Marlstone. Abstracted water discharged to surface waters. Abstracted water discharged to surface waters via attenuation pond within Banbury Jurassic GWB so may have adverse impact on water balance of local aquifers. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as locating stream sources.**
	Chipping Warden Green Tunnel (CFA15)
2. Surface water.	**Quantity** - No assessment update at this stage Information collected during medium term survey indicates that the pond visited (6) is likely to be groundwater dependent. No other springs have been surveyed as part of the medium term surveys. As such the assumptions made in the previous WFD assessment that there is the potential for cutting to affect flows in the Marlstone Rock / Dyrham, with interception of springs feeding local surface water courses (tributaries of Highfurlong Brook and River Cherwell) cannot be changed at this stage. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as locating stream sources.**
	Quality- No assessment update at this stage Information collected during medium term survey indicates that the pond visited (6) is likely to be groundwater dependent. No other springs have been surveyed as part of the medium term surveys. As such the assumptions made in the previous WFD assessment that changes in water chemistry may be affected by tunnel dewatering (combined with dewatering of Edgcote Cutting) cannot be changed at this stage. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as locating stream sources.**
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs).	**Quantity** - No assessment update at this stage Information collected during medium term survey indicates that the pond visited (6) is likely to be groundwater dependent. No other springs have been surveyed as part of the medium term surveys. As such the assumptions made in the previous WFD assessment that tunnel dewatering (combined with dewatering of Edgcote Cutting) may reduce local spring flows into the downhill Trafford Bridge Marsh LWS cannot be changed at this stage. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as locating stream sources.**
	Quality- No assessment update at this stage Information collected during medium term survey indicates that the pond visited (6) is likely to be groundwater dependent. No other springs have been surveyed as part of the medium term surveys. As such the assumptions made in the previous WFD assessment that changes in water chemistry may be affected by tunnel dewatering (combined with dewatering of Edgcote Cutting) into the downhill Trafford Bridge Marsh LWS cannot be changed at this stage. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as locating stream sources.**
4. Water balance.	**Quantity** - No assessment update required at this stage as survey data collected currently does not relate to assumptions made on water balance: Cutting is in Marlstone. Abstracted water discharged to surface waters. Abstracted water discharged to surface waters via attenuation pond within Banbury Jurassic GWB so may have adverse impact on water balance of local aquifers. **Assessment is to be revisited following collection of spring flow monitoring, and other long term surveys as well as locating stream sources.**

There are no AP2 Changes in this water body requiring assessment

Water Body ID	GB40902G302200
Groundwater Body Name	Warwickshire Avon - Coal Measures Coventry
CFAs covered by Waterbody	17,18,23

No WFD Surveys provided directly on this water body

CFA	18	23	
AP2 ID	AP2-018-004	AP-C224-027	SES-C224-051
AP2 Location	Stoneleigh, Kenilworth and Burton Green	Solihull Metropolitan Borough, Parish of Hampton-in-Arden	Diddington Lane
New/Replacement Scheme Element	ADJUSTMENT TO EXISTING AND NEW	NEW	
AP2 Scheme Element Type	Portals, Cromwell Lane underpass	Road Realignment Works	Field Access Provision Works
Original Scheme	There have been requests for inclusion within the design of a bored tunnel through Burton Green, ranging in length from 2.5km to 13km by Warwickshire County Council and 70 number of other individuals and organisations.	Diddington Lane will be closed to traffic with local access to agricultural land retained	The original Scheme included the stopping up of Diddington Lane to the east of Hampton-in-Arden. The existing bridleway which runs along Diddington Lane would be retained with a diversion under the Shadow Brook Underbridge. Access to agricultural fields to the east of the route alignment was previously off Diddington Lane. With the original Scheme, this access would be achieved off the realigned bridleway, immediately south of its crossing of the Shadow Brook, and adjacent to the Shadow Brook Underbridge.
AP2 Description	The following elements are included in this amendment: 1) revised vertical alignment through the Burton Green green tunnel and Burton Green retaining structure. The revision will mean the south portal is slightly deeper (2-3 m) and the north portal is slightly shallower; 2) 50m extensions to the green tunnel at both the north and south portals, which will provide additional space for landscaping works and alterations around the portals; 3) a revised vertical (slightly deeper at south portal) and horizontal alignment for Kenilworth Greenway at Burton Green including a new underpass beneath Cromwell Lane in place of the currently proposed at-grade road crossing, providing safety improvements by separating Greenway users from Cromwell Lane traffic; 4) tunnel portal buildings and access relocated to north-east side of HS2 at southern portal with access via Bockendon Road i.e. HB access from Red Lane is no longer required; 5) a relocated balancing pond at 145+200 on the DOWN side; 6) an extended mitigation earthwork adjacent to footpath W168; 7) Footpath W168 Underpass relocated 100m north. 8) Provision of a footpath link approximately 150m long along Waste Lane to facilitate access from properties on Waste Lane to the Greenway.	Provision of an additional road (Diddington Lane - reinstated) over HS2 infrastructure.	Provide field access from Diddington Lane
Changes to Previously assessed elements	Burton Green South Porous Portal (CFA18), Burton Green North Porous Portal (CFA18)	None	None
AP2 Assessment Requirements	Assessment of impact of changes on previously assessed portals, and assessment of Cromwell Lane underpass	AP located on Tame Anker Mease - Secondary Combined No assessment required	AP located on Tame Anker Mease - Secondary Combined No assessment required

GB400902SG20230 AP2 Assessment

A. Risk screening of potential to cause deterioration of current WFD status

| Groundwater body | Scheme Elements | Cutting | | | | | | | | | | | | | | Embankment | | | | | | | | | | | | | |

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Cutting		Embankment	Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Park Lane Cutting (CFA23)		Lavender Hall Embankment (CFA23)				
						149-L3		149-L2				
GB40401G302700					Phase	Construction & Operation		Construction & Operation				
Tame Anker Mease - PT Sandstone Nuneaton & Meriden	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	None identified				
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)							
1. Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	Low	Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impacts identified	Remains Good Status	None required	Remains Good Status
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Good	High	Not At Risk	Good Ecological Status by 2015		Scheme element between tributaries of River Blythe (SW body GB104028042571). River Blythe is SSSI. River Blythe WRMU has restrictions on abstraction in low flow conditions (Q50 and above). Cutting is up to 12m deep and will intersect groundwater. Hydraulic connection with river via superficial and bedrock aquifers. Embedded mitigation includes use of cut-offs and reintroduction of water drained by the cutting to groundwater via SuDS. Track drainage discharged to balancing pond then Bayleys Brook. Implementation of groundwater monitoring regime during construction. No significant residual impacts post-mitigation.	Scheme element between tributaries of River Blythe (SW body GB104028042571). River Blythe is SSSI. Cutting is up to 12m deep and will intersect groundwater. Cutting oriented roughly parallel to surface water divide, limiting the potential for baseflow to be intercepted. Hydraulic connection via superficial and bedrock aquifers. Incorporate passive bypasses within the cut-off design, incorporate collars in these passive bypasses to avoid creating artificial flow paths. Track drainage discharged to balancing pond then Bayleys Brook. Implementation of monitoring regime during construction. No significant residual impacts post-mitigation.	No impacts identified as result of scheme element	Localised effects	Remains Good Status	None required	Remains Good Status
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs). To assess the impact of groundwater abstractions on the condition of GWDTEs.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		Known and potential GWDTEs in vicinity of scheme element (including Berkswell Marsh SSSI, The Bogs Ancient Woodland, Fern Bank Marsh LWS and Berkswell Hall Wood LWS). Cutting is up to 12m deep and will intersect groundwater. Hydraulic connection with GWDTEs via superficial and bedrock aquifers. Embedded mitigation includes use of cut-offs and reintroduction of water drained by the cutting to groundwater via SuDS. Track drainage discharged to balancing pond then Bayleys Brook. Implementation of groundwater monitoring regime during construction. No significant residual impacts on SSSI post-mitigation expected but requires further consideration during detailed design.	Known and potential GWDTEs in vicinity of scheme element (including Berkswell Marsh SSSI, The Bogs Ancient Woodland, Fern Bank Marsh LWS and Berkswell Hall Wood LWS). Cutting is up to 12m deep and will intersect groundwater. Hydraulic connection via superficial and bedrock aquifers. Incorporate passive bypasses within the cut-off design, incorporate collars in these passive bypasses to avoid creating artificial flow paths. Track drainage discharged to balancing pond then Bayleys Brook. Implementation of groundwater monitoring regime during construction. No significant residual impacts post-mitigation.	No impacts identified as result of scheme element	No significant residual impacts post-mitigation predicted but monitoring required to confirm	Remains Good Status	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater to maximise potential for recharge back to groundwater. Monitoring during construction	Remains Good Status
4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		Not located within GWMU in CAMS. Nearest GWMU (Bromsgrove Sandstone Formation 200m to the north) has available capacity for abstraction. Unlicensed abstraction 200m to southwest at Silver Birch. Embedded mitigation includes reintroduction of water drained by the cutting to groundwater via SuDS, reinfiltration, trenches and balancing ponds. Track drainage discharges in TAM SC GWB so adverse impact on local water balance.	Unlicensed abstraction 200m to southwest at Silver Birch. Influence on local flow regime due to presence of cutting.	No impacts identified as result of scheme element	Groundwater being transferred out of GWB. Current water balance for GWB is at Good status but has limited spare capacity.	Remains Good Status	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater to maximise potential for recharge back to groundwater. Monitoring during construction	Remains Good Status
Quantitative status	Good									Good		Good

Groundwater body					Scheme Elements	Cutting		Embankment	Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Park Lane Cutting (CFA23)		Lavender Hall Embankment (CFA23)				
						149-L3		149-L2				
GB40401G302700					Phase	Construction & Operation		Construction & Operation				
Tame Anker Mease - PT Sandstone Nuneaton & Meriden	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	None identified				
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)							
1. Saline or other intrusions. To identify groundwater bodies where intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	Low	Not At Risk	Good Chemical Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impacts identified	Remains Good Status	None required	Remains Good Status
2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Good	Low	Not At Risk	Good Chemical Status by 2015		Scheme element between tributaries of River Blythe (SW body GB104028042571). River Blythe is SSSI. Lavender Hall landfill close (50m) to south-eastern end. Bradnocks Marsh Lane landfill 800m to the southwest. Embedded mitigation includes use of cut-offs and reintroduction of water drained by the cutting to groundwater via SuDS. Track drainage discharged to balancing pond then Bayleys Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant residual impacts identified	Scheme element between tributaries of River Blythe (SW body GB104028042571). River Blythe is SSSI. Lavender Hall landfill close (50m) to south-eastern end. Bradnocks Marsh Lane landfill 800m to the southwest. Track drainage discharged to balancing pond then Bayleys Brook. CoCP and best practice for design, construction and operations, in particular controls on pesticide usage, reduce risks to water quality. No significant residual impacts identified	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No impacts identified as result of scheme element	Localised effects	Remains Good Status	None required	Remains Good Status
3. GWDTEs. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTEs.	Good	High	Probably Not At Risk	Good Chemical Status by 2015		Known and potential GWDTEs in vicinity of scheme element (including Berkswell Marsh SSSI, The Bogs Ancient Woodland, Fern Bank Marsh LWS and Berkswell Hall Wood LWS). Lavender Hall landfill close (50m) to south-eastern end. Bradnocks Marsh Lane landfill 800m to the southwest. Embedded mitigation includes use of cut-offs and reintroduction of water drained by the cutting to groundwater via SuDS. Track drainage discharged to balancing pond then Bayleys Brook. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant residual impacts on SSSI post-mitigation expected but requires further consideration during detailed design.	Known and potential GWDTEs in vicinity of scheme element (including Berkswell Marsh SSSI, The Bogs Ancient Woodland, Fern Bank Marsh LWS and Berkswell Hall Wood LWS). Track drainage discharged to balancing pond then Bayleys Brook. CoCP and best practice for design, construction and operations, in particular controls on pesticide usage, reduce risks to groundwater quality. No significant impacts identified	Potential GWDTE (Fern Bank Marsh LWS) in vicinity of scheme element. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No impacts identified as result of scheme element	No significant residual impacts post-mitigation predicted but monitoring required to confirm	Remains Good Status	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater. Monitoring during construction	Remains Good Status
4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	Low	Probably At Risk	Good Chemical Status by 2015		In DrWPA. Lavender Hall landfill close (50m) to south-eastern end. Bradnocks Marsh Lane landfill 800m to the southwest. Unlicensed abstraction 200m to southwest at Silver Birch. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant residual impacts post-mitigation.	In DrWPA. Lavender Hall landfill close (50m) to south-eastern end. Bradnocks Marsh Lane landfill 800m to the southwest. Unlicensed abstraction 200m to southwest at Silver Birch. CoCP and best practice for design, construction and operations. No significant residual impacts post-mitigation.	In DrWPA. Lavender Hall landfill nearby. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No impacts identified as result of scheme element	Localised effects	Remains Good Status	None required	Remains Good Status
5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		Lavender Hall landfill close (50m) to south-eastern end. Bradnocks Marsh Lane landfill 800m to the southwest. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified	Lavender Hall landfill close (50m) to south-eastern end. Bradnocks Marsh Lane landfill 800m to the southwest. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified	Lavender Hall landfill nearby. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No impacts identified as result of scheme element	Localised effects	Remains Good Status	None required	Remains Good Status
Chemical status	Good									Good		Good
Overall status	Good									Good		Good

Ref:
Environment Agency (2013) Tame, Anker and Mease abstraction licensing strategy - WRMU2 - River Blythe
Environment Agency website; What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx
Environment Agency (2013) Tame, Anker and Mease abstraction licensing strategy - WRMU2 - River Blythe
Environment Agency website; What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx

WFD Baseline Survey Details

Water Body ID	GB40401G302700
Groundwater Body Name	Tame Anker & Mease - PT Sandstone Nuneaton & Meriden
Scheme Element	Park Lane Cutting
Key Receptors	Berkswell Marsh SSSI plus adjacent LWSs (The Bogs Ancient Woodland, Fern Bank March LWS and Berkswell Hall Wood LWS) Tributaries of River Blythe Water balance
Objectives of the Survey	• Condition survey to assess any existing damage/pressures to Berkswell Marsh SSSI GWDTE. • Assessment of GW levels and aquifer properties along line of route to refine drawdown and dewatering rate estimates • Confirmation of conceptual hydrogeological model • Establishment of long-term monitoring network (GW, SW & Ecology)
Survey Scope	• Vegetation survey (NVC & geostatistical survey & condition assessment) at Berkswell Marsh SSSI and adjacent LWSs • Hydrological survey of flows/levels at springs / tributaries feeding SSSI & Blythe tributary. • Monitoring bores: 5 no. o 1 shallow bore within SSSI between the two watercourses (it is assumed that standard drilling may be too disruptive within SSSI but window sampling probably possible) o 1 pair (shallow & deep) between cutting and SSSI o 1 pair (shallow & deep) between cutting and watercourse upstream of SSSI (e.g. area around Marlowes) • Groundwater and surface water (crest gauge) level loggers • In situ aquifer property testing • Water quality sampling (GW & SW)
Medium Term Survey Results Summary	Survey point**WFD-GW1-0007a** monitored a Stream and Drain on 05/08/2014 10:50. The stream is identified as likely to be groundwater fed from the secondary A aquifer superficial deposits formed of glacio-fluvial and alluvium, while the drain is identified as potentially likely to be groundwater fed, both are 2 m bgl. The area is described as marshy grassland with rushes, encompassing 2 stream features supporting minimal macrophytes. The entire site is described as having plant communities indicating a high water table. NVC and groundwater monitoring is recommended, although not surface water monitoring. An NVC survey was carried out in the area on 18/08/2014. Identifying MG10 as the overall community. The Rush Pasture is classified by the UKTAG guidance as being moderately groundwater dependent. (NVC surveys labelled as c, rather than a). Survey point**WFD-GW1-0007b** monitored a stream in two locations on 05/08/2014 13:30 (SP 23417 79477, and SP 23444 79581). Flow rates of 0.1 m^3/sec and 0.00015 m^3/sec were noted. The stream was noted to be fed by both surface water from the east, through series of what appears to be irrigation ditches leading from a large surface water lake to which the stream is connected upstream, along with groundwater from the secondary A alluvium and glaciofluvial deposits. Area is described as a wetland and wet meadow dominated by rushes, sedges, grasses & tall herbs. The entire site has plant communities indicating a high water table, extensive areas of wet meadow with numerous surface water features crisscrossing. The site was wet despite the dry weather suggesting a high water table, while the streams stages are set approximately 2-3 m bgl. NVC and groundwater monitoring is recommended, and surface water level monitoring within the stream. An NVC survey was carried out in the area in Berkswell Hall Wood LWS on 19/08/2014. Identifying communities, OV24, OV26e, W7 and W24 as present. Of these W7 alluvial forests is classified by the UKTAG guidance as being highly groundwater dependent, although the other communities are not groundwater dependent.. Survey point**WFD-GW1-0007c** monitored a stream on 05/08/2014 13:30 (SP2287379862). A flow rate of 0.26 m^3/sec was noted. Again the stream is identified as likely to be groundwater fed. NVC and groundwater monitoring is recommended. An NVC survey was carried out in the area of the Berkswell Marsh SSSI on 19/08/2014. Identifying communities of W6, MG1, W24 and S7. Of these conmmunities the W6 wood land and S7 carex swamp are classified by the UKTAG guidance as being moderately groundwater dependent. (NVC surveys labelled as a, rather than c). Survey point**WFD-GW1-0007d** monitored two streams on 04/07/2014 10:42 (SP 24152 79103, andSP 24025 79066). The watercourse at SP 242152, 79103 is likely to be fed by springs and a drain is also shown to be contributing flow (rate of 0.0465 m^3/s noted). The watercourse flows southwest where it joins with another watercourse flowing from south to north near the footbridge (SP 24025 79066). The watercourse flows to the pool (flow rate of 0.024 m^3/s noted). The entire site is noted to have plant communities indicating a high water table, and is described as extensive areas of wet meadow with stream feature running through it. Groundwater within the Alluvium is noted as likely to contribute baseflow to surface water which feeds the pool downstream and adjacent wetland habitats. NVC and groundwater monitoring is recommended, and surface water level monitoring within the stream, with the footbridge suggested as a good location for monitoring. No vegetation surveys have been undertaken at the adjacent LWSs.
Medium Term Survey Results Conclusions in relation to previous assessment	Area is described as being likely to be groundwater dependent. Further NVC (particularly at The Bogs Ancient Woodland and Fern Bank March LWS), groundwater and surface water level monitoring is recommended.
Additional Comments	Important to establish monitoring network for Berkswell Marsh SSSI as soon as possible to maximise baseline dataset prior to construction to understand existing variation in conditions (ideally hope to have dry summer in intervening period)

Blue - included in medium term survey
Black - would be covered in long term survey

dark blue - Recommendations additional to those provided in survey reports

Audit Trail for the Update of the WFD Water Body Assessment with Baseline Data

WFD Classification Elements Changed	Nature of the Assessment Update and Justification
	Park Lane Cutting (CFA 23)
2. Surface water.	**Quantity** - No assessment update at this stage Information collected during medium term survey indicates that the streams visited are likely to be groundwater dependent. As such the assumption made in the previous WFD assessment that there is a hydraulic connection with River Blythe SSSI (and tributaries) via superficial and bedrock aquifers holds. **Assessment is to be revisited following collection of long term surveys.**
	Quality - No assessment update at this stage Information collected during medium term survey indicates that the streams visited are likely to be groundwater dependent. As such the assumption made in the previous WFD assessment that there is a hydraulic connection with River Blythe SSSI (and tributaries) via superficial and bedrock aquifers holds. **Assessment is to be revisited following collection of long term surveys.**
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs).	**Quantity** - No assessment update at this stage Information collected during medium term survey indicates that the streams visited are likely to be groundwater dependent. As such the assumption made that Berkswell Marsh SSSI is a GWDTE holds. **Assessment is to be revisited following collection of long term surveys.**
	Quality - No assessment update at this stage Information collected during medium term survey indicates that the streams visited are likely to be groundwater dependent. As such the assumption made that Berkswell Marsh SSSI is a GWDTE holds. **Assessment is to be revisited following collection of long term surveys.**
4. Water balance.	Quantity - No assessment update at this stage as survey data collected does not relate to assumptions made on water balance: Embedded mitigation includes reintroduction of water drained by the cutting to groundwater via SuDS, reinfiltration, trenches and balancing ponds. Track drainage discharges in TAM SC GWB so adverse impact on local water balance.

There are no AP2 Changes in this water body requiring assessment

WFD Baseline Survey Details

Water Body ID	GB40402G990800
Groundwater Body Name	Tame Anker Mease - Secondary Combined
Scheme Element	M42 Motorway Viaduct Pool Wood Embankment Associated roadworks
Key Receptors	Coleshill & Bannerly Pools SSSI GWDTE (also River Blythe SSSI is downstream)
Objectives of the Survey	• Condition survey to assess any existing damage/pressures to Coleshill & Bannerly Pools SSSI GWDTE. • Refine understanding of GW-SW interactions • Establishment of long-term monitoring network (GW, SW & Ecology)
Survey Scope	• Vegetation survey (NVC & geostatistical survey & condition assessment) at Coleshill & Bannerly Pools SSSI • Hydrological survey of flows/levels in pools and associated watercourses • Monitoring bores: 4 no. o 2 shallow holes within SSSI (one each side A446) o 1 pair holes (shallow & deep) between viaduct and SSSI outside CCB • Groundwater and surface water (crest gauge) level loggers • In situ aquifer property testing • Water quality monitoring (GW & SW)
Medium Term Survey Results Summary	Survey point **WFD-GW1-0008a** monitored a Spring/Pond/Drain/Bog on 23/07/2015 13:21-14:25. The presence of the spring (at SP20291 86456) (forming a shallow pond covered by vegetation) suggests that the source of water is from the groundwater of Alluvium Deposit (clay, silt, sand and gravel) Secondary A Aquifer overlying the area. The spring does not appear to be in hydraulically connected to the drain to the east (downgradient) of the woodland as the drain is shown to be dry. The high electrical conductivity of the spring (1058 µS/Cm) suggest the water is mineralised possibly resulting from contact with the geological strata. The direction of flow could not be determined and no distinct channels were present to take measurements from. Moderate flow from the spring is likely to be downgradient to the east of the wet woodland. The dry drains present within the woodland suggest that during the wet months, surface runoff from the adjacent arable land flow towards the drains. There are two different habitat types. The habitat gradually transitions from a drier woodland community to a boggy wetland community dominated by rushes – Juncus sp and sedges - Carex sp, these are dependent on groundwater. A detailed NVC survey is recommended for the boggy areas, but it was not recommended to monitor flows and level as all year round flow is not likely to occur. An NVC survey was undertaken on 15/07/2014 and identified broad leaved woodland of W4b. W4 woodland is classified by the UKTAG guidance to be highly groundwater dependent. Survey point **WFD-GW1-0008b** monitored a Pool/Swamp on 04/07/2015 16:24, and 24/07/2015 13:00. The site as a whole appears to be groundwater dependant, characterised by the areas of wet woodland (W10), swamp (S7 Carex acutiformis) and an aquatic community within that. The latter two habitats indicating permanent water availability, most commonly associated with groundwater. The pool and woodland are reported as likely to be groundwater dependent. The underlying superficial geology comprises Glaciofluvial Deposit, Devensian Sand and Gravel Secondary A Aquifer. Surface runoff from and percolation of rainwater from adjacent land to west (which is at a higher ground elevation) is expected to flow to the pool/swamp during the wetter winter months. A detailed NVC survey is recommended for the area. An NVC survey was undertaken on 24/07/2014 and identified wet wooodland of W5, and Swamps of S7. W5 woodland, and S7 carex swamp are classified by the UKTAG guidance to be moderately groundwater dependent. Survey point **WFD-GW1-0008c** monitored a Ditch/watercourse and woodland on 04/07/2015 16:17, and 23/07/2015 12:30. The area was described as raised/lowland bog, a homogeneous area characterised as wet woodland, predominantly immature undesirable woody species including silver birch Betula pendula with crack willow Salix fragilis. The drain and the adjacent woodland to the south are reported as considered to be groundwater dependent evidenced by the Secondary A superficial aquifer (Glaciofluvial Deposits) underlying the area. The drain appears to be draining the wet woodlands to the west of Stonebridge road (A446) through a culvert under the A446. Survey point **WFD-GW1-0008d** monitored a Boggy wet drain/ditches/pools on 23/07/2015 11:10. The report details that the bog is likely to be dependent on groundwater and likely to receive increased recharge from the superficial deposit (Secondary A Aquifer) in wet conditions when the water table rises. There is no evidence of surface watercourses flowing to the site with the exception of possible surface water run-off to the bog from adjacent land to the A446 drain/culvert in wet winter periods. The water quality is slightly acidic unlike the higher pH value of 6.47 of the water in drain/culvert near the A446. The bog is drained by the ditches present on site and culverts. This site is comprised of six habitat types, four of which contain wetland plant communities The four wetland communities are characterised as: W16a – Quercus spp. – Betula spp. – Deschampsia flexuosa woodland The soft rush – Juncus effusus – was recorded in localised patches; W5 – Alnus glutinosa – Carex paniculata woodland. The soft rush – Juncus effusus, the lesser pond sedge – Carex acutiformis, and the greater pond sedge – Carex riparia were present at the ground layer in localised patches; S6 – Carex riparia swamp; and A10 – Polygonum amphibium community. A detailed NVC survey is recommended for the area, but it was not recommended to monitor flows and level as all year round flow is not likely to occur. An NVC survey was undertaken on 16/07/2014 and identified wooodland of W16a around aquatic lake communities (A10) and carex swamp (S6). None of these vegetation types are classified by the UKTAG guidance as groundwater dependent.
Medium Term Survey Results Conclusions in relation to previous assessment	The surveys picked up water features dependent on groundwater. The ecology is described to include highly groundwater dependent features (Juncus sp, Juncus effusus (e.g. M22, M23)) and moderately groundwater dependent features (swamp S7, W5 woodland). A detailed NVC survey is recommended
Additional Comments	Establish monitoring network for River Blythe SSSI and Coleshill & Bannerly Pools SSSI as soon as possible to maximise baseline dataset prior to construction to understand existing variation in conditions (ideally hope to have dry summer in intervening period) Survey point c appears to be the only suitable one for monitoring surface water flow. Monitoring of surface water levels should be undertaken at points b, c and d, with a surveyed elevation taken of the spring at point a. SW levels are required to compare to groundwater, as information suggests that the water features are groundwater dependent.

Blue - included in medium term survey
Black - would be covered in long term survey

dark blue - Recommendations additional to those provided in survey reports

Audit Trail for the Update of the WFD Water Body Assessment with Baseline Data

WFD Classification Elements Changed	Nature of the Assessment Update and Justification
	Pool Wood Embankment (CFA24)
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs).	**Quantity** - No assessment update at this stage Information collected during medium term survey indicates that the majority of the area is likely to be groundwater dependent. As such the assumptions made that the Coleshill & Bannerly Pools SSSI is groundwater dependent holds. **Assessment is to be revisited following collection of NVC and long term surveys.**
	Quality - No assessment update at this stage Information collected during medium term survey indicates that the majority of the area is likely to be groundwater dependent. As such the assumptions made that the Coleshill & Bannerly Pools SSSI is groundwater dependent holds. **Assessment is to be revisited following collection of NVC and long term surveys.**
	M42 Motorway Viaduct (CFA24)
2. Surface water.	**Quantity** - No assessment update at this stage Information collected during medium term survey is related to the Coleshill & Bannerly Pools SSSI and not the tributary of River Blythe surface water feature. **Assessment is to be revisited following collection of long term surveys.**
	Quality - No assessment update at this stage Information collected during medium term survey is related to the Coleshill & Bannerly Pools SSSI and not the tributary of River Blythe surface water feature. **Assessment is to be revisited following collection of long term surveys.**
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs).	**Quantity** - No assessment update at this stage Information collected during medium term survey indicates that the area is likely to be groundwater dependent. As such the assumptions made that the Coleshill & Bannerly Pools SSSI is groundwater dependent, dewatering will be temporary and localised, Abstracted water will be returned to ground via SuDS or to adjacent stretch of surface water body and localised mounding of groundwater around piles may occur hold. **Assessment is to be revisited following NVC and other long term surveys**
	Quality - No assessment update at this stage Information collected during medium term survey indicates that the area is likely to be groundwater dependent. As such the assumptions made that the Coleshill & Bannerly Pools SSSI is groundwater dependent, dewatering will be temporary and localised, Abstracted water will be returned to ground via SuDS or to adjacent stretch of surface water body, creation of new preferential pathways into aquifer due to piling and turbidity or fluids used in construction may influence water quality locally hold. **Assessment is to be revisited following NVC and other long term surveys**
4. Water balance.	Quantity - No assessment update at this stage as survey data collected does not relate to assumptions made on water balance: Abstracted water will be returned to ground via SuDS or to adjacent stretch of surface water body
	A452/B4438 Roundabout Highway Works
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs).	**Quantity** - No assessment update at this stage Information collected during medium term survey indicates that the area is likely to be groundwater dependent. As such the assumptions made that the Coleshill & Bannerly Pools SSSI is groundwater dependent, dewatering will be temporary and localised, Abstracted water will be returned to ground via SuDS or to adjacent stretch of surface water body and localised mounding of groundwater around foundations may occur hold. **Assessment is to be revisited following NVC and other long term surveys**
	Quality - No assessment update at this stage Information collected during medium term survey indicates that the area is likely to be groundwater dependent. As such the assumptions made that the Coleshill & Bannerly Pools SSSI is groundwater dependent holds. **Assessment is to be revisited following NVC and other long term surveys**

Water Body ID	GB40402G990800
Groundwater Body Name	Tame Anker Mease - Secondary Combined
CFAs covered by Waterbody	19, 20, 21, 22, 23, 24, 25, 26 (plus new element off route in 15)

CFA	19	20			21	22			23		24, 25, 26	15
AP2 ID	AP2-019-002	AP2-020-005	AP2-020-005	AP-C223-113	AP2-021-001	AP2-022-001	AP2-022-001	AP2-022-001	AP2-023-005	SES-C224-051	No scoped in APs	AP-C222-214
AP2 Location	Coleshill Junction (traffic segregation)	Curdworth to Middleton (Cuttle Mill access)	Curdworth to Middleton (Cuttle Mill Landscape)	Middleton	Parish of Drayton Bassett	Whittington to Handsacre (Handsacre Connection)	Whittington to Handsacre (Tuppenhurst Farm)	Parish of Fradley & Streethay Parish of Lichfield (Vertical Alignment)	Solihull Metropolitan Borough, Parish of Hampton-in-Arden	Diddington Lane	NA	Chipping Warden
New/Replacement Scheme Element	NEW	NEW	NEW	REPLACEMENT	REPLACEMENT	REPLACEMENT	NEW	EXISTING/REPLACEMENT/NEW	NEW	NEW	NA	NEW
AP2 Scheme Element Type	Overbridge	Relocated access road	None	Viaduct	Embankment	Viaducts	New Road Access Works	Viaducts, Embankments, Retained Cut, Cuttings, Underbruidges, Road Realignment	Road Realignment Works	Field Access Provision Works	NA	Road extension and permanent presence
Original Scheme	Diversion of Manor Drive and Footpath M58 to skirt the west side of the route (the main line and then the Birmingham spur), to join the B4114 Birmingham Road at a new junction just east of where it crosses the River Cole and extend to a point 400m south-east of Coleshill Manor Office Campus.	In the November 2013 ES, the Cuttle Mill mid-point auto-transformer would be located to the west of the Proposed Scheme, north of the Birmingham and Fazeley Canal, to the south of Cuttle Mill Fishery. Access to the mid-point autotransformer was to be provided from the A4091 Tamworth Road, via Cuttle Mill Lane, running to the south-west of the Cuttle Mill Fishery.	Mitigation planting was proposed (map CT-05-113 and 114) surrounding Cuttle Mill Fishery to compensate for the loss of Local Wildlife Site ancient woodland from North Wood due to the loss and severance anticipated from the Proposed Scheme.	The Proposed Scheme was designed to travel largely on embankment and over the Langley Brook on an approximately 90m viaduct, with 5 spans and a 3m noise barrier (later reported as 4m) on the west side of the viaduct. Two balancing ponds would be provided, one to the west of the viaduct and one to the east, with outfalls to Langley Brook. Clearance under the viaduct was designed to be 2.9m, with the brook passing through the second span from the north end.	The proposed Drayton Bassett Viaduct spans the Gallows Brook flood plain which comprises two watercourses. The proposed viaduct extends to 155m in length and 5.8m above ground level in height.	In the November 2013 scheme, the Route runs on embankment northwards at around 8 - 10m above GL to cross over Wood End Lane and the Trent & Mersey Canal, with junction for links to Handsacre that have paired viaducts over T&M Canal (twice) and Pyford Brook before descending to near ground level. Wood End Lane realigned to pass under HS2 to south of junction; drainage pumping station needed. Shaw Lane closed just south of Handsacre junction. Fulfen Wood stream passes under embankment in culvert at 184+200. Mare Brook passes under embankment in culverts at 185+600 and 186+200.	Shaw Lane will be stopped up between the WCML and Tuppenhurst Lane (see Volume 2: map CT-06-130a, D5 to D8) and a balancing pond and access will be provided south of Shaw Lane. A section of Shaw Lane of approximately 340m will be stopped up at the existing crossing of the West Coast Main Line with traffic diverted west to A515 Lichfield Road.	Wood End Lane realigned to pass under HS2 to south of junction; drainage pumping station needed. Shaw Lane closed just south of Handsacre junction. Fulfen Wood stream passes under embankment in culvert at 184+200. Mare Brook passes under embankment in culverts at 185+600 and 186+200. False cutting earthworks included to south of Cappers Lane, to north of A38, by T&M Canal and by Shaw Lane. Lower slopes of embankments regraded to north of Cappers Lane, with noise barrier fences along embankment north to 184+200. Planting included on regraded earthworks and most of outer slopes of false cuttings. Large ecological compensation area on west side to north of Streethay. Large quantities of import for engineering and environmental fill require provision of Streethay construction sidings between A38 and route, with reception sidings to east alongside SSL and rail connection on temp bridge over Coventry Canal. Fulfen Wood stream culverted under sidings	Diddington Lane will be closed to traffic with local access to agricultural land retained	The original Scheme included the stopping up of Diddington Lane to the east of Hampton-in-Arden. The existing bridleway which runs along Diddington Lane would be retained with a diversion under the Shadow Brook Underbridge. Access to agricultural fields to the east of the route alignment was previously off Diddington Lane. With the original Scheme, this access would be achieved off the realigned bridleway, immediately south of its crossing of the Shadow Brook, and adjacent to the Shadow Brook Underbridge.	NA	The Bill provides for a temporary realignment of the A361 Byfield Road, east of Chipping Warden, to approximately 150m north for a period of approximately three years whilst the green tunnel past Chipping Warden is built. This would divert construction traffic around Chipping Warden rather than through the village. The road would then be permanently reinstated along its existing alignment over the green tunnel
AP2 Description	Additional land required for segregating construction traffic from the entrance to IM properties on Manor Drive. Additional land includes a crossing (bridge) over watercourse (River Cole). Note AP-C223-168 is combined with this AP.	Further land is required for a revised construction access (just to the north of the existing fishery buildings) near Cuttle Mill Fishery. Could affect the potentially groundwater dependent Cuttle Mill Fishery ponds	Revised landscaping arrangements proposed. Revision of the landscape mitigation planting area and bund requiring minor overall increase in land on a temporary and permanent basis	Viaduct is being lowered by 1 m (Mercia Mudstone).	The proposed amendment replaces Drayton Bassett viaduct with an embankment and two culverts, each spanning 10 m. The vertical alignment is anticipated to be lowered in this area by approximately 2.5 m	Further land and rights are required to enable the vertical realignment of the HS2 where it crosses the A38 and the Trent and Mersey Canal. Curborough Viaduct (replaces 2 Viaducts over Trent and Mersey Canals)	Tuppenhurst Lane Alternative access for farm vehicles/machinery New access crosses Bourne Brook and flood plain	Further land and rights are required to enable the vertical realignment of the HS2 where it crosses the A38 and the Trent and Mersey Canal. The vertical alignment of the railway (where it currently crosses over the A38, SSRL and WCML) is proposed to be lowered to pass under the transport corridors. This would delete the 16m high embankments (extending approximately 3km), lowering the railway into cutting with a maximum localised depth of 18m half way between the WCML crossing and the A38/SSRL crossing.	Provision of an additional road (Diddington Lane - reinstated) over HS2 infrastructure.	Provide field access from Diddington Lane	NA	the need to make the temporary alignment of the A361 Byfield Road permanent and to extend the road extended southwards to the west of Chipping Warden has been identified. It will be used by construction traffic as well as providing a permanent bypass for Chipping Warden
Changes to Previously assessed elements	None	None	None	None	Replacement of Drayton Bassett Viaduct with an Embankment	None	None	**Existing:** Streethay Viaduct, Fulfen Wood Viaduct, Fulfen Wood Embankment **Replacement:** Streethay Embankment is replaced by Streethay Retained Cut	None	None	NA	None
AP2 Assessment Requirements	Overbridges for minor roads, bridlepaths and footpaths have not been assessed separately; these are expected to have shallow foundations and relatively small footprints. As such no additional assessment required	Road works to be assessed	No assessment required for groundwater as not significant structure	None as not located in water body (on unproductive strata)	Change from Viaduct to Embankment	Area that particular AP covers is under GB40402G300300 Staffordshire Trent Valley - Mercia Mudstone East & Coal Measures water body	Area that particular AP covers is under GB40402G300300 Staffordshire Trent Valley - Mercia Mudstone East & Coal Measures water body	**New:** A51 Cutting, Whittington Heath Embankment, Lichfield Road Underbridge, Darnford Cutting, Cappers Lane Viaduct, Streethay Retained Cut, WCML Underbridge, Curborough Embankment and Wood End Lane Realignment AP also extends under GB40402G300300 Staffordshire Trent Valley - Mercia Mudstone East & Coal Measures water body	New Road realignment	New Road realignment	NA	Road extension and permanent presence to be assessed

Requires Assessment

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body	Bond Tunnel				Cutting																																			
Scheme Elements	Brentford Tunnel (ZFA001)				Hornbrook Cutting (ZFA23)		Patrick Cutting (ZFA22)		Oddington Cutting (ZFA3/ZFA24)		Bickerhill Cutting (ZFA24)		Colesfield Manor Cutting (ZFA19)		Gilson Cutting (ZFA18)		Curtlesworth Cutting (ZFA17)		Middleton Pool Cutting (ZFA8)		Coppice Lane Cutting (ZFA20)		Drayton Lane Cutting (ZFA21)		Water Orton Cutting (ZFA10/ZS)		AF1 GS1 (ZFA1)		Dartford Cutting (ZFA23)		Embankment (ZFA24)	Embankment (ZFA24)	Embankment (ZFA24)	Embankment (ZFA24)	Embankment (ZFA24)	Embankment (ZFA24)	Embankment (ZFA24)	Embankment (ZFA24)	Embankment (ZFA24)	Embankment (ZFA24)	Pool Wood Embankment (ZFA24)	Colesfill Embankment No. 1 (ZFA24)
	B-14B-L7				152-L4		153-L4		155-L2		156-L2		B-16L-L2		169-L1		170-L1		170-L1		171-L3		175-L3		N-8E-L2		AF1 GS1 (Vertical Alignment)		AF1 GS1 (Vertical Alignment)		152-L1	152-L2	153-L1	153-L3	153-L5	154-L2	155-L1	156-L1	157-L1	158-L2	158-L4
Phase	Construction	Construction & Operation			Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation
GB640022090000																																								
Tame Anker Mease - Secondary Combined	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Obstructing or mobilising existing poor quality groundwater by depressurisation	Creating or altering of pathways along which existing poor quality groundwater can migrate	Lowering of groundwater levels and reduction in groundwater contributions to surface water features and groundwater dependent terrestrial ecosystems	"Damming" of groundwater flow and reduction in groundwater contributions

GB640602090000 AF2 Assessment

A. Risk screening of potential to cause deterioration of current WFD status

| Groundwater body | | | | | Scheme Elements | Embankment | | | | |

GB480202090000 WFD Assessment

A. Risk screening of potential to cause deterioration of current WFD status

| Groundwater body | Scheme Elements | Station | Tunnel Portal | | Viaduct | | |

GB640202W0000 AP2 Assessment

A. Risk screening of potential to cause deterioration of current WFD status

| Groundwater body | | | | | Scheme Elements | Waterbodies | | | | |

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements					Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Wood End Lane Realignment (CFA22)	Diddington Lane Road Realignment Works (CFA23)	Diddington Lane Field Access Provision Works (CFA23)	Chipping Warden Relief Road (CFA15)				
						AP2-022-001 (Vertical Alignment)	AP2-023-005	SES-C224-051	AP-C222-214				
GB40402G990800					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
Tame Anker Mease - Secondary Combined	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions				
WFD classification elements: **1.Saline or other intrusions.** To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Probably Not At Risk	Good Ecological Status by 2015	Predicted change to status elements (green = none, amber = possibly, red = likely)	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impacts predicted	Remains at Good Status	None required	Remains at Good Status
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Good	High	Not At Risk	Good Ecological Status by 2015		If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Crosses Shadow Brook. Dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around piles may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Crosses Shadow Brook. Dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around piles may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	There are springs in the ROI of the relief road that may be hydraulically connected to the River Cherwell. Dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around piles may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Local or temporary impacts predicted. However, combined impacts of all design elements have the potential to have an adverse effect on the WFD element.	Remains at Good Status	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater to maximise potential for recharge back to groundwater. Monitoring during construction	Remains at Good Status
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs). To assess the impact of groundwater abstractions on the condition of GWDTEs.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Local or temporary impacts predicted. However, combined impacts of all design elements have the potential to have an adverse effect on the WFD element.	Remains at Good Status	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater to maximise potential for recharge back to groundwater. Monitoring during construction	Remains at Good Status
4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	Local or temporary impacts predicted. GWB current water balance considered to have sufficient capacity to avoid change in status.	Remains at Good Status	None required	Remains at Good Status
Quantitative status	Good										Good		Good

Groundwater body					Scheme Elements					Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Wood End Lane Realignment (CFA22)	Diddington Lane Road Realignment Works (CFA23)	Diddington Lane Field Access Provision Works (CFA23)	Chipping Warden Relief Road (CFA15)				
						AP2-022-001 (Vertical Alignment)	AP2-023-005	SES-C224-051	AP-C222-214				
GB40402G990800					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
Tame Anker Mease - Secondary Combined	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate				
WFD classification elements: **1. Saline or other intrusions.** To identify groundwater bodies where intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Probably Not At Risk	Good Chemical Status by 2015	Predicted change to status elements (green = none, amber = possibly, red = likely)	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impacts predicted	Remains at Good Status	None required	Remains at Good Status
2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Good	Low	Not At Risk	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	There are springs in the ROI of the relief road that may be hydraulically connected to the River Cherwell. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Local or temporary impacts predicted. However, combined impacts of all design elements have the potential to have an adverse effect on the WFD element.	Remains at Good Status	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater Monitoring during construction	Remains at Good Status
3. GWDTEs. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTEs.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Local or temporary impacts predicted. However, combined impacts of all design elements have the potential to have an adverse effect on the WFD element.	Remains at Good Status	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater. Monitoring during construction	Remains at Good Status
4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Poor	Low	Probably At Risk	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Local or temporary impacts predicted. Combined impacts of all design elements have the potential to have an adverse effect on the WFD element. However, given size of GWB the deterioration is not considered significant.	No significant deterioration	Reassess once site investigation & monitoring data available Monitoring during construction	Remains at Good Status
5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Local or temporary impacts predicted. Combined impacts of all design elements have the potential to have an adverse effect on the WFD element. However, given size of GWB the deterioration is not considered significant.	Remains at Good Status	Reassess once site investigation & monitoring data available Monitoring during construction	Remains at Good Status
Chemical status	Poor										Poor		Poor
Overall status	Poor										Poor		Poor

B. Risk screening of potential to prevent future attainment of good WFD status

WFD classification element currently at less than good status	Current status			Status objective	Scheme Elements					Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Wood End Lane Realignment (CFA22)	Diddington Lane Road Realignment Works (CFA23)	Diddington Lane Field Access Provision Works (CFA23)	Chipping Warden Relief Road (CFA15)				
						AP2-022-001 (Vertical Alignment)	AP2-023-005	SES-C224-051	AP-C222-214				
4. Drinking Water Protected Areas (DrWPAs) (chemical)	Poor			Good Status by 2015	Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	**Where RBMP measure will happen**			**When RBMP measure will happen**	**Identified impacts**	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate				
Implement new regulatory approach arising from new Groundwater Directive (2006/116/EC), including Registration in conjunction with Standard Rules.	Humber RBD			2012	Predicted change to status elements (green = none, amber = possibly, red = likely)	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	None required	RBMP Measure is insensitive to scheme element.

Ref:
Environment Agency (2013) Tame, Anker and Mease abstraction licensing strategy - WRMU1 - Rivers Tame, Cole, Anker and Trent,
Environment Agency website; What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx
Environment Agency (2009) River Basin Management Plan - Humber River Basin District - Annex C Actions to deliver objectives

GB40401G301000

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Cutting						Embankment							Station	
						Hints Cutting (CFA21)		Swinfen Hall Cutting (CFA21 and CFA22)		Whittington Common Cutting (CFA22)		Hints Embankment (CFA21)	Mildmore Wood Embankment (CFA21)	Bucks Head Embankment	Whittington Heath Embankment (CFA22)	Huddlesford Embankment (CFA22)	Fulfen Wood South Embankment (CFA22)	Fulfen Wood North Embankment (CFA22)	Curzon Street Station (CFA26)	
						176-L1		177-L3		182-L1		175-L3	176-L2	177-L2	181-L1	183-L1	183-L3	183-L5	B-175-L1	
GB40401G301000					Phase	Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	
Tame Anker Mease - PT Sandstone Birmingham Lichfield	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTE's or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTE's or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTE's or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Reduction in groundwater contributions	Reduction in groundwater contributions	Reduction in groundwater contributions	Reduction in groundwater contributions	Reduction in groundwater contributions	Reduction in groundwater contributions	Reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTE's or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)															
1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		No likely saline or other intrusion of poor quality water as no sources of poor water quality identified in vicinity of scheme element.	No likely saline or other intrusion of poor quality water as no sources of poor water quality identified in vicinity of scheme element.	No likely saline or other intrusion of poor quality water as no sources of poor water quality identified in vicinity of scheme element.	No likely saline or other intrusion of poor quality water as no sources of poor water quality identified in vicinity of scheme element.	No likely saline or other intrusion of poor quality water as no sources of poor water quality identified in vicinity of scheme element.	No likely saline or other intrusion of poor quality water as no sources of poor water quality identified in vicinity of scheme element.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Poor	Low	At Risk	Good Ecological Status by 2015		Black Brook / Bourne Brook located 300m east of scheme element. Although not within radius of influence, groundwater contributions to surface water are likely altered by drainage to the short but deep cutting. Contributions to baseflow in surface water body likely to be reduced in vicinity of cutting (c.1km reach). Discharge of track drainage to attenuation pond at N end, upstream of cutting, mitigating impacts.	Black Brook / Bourne Brook located 300m east of scheme element. Although not within radius of influence, groundwater contributions to surface water are likely altered by drainage to the short but deep cutting. Contributions to baseflow in surface water body likely to be reduced in vicinity of cutting (c.1km reach). Discharge of track drainage to attenuation pond at N end, upstream of cutting, mitigating impacts.	South end of cutting is in Black Bourne Brook catchment. Majority of cutting is in East Litchfield catchment (currently has Moderate hydrology with flows unable to support Good ecological potential). Minor proportion in River Tame catchment. Nearby ponds and issues likely to be impacted by local reduction in groundwater levels caused by cutting. Black Brook Corridor and Church Wood and meadow located within ROI and potential to received reduced groundwater flow as a result of drainage to cutting. GW contributions to surface watercourse to west (headwaters of East Litchfield catchment) likely to also be altered by shallow cutting. Track drainage for majority of cutting discharged into attenuation pond near S end in Black Bourne Brook catchment but close to catchment divide with East Litchfield catchment; water may be transferred out of East Litchfield catchment. Track drainage for N end of cutting discharged to N of cutting into attenuation pond near watercourse. No significant impact on River Tame catchment predicted.	Nearby ponds and issues likely to be impacted by local reduction in groundwater levels caused by cutting. Groundwater contributions to surface watercourse to west (headwaters of East Litchfield catchment) likely to also be altered by shallow cutting. Track drainage crosses catchment divide.	Possible very minor influence on groundwater contribution to nearby watercourse (East Litchfield catchment), however only likely to be minor and mitigated by reintroduction of groundwater drained by the cutting to groundwater via SuDS.	Possible very minor influence on groundwater contribution to nearby watercourse (East Litchfield catchment), however only likely to be minor and mitigated by reintroduction of groundwater drained by the cutting to groundwater via SuDS.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
3. Groundwater Dependent Terrestrial Ecosystems (GWDTE's). To assess the impact of groundwater abstractions on the condition of GWDTE'S.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		Roundhill Wood and Rookery Wood are located within ROI on productive strata, however situated on a hill therefore unlikely to be groundwater dependent. Therefore impacts are considered negligible.	Roundhill Wood and Rookery Wood are located within ROI on productive strata, however situated on a hill therefore unlikely to be groundwater dependent. Therefore impacts are considered negligible.	Black Brook Corridor and Church Wood and meadow located within ROI and potential to received reduced groundwater flow locally as a result of drainage to cutting. Nearby ponds and issues likely to be impacted by local reduction in groundwater levels caused by cutting. No significant impact on flows in Black Brook itself predicted.	Black Brook Corridor and Church Wood and meadow located within ROI and potential to received reduced groundwater flow as a result of drainage to cutting. Nearby ponds and issues likely to be impacted by local reduction in groundwater levels caused by cutting.	Whittington Common Cutting only ecological receptor identified in vicinity of site however unlikely to be groundwater dependent and therefore no risk posed by scheme element.	Whittington Common Cutting only ecological receptor identified in vicinity of site however unlikely to be groundwater dependent and therefore no risk posed by scheme element.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Poor	Low	Probably At Risk	Good Ecological Status by 2015		Potential for dewatering to reduce groundwater levels and flow in the aquifer. Impact likely to be local and not greatly impact the regional groundwater regime. Embedded mitigation to reintroduce groundwater drained by the cutting to groundwater via SuDS	Potential for dewatering to reduce groundwater levels. Impact likely to be local and not greatly impact the regional groundwater regime. Embedded mitigation to reintroduce groundwater drained by the cutting to groundwater via SuDS.	Potential for dewatering to reduce groundwater levels. Impact likely to be local and not greatly impact the regional groundwater regime. Embedded mitigation to reintroduce groundwater drained by the cutting to groundwater via SuDS.	Potential for dewatering to reduce groundwater levels. Impact likely to be local and not greatly impact the regional groundwater regime. Embedded mitigation to reintroduce groundwater drained by the cutting to groundwater via SuDS.	Potential for dewatering to reduce groundwater levels. Impact likely to be local and not greatly impact the regional groundwater regime. Embedded mitigation to reintroduce groundwater drained by the cutting to groundwater via SuDS.	Potential for dewatering to reduce groundwater levels. Impact likely to be local and not greatly impact the regional groundwater regime. Embedded mitigation to reintroduce groundwater drained by the cutting to groundwater via SuDS.	Potential reduction in groundwater recharge due to deposition of material minimal and will be mitigated by collection of route drainage to ditches and swales for infiltration back to groundwater.	Potential reduction in groundwater recharge due to deposition of material minimal and will be mitigated by collection of route drainage to ditches and swales for infiltration back to groundwater.	Potential reduction in groundwater recharge due to deposition of material minimal and will be mitigated by collection of route drainage to ditches and swales for infiltration back to groundwater.	Potential reduction in groundwater recharge due to deposition of material minimal and will be mitigated by collection of route drainage to ditches and swales for infiltration back to groundwater.	Potential reduction in groundwater recharge due to deposition of material minimal and will be mitigated by collection of route drainage to ditches and swales for infiltration back to groundwater.	Potential reduction in groundwater recharge due to deposition of material minimal and will be mitigated by collection of route drainage to ditches and swales for infiltration back to groundwater.	Potential reduction in groundwater recharge due to deposition of material minimal and will be mitigated by collection of route drainage to ditches and swales for infiltration back to groundwater.	Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to surface water flows. Negligible impact following mitigation.	Potential reduction in groundwater recharge due to development mitigated by collection of runoff back to ground where appropriate. Potential underground works could provide barrier to groundwater flow although any impact likely to be minor and have negligible impact.

Quantitative status	Poor

Groundwater body					Scheme Elements	Cutting						Embankment							Station	
						Hints Cutting (CFA21)		Swinfen Hall Cutting (CFA21 and CFA22)		Whittington Common Cutting (CFA22)		Hints Embankment (CFA21)	Mildmore Wood Embankment (CFA21)	Bucks Head Embankment	Whittington Heath Embankment (CFA22)	Huddlesford Embankment (CFA22)	Fulfen Wood South Embankment (CFA22)	Fulfen Wood North Embankment (CFA22)	Curzon Street Station (CFA26)	
						176-L1		177-L3		182-L1		175-L3	176-L2	177-L2	181-L1	183-L1	183-L3	183-L5	B-175-L1	
GB40401G301000					Phase	Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	
Tame Anker Mease - PT Sandstone Birmingham Lichfield	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	None identified	None identified		None identified	None identified	None identified	None identified	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)															
1. Saline or other intrusions. To identify groundwater bodies where intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Poor	High	Probably Not At Risk	Good Chemical Status by 2015		No likely saline or other intrusion of poor quality water as no sources of poor water quality identified in vicinity of scheme element.	No likely saline or other intrusion of poor quality water as no sources of poor water quality identified in vicinity of scheme element.	No likely saline or other intrusion of poor quality water as no sources of poor water quality identified in vicinity of scheme element.	No likely saline or other intrusion of poor quality water as no sources of poor water quality identified in vicinity of scheme element.	No likely saline or other intrusion of poor quality water as no sources of poor water quality identified in vicinity of scheme element.	No likely saline or other intrusion of poor quality water as no sources of poor water quality identified in vicinity of scheme element.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Good	Low	At Risk	Good Chemical Status by 2015		Black Brook / Bourne Brook located 300m east of scheme element. Discharge of track drainage to attenuation pond at N end, upstream of cutting. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Black Brook / Bourne Brook located 300m east of scheme element. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Track drainage discharged to attenuation ponds. Potential influence in baseflow to tributary of East Litchfield catchment to W of cutting. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Track drainage discharged to attenuation ponds. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element
3. GWDTE's. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTE's.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		Roundhill Wood and Rookery Wood are located within ROI on productive strata, however situated on a hill therefore unlikely to be groundwater dependent. Discharge of track drainage to attenuation pond at N end, upstream of cutting. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Roundhill Wood and Rookery Wood are located within ROI on productive strata, however situated on a hill therefore unlikely to be groundwater dependent. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Black Brook Corridor and Church Wood and meadow located within ROI and potential to received reduced groundwater flow as a result of drainage to cutting. Track drainage discharged to attenuation ponds. Implementation of CoCP will mitigate against any pollutant link to GWDTE's during construction.	Black Brook Corridor and Church Wood and meadow located within ROI and potential to received reduced groundwater flow as a result of drainage to cutting. Track drainage discharged to attenuation ponds. Implementation of CoCP will mitigate against any pollutant link to GWDTE's during construction.	Whittington Common Cutting only ecological receptor identified in vicinity of site. However, it is unlikely to be groundwater dependent and therefore no risk posed by scheme element. Implementation of CoCP will mitigate against any pollutant link to GWDTE's during construction.	Whittington Common Cutting only ecological receptor identified in vicinity of site however unlikely to be groundwater dependent. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	Low	At Risk	Good Chemical Status by 2015		Designated DrWPA and nearest abstraction 1.9km to the north-east and outside of the calculated radius of influence from the cutting therefore no impact identified to groundwater quality or flow at the abstraction. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Designated DrWPA and nearest abstraction 1.9km to the north-east and outside of the calculated radius of influence from the cutting therefore no impact identified to groundwater quality or flow at the abstraction. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Designated DrWPA, SPZ3 and nearby licensed abstractions. Potential impact to groundwater quality in SPZ through the saturated zones from scheme element during construction. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Designated DrWPA, SPZ3 and nearby licensed abstractions. Track drainage discharged to attenuation ponds. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Designated DrWPA and located in SPZ3. Likely reduction in groundwater levels minor and unlikely to have impact on SPZ. Potential impact to groundwater quality in SPZ through the saturated zones from scheme element during construction. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element.	Designated DrWPA, SPZ3 and nearby licensed abstractions. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. Potential impact to groundwater quality through the saturated zones from scheme element during construction, including machinery fluids and disturbance leading to turbidity. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	In DrWPA. Station structure will be waterproofed. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element
5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		Potential impact to groundwater quality through the saturated zones from scheme element during construction. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Potential impact to groundwater quality through the saturated zones from scheme element during construction. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Track drainage discharged to attenuation ponds. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Potential impact to groundwater quality through the saturated zones from scheme element during construction. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Potential impact to groundwater quality through the saturated zones from scheme element during construction, including machinery fluids and disturbance leading to turbidity. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	No impacts identified as result of scheme element

Chemical status	Poor
Overall status	Poor

B. Risk screening of potential to prevent future attainment of good WFD status

WFD classification element currently at less than good status	Current status			Status objective	Scheme Elements	Cutting						Embankment							Station	
						Hints Cutting (CFA21)		Swinfen Hall Cutting (CFA21 and CFA22)		Whittington Common Cutting (CFA22)		Hints Embankment (CFA21)	Mildmore Wood Embankment (CFA21)	Bucks Head Embankment	Whittington Heath Embankment (CFA22)	Huddlesford Embankment (CFA22)	Fulfen Wood South Embankment (CFA22)	Fulfen Wood North Embankment (CFA22)	Curzon Street Station (CFA26)	
						176-L1		177-L3		182-L1		175-L3	176-L2	177-L2	181-L1	183-L1	183-L3	183-L5	B-175-L1	
2. Surface water (quantitative), 4. Water balance (quantitative), 1. Saline or other intrusions (chemical)	Poor			Good Status by 2015	Phase	Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	
RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	**Where RBMP measure will happen**			**When RBMP measure will happen**	**Identified chemical impacts**	Disturbing or mobilising existing groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	None identified	None identified		None identified	None identified	None identified	None identified	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate
Implement new regulatory approach arising from new Groundwater Directive (2006/116/EC), including Registration in conjunction with Standard Rules	Humber RBD			2012	Predicted change to status elements (green = none, amber = possibly, red = likely)	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact
Local pollution prevention campaigns & education to include emphasis on solvent use.	Tame Anker Mease - PT Sandstone Birmingham Lichfield groundwater body			2010		CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.
Investigation at local nature conservation site perceived to be adversely affected by abstraction: Bourne Brook and Hopwas Hayes.	Tame Anker Mease - PT Sandstone Birmingham Lichfield groundwater body			2012		Black Brook / Bourne Brook located 300m east of scheme element. Although not within radius of influence, groundwater contributions to surface water are likely to be altered by drainage to the deep cutting although relatively short in length. Contributions to baseflow in surface water body likely to be reduced in vicinity of cutting although mitigation proposed to reinject water via trenches and SuDS.	Black Brook / Bourne Brook located 300m east of scheme element. Although not within radius of influence, groundwater contributions to surface water are likely altered by drainage to the deep cutting although relatively short in length. Contributions to baseflow in surface water body likely to be reduced in vicinity of cutting although mitigation proposed to reinject water via trenches and SuDS.	Nearby ponds and issues likely to be impacted by local reduction in groundwater levels caused by cutting. Groundwater contributions to unnamed surface watercourse likely to also be altered by shallow cutting. Embedded mitigation to reintroduce groundwater drained by the cutting to groundwater via SuDS, reinfiltration, trenches and balancing ponds.	Nearby ponds and issues likely to be impacted by local reduction in groundwater levels caused by cutting. Groundwater contributions to unnamed surface watercourse likely to also be altered by shallow cutting. Embedded mitigation to reintroduce groundwater drained by the cutting to groundwater via SuDS, reinfiltration, trenches and balancing ponds.	Possible very minor influence on groundwater contribution surface waters but this is several kilometres upstream of Hopwas Hayes. No significant impact predicted.	Possible very minor influence on groundwater contribution surface waters but this is several kilometres upstream of Hopwas Hayes. No significant impact predicted.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element

Ref:

Environment Agency (2013) Tame, Anker and Mease abstraction licensing strategy - Lichfield and Shenstone GWMU's
Environment Agency website; What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx
Environment Agency (2009) River Basin Management Plan - Humber River Basin District - Annex C Actions to deliver objectives

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Viaduct				Other Key Structures					Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Black Brook Viaduct (CFA21)	Capper's Lane Viaduct (CFA22)	Fulfen Wood Viaduct (CFA22)	Curzon Street No.3 Viaduct (CFA26)	Watling Street Overbridge	A5 Trunk Road Overbridge	A51 Tamworth Road Overbridge	A4540 Lawley Middleway	Curzon Street Station Highway Works				
						177-L1	183-L2	183-L4	B-174-L2	178-S1	178-S3	181-S2	B-174-S1	B-174-S2				
GB40401G301000					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
Tame Anker Mease - PT Sandstone Birmingham Lichfield	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions				
WFD classification elements: **1.Saline or other intrusions.** To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Probably Not At Risk	Good Ecological Status by 2015	Predicted change to status elements (green = none, amber = possibly, red = likely)	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified	Remains Good Status	None required	Remains Good Status
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Poor	Low	At Risk	Good Ecological Status by 2015		Minor impact on groundwater flows through localised mounding of groundwater around piles. Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to surface water flows. Negligible impact following mitigation.	Minor impact on groundwater flows through localised mounding of groundwater around piles. Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to surface water flows. Negligible impact following mitigation.	No impacts identified as result of scheme element	Possibility that scheme element could have minor impact on groundwater flows through mounding of groundwater around piles however influence likely to be local and no likely impact on nearby surface waterbodies.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Predominantly localised/temporary or other minor effects. Potential adverse impact on East Litchfield Catchment, which is already unable to support Good ecological potential due to abstraction	No Significant Deterioration	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater to maximise potential for recharge back to groundwater. Monitoring during construction	No Significant Deterioration
3. Groundwater Dependent Terrestrial Ecosystems (GWDTE's). To assess the impact of groundwater abstractions on the condition of GWDTE'S.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		Minor impact on groundwater flows through localised mounding of groundwater around piles. Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to surface water flows. Negligible impact following mitigation.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Minor impact on groundwater flows through localised mounding of groundwater around piles. Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to surface water flows. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Embankment crosses Coleshill Pool Wood LWS. Close to Coleshill & Bannerly Pools SSSI. Loss of habitat beneath footprint of scheme not assessed. Mitigation through drainage design.	Remains Good Status	None required	Remains Good Status
4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Poor	Low	Probably At Risk	Good Ecological Status by 2015		Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to surface water flows. Negligible impact following mitigation.	Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to surface water flows. Negligible impact following mitigation.	Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to surface water flows. Negligible impact following mitigation.	Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to surface water flows. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	Localised / temporary impacts predicted. However, combined impacts of all design elements have the potential to have an adverse effect on the water balance taking into account existing abstraction pressures.	No Significant Deterioration	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater to maximise potential for recharge back to groundwater. Monitoring during construction	No Significant Deterioration
Quantitative status	Poor															Poor		Poor

Groundwater body					Scheme Elements	Viaduct				Other Key Structures					Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Black Brook Viaduct (CFA21)	Capper's Lane Viaduct (CFA22)	Fulfen Wood Viaduct (CFA22)	Curzon Street No.3 Viaduct (CFA26)	Watling Street Overbridge	A5 Trunk Road Overbridge	A51 Tamworth Road Overbridge	A4540 Lawley Middleway	Curzon Street Station Highway Works				
						177-L1	183-L2	183-L4	B-174-L2	178-S1	178-S3	181-S2	B-174-S1	B-174-S2				
GB40401G301000					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
Tame Anker Mease - PT Sandstone Birmingham Lichfield	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions				
WFD classification elements: **1. Saline or other intrusions.** To identify groundwater bodies where intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Poor	High	Probably Not At Risk	Good Chemical Status by 2015	Predicted change to status elements (green = none, amber = possibly, red = likely)	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified	No Significant Deterioration	None required	No Significant Deterioration
2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Good	Low	At Risk	Good Chemical Status by 2015		Possibility that scheme element could have minor impact on groundwater quality due to piling. However influence likely to be local. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact on nearby watercourse following mitigation.	Possibility that scheme element could have minor impact on groundwater quality due to piling. However influence likely to be local. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact on nearby watercourse following mitigation.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In catchment of Black-Bourne Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In catchment of Black-Bourne Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In catchment of River Rea. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In catchment of River Rea. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Localised/temporary or other minor effect	Remains Good Status	None required	Remains Good Status
3. GWDTE's. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTE's.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		Possibility that scheme element could have minor impact on groundwater quality due to piling. However influence likely to be local. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact on nearby potential GWDTEs following mitigation.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Possibility that scheme element could have minor impact on groundwater quality due to piling. However influence likely to be local. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact on nearby potential GWDTEs following mitigation.	In catchment of Black-Bourne Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In catchment of Black-Bourne Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Localised/temporary or other minor effect	Remains Good Status	None required	Remains Good Status
4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	Low	At Risk	Good Chemical Status by 2015		Designated DrWPA and located within SPZ3. Potential impact to groundwater quality through the saturated zones from scheme element during construction, including machinery fluids and disturbance leading to turbidity. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Designated DrWPA and located within SPZ3. Potential impact to groundwater quality through the saturated zones from scheme element during construction, including machinery fluids and disturbance leading to turbidity. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Designated DrWPA and located within SPZ3. Potential impact to groundwater quality through the saturated zones from scheme element during construction, including machinery fluids and disturbance leading to turbidity. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Potential impact to groundwater quality through the saturated zones from scheme element during construction, including machinery fluids and disturbance leading to turbidity. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	In DrWPA and SPZ3. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA and SPZ3. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA and SPZ3. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA. Potential existing poor groundwater quality in area. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA. Potential existing poor groundwater quality in area. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Localised/temporary or other minor effect	Remains Good Status	None required	Remains Good Status
5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		Potential impact to groundwater quality through the saturated zones from scheme element during construction, including machinery fluids and disturbance leading to turbidity. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Potential impact to groundwater quality through the saturated zones from scheme element during construction, including machinery fluids and disturbance leading to turbidity. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Potential impact to groundwater quality through the saturated zones from scheme element during construction, including machinery fluids and disturbance leading to turbidity. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Potential impact to groundwater quality through the saturated zones from scheme element during construction, including machinery fluids and disturbance leading to turbidity. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Potential existing poor groundwater quality in area. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Potential existing poor groundwater quality in area. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Localised/temporary or other minor effect	Remains Good Status	None required	Remains Good Status
Chemical status	Poor															Poor		Poor
Overall status	Poor															Poor		Poor

B. Risk screening of potential to prevent future attainment of good WFD status

WFD classification element currently at less than good status	Current status			Status objective	Scheme Elements	Viaduct				Other Key Structures					Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Black Brook Viaduct (CFA21)	Capper's Lane Viaduct (CFA22)	Fulfen Wood Viaduct (CFA22)	Curzon Street No.3 Viaduct (CFA26)	Watling Street Overbridge	A5 Trunk Road Overbridge	A51 Tamworth Road Overbridge	A4540 Lawley Middleway	Curzon Street Station Highway Works				
						177-L1	183-L2	183-L4	B-174-L2	178-S1	178-S3	181-S2	B-174-S1	B-174-S2				
2. Surface water (quantitative), 4. Water balance (quantitative), 1. Saline or other intrusions (chemical)	Poor			Good Status by 2015	Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	**Where RBMP measure will happen**			**When RBMP measure will happen**	Identified chemical impacts	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions				
Implement new regulatory approach arising from new Groundwater Directive (2006/116/EC), including Registration in conjunction with Standard Rules.	Humber RBD			2012	Predicted change to status elements (green = none, amber = possibly, red = likely)	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	No impacts identified	No impacts identified	None required	No impacts identified
Local pollution prevention campaigns & education to include emphasis on solvent use.	Tame Anker Mease - PT Sandstone Birmingham Lichfield groundwater body			2010		CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	No impacts identified	No impacts identified	None required	No impacts identified
Investigation at local nature conservation site perceived to be adversely affected by abstraction: Bourne Brook and Hopwas Hayes.	Tame Anker Mease - PT Sandstone Birmingham Lichfield groundwater body			2012		Minor impact on groundwater flows through localised mounding of groundwater around piles. Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to surface water flows. Negligible impact following mitigation.	Possible very minor influence on groundwater contribution surface waters but this is several kilometres upstream of Hopwas Hayes. No significant impact predicted.	Possible very minor influence on groundwater contribution surface waters but this is several kilometres upstream of Hopwas Hayes. No significant impact predicted.	Possible very minor influence on groundwater contribution surface waters but this is several kilometres upstream of Hopwas Hayes. No significant impact predicted.	In catchment of Black-Bourne Brook. If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	In catchment of Black-Bourne Brook. If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Localised/temporary or other minor effect	Localised/temporary or other minor effect	None required	Localised/temporary or other minor effect

Ref:
Environment Agency (2013) Tame, Anker and Mease abstraction licensing strategy - Lichfield and Shenstone GWMU's
Environment Agency website; What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx
Environment Agency (2009) River Basin Management Plan - Humber River Basin District - Annex C Actions to deliver objectives

WFD Baseline Survey Details

Water Body ID	GB40401G301000
Groundwater Body Name	Tame Anker Mease - PT Sandstone Birmingham Lichfield
Scheme Element	Swinfield Cutting
Key Receptors	East Litchfield catchment Black Brook Corridor
Objectives of the Survey	• Assessment of GW levels and aquifer properties along line of route to refine drawdown and dewatering rate estimates • Refine understanding of GW-SW interactions • Establishment of long-term monitoring network (GW & SW)
Survey Scope	• Hydrological survey of flows/levels at springs / tributaries feeding East Litchfield catchment and Black Brook Corridor. • Monitoring bores: 2 no. o 1 at S end in Black Brook catchment outside CCB (may be able to use spring instead if suitable) o 1 in central area in East Litchfield catchment outside CCB near tributary • Groundwater level logger • In situ aquifer property testing
Medium Term Survey Results Summary	At survey point **WFD-GW1-0009** a large lake and a water course were observed. The flows from the large lake could not be estimated. A water control system exists on site to keep water levels below ground surface, . The lake flows into smaller ditches downstream through drainage pipes (below ground) connected to the ditch. The large lake also drains the adjacent woodland. The large lake is likely to be groundwater dependent evidenced by the Principal Aquifer (Bromsgrove Sandstone) underlying the area and minimal flow of surface water to the lake from an upstream source (SK24435, 05511). A flow velocity of 0.004 m^3/s was recorded on 29/07/2014 11:40 from the watercourse downstream of the lake (SK14285,05732). A level monitoring gauge is installed downstream of lake. The flow from the upstream watercourse is described as very low, but is not quantified. There are several small drains / wet ditches on the site. These drains / ditches have very limited aquatic communities with only duckweek – Lemna sp and Fool's water cress - Apium nodiflorum found in localised patches. **Future NVC assessment of the lake feature is recommended, no further monitoring of the stream feature is recommended. Level/ flow data can be obtained from the existing water monitoring gauge/v-notch weir at (SK14285 05732) downstream of the large lake can be used to establish the baseline condition and subsequent future monitoring.**
Medium Term Survey Results Conclusions in relation to previous assessment	Lake is identified as groundwater dependent, with level monitoring available. It is identified that the lake is managed for occasional recreational use. The lake level monitoring gauge should be utilised for measurements going forward in further surveys. Also recommended that level monitoring be undertaken of the large lake.
Additional Comments	Consider incorporating GW assessment into geotechnical investigation programme and monitoring into general environmental baseline monitoring plan

Blue - included in medium term survey
Black - would be covered in long term survey

dark blue - Recommendations additional to those provided in survey reports

Audit Trail for the Update of the WFD Water Body Assessment with Baseline Data

WFD Classification Elements Changed	Nature of the Assessment Update and Justification
	Swinfield Cutting (CFA21 & 22)
2. Surface water.	**Quantity** - No assessment update at this stage Information collected during medium term survey indicates that the lake visited (d) is likely tot be groundwater dependent. As such the assumptions made in the previous WFD assessment that Nearby ponds and issues likely to be impacted by local reduction in groundwater levels caused by cutting holds. **Assessment is to be revisited following long term surveys as well collection of data from exisitng level monitoring gauge identified at lake.**
	Quality - No assessment update at this stage Information collected during medium term survey indicates that the lake visited is likely tot be groundwater dependent. As such the assumptions made in the previous WFD assessment that Track drainage discharged to attenuation ponds and potential influence in baseflow to tributary of East Litchfield catchment to W of cutting could affect quality hold. **Assessment is to be revisited following long term surveys as well collection of data from exisitng level monitoring gauge identified at lake.**
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs).	**Quantity** - No assessment update at this stage Information collected during medium term survey indicates that the lake visited is likely to be groundwater dependent. As such the assumptions made in the previous WFD assessment that Black Brook Corridor and Church Wood and meadow located within ROI and potential to received reduced groundwater flow locally as a result of drainage to cutting, and nearby ponds and issues likely to be impacted by local reduction in groundwater levels caused by cutting hold. **Assessment is to be revisited following long term surveys as well collection of data from exisitng level monitoring gauge identified at lake.**
	Quality - No assessment update at this stage Information collected during medium term survey indicates that the lake visited is likely tot be groundwater dependent. As such the assumptions made in the previous WFD assessment that Track drainage discharged to attenuation ponds and potential influence in baseflow to tributary of East Litchfield catchment to W of cutting could affect quality in Black Brook Corridor and Church Wood and meadow located within ROI and due to potential to receive reduced groundwater flow locally hold. **Assessment is to be revisited following long term surveys as well collection of data from exisitng level monitoring gauge identified at lake.**
4. Water balance.	Quantity - No assessment update at this stage as survey data collected does not relate to assumptions made on water balance: Potential for dewatering to reduce groundwater levels. Impact likely to be local and not greatly impact the regional groundwater regime.

There are no AP2 Changes in this water body requiring assessment

Water Body ID	GB40402G300300
Groundwater Body Name	Staffordshire Trent Valley - Mercia Mudstone East & Coal Measures
CFAs covered by Waterbody	22

No WFD Surveys provided on this water body

CFA	22		
AP2 ID	AP2-022-001	AP2-022-001 (Tuppenhurst Farm)	AP2-022-001
AP2 Location	Whittington to Handsacre (Handsacre Connection)	Whittington to Handsacre	Parish of Fradley & Streethay Parish of Lichfield (Vertical Alignment)
New/Replacement Scheme Element	REPLACEMENT	NEW	REPLACEMENT/NEW
AP2 Scheme Element Type	Viaducts	New Road Access Works	Viaducts, Embankments
Original Scheme	In the November 2013 scheme, the Route runs on embankment northwards at around 8 - 10m above GL to cross over Wood End Lane and the Trent & Mersey Canal, with junction for links to Handsacre that have paired viaducts over T&M Canal (twice) and Pyford Brook before descending to near ground level. Wood End Lane realigned to pass under HS2 to south of junction; drainage pumping station needed. Shaw Lane closed just south of Handsacre junction. Fulfen Wood stream passes under embankment in culvert at 184+200. Mare Brook passes under embankment in culverts at 185+600 and 186+200.	Shaw Lane will be stopped up between the WCML and Tuppenhurst Lane (see Volume 2: map CT-06-130a, D5 to D8) and a balancing pond and access will be provided south of Shaw Lane. A section of Shaw Lane of approximately 340m will be stopped up at the existing crossing of the West Coast Main Line with traffic diverted west to A515 Lichfield Road.	Wood End Lane realigned to pass under HS2 to south of junction; drainage pumping station needed. Shaw Lane closed just south of Handsacre junction. Fulfen Wood stream passes under embankment in culvert at 184+200. Mare Brook passes under embankment in culverts at 185+600 and 186+200. False cutting earthworks included to south of Cappers Lane, to north of A38, by T&M Canal and by Shaw Lane. Lower slopes of embankments regraded to north of Cappers Lane, with noise barrier fences along embankment north to 184+200. Planting included on regraded earthworks and most of outer slopes of false cuttings. Large ecological compensation area on west side to north of Streethay. Large quantities of import for engineering and environmental fill require provision of Streethay construction sidings between A38 and route, with reception sidings to east alongside SSL and rail connection on temp bridge over Coventry Canal. Fulfen Wood stream culverted under sidings
AP2 Description	Further land and rights are required to enable the vertical realignment of the HS2 where it crosses the A38 and the Trent and Mersey Canal. Curborough Viaduct (replaces 2 Viaducts over Trent and Mersey Canals)	Tuppenhurst Lane Alternative access for farm vehicles/machinery New access crosses Bourne Brook and flood plain	Further land and rights are required to enable the vertical realignment of the HS2 where it crosses the A38 and the Trent and Mersey Canal. The vertical alignment of the railway (where it currently crosses over the A38, SSRL and WCML) is proposed to be lowered to pass under the transport corridors. This would delete the 16m high embankments (extending approximately 3km), lowering the railway into cutting with a maximum localised depth of 18m half way between the WCML crossing and the A38/SSRL crossing.
Changes to Previously assessed elements	Trent & Mersey Canal East Viaduct, Trent & Mersey Canal West Viaduct and Pyford Brook Viaducts replaced by Curborough Viaduct	Road access	**Replacements:** Streethay Embankment is replaced by Lichfield Retained Cut (in Tame Anker Mease), Pyford Brook Embankments are replaced by Curborough Embankment
AP2 Assessment Requirements	Curborough Viaduct to be assessed	Road access to be assessed, assumed Bourne Brook crossed by small bridge	New:Curborough Embankment AP also extends under GB40402G990800 Tame Anker Mease - Secondary Combined water body, and also includes AP2-022-001

Requires Assessment

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Embankment						Retaining Wall		Viaduct					Other Key Structures		Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Pyford Brook East Embankment (CFA22)	Pyford Brook West Embankment (CFA22)	Ravenshaw Embankment (CFA22)	Shaw Lane Embankment (CFA22)	Lilac Embankment (CFA22)	Curbough Embankment (CFA22)	Handscare Retaining Wall		Bourne Brook Viaduct (CFA22)	Harvey's Rough Viaduct	Curborough Viaduct (Handscare Connection)	A515 Lichfield Road Underbridge	Tuppenhurst Farm Road Access					
						188-L1		188-L2	190-L2	191-L2	AP2-022-001 (Vertical Alignment)	192-L4		190-L1	191-L1	AP2-022-001	190-S2	AP2-022-001					
GB40402G300300					Phase	Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation					
Staffordshire Trent Valley - Mercia Mudstone East & Coal Measures	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	[illegible]	[illegible]	Reduction in groundwater contributions	Reduction in groundwater contributions	Reduction in groundwater contributions	Reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies or GWDTE's by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	[illegible]	[illegible]	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions				
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)																			
1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		[illegible]	[illegible]	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	[illegible]	[illegible]	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified	Remains Good Status	None required	Remains Good Status
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Good	Low	Not At Risk	Good Ecological Status by 2015		[illegible]	[illegible]	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Near tributaries of River Trent and Longdon/Armitage Catchment. Trent & Mersey canal not considered GW dependent. Abstracted water returned to ground via SuDS where possible or to surface water. Localised effects on baseflows.	In GW divide between tributaries. Cut-off wall likely to affect flows in superficials. Adjacent to existing cutting. No significant impacts predicted.	[illegible]	[illegible]	Groundwater in hydraulic connection with Bourne Brook. Minor impact on groundwater flows through localised mounding of groundwater around piles. Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to surface water flows. Negligible impact following mitigation.	Minor impact on groundwater flows through localised mounding of groundwater around piles. Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to surface water flows. Negligible impact following mitigation.	Groundwater in hydraulic connection with Curborough Bourne Brook. Minor impact on groundwater flows through localised mounding of groundwater around piles. Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to surface water flows. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Localised/temporary or other minor effect	Remains Good Status	None required	Remains Good Status
3. Groundwater Dependent Terrestrial Ecosystems (GWDTE's). To assess the impact of groundwater abstractions on the condition of GWDTE'S.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		[illegible]	[illegible]	Route close to pond at Black Slough Wood and ponds at Wood End Lane. Ponds likely to be lost to the scheme so impact on groundwater body status not assessed. Route crosses Ravenshaw Wood, Black Slough and Slash, Tomhay Wood, Vicar's Coppice. Potential GWDTEs identified. No impacts to groundwater body status identified as result of scheme element	John's Gorse Ancient Woodland and BAP habitat including ponds and wet woodlands crossed by route. Potential GWDTEs identified. No impacts to groundwater body status identified as result of scheme element	Near LWS wetland area off Tuppenhurst Lane. Potential GWDTEs identified. No impacts to groundwater body status identified as result of scheme element	Route crosses Big Lyntus Wood, Curborough Brook and associated habitats. Potential GWDTEs identified. No impacts to groundwater body Status identified as result of scheme element	Near LWS wetland area off Tuppenhurst Lane. Potential GWDTEs identified. Adjacent to existing cutting. Abstracted water returned to ground via SuDS where possible or to surface water. Cut-off walls will reduce inflows.	Cut-off walls will locally influence flow regime in superficials. Adjacent to existing cutting.	[illegible]	[illegible]	Close to John's Gorse Ancient Woodland and BAP Habitat, including ponds and wet woodland habitat. Vicar's Coppice Ancient Woodland nearby. Ponds that will be lost within construction footprint have not been assessed with respect to groundwater body status. Minor impact on groundwater flows through localised mounding of groundwater around piles. Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to GWDTEs. Negligible impact following mitigation.	Route close to pond near Shaw House. Pond likely to be lost to the scheme so impact on groundwater body status not assessed. Ancient Woodland nearby. Minor impact on groundwater flows through localised mounding of groundwater around piles. Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to GWDTEs. Negligible impact following mitigation.	Close to Big Lyntus Wood, Curborough Brook and associated habitats. Potential GWDTEs identified in vicinity. Minor impact on groundwater flows through localised mounding of groundwater around piles. Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to GWDTEs. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Localised/temporary or other minor effect	Remains Good Status	None required	Remains Good Status
4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		[illegible]	[illegible]	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Abstracted water returned to ground via SuDS where possible or to surface water.	Cut-off walls will locally influence flow in superficials.	[illegible]	[illegible]	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	Localised/temporary or other minor effect	Remains Good Status	None required	Remains Good Status
Quantitative Status	Good																					Good		Good

Groundwater body					Scheme Elements	Embankment						Retaining Wall		Viaduct					Other Key Structures		Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Pyford Brook East Embankment (CFA22)	Pyford Brook West Embankment (CFA22)	Ravenshaw Embankment (CFA22)	Shaw Lane Embankment (CFA22)	Lilac Embankment (CFA22)	Curbough Embankment (CFA22)	Handscare Retaining Wall		Bourne Brook Viaduct (CFA22)	Harvey's Rough Viaduct	Curborough Viaduct (Handscare Connection)	A515 Lichfield Road Underbridge	Tuppenhurst Farm Road Access					
						188-L4		188-L2	190-L2	191-L2	AP2-022-001 (Vertical Alignment)	192-L4		190-L1	191-L1	AP2-022-001	190-S2	AP2-022-001					
GB40402G300300					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation					
Staffordshire Trent Valley - Mercia Mudstone East & Coal Measures	Current status	Confidence	Risk	Status objective	Identified chemical impacts	[illegible]	None identified	None identified	None identified	None identified	None identified	None identified	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate				
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)																			
1. Saline or other intrusions. To identify groundwater bodies where intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		[illegible]	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	[illegible]	[illegible]	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified	Remains Good Status	None required	Remains Good Status
2. Surface water. To assess the impact of groundwater abstractions on the chemical and ecological status of surface water bodies.	Good	Low	Not At Risk	Good Chemical Status by 2015		[illegible]	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	[illegible]	[illegible]	Potential for impact to groundwater quality during construction. Potential hydraulic connection with Bourne Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Potential for impact to groundwater quality during construction. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Potential for impact to groundwater quality during construction. Potential hydraulic connection with Curborough Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Potential for impact to groundwater quality during construction. Potential hydraulic connection with Bourne Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Localised/temporary or other minor effect	Remains Good Status	None required	Remains Good Status
3. GWDTE's. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTE's.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		[illegible]	Route crosses Fradley Wood, Curborough Brook and associated habitats. Potential GWDTEs in vicinity. Limited potential for impact to groundwater quality through unsaturated zone during construction. With the implementation of CoCP and best practice there should be sufficient mitigation in place to avoid adversely impacting groundwater quality. Negligible residual impact.	Route crosses Fradley Wood, Curborough Brook and associated habitats. Limited potential GWDTEs in vicinity. Potential for impact to groundwater quality through unsaturated zone during construction. With the implementation of CoCP and best practice there should be sufficient mitigation in place to avoid adversely impacting groundwater quality. Negligible residual impact.	Route close to pond at Black Slough Wood and ponds at Wood End Lane. Ponds likely to be lost to the scheme so impact on groundwater body status not assessed. Route crosses Ravenshaw Wood, Black Slough and Slash, Tomhay Wood, Vicar's Coppice. Potential GWDTEs identified. Limited potential for impact to groundwater quality through unsaturated zone during construction. With the implementation of CoCP and best practice there should be sufficient mitigation in place to avoid adversely impacting groundwater quality. Negligible residual impact.	John's Gorse Ancient Woodland and BAP habitat including ponds and wet woodlands crossed by route. Potential GWDTEs identified. Limited potential for impact to groundwater quality through unsaturated zone during construction. With the implementation of CoCP and best practice there should be sufficient mitigation in place to avoid adversely impacting groundwater quality.	Near LWS wetland area off Tuppenhurst Lane. Potential GWDTEs identified. Limited potential for impact to groundwater quality through unsaturated zone during construction. With the implementation of CoCP and best practice there should be sufficient mitigation in place to avoid adversely impacting groundwater quality.	Route crosses Big Lyntus Wood, Curborough Brook and associated habitats. Limited potential GWDTEs in vicinity. Potential for impact to groundwater quality through unsaturated zone during construction. With the implementation of CoCP and best practice there should be sufficient mitigation in place to avoid adversely impacting groundwater quality. Negligible residual impact.	Near LWS wetland area off Tuppenhurst Lane. Potential GWDTEs identified. Limited potential for impact to groundwater quality through unsaturated zone during construction. With the implementation of CoCP and best practice there should be sufficient mitigation in place to avoid adversely impacting groundwater quality.	Near LWS wetland area off Tuppenhurst Lane. Potential GWDTEs identified. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Near LWS wetland area off Tuppenhurst Lane. Potential GWDTEs identified. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	[illegible]	[illegible]	Close to John's Gorse Ancient Woodland and BAP Habitat, including ponds and wet woodland habitat. Vicar's Coppice Ancient Woodland nearby. Ponds that will be lost within construction footprint have not been assessed with respect to groundwater body status. Potential for impact to groundwater quality during construction. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Route close to pond near Shaw House. Pond likely to be lost to the scheme so impact on groundwater body status not assessed. Ancient Woodland nearby. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Close to Big Lyntus Wood, Curborough Brook and associated habitats. Potential GWDTEs identified in vicinity. Minor impact on groundwater flows through localised mounding of groundwater around piles. Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to GWDTEs. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Localised/temporary or other minor effect	Remains Good Status	None required	Remains Good Status
4. Drinking Water Protected Areas (DWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		[illegible]	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Within DrWPA. Abstractions in vicinity but scheme element is not within SPZ. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Within DrWPA. Abstractions in vicinity but scheme element is not within SPZ. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	[illegible]	[illegible]	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	No impacts identified	Remains Good Status	None required	Remains Good Status
5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		[illegible]	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	[illegible]	[illegible]	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No impacts identified	Remains Good Status	None required	Remains Good Status
Chemical Status	Good																					Good		Good
Overall status	Good																					Good		Good

Water Body ID	GB40603G000300
Groundwater Body Name	Lower Thames Gravels
CFAs covered by Waterbody	New Site - Off Route

No WFD Surveys provided on this water body as new location

CFA	New					
AP2 ID	AP2-000-001					
AP2 Location	HEx Depot, Berkshire					
New/Replacement Scheme Element	NEW					
AP2 Scheme Element Type	Depot	Hollow Hill Lane Realignment Works	Hollow Hill Lane Underbridge	Horton Brook Diversion	Embankment	Cutting
Original Scheme	None New Relocation of the Heathrow Express depot to Langley.					
AP2 Description	The Depot facility buildings are to be constructed on land raised from the present level by approximately 3 m	A section of Hollow Hill Lane will be realigned by up to approximately 15m to the west of its existing alignment and lowered by approximately 4.0 m and a new road underbridge will be provided.		A section of Horton Brook and another small adjacent waterway will be placed in culverts across the area to be used for flood compensation and where these waterways cross under the revised scheme trackwork	To the east of Hollow Hill Lane, the Langley Depot East Connection trackwork will be built on embankment up to approximately 3 m high for approximately 130 m and then in shallow cutting up to approximately 2.0 m deep for approximately 700 m.	
Changes to Previously assessed elements	NA					
AP2 Assessment Requirements	Depot presence to be assessed	Realignment works to be assessed	Underbridge to be assessed	Brook diversion to be assessed	Embankment presence to be assessed	Cutting presence to be assessed

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Embankment	Cutting		Depot	Other Key Structures			Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Langley Embankment	Langley Cutting		HEx Depot	Hollow Hill Lane Underbridge	Hollow Hill Lane Realignment Works	Horton Brook Diversion				
						AP2-000-001	AP2-000-001		AP2-000-001	AP2-000-001	AP2-000-001	AP2-000-001				
GB40603G000300					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
Lower Thames Gravels	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	None Identified	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTE's or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control				
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)											
1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impacts predicted	Remains at Good Status	None required	Remains at Good Status
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	In Horton Brook catchment. If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS at upstream end. No significant impacts identified as result of scheme element.	No significant impacts identified as result of scheme element	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Negligible impact following mitigation.	Potential localised effects. Negligible impact following mitigation.	Remains at Good Status	Reassess once site investigation & monitoring data available Monitoring during construction	Remains at Good Status
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs). To assess the impact of groundwater abstractions on the condition of GWDTEs.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	Abstracted water returned to ground via SuDS. No significant impacts identified as result of scheme element.	No impacts identified as result of scheme element	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Dewatering will be temporary and localised. Abstracted water returned to ground via SuDS or to adjacent stretch of surface water body. . Negligible impact following mitigation.	No significant impacts predicted	Remains at Good Status	Reassess once site investigation & monitoring data available Monitoring during construction	Remains at Good Status
4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	Abstractions returned to ground via SuDS. No significant impacts identified as result of scheme element	No significant impacts identified as result of scheme element	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	Potential localised effects. Negligible impact following mitigation.	Remains at Good Status	None required	Remains at Good Status
Quantitative status	Good													Good		Good

Groundwater body					Scheme Elements	Embankment	Cutting		Depot	Other Key Structures			Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Langley Embankment	Langley Cutting		HEx Depot	Hollow Hill Lane Underbridge	Hollow Hill Lane Realignment Works	Horton Brook Diversion				
						AP2-000-001	AP2-000-001		AP2-000-001	AP2-000-001	AP2-000-001	AP2-000-001				
GB40603G000300					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
Lower Thames Gravels	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate				
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)											
1. Saline or other intrusions. To identify groundwater bodies where intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Probably Not At Risk	Good Chemical Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impacts predicted	Remains at Good Status	None required	Remains at Good Status
2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Poor (Assessed as Good in 2012)	Low	Probably Not At Risk	Poor Chemical Status (technically infeasible)		Close to Hollow Lane historical landfill, poor quality groundwater may exist locally. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Abstracted water returned to ground via SuDS. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Abstracted water returned to ground via SuDS. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Close to Horton Brook and Grand Union Canal. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In catchment of Horton Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In catchment of Horton Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Dewatering, if required, is temporary and localised. Abstractions returned to ground via SuDS. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Potential localised effects. Negligible impact following mitigation.	No significant deterioration	Reassess once site investigation & monitoring data available Monitoring during construction	No significnt deterioration
3. GWDTEs. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTEs.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No significant impacts predicted	Remains at Good Status	Reassess once site investigation & monitoring data available Monitoring during construction	Remains at Good Status
4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	Low	Probably At Risk	Good Chemical Status by 2015		In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. Potential existing poor groundwater quality in area. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA. Potential existing poor groundwater quality in area. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA. Potential existing poor groundwater quality in area. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design , construction and operations reduce risks to water quality. No significant residual impacts predicted.	No significant impacts predicted	Remains at Good Status	Reassess once site investigation & monitoring data available Monitoring during construction	Remains at Good Status
5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		Close to Hollow Lane landfill. Poor quality groundwater may exist locally. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Potential existing poor groundwater quality in area. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Potential existing poor groundwater quality in area. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Potential existing poor groundwater quality in area. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Potential localised effects. Negligible impact following mitigation.	Remains at Good Status	Reassess once site investigation & monitoring data available Monitoring during construction	Remains at Good Status
Chemical status	Poor													Poor		Poor
Overall status	Poor													Poor		Poor

B. Risk screening of potential to prevent future attainment of good WFD status

WFD classification element currently at less than good status	Current status			Status objective	Scheme Elements	Embankment	Cutting		Depot	Other Key Structures			Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Langley Embankment	Langley Cutting		HEx Depot	Hollow Hill Lane Underbridge	Hollow Hill Lane Realignment Works	Horton Brook Diversion				
						AP2-000-001	AP2-000-001		AP2-000-001	AP2-000-001	AP2-000-001	AP2-000-001				
4. Drinking Water Protected Areas (DrWPAs) (chemical)	Good			Good Status by 2015	Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	**Where RBMP measure will happen**			**When RBMP measure will happen**	**Identified impacts**	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate				
Registrations (in conjunction with Standard Rules) - Implement new regulatory approach (via Environmental Permitting Regulations) arising from implementation of new Groundwater Directive (2006/116/EC).	Thames RBD			2012	Predicted change to status elements (green = none, amber = possibly, red = likely)	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.		None required	RBMP Measure is insensitive to scheme element.
R&D on fate and transport of phosphate in groundwater to determine impact on surface water.	Thames RBD			2012		CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No significant impact predicted.	No significant impact predicted.	None required	No significant impact predicted.

Ref:
Environment Agency (2013) Tame, Anker and Mease abstraction licensing strategy - WRMU1 - Rivers Tame, Cole, Anker and Trent, WRMU2 - River Blythe and WRMU3 - Bourne/ Black Brook
Environment Agency website; What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx
Environment Agency (2009) River Basin Management Plan - Humber River Basin District - Annex C Actions to deliver objectives

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