HIGH SPEED RAIL
(LONDON - WEST MIDLANDS)

Supplementary Environmental Statement 3 and Additional Provision 4 Environmental Statement

Volume 5 | Water resources
(WR-001-000: Annex A and Annex B)

October 2015

SES3 and AP4 ES 3.5.1.12

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						Risk to Overall Status				
Surface water body name	**Waterbody ID**	**Catchment**	**Geographical Area**	**CFA**	**No. AP4 Updates**	**Original Assessment**	**Post-Additonal Baseline survey**	**Post-AP2 Updates**	**Post-AP4 Updates**	**Assessment Summary**
Canley Bk - source to conf with Finham Bk	GB109054044520	Warwickshire Avon	North	18	1			No AP2 updates		Original + Baseline + AP4
Stoke Brook Aylesbury	GB106039030320	Thame and South Chilterns	South	10, 11,	1			No AP2 updates		Original + Baseline + AP4
Colne and GUC (from confluence with Chess to Ash)	GB106039023090	Colne	South	7	2		reduced risk			Original + Baseline + AP2 + AP4
R Blythe from Patrick Bridge to R Tame	GB104028042572	Tame Anker and Mease	West	23, 24	3					Original + Baseline + AP2 + AP4
Oxford Canal, summit pound	GB70910196	N/A	North	16	1		No baseline survey updates	No AP2 updates		Original + AP4
Misbourne	GB106039029830	Colne	South	7, 8, 9,	1		No baseline survey updates	No AP2 updates		Original + AP4
Yeading Brook (west arm)	GB106039023060	London	London MET	5, 6	1		No baseline survey updates	No AP2 updates		Original + AP4
River Tame from Conf of the two arms to R Blythe	GB104028046840	Tame Anker and Mease	West	19, 20, 25, 26	2		No baseline survey updates	No AP2 updates		Original + AP4

CFA 1 - 5 Cover Sheet

						Risk to Overall Status				
Surface water body name	**Waterbody ID**	**Catchment**	**Geographical Area**	**CFA**	**No. AP4 Updates**	**Original Assessment**	**Post-Additonal Baseline survey**	**Post-AP2 Updates**	**Post-AP4 Updates**	**Assessment Summary**
Yeading Brook (west arm)	GB106039023060	London	London MET	5, 6	1		No baseline survey updates	No AP2 updates		Original + AP4

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~~Strikethrough text~~	In assessment tab, where text from the previous assessment is no longer relevant/has been superseded and therefore has been removed (but is still visible to the reader).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 AP4 Assessment Changes:

	In AP4 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 AP4 change

Water Body ID	GB106039023060
Surface Water Body Name	Yeading Brook (West Arm)
CFAs covered by Waterbody	6

CFA	New
AP4 ID	AP-C221-082
AP4 Name	Extension of West Ruislip (porous) portal
AP4 Location	West Ruislip
New/Replacement Scheme Element	NEW
AP4 Scheme Element Type	Tunnel Portal
Original Scheme	The portal and approach ramp will consist of diaphragm walls forming an earth retaining box structure with an approximate length of 520m. It will include the following key permanent features: • a ramp structure which will ascend to ground level and consists of diaphragm walls, a porous portal hood and portal structure; • the covered section of the portal structure will provide a launch chamber for two Tunnel Boring Machines (TBM), with a base slab 15m below ground level; • modifications to the existing railway adjacent to the portal.
AP4 Description	Extension of the West Ruislip portal, is located in close proximity to a ditch, identified in CT-06-18 as Ickenham Stream. Ickenham Stream is not a WFD waterbody and flows into the west arm of the Yeading Brook.
Changes to Previously assessed elements	NA
AP4 Assessment Requirements	Portal extension 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	Bored Tunnel					WEST RUISLIP PORTAL EXTENSION - AP-C221-082		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)	-
	GB106039023060	Moderate	Good Ecological Potential by 2027	Description of scheme element impact	Northolt tunnel (13.4km) passes directly underneath Yeading Brook West (SWC-CFA6-4 and SWC-CFA6-5). Settlement predicted to be minor and very localised as a result of underlying clay. Tunnel drainage will be directed towards the vent shafts, where it will be pumped to the surface and discharged as appropriate. It is anticipated that discharge will be through a connection to the Thames Water sewer network.					Drawings (CT - 06 - 018) shows that West Ruislip portal will be extended 250m to the west to within approximately 50m of Ickenham Stream.				Construction	Operation		
	Yeading Brook (West Arm)			Identified biological impacts	Noise and Vibration	Drainage	Settlement of ground leading to enhancement of fractures and increased vertical permeability	Dewatering of excavations during construction	Landtake (for slab or other surface infrastructure overlaying tunnel)	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	-
	2. Macrophytes and phytobenthos - macrophytes	-	-		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. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	Settlement at watercourse crossings predicted to be minor and very localised (ES Water Chapter Vol 5). No likely effect anticipated.	As tunnel crossings near Yeading Brook are located on unproductive clay strata, no dewatering is expected to be necessary. No effect anticipated on this quality element.	No slab or other structure proposed.	• The proposed AP4 may may locally influence flow to Ickenham Stream, however, the tunnel will only affect unproductive strata and only negligible effect on flows are anticipated. Although no baseline data are available, only a negligible effect on macrophytes is anticipated.	• The proposed AP4 may may locally influence flow to Ickenham Stream; however, the tunnel will only affect unproductive strata and only negligible effect on flows are anticipated. Although no baseline data are available, only a negligible effect on macrophytes is anticipated.	No scheme element on upstream water body	Scheme elements present on this water body are likely to have no significant effects on this quality element. No effect anticipated at the scale of the water body. The macrophytes quality element does not currently have a status.	None required.	None required.	N/A	-
	3. Macroinvertebrates	Poor	Good by 2027 ?		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. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	Settlement at watercourse crossings predicted to be minor and very localised (ES Water Chapter Vol 5). No likely effect anticipated.	As tunnel crossings near Yeading Brook are located on unproductive clay strata, no dewatering is expected to be necessary. No effect anticipated on this quality element.	No slab or other structure proposed.	• The proposed AP4 may may locally influence flow to Ickenham Stream, however, the tunnel will only affect unproductive strata and only negligible effect on flows are anticipated. Although no baseline data are available, only a negligible effect on macroinvertebrates is anticipated.	• The proposed AP4 may may locally influence flow to Ickenham Stream; however, the tunnel will only affect unproductive strata and only negligible effect on flows are anticipated. Although no baseline data are available, only a negligible effect on macroinvertebrates is anticipated.	No scheme element on upstream water body	Scheme elements present on this water body are likely to have no significant effects on this quality element. No effect anticipated at the scale of the water body. The macrophytes quality element does not currently have a status. The scheme therefore is not considered as having the potential to deteriorate the current WFD status (Poor) of this quality element.	None required.	None required.	N/A	-
	4. Fish	Moderate	Good by 2027 ?		Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). However, effects are likely to be temporary and localised.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	Settlement at watercourse crossings predicted to be minor and very localised (ES Water Chapter Vol 5). No likely effect anticipated.	As tunnel crossings near Yeading Brook are located on unproductive clay strata, no dewatering is expected to be necessary. No effect anticipated on this quality element.	No slab or other structure proposed.	• The proposed AP4 may may locally influence flow to Ickenham Stream, however, the tunnel will only affect unproductive strata and only negligible effect on flows are anticipated. Although no baseline data are available, only a negligible effect on fish is anticipated.	• The proposed AP4 may may locally influence flow to Ickenham Stream, however, the tunnel will only affect unproductive strata and only negligible effect on flows are anticipated. Although no baseline data are available, only a negligible effect on fish is anticipated.	No scheme element on upstream water body	Scheme elements present on this water body are likely to have only localised and temporary effects on this quality element. No effect anticipated at the scale of the water body. The macrophytes quality element does not currently have a status. The scheme therefore is not considered as having the potential to deteriorate the current WFD status (Moderate) of this quality element.	None required.	None required.	N/A	-
	Physico-Chemical status																
WFD classification elements	5. Dissolved Oxygen	Not assessed	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	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. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	As tunnel crossings near Yeading Brook are located on unproductive clay strata, no dewatering is expected to be necessary. No effect anticipated on this quality element.	N/A	• The proposed AP4 porous tunnel portal extension may locally influence flow to Ickenham Stream, however, as tunnelling will be in unproductive clay strata, there is unlikely to be any impact on surface water from any dewatering that takes place. There will be a negligible effect on this sub-element, therefore no change in status is anticipated.	• The proposed AP4 porous tunnel portal extension may locally influence flow to Ickenham Stream, however, as tunnelling will be in unproductive clay strata, there is unlikely to be any impact on surface water from any dewatering that takes place. There will be a negligible effect on this sub-element, therefore no change in status is anticipated.	No scheme element 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 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 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	Not assessed	-		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. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	As tunnel crossings near Yeading Brook are located on unproductive clay strata, no dewatering is expected to be necessary. No effect anticipated on this quality element.	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No scheme element on upstream water body					-
	7. Phosphate	Not assessed	-		N/A	Receptor is insensitive to impact	N/A	As tunnel crossings near Yeading Brook are located on unproductive clay strata, no dewatering is expected to be necessary. No effect anticipated on this quality element.	N/A	• The proposed AP4 porous tunnel portal extension may locally influence flow to Ickenham Stream, however, as tunnelling will be in unproductive clay strata, there is unlikely to be any impact on surface water from any dewatering that takes place. There will be a negligible effect on this sub-element, therefore no change in status is anticipated.	• The proposed AP4 porous tunnel portal extension may locally influence flow to Ickenham Stream, however, as tunnelling will be in unproductive clay strata, there is unlikely to be any impact on surface water from any dewatering that takes place. There will be a negligible effect on this sub-element, therefore no change in status is anticipated.	No scheme element on upstream water body					-
	8. Ammonia	Not assessed	-		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. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	As tunnel crossings near Yeading Brook are located on unproductive clay strata, no dewatering is expected to be necessary. No effect anticipated on this quality element.	N/A	• The proposed AP4 porous tunnel portal extension may locally influence flow to Ickenham Stream, however, as tunnelling will be in unproductive clay strata, there is unlikely to be any impact on surface water from any dewatering that takes place. There will be a negligible effect on this sub-element, therefore no change in status is anticipated.	• The proposed AP4 porous tunnel portal extension may locally influence flow to Ickenham Stream, however, as tunnelling will be in unproductive clay strata, there is unlikely to be any impact on surface water from any dewatering that takes place. There will be a negligible effect on this sub-element, therefore no change in status is anticipated.	No scheme element on upstream water body					-
	9. Temperature	Not assessed	-		N/A	Receptor is insensitive to impact	N/A	As tunnel crossings near Yeading Brook are located on unproductive clay strata, no dewatering is expected to be necessary. No effect anticipated on this quality element.	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No scheme element on upstream water body					-
	10. Specific Pollutants (Annex VIII)	Not assessed	-		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. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	As tunnel crossings near Yeading Brook are located on unproductive clay strata, no dewatering is expected to be necessary. No effect anticipated on this quality element.	N/A	• The proposed AP4 porous tunnel portal extension may locally influence flow to Ickenham Stream, however, as tunnelling will be in unproductive clay strata, there is unlikely to be any impact on surface water from any dewatering that takes place. There will be a negligible effect on this sub-element, therefore no change in status is anticipated.	• The proposed AP4 porous tunnel portal extension may locally influence flow to Ickenham Stream, however, as tunnelling will be in unproductive clay strata, there is unlikely to be any impact on surface water from any dewatering that takes place. There will be a negligible effect on this sub-element, therefore no change in status is anticipated.	No scheme element on upstream water body					-
	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	• Settlement can open up fissures which could lead to increased vertical permeability to underlying aquifers and loss of flow, with associated effects on flow dynamics, continuity and sediment transport and bed sedimentation. The risk of impacts to hydromorphology is low, especially as tunnelling will be within unproductive clay strata, and if impacts were to occur the effects would probably be minor or negligible.	• Dewatering can decrease flow rates, with associated effects on flow dynamics, continuity and sediment transport and bed sedimentation. However, as tunnelling will be in unproductive clay strata, there is unlikely to be any impact on surface water from any dewatering that takes place. The risk of impacts to hydromorphology is low and if impacts were to occur the effects would probably be minor or negligible.	N/A	• The minor tributary of the Yeading Brook according to Ordnance Survey maps and satellite imagery has a channel width of approximately 1.5m. It appears to be heavily modified and straightened for infrastructure and urbanisation purposes at the proposed crossing point. • The portal extension is located close to the Yeading Brook, so cuttings are not anticipated to penetrate groundwater• Dewatering requirements are anticipated but are likely to be limited in scale. • Overall, as tunnelling will be in unproductive clay strata, there is unlikely to be any impact on surface water from any dewatering that takes place. The risk of impacts to hydromorphology is low and limited to temporary construction activities. If impacts were to occur the effects would probably be minor or negligible at waterbody scale.	N/A	Upstream water body not impacted by scheme	It is unlikely that there will be any impact on the contribution of surface water flow from groundwater during any dewatering, and therefore it is considered that there will be no effects on hydromorphology.	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	• Potential for temporary reduction in flows, as dewatering may be required because of the presence of clay at site. • Implementation of CoCP measures during construction, and suitable drainage systems will ensure potential impacts to surface water are reduced to negligible effects.	N/A	Upstream water body not impacted by scheme		None required	None required		
	13. River continuity	-	-		N/A	N/A			N/A	• River continuity appears to be limited because the channel and riparian have been historically modified. The tributary has also been culverted under Chiltern Main Line and realigned for urban expansion – meaning that the portal extension and potential dewatering is not anticipated to have a significant effect on continuity.	N/A	Upstream water body not impacted by scheme		None required	None required		
	14. River depth and width variation bed	-	-		N/A	N/A			N/A	• Channel width and depth appears to have limited diversity, and the portal extension and potential dewatering are not anticipated to have a significant effect.	N/A	Upstream water body not impacted by scheme		None required	None required		
	15. Structure and substrate of river bed	-	-		N/A	N/A			N/A	• Channel bed unlikely to have significant diversity, and the portal extension and potential dewatering are not anticipated to have a significant effect.	N/A	Upstream water body not impacted by scheme		None required	None required		
	16. Structure of riparian zone	-	-		N/A	N/A			N/A	• Potential impacts on surface flows could, in principle, affect riparian connectivity this would probably be insignificant	N/A	Upstream water body not impacted by scheme		None required	None required		

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	-														
Appropriate timing (vegetation control)	In Place	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• Overall there is judged to be no significant impact on existing or future status	• Overall there is judged to be no significant impact on existing or future status	N/A			No effect anticipated	N/A	N/A	N/A	N/A	N/A
Appropriate vegetation control technique	In Place	-		N/A	N/A			N/A			No effect anticipated	N/A	N/A	N/A	N/A	N/A
Selective vegetation control regime	In Place	-		N/A	N/A			N/A			No effect anticipated	N/A	N/A	N/A	N/A	N/A
Retain marginal aquatic and riparian habitats (channel alteration)	Not in place	-		N/A	N/A			N/A			No effect anticipated	N/A	N/A	N/A	N/A	N/A
Operational and structural changes to locks, sluices, weirs, beach control, etc.	Not in place	-		N/A	N/A			N/A			No effect anticipated	N/A	N/A	N/A	N/A	N/A
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	Not in place	-		N/A	N/A			N/A			No effect anticipated	N/A	N/A	N/A	N/A	N/A
Where new or altered structures in place and managed to enable fish to access waters upstream and downstream of the intervention	Not in place	-		N/A	N/A			N/A			No effect anticipated	N/A	N/A	N/A	N/A	N/A
Alteration of channel bed (within culvert)	Not in place	-		N/A	N/A			N/A			No effect anticipated	N/A	N/A	N/A	N/A	N/A
Re-opening existing culverts	Not in place	-		N/A	N/A			N/A			No effect anticipated	N/A	N/A	N/A	N/A	N/A
Increase in-channel morphological diversity	Not in place	-		N/A	N/A			N/A			No effect anticipated	N/A	N/A	N/A	N/A	N/A
Preserve and, where possible, restore historic aquatic habitats	Not in place	-		N/A	N/A			N/A			No effect anticipated	N/A	N/A	N/A	N/A	N/A
Removal of hard bank reinforcement / revetment, or replacement with soft engineering solution	Not in place	-		N/A	N/A			N/A			No effect anticipated	N/A	N/A	N/A	N/A	N/A
Remove obsolete structure	Not in place	-		N/A	N/A			N/A			No effect anticipated	N/A	N/A	N/A	N/A	N/A

CFA 7 - 15 Cover Sheet

						Risk to Overall Status				
Surface water body name	**Waterbody ID**	**Catchment**	**Geographical Area**	**CFA**	**No. AP4 Updates**	**Original Assessment**	**Post-Additonal Baseline survey**	**Post-AP2 Updates**	**Post-AP4 Updates**	**Assessment Summary**
Stoke Brook Aylesbury	GB106039030320	Thame and South Chilterns	South	10, 11,	1			No AP2 updates		Original + Baseline + AP4
Colne and GUC (from confluence with Chess to Ash)	GB106039023090	Colne	South	7	2		reduced risk			Original + Baseline + AP2 + AP4
Misbourne	GB106039029830	Colne	South	7, 8, 9,	1		No baseline survey updates	No AP2 updates		Original + AP4

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 AP4 Assessment Changes:

	In AP4 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 AP4 change

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

CFA	7	7
AP4 ID	AP-C222-061	AP-C221-088
AP4 Name	Affinity Water Turbidity Treatment	Haul Road through Uxbridge Golf Course
AP4 Location	Colne Valley	Colne Valley
New/Replacement Scheme Element	NEW	NEW
Scheme Element Type	Pumping Station	Construction Haul Road
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.	The movement of construction vehicles carrying materials, plant, other equipment and workforce on public roads will be via designated construction traffic routes within the West Ruislip and Ickenham area. A temporary railhead to facilitate construction works and allow removal of surplus excavated material will be provided between Breakspear Road South and Harvil Road (in CFA6).
AP4 Description	Affinity Water Turbidity Treatment - To provide construction mitigation for Affinity Water pumping sites to provide turbidity treatment at the West Hyde pumping station in the Colne Valley. To allow this to happen, **access to the AW site, a concrete pad for the treatment plant to be placed on and an associated outfall to the nearby lake.**	The temporary provision of a haul road from A40 / Swakeleys Road roundabout to the western side of Harvil Road, through Uxbridge Golf Course, to carry construction traffic, bypassing the residential areas.
Changes to Previously Assessed Elements	None	None
AP4 Assessment Requirement	Pumping Station discharges	Haul Road
Drawings (AP4) Construction Phase (05) Proposed Scheme (06)	AP-C222-061	AP-C221-088

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

Surface Water body	Current status	Status objective
GB106039023090	Poor	Good Ecological Potential by 2027
Colne and GUC (from confluence with Chess to Ash)		
Overall/ambient assessment	N/A	N/A
Mitigations		

Scheme Elements	Colne Valley Viaduct CFA7-SWC3 - River Colne crossing					River Diversion of River Colne			ACCESS BRIDGE - River Colne AP-C222-073					Colne Valley Viaduct CFA7-SWC3 - Newyears Green Bourne crossing					River Diversion - Newyears Green Bourne			Culvert - tributaries				
Description of scheme element impact	*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.*					*Diversion of approximately 160m to the River Colne to avoid a viaduct pier being located in the river.*			*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*					*Approximately 1.4km long viaduct of up to 15.5m high with piers close to banks edge crossing Newyears Green Bourne, a tributary of the River Colne.*					*3 Road Crossing (CFA7-SWC 5) will incorporate two meandering bends (approximately 20m either side of existing channel as*			*Culvert on tributary of the River Colne near Maydensole Cottage*				
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	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	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
Mitigations	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	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 element (greater / none / adverse / unknown) and Risk(s)																												
1. Macrophytes and phytobenthos - macrophytes	Receptor is insensitive to impact	Viaduct footings will be close to river bank, and may result in the permanent loss of macrophytes in the footprint of the piers. However, this habitat is not a diverse macrophyte community, with the notable Callitriche hamulata and Callitriche obtusangula' often considered to be minor and localised.	Viaduct will be 15.5m above water body. Shaw (2017) found shading to have no impact on the composition of macrophyte communities beneath the viaduct, but this is not considered to be greater than a minor localised change.	No effects anticipated.	No impact. Runoff will be collected by drainage to balancing pond.	Receptor is insensitive to impact	The new channel will incorporate marginal berms to encourage emergent macrophyte species and fen, channel will include a range of habitats suitable for colonisation by macrophytes. The River Colne supports a diverse macrophyte community, with the notable Callitriche hamulata' and Callitriche obtusangula'. Effect considered to be minor and localised.	No effect on the quality of habitat available.	There will be loss of marginal and channel macrophytes over the 160m length of the existing R Colne that lies within the diverted 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 the new channel following the river diversion. Effect is considered to be minor.	Marsten would reflect or improve upon the existing sinuosity of the channel. Geomorphological processes would support the development of a diverse and dynamic marginal and channel macrophyte community and therefore not effects on macrophyte communities.	Receptor is insensitive to impact	Viaduct footings in the watercourse will result in the permanent loss of macrophyte habitat in the wetted channel. 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 habitat. 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 flow and 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.	Receptor is 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.	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 not to the River Colne's geomorphological processes and macrophyte colonisation. In addition, design measures could be put in place in order to limit extent / loss of the watercourse habitat feature.	Improvement Third storage will be provided at the edge of Newyears Green Bourne floodplain which will ensure that the existing channel will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Hydromorphological impacts are not predicted to have effects on macrophytes.	No watercourse present, therefore no impact.	No watercourse present, therefore no impact.	No watercourse present, therefore no impact.	No watercourse present, therefore no impact.	No watercourse present, therefore no impact.
2. Macroinvertebrates	Receptor is insensitive to impact	Viaduct footings will be close to river bank, and will result in the loss of marginal / river substrate which may be important for macroinvertebrates. The River Colne was assessed as to be of good macroinvertebrate ecological status when surveyed (but not localised effect).	Macroinvertebrate community beneath viaducts may be slightly altered due to shading effects on the 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.	Receptor is insensitive to impact	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 macroinvertebrate taxa that currently characterise the reach.	No detectable effect anticipated due to the the very limited extent of loss of macrophytes from shading.	Receptor is insensitive to impact	Viaduct footings in the watercourse will result in the localised loss of marginal or channel habitats which may be important for fish. In addition, River Colne is of moderate fish quality, with common species present. Potential minor and localised effects.	No detectable effect anticipated due to the the very limited extent of loss of macrophytes from shading.	Potential detrimental effect on hydromorphology, with footings in the watercourse likely to narrow channel, increase flow and habitat continuity. The River Colne is of moderate fish quality, with common species present. Potential minor and localised effect.	Potential localised and temporary adverse effect on dissolved oxygen levels and other contaminants. The River Colne is of moderate fish quality, with common species present. Potential minor effect.	Receptor is insensitive to impact	Bridge footings will not be located in the diverted channel. New Years Green Bourne is a beachy stream and has potential for macroinvertebrates. Effect likely to be minor.	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.	New Years Green Bourne assessed to of poor potential for macroinvertebrates. Effect likely to be minor and localised.	The river diversion will offer a greater diversity of macroinvertebrate habitat than the existing channel.	Hydromorphological impacts are not predicted to have effects on macroinvertebrates.	No watercourse is actually present or crossing. No impact anticipated.	No watercourse is actually present or crossing. No impact anticipated.	No watercourse is actually present or crossing. No impact anticipated.	No watercourse is actually present or crossing. No impact anticipated.	No watercourse is actually present or crossing. No impact anticipated.
3. Fish	Noise and vibration may cause minor, localised disturbance to fish. Any misalignment of wetlands could affect gravel habitats, though NHS suggests that bed gravel habitats are limited. 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, but this is considered to be localised and minor.	No effects anticipated.	No impact. Runoff will be collected by drainage to balancing pond.	There will be loss of fish habitats within the existing R Colne channel. Several fish were recorded within the survey area (pike, perch, roach, gudgeon, minnow, stickleback, bullhead). The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities. Minimal 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 communities.	Noise and vibration may cause minor, localised disturbance to fish. In addition, River Colne of moderate fish quality, with only four species recorded. Any impairment of wetlands 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. Any impairment of wetlands considered to be minor and localised.	No detectable effect anticipated due to the the very limited extent of loss of macrophytes from shading.	Potential detrimental effect on hydromorphology, with footings in the watercourse likely to narrow channel, increase flow and habitat continuity. In addition, River Colne is of moderate fish quality, with only four species recorded. Minimal 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. Minimal effect considered to be minor and localised.	New Years Green Bourne is a beachy stream and has potential for fish. No effect anticipated as piers will not be located within the channel and watercourse is not considered to be accessible for fish.	No effect anticipated as piers will not be located within the channel and watercourse is not considered to be accessible 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.	New Years Green Bourne is a beachy stream and has potential for fish. No effect anticipated as piers will not be located within the channel and watercourse is not considered to be accessible for fish.	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.	No watercourse is actually present or crossing. No impact anticipated.	No watercourse is actually present or crossing. No impact anticipated.	No watercourse is actually present or crossing. No impact anticipated.	No watercourse is actually present or crossing. No impact anticipated.	No watercourse is actually present or crossing. No impact anticipated.
Physico-Chemical status																												
WFD classification elements: Predicted change to status element (greater / none / adverse / unknown) and Risk(s)																												
5. Dissolved Oxygen	High	-	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	Release of sediment during construction of new channel and changes in river processes may cause a temporary drop 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 drop 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.	N/A	N/A	The additional width of the proposed M25 bridge will marginally increase the amount of shaded watercourse. Despite this, it is predicted to result in no more than a minimal, localised impact on dissolved oxygen. The impact is likely to have a minor, local effect in relation to the River Colne's WFD classification. Therefore, no change to status from the previous assessment is anticipated.	The construction of the proposed M25 bridge is predicted to result in no more than a temporary, minor 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. Therefore, no change to status from the previous assessment is anticipated.	The construction of the proposed JM1 bridge is predicted to result in no more than a temporary, minor 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. Therefore, no change to status from the previous assessment is anticipated.	N/A	N/A	Some shading with negligible/no effect.	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. 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	Release of sediment during construction of new channel and changes in river processes may cause a temporary drop 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 drop 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.	N/A	N/A	No watercourse present, therefore no impact.	No watercourse present, therefore no impact.	No watercourse present, therefore no impact.
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	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	No watercourse present, therefore no impact.	No watercourse present, therefore no impact.	No watercourse present, therefore no impact.
7. Phosphate	Poor	-	N/A	N/A	N/A	Ineffectively an open span bridge, so there would be no impact on phosphate.	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.	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. CoCP measures (Section 10) implemented during construction will ensure potential impacts to water quality are reduced to minor/temporary impacts with negligible effect.	N/A	N/A	The proposed M25 bridge crossing is effectively an open span bridge, so there would be no impact on phosphate. Therefore no change to status from the previous assessment is anticipated.	The construction of the proposed JM1 bridge is predicted to result in no more than a temporary, minor impact on phosphate. 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 to status from the previous assessment is anticipated.	N/A	N/A	Ineffectively an open span bridge, so there would be no impact on phosphate.	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 phosphate.	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. CoCP measures (Section 10) implemented during construction will ensure potential impacts to water quality are reduced to minor/temporary impacts with negligible effect.	N/A	N/A	No watercourse present, therefore no impact.	No watercourse present, therefore no impact.	No watercourse present, therefore no impact.
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	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	No watercourse present, therefore no impact.	No watercourse present, therefore no impact.	No watercourse present, therefore no impact.
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	The additional width of the proposed M25 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. The impact is likely to have a minor, local effect in relation to the River Colne's WFD classification. No change to status from the previous assessment is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	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	No watercourse present, therefore no impact.	No watercourse present, therefore no impact.	No watercourse present, therefore no impact.
10. Specific Pollutants (Annex VIII)	High	-	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.	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.	N/A	N/A	The construction of the proposed JM1 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 to status from the previous assessment is anticipated.	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.	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.	N/A	N/A	No watercourse present, therefore no impact.	No watercourse present, therefore no impact.	No watercourse present, therefore no impact.
Hydromorphological status																												
WFD classification elements: Predicted change to status element (greater / none / adverse / unknown) and Risk(s)																												
11. Quantity and dynamic of river flow	-	-	N/A	N/A	N/A	Footings would be close to the watercourse and could have local influences in riparian zones 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 during the 320m reach immediately upstream. Increasing channel sinuosity from the existing relatively straight channel is likely to improve morphological diversity in the new channel. No significant impacts anticipated. A 5 % difference in channel length is considered to be within the natural variation of channel length and is not considered to be of a significant magnitude. Therefore, the proposed realignment is not considered to have a detrimental effect on the balance of increased sinuosity against the likely reduction in channel gradient. Overall, the effect of the diversion is not considered to be detrimental or beneficial	N/A	N/A	N/A	Footings in the watercourse would narrow the channel and cause local increases in flow velocity and turbulence. Therefore, footings may be likely to have a minor effect on the: • Channel width and depth; • Flow events; • Velocity and turbulence. Overall, flow modifications would be detrimental to hydromorphology	N/A	N/A	N/A	N/A	Footings would be close to the watercourse and could have local influences in riparian zones during peak flow events. This is unlikely to significantly affect hydromorphology.	N/A	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 habitat creation. Newyear's Green Bourne is a minor tributary of the River Colne, and in practical terms represents a very small % of the River Colne's flow. Lengthening the channel may reduce flow rates although the diversion is not far from the existing channel, so this is unlikely. Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of length increase on flow rates needs to be flagged as a risk	N/A	N/A	N/A	No watercourse present, therefore no impact.	N/A
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	N/A	N/A	N/A	Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	No watercourse present, therefore no impact.	No watercourse present, therefore no impact.	N/A
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 during the 320m reach immediately upstream. No significant impacts anticipated	N/A	N/A	N/A	Footings in the watercourse would decrease natural continuity by the presence of physical obstacles and locally increased flow velocity and turbulence. Increased in flow velocity and turbulence would reduce continuity and may be inhibitive to species passage	N/A	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		Lengthening the channel may result in increased channel storage and reduced floodplain connectivity, but the size of the watercourse and the distance of the diversion mean that continuity is unlikely to be significantly affected	N/A	N/A	N/A	No watercourse present, therefore no impact.	N/A
14. River depth and width variation	-	-	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 channel would not be significantly affected by the proposed realignment. Channel width and depth appears to be diverse, and the channel would not be significantly affected by the proposed realignment.	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 ecological deterioration. Bank protection may be necessary to protect new channel assets, which could exacerbate further loss of natural bank habitat and offset the equilibrium of the sediment regime. On balance, the effects cannot be classified as detrimental or beneficial	N/A	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		The diversion would replicate existing channel geometry. Out of channel flow depths may decrease slightly due to increased channel length, but the practical terms these would be no significant change	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	Bed forms are unlikely to be significantly affected by the viaduct	N/A	N/A	N/A	Some localised bed scour is likely due to local increase in flow velocities and turbulence, although this would promote diversity. Some localised scour of the bed and banks is likely, although this would promote morphological diversity rather than causing ecological deterioration. Bank protection may be necessary to protect new channel assets, which could exacerbate further loss of natural bank habitat and offset the equilibrium of the sediment regime. On balance, the effects cannot be classified as detrimental or beneficial	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 ecological deterioration. Some localised bed scour is likely due to local increase in flow velocities and turbulence, although this would promote diversity. Some localised scour of the bed and banks is likely, although this would promote morphological diversity rather than causing ecological deterioration. Bank protection may be necessary to protect new channel assets, which could exacerbate further loss of natural bank habitat and offset the equilibrium of the sediment regime. On balance, the effects cannot be classified as detrimental or beneficial	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	No watercourse present, therefore no impact.	N/A
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 is likely to 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	Although channel capacity would increase, there is unlikely to be any significant impact on the existing bank, riparian and floodplain structure and connectivity with channel	N/A	N/A	N/A	No watercourse present, therefore no impact.	N/A

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

RSWF measures to achieve Good Ecological Potential achieved or confirmed or implemented	Where RSWF measure will happen	When RSWF measure will happen
Reduce sediment resuspension	-	In place
Bank rehabilitation / reprofiling	-	In place
Fixed bunds (earth banks, in place of floodwalls)	-	In place
Set back embankments	-	In place
Avoid the need to dredge (e.g. minimise under keel clearance; use fluid mud navigation; flow manipulation or training 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 (local wash / sources of fine sediment)	-	In place
Manage disturbance	-	In place
Prepare a dredging / disposal strategy	-	In place
Ideally vessel design	-	In place
Vessel Management	-	In place
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	-	Not in Place
Removal of hard bank reinforcement / revetment, or replacement with soft engineering solution	-	Not in Place
Preserve and, where possible, restore riparian aquatic habitats	-	Not in Place
Re-opening existing culverts	-	Not in Place
Alteration of channel bed (within culvert)	-	Not in Place
Structures or other mechanisms in channel to enable fish to access waters upstream and downstream of the impounding structure	-	Not in Place
Operational and structural changes to locks, sluices, weirs, beach control, etc.	-	Not in Place
Remove obsolete structure	-	Not in Place
Educate landowners on sensitive management practices (urbanisation)	-	Not in Place
Improve floodplain connectivity	-	Not in Place

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

Surface Water body	Current status	Status objective
GB109039023090	Poor	Good Ecological Potential by 2027
Colne and GUC (from confluence with Chess to Ash)		
Heavily modified or artificial waterbody	N/A	N/A

Scheme Elements	Colne Valley Viaduct - Grand Union Canal crossing					PUMPING STATIONS FOR GROUNDWATER TURBIDITY TREATMENT - AP-CZ22-061			HAUL ROAD THROUGH UXBRIDGE GOLF COURSE - AP-C221-088					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)	
																Construction	Operation		
Description of scheme element impact	Approximately 3.4km long viaduct of up to 21.5m 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.					Drawing C7 - DE-CFA07_APA) shows that there will be three (3) Affinity Water Pumping Stations that require HS2 site access to treat groundwater abstractions. The turbidity treatment equipment will utilise existing abstraction and discharge points present at each pumping station facility.			Exact co-ordinates of Haul Road through golf course (X: 505958, Y: 186803). Haul Road partially within Flood Zone 3 of Fray's River (tributary of River Colne). Does not cross any tributaries or WFD waterbodies, but is shown to cross golf course drainage channels.									
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	Drainage	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage						
Fish	N/A	N/A	N/A	N/A	N/A	N/A	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																			
1. Macrophytes and phytobenthos - macrophytes	Receptor insensitive to impact	Viaduct footings will be close to canal banks but will not significantly change composition of macrophyte communities beneath the viaduct, but this is not considered to be greater than a minor localised change.	Viaduct will be 21.5m above water body. Shading will not change the species 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.	Turbidity treatment will use existing discharge points and therefore no additional turbidity is expected. No effects due to turbidity therefore anticipated.	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.	The provision of the turbidity treatment equipment will utilise existing discharge points present at each pumping station, therefore it is predicted to result in a no more than a temporary, localised impact on the water chemistry. 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.	Receptor is insensitive to impact	N/A	N/A	N/A	No effects anticipated on the hydromorphology of any WFD waterbodies. Therefore, no change in status from the previous assessment is anticipated.	Negligible effects are expected on hydromorphology and sediment due to increased groundwater abstraction. Effects on biological sub-elements therefore considered to be negligible.	Upstream water bodies not impacted by scheme	There will be temporary loss of macrophyte cover on the R Colne within vegetation in the river diversion established. No significant impacts predicted on macrophyte communities as a result of the scheme. Any loss of macrophytes within the culverted sections of the River Colne and culvert of its tributaries due to loss of bed material and shading. However, this limited in extent and is not considered to affect overall status class for this quality element.	No additional mitigation required Mitigation measures could be put in place in order to mitigate the loss of macrophytes, species recorded in New Years Green Bourne and the River Colne	No additional mitigation required	Minor and localised effects	
2. Macrophytes and phytobenthos - phytobenthos																			
3. Macroinvertebrates	Receptor insensitive to impact	No macroinvertebrate data available. Temporary loss of marginal macrophytes will result in localised, minor localised effects on macroinvertebrate community.		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.	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.	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.		N/A	N/A	N/A		Negligible effects anticipated on hydromorphology and sediment due to increased groundwater abstraction. Effects on biological sub-elements therefore considered to be negligible.	Upstream water bodies not impacted by scheme	There will be temporary (river diversion) and permanent (culvert) loss of marcroinvertebrates and macroinvertebrate habitat from the existing River Colne channel. The river diversions will be designed to ensure there is no net loss of habitat and that habitat quality is maintained. Therefore, the temporary loss of habitat from the River Colne due to river diversions would be balanced through beneficial effects of habitat creation measures. Habitat quality effects therefore considered to be only localised and / or temporary and, overall, would not affect the WFD status of the 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 only 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 AFO assessment.	Monitoring to be undertaken during the construction period. Priority will be given to early habitat creation to provide maximum opportunity for establishment of vegetation prior to removal of existing river reach.	No additional mitigation required	Minor and localised effects.	
4. Fish	Minor redistribution of fish communities may occur during construction	Minor redistribution of fish communities may occur during construction		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.	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.	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.		N/A	N/A	N/A			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 established. Migratory routes for fish will be maintained by retaining the existing channel whilst the river diversions established. Therefore, the temporary loss of habitat from the River Colne due to river diversions would be balanced through beneficial effects of habitat creation measures. Habitat quality effects therefore considered to be only localised and / or temporary and, overall, would not affect the WFD status of the 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 only 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 AFO assessment.	No additional mitigation required It would be advisable to electric fish prior to dewatering, but this is not going to be fast for river diversion	No additional mitigation required	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 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	• The provision of the turbidity treatment equipment will utilise existing discharge points present at each pumping station, therefore it is predicted to result in a no more than a temporary, localised impact on the water chemistry. • 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.	Receptor is insensitive to impact	N/A	N/A	N/A	• The provisions of the temporary construction access road will loss of habitat to result in no more than a temporary, minor impact on the river channel. • 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.	• The provision of the temporary construction access road to result in no more than a temporary, minor impact on the river channel. • 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.	Upstream water bodies not impacted by scheme	The provision of the temporary construction access road and turbidity treatment will contribute slightly to the cumulative impact on the 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.	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	Upstream water bodies not impacted by scheme	Receptor is insensitive to impact	No additional mitigation required	No additional mitigation required	Receptor is insensitive to impac	
7. Phosphate	Poor	-	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 phosphate.	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	• Relocation of temporary construction access road will loss of habitat to result in no more than a temporary, minor impact on the river channel.	• The provision of the temporary construction access road to result in no more than a temporary, minor impact on the river channel. • 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.	Upstream water bodies not impacted by scheme	The provision of the temporary construction access road will contribute slightly to the cumulative impact on the 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.	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	Upstream water bodies not impacted by scheme	Receptor is insensitive to impact			Receptor is insensitive to impac	
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	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream water bodies not impacted by scheme	The provision of the temporary construction access road will contribute slightly to the cumulative impact on the 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.			Minor and localised effects	
10. Specific Pollutants (Annex VIII)	High	-	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.	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	• The provision of the temporary construction access road will loss of habitat to result in no more than a temporary, minor impact on the river channel. • 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.	• The provision of the temporary construction access road to result in no more than a temporary, minor impact on the river channel. • 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.	Upstream water bodies 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 use of the water body. There is a small risk associated with pollution from road 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																			
WFD classification elements																			
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		Upstream water bodies not impacted by scheme		No additional mitigation required	Minor natural recovery. • Potentially fall new woody debris if one is cleared from the crossing locations	No significant impacts predicted	**Hydromorphology Baseline** • 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 lake are considered. • Some space may be available in woodland areas to the west of the channel (and to the east of the A412). • Channel is anoxic but this is likely to be permitted because of its proximity to the lake • Map from the mid 1900s shows that channel planform has not changed significantly since the 1900s (Figure 3.1) • From the walkover survey report some local diversity of reed forms have been observed. • Vegetated islands appear to be in the channel aligned with bridge piers for the Heathrow Road crossing. • Survey WFD-LBR1-0007 shows that the channel has been historically straightened and that the channel is heavily modified. The channel planform is also constrained by the adjacent downstream reservoir (hydrodynamic connectivity affecting the overall quantity and dynamics of flow). Survey WFD-LBR1-0008 shows that the channel is heavily modified by the A408 and the river does possess complex and continuous hydromorphological vegetation.
12. Connection to Groundwater	-	-	N/A	N/A	N/A		N/A	N/A	• The provision of the turbidity treatment equipment will utilise existing discharge points present at each pumping station, therefore it is predicted to result in no more than a temporary, localised impact on the water chemistry. • 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.		N/A	N/A	N/A		N/A		Upstream water bodies not impacted by scheme					• Viaduct not significant to hydromorphology
13. River continuity	-	-	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 the viaduct footings. • Overall, there would probably be no hydromorphological impact		N/A	N/A	N/A	• A new culvert will be constructed on the un-named tributary of the R Colne near Wraysbeds College. Culverts will be designed to ensure there is no net loss of habitat and that habitat quality is maintained. Therefore, 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. • In Barrs, the pumping stations, which are located close to the River Colne, could have potential indirect effects on surface flows in the River Colne, since groundwater abstractions have the potential to result in groundwater connectivity and levels to be affected. However, the risk of impacts across a series of overlying hydrogeological units is considered to be negligible. It also considered that the monitoring and mitigation measures that will be implemented as part of the groundwater abstractions will reduce the risk of impacts to negligible. • In the Colne, it is considered unlikely that the abstraction at Broadwater Lake Nature Reserve, as groundwater abstractions therefore have the potential to result in groundwater connectivity and levels to be affected. However, the risk of impacts across a series of overlying hydrogeological units is considered to be negligible. It also considered that the monitoring and mitigation measures that will be implemented as part of the groundwater abstractions will reduce the risk of impacts to negligible.	N/A	N/A	N/A	• In haul road in the river floodplain that does not cross the river channel, so no significant impact on the channel or river bridges, i.e. no significant impact on the channel or hydromorphological impact. 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 chosen, and the proposed short diversion to ensure there are no bridge piers in the channel appears to replicate unsundry immediately upstream. • There are considered to be no significant impacts from introducing minor impacts from a new access bridge from Northern Court Drive • The overall impact on the waterbody has not needed to be updated as a result of the AFO assessments	No additional mitigation required	Minor natural recovery. • Potentially fall new woody debris if one is cleared from the crossing locations	No significant impacts predicted	• 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	-	-	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					• Channel depth generally heterogeneous due to sinuosity, meanders and weirs • 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	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					• Low, medium, cataraious RBNP channel type • Developed in alluvium (clay, silt, sand, gravel) and Shepperton Gravel Member (sand and gravel) overlain by Langley Silt Member (silt and clay). The faults support at the site that would support an influence on channel flow • Channel sediments likely to be gravel matrix with sands silts and clays
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	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 Ecological status

RBMP measures to achieve Good Ecological Potential (planned or confirmed or implemented)	Where RBMP measure will happen	When RBMP measure will happen																		
Reduce sediment resuspension	-	In place	Pipeline Bridge Crossing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	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 Wraysbeds College may also cause some minor sediment resuspension. Narrowing of the R Colne may result in settling of sediment, but this is not considered to be significant. Therefore, the overall effect remains unchanged as part of this AFO assessment. It 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.	-	-		
Fixed 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 techniques	-	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 (local work / sources of fine sediment)	-	In place	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect	-	-		
Manage disturbance	-	In place	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect	-	-		
Prepare a dredging / disposal strategy	-	In place	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect	-	-		
Ideally 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 4 Cylne viaduct footing will prevent removal of hard bank reinforcement in this locations, 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 the 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 Wraysbeds College. Culverts will be designed to ensure there is no net loss of habitat and that habitat quality is maintained. Therefore, 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 to maintain or enable fish to access waters upstream and downstream of the impounding structure	-	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	-	-		

Water Body ID	GB106039029830
Surface waterbody Name	Misbourne
CFAs covered by Waterbody	7, 8, 9

CFA	9
AP4 ID	AP-C222-284
AP4 Location	Buckinghamshire
New/Replacement Scheme Element	Replacement
AP4 Scheme Element Type	Chiltern Tunnel Extension
Original Scheme	The original scheme would emerge from tunnel at Mantle's Wood and continue north-west mainly in deep cutting, as far as the B485 Chesham Road where it would enter the South Heath green tunnel. Upon emerging from the South Heath green tunnel, north of Frith Hill the original scheme would continue north-west in a cutting, up to 11m deep in this area, north to Leather Lane The original scheme provided for the permanent provision of the Chiltern tunnel north portal, located approximately 600m west of Hyde Heath including a portal building, access track and a 100m-long porous portal . In the AP2 scheme changes were made to extend the Chiltern tunnel north portal to 220m. The portal building was relocated approximately 120m north-west along the HS2 route to accommodate the longer portal. The permanent access track to the portal building and associated earthwork was extended by approximately 120m in length and realigned closer to the track .
AP4 Description	Extension of the bored Chiltern tunnel by 2.6km from Mantle's Wood, north west of Hyde Heath emerging at a revised Chiltern tunnel north portal north west of South Heath. The changes within CFA9 associated with the extension of the Chiltern tunnel are listed below: • extension of bored Chiltern tunnel by approximately 2.6km and an increase in depth and width of the bored tunnel alignment; • revised design of Little Missenden vent shaft and auto-transformer station (ATS); • new Chesham Road vent shaft and auto-transformer station (ATS) and associated satellite compound; • a temporary access from the A413 to the Chiltern Tunnel north portal construction compound; • removal of environmental mitigation i n the original scheme between Mantle's Wood and the new north portal; and • incorporation of landscape earthworks and planting around the new north portal to integrate the feature into the surrounding landform.
Changes to Previously assessed elements	Bored Chiltern Tunnel is extended by 2.6 km, Chiltern tunnel North cutting has changed location, south heath cutting is shortened, and deepened at chiltern tunnel portal by around 10 m, embankments in the vicinity of chiltern tunnel, south heath cut and cover tunnel is removed, chiltern tunnel portal north has changed location and deepened by around 10 m.
AP4 Assessment Requirements	Removal of South Heath Cut and cover tunnel, bored tunnel, chiltern tunnel north cutting, south heath cutting, chiltern tunnel portal north
Drawings (Original, AP2 and AP4) Construction Phase (05) Proposed Scheme (06)	CT-05_CFA09_AP4.pdf

Requires Assessment

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

	Surface Water body	Current status	Status objective	Scheme Elements	Chiltern Tunnel - including extension AP-C222-284				Chiltern Tunnel				Impacts from other WFD water bodies (assessed separately)	OVERALL impact on element	Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	-
					The proposed tunnel is approximately 16,000m in length emerging at a revised north portal located north west of South Heath. 13,472m in length Crossing underneath the Misbourne in 2 locations, south east of Chalfont St Giles and Shardeloes Lake. A minimum cover between the river bed and the tunnel crown will be developed at the detailed design stage to minimise the risk of hydraulic pathways developing. There will also be an increase in depth and width of the bored tunnel alignment.				The proposed tunnel crossing underneath the non designated Shardeloes Lake.						Construction	Operation		
	GB106039029830	Poor	Good Ecological Potential by 2027	Description of scheme element impact														
	Misbourne			Identified biological impacts	Noise and Vibration	Drainage	Settlement of ground leading to enhancement of fractures and increased vertical permeability	Landtake (for slab or other surface infrastructure overlaying tunnel)	Noise and Vibration	Drainage	Settlement of ground leading to enhancement of fractures and increased vertical permeability	Landtake (for slab or other surface infrastructure overlaying tunnel)						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	Not assessed	-	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	No upstream water body		N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	-	-		Receptor insensitive to impact	PSI score indicated that watercourse is sedimented, and therefore relatively insensitive to minor increases as a result of construction. Nonetheless, CoCP measures will mitigate for any silty discharges during construction.	No EA macrophyte data available. River corridor survey undertaken for HS2 recorded well developed marginal emergent macrophyte beds including reed sweet grass (Glyceria maxima) and common reed (Phragmites australis). Submerged macrophytes (Ranunculus sp) and marginal species (Water mint: Mentha aquatica) also recorded. Risk of settlement occurring is considered to be very low, and would be mitigated, therefore effects on biological receptors considered to be neutral.	Risk of fractures occurring is considered to be very low and any bed sealing would be localised. Given risk of impact occurring and extent of any bed sealing effect is considered to minor and localised.	Receptor insensitive to impact	PSI score indicated that watercourse is sedimented, and therefore relatively insensitive to minor increases as a result of construction. Nonetheless, CoCP measures will mitigate for any silty discharges during construction.	No EA macrophyte data available. River corridor survey undertaken for HS2 recorded well developed marginal emergent macrophyte beds including reed sweet grass (Glyceria maxima) and common reed (Phragmites australis). Submerged macrophytes (Ranunculus sp) and marginal species (Water mint: Mentha aquatica) also recorded. Minor changes in water level may give rise to localised changes in distribution and relative abundance of marginal and channel macrophytes.	Risk of fractures occurring is considered to be very low and any bed sealing would be localised. Given risk of impact occurring and extent of any bed sealing effect is considered to minor and localised.	No upstream water body	No EA macrophyte data available but river corridor survey recorded well developed marginal emergent macrophyte beds. Effects are associated with possible settlement of the river bed leading to risk of fractures and loss of flow. Risk of effect occurring is considered to be very low and mitigation would be targeted at affected area. Overall, effect is consider to be minor and localised.	None required.	None required.	Minor and localised effects	-
	3. Macroinvertebrates	Good	-		Receptor insensitive to impact	PSI score indicated that watercourse is sedimented, and therefore relatively insensitive to minor increases as a result of construction. Nonetheless, CoCP measures will mitigate for any silty discharges during construction.	River Misbourne is ephemeral and dries up periodically. This is reflected in invertebrate data which show that there are periodic declines in number of taxa and LIFE score. Risk of settlement occurring is considered to be very low, and would be mitigated, therefore effects on biological receptors considered to be neutral.		Receptor insensitive to impact	PSI score indicated that watercourse is sedimented, and therefore relatively insensitive to minor increases as a result of construction. Nonetheless, CoCP measures will mitigate for any silty discharges during construction.	River Misbourne is ephemeral and dries up periodically. This is reflected in invertebrate data which show that there are periodic declines in number of taxa and LIFE score.		No upstream water body	Macroinvertebrate community characteristic of ephemeral stream. Effects are associated with possible settlement of the river bed leading to risk of fractures and loss of flow. Risk of effect occurring is considered to be very low and mitigation would be targeted at affected area. Overall, effect is consider to be minor and localised.	None required.	None required.	Minor and localised effects	-
	4. Fish	Poor	-		No impacts are anticipated due to the depth of the tunnel	Misbourne supports community of cyprinid and coarse fish species. Relatively insensitive to minor and localised changes in water quality.	Risk of settlement occurring is considered to be very low, and would be mitigated, therefore effects on biological receptors considered to be neutral.		No impacts are anticipated due to the depth of the tunnel	Misbourne supports community of cyprinid and coarse fish species. Relatively insensitive to minor and localised changes in water quality.			No upstream water body	Misbourne supports community of cyprinid and coarse fish species. Overall, effect is consider to be minor and localised.	None required.	None required.	Minor and localised effects	-
	Physico-Chemical status																	
WFD classification elements	5. Dissolved Oxygen	Good	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	CoCP measures will control surface waters through the use of temporary drainage and attenuation ponds. Tunnel drainage will be pumped to the Chalfont St Peter and Amersham vent shafts for disposal to sewer. Minor impact with negligible effect.	N/A	N/A	N/A	CoCP measures will control surface waters through the use of temporary drainage and attenuation ponds. Tunnel drainage will be pumped to the Chalfont St Peter and Amersham vent shafts for disposal to sewer. Minor impact with negligible effect.	N/A	N/A	No 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 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 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	CoCP measures will control surface waters through the use of temporary drainage and attenuation ponds. Tunnel drainage will be pumped to the Chalfont St Peter and Amersham vent shafts for disposal to sewer. Minor impact with negligible effect.	N/A	N/A	N/A	CoCP measures will control surface waters through the use of temporary drainage and attenuation ponds. Tunnel drainage will be pumped to the Chalfont St Peter and Amersham vent shafts for disposal to sewer. Minor impact with negligible effect.	N/A	N/A	No upstream water body					-
	7. Phosphate	Poor	-		N/A	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	N/A	N/A	No upstream water body					-
	8. Ammonia	High	-		N/A	CoCP measures will control surface waters through the use of temporary drainage and attenuation ponds. Tunnel drainage will be pumped to the Chalfont St Peter and Amersham vent shafts for disposal to sewer. Minor impact with negligible effect.	N/A	N/A	N/A	CoCP measures will control surface waters through the use of temporary drainage and attenuation ponds. Tunnel drainage will be pumped to the Chalfont St Peter and Amersham vent shafts for disposal to sewer. Minor impact with negligible effect.	N/A	N/A	No upstream water body					-
	9. Temperature	-	-		N/A	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	N/A	N/A	No upstream water body					-
	10. Specific Pollutants (Annex VIII)	High	-		N/A	CoCP measures will control surface waters through the use of temporary drainage and attenuation ponds. Tunnel drainage will be pumped to the Chalfont St Peter and Amersham vent shafts for disposal to sewer. Minor impact with negligible effect.	N/A	N/A	N/A	CoCP measures will control surface waters through the use of temporary drainage and attenuation ponds. Tunnel drainage will be pumped to the Chalfont St Peter and Amersham vent shafts for disposal to sewer. Minor impact with negligible effect.	N/A	N/A	No upstream water body					-
	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	The watercourse is ephemeral, but there is a low risk of settlement opening up fissures which could lead to increased vertical permeability to underlying aquifers and loss of flow, and associated flow dynamics, continuity and sediment transport or bed sedimentation. If impacts were to occur they would be minor, and to reemphasise, the risk is low.. Overall the effects are considered most likely to be negligible.	N/A	N/A	N/A	The watercourse is ephemeral, but there is a low risk of settlement opening up fissures which could lead to increased vertical permeability to underlying aquifers and loss of flow, and associated flow dynamics, continuity and sediment transport or bed sedimentation. If impacts were to occur they would be minor, and to reemphasise, the risk is low.. Overall the effects are considered most likely to be negligible.	N/A	No upstream water body	There is a low risk of small impacts on flow, but overall the likelihood of effects on hydromorphology is considered to be negligible. Local effects might occur if plugging of fractures in stream bed above tunnel were undertaken.	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	N/A		N/A	No upstream water body					
	13. River continuity	-	-		N/A	N/A		N/A	N/A	N/A		N/A	No upstream water body					
	14. River depth and width variation bed	-	-		N/A	N/A		N/A	N/A	N/A		N/A	No upstream water body					
	15. Structure and substrate of river bed	-	-		N/A	N/A		N/A	N/A	N/A		N/A	No upstream water body					
	16. Structure of riparian zone	-	-		N/A	N/A		N/A	N/A	N/A		N/A	No upstream water body					

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

Water Body ID	GB106039030320
Surface waterbody Name	Stoke Brook Aylesbury
CFAs covered by Waterbody	10, 11

CFA	11
AP4 ID	AP4-011-072
AP4 Location	Aylesbury
New/Replacement Scheme Element	Replacement
AP4 Scheme Element Type	Culvert and Diversion
Original Scheme	An overbridge west of Aylesbury Park Golf Club, approximately 12m above existing ground level, providing a reinstatement of Footpath SBH/32. The approaches to the overbridge will be planted to integrate the structure into the landscape. A balancing pond for railway drainage north of A418 Oxford Road to the east of the Proposed Scheme, with access from A418 Oxford Road.
AP4 Description	Since submission of the Bill, it has been decided that the overbridge should be moved adjacent northwards in order to avoid the removal of existing vegetation and trees which would screen any new structure. Earthworks would be provided on the overbridge approaches to integrate the structure into the landscape. The land required for the amendment is outside the original limits of the Bill
Changes to Previously assessed elements	Culvert and Diversion
AP4 Assessment Requirements	None
Drawings (Original, AP2 and AP4) Construction Phase (05) Proposed Scheme (06)	AP-C222-072

Requires 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 Stoke Brook and Tributaries			Culverts on Stoke Brook				
GB106039030320	Moderate	Good Ecological Status by 2015	Description of scheme element impact	River diversions at crossings (SWC11-SWC3 to CFA11-SWC6) will form a permanent realignment in area of St Mary's Church. Crossings require long culverts.			Crossings requiring culverts on Stoke Brook at SWC11-SWC1 to CFA11-SWC6 and CFA11-SWC18. Culvert lengths on Stoke Brook and tributaries = 60m + 47m + 58m + 77m + 40m. Total = 282m.				
Stoke Brook Aylesbury			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
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
2. Macrophytes and phytobenthos - macrophytes	-	-		- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. - 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.	- 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.	- 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 immediately downstream). - Stoke Brook and tributaries heavily shaded, with poor macrophyte diversity and common species only. - Potential localised adverse effect with no effect on element status at the scale of the waterbody.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. - Stoke Brook and tributaries relatively 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.	- Shading of the channel from the culvert has the potential to reduce photosynthetic activity and therefore effect macrophyte communities present. - Stoke Brook and tributaries relatively 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.	- Changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert, loss of flow diversity etc.) may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediately downstream). - Stoke Brook and tributaries relatively heavily shaded, with poor macrophyte diversity and common species only. - This would only be affect 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 and volume of run-off from the proposed railway. There is no anticipated change in water quality.
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 poor to good invertebrate quality, and the community is therefore not likely to be highly sensitive to the impact - Given the relatively short distance affected and the invertebrate community present, there would only be highly localised effects on the invertebrate community and no conceivable 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 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.	- 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 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 good invertebrate quality - Given the relatively short distance affected and the invertebrate community present, there would only be highly localised effects on the invertebrate community and no conceivable effect on this element at a water body level.	- Shading will lead to the loss of macrophyte cover and therefore macroinvertebrate habitat and foraging resource. - Baseline invertebrate data indicate poor to moderate good invertebrate quality - Effects are likely to be minor adverse.	- Changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert), loss of flow diversity etc. 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 and potential effects are considered to be minimal 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.
4. Fish	-	-		- 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. - Stoke Brook and tributaries are not considered to support fish suitable habitat, or potential for salmonids. Potential for minor fish species only - Potential localised and minor adverse effect only, 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 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.	- Localised changes in flow dynamics may result in changes to fish habitat. - Stoke Brook and tributaries are not considered to support fish suitable habitat, or potential for salmonids. Potential for minor fish species only - Only localised minor effect anticipated	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - Stoke Brook and tributaries are not considered to support fish suitable habitat, or potential for salmonids. - Only localised and minor effect anticipated with no effect at the scale of the waterbody.	- 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. - Stoke Brook and tributaries are not considered to support fish suitable habitat, or potential for salmonids. - Only localised and minor effect anticipated with no effect at the scale of the waterbody.	Shading will only have negligible or no effects on fish.	Changes in flow dynamics (potential increased flow due to the straightened channel in the culvert, loss of flow diversity etc.) and the presence of the culvert have the potential to impede upstream passage of any migratory fish. - Stoke Brook and tributaries are not considered to support fish suitable habitat, or potential for salmonids. - Only localised and minor effect anticipated with no effect at the scale of the waterbody for 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.
Physico-Chemical status											
WFD classification elements: 5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, 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.	• CoCP measures (Section 16) implemented 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 permanent 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 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.
6. pH	High	-		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
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 permanent 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
8. Ammonia	High	-		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
9. Temperature	-	-		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
10. Specific Pollutants (Annex VIII)	-	-		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.
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	• Based on the walkover survey report the channel width ranges approximately from 1-4 m near the proposed crossing point, with no significant diversity in flow dynamics • It appears that watercourse would be lengthened and straightened to align against the embankment. Lengthening the channel may reduce flow rates although the diversion is not far from the existing channel course. Lengthening would reduce sinuosity and morphological dynamics.	N/A	N/A	N/A	• Approximately 300 m of culverts would be located in the middle of a 9.59 km water body, which is currently of Moderate overall status (according to the 2009 RBMP), but with some sensitivity for invertebrates, which are classified as Moderate in 2009 • Extensive culverting would result in significant loss of diversity in 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 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	N/A
12. Connection to 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
13. River continuity	-	-		N/A	N/A	• Lengthening the channel around an embankment may result in reduced riparian and floodplain connectivity, even though the size of the watercourse suggests that there are unlikely to be severe effects	N/A	N/A	N/A	• The culvert would be located in the middle of the water body and would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity in and adjacent to both sides of the channel	N/A
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	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 major diversity in river depth and width, but there is still a significant risk to the water body	N/A
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 there would probably be no measurable impact • Survey reports show that the channel bed is dominated my fine sediment and is not particularly morphologically valuable	N/A	N/A	N/A	• 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 bed structure	N/A
16. Structure of riparian zone	-	-		N/A	N/A	• The embankment would modify the riparian zone and reduce connectivity, but in water body terms this is unlikely to be a severe problem	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.	N/A

Element	Cutting		Culverts on Sedrup Ditch				
Description of scheme element impact	Wendover North Cutting - dewatering activities and other hydrological impacts on Stoke Brook upstream springs, water discharged approximately 1 km downstream of springs with potential affects 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.				
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.	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	N/A	N/A
2. Macrophytes and phytobenthos - macrophytes	Possible change in macrophyte communities over approx. 1 km of the upstream area of Stoke Brook main watercourse and tributaries. - While baseline data shows that Stoke Brook and its tributary are heavily shaded in the area and only support low diversity macrophyte communities, with only common species, there may be effects over a wider area. - 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.	Receptor is insensitive to impact	- Dry drainage ditch with no evidence of recent flows. - No effect anticipated.	- Dry drainage ditch with no evidence of recent flows. - no effect anticipated	- Dry drainage ditch with no evidence of recent flows. - No 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	Possible change in macroinvertebrate communities over approx. 1 km of the upstream area of Stoke Brook main watercourse and tributaries. - Stoke Brook and tributary of Poor to Good macroinvertebrate quality and communities adapted to slow / moderate flows and slightly sedimented to sedimented conditions. - Following a precautionary approach, 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.	Receptor is insensitive to impact	- Dry drainage ditch with no evidence of recent flows. - no effect anticipated	- Dry drainage ditch with no evidence of recent flows. - No effect anticipated	- Dry drainage ditch with no evidence of recent flows. - No 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	Possible change in fish communities over approx. 1 km of the upstream area of Stoke Brook main watercourse and tributaries. - Neither Stoke Brook nor its tributary support suitable habitat for salmonids. Potential for minor fish species only. - Potential localised and minor adverse effect, with no effect on WFD status of this element at the scale of the waterbody.	- CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	- 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 temporally, low and highly localised, no measurable effects are anticipated.	- Dry drainage ditch with no evidence of recent flows. - No effect anticipated	Shading will only have negligible or no effects on fish.	- Dry drainage ditch with no evidence of recent flows. - No 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.
Physico-Chemical status							
5. 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.	- CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	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.
6. pH	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	Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution. The stream is unlikely to be groundwater dependent, however the source of the stream would need to be located to confirm this.	- CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	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
8. Ammonia	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	- CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	N/A	N/A	Receptor is insensitive to impact	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	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)	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	- CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	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							
11. Quantity and dynamics of river flow	• Dewatering would reduce flows volumes and diversity in the headwaters • This would be localised to approximately 1km, but this is still a significant extent (approximately 10% of the surface 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 has residential development close to the channel, making the upper 1km sensitive at water body scale	N/A	N/A	N/A	N/A	• Survey report shows that the channel width varies from approximately 0.5 to 2m with primarily smooth laminar flow and no significant flow diversity. • 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. Channel capacity could be reduced. • Survey shows that the channel is over-deepened and incised, which probably means reduced floodplain connectivity. However, shortening the channel and reducing its capacity could help to rehabilitate floodplain flows. • Culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow	N/A
12. Connection to Groundwater	• Potential reduction in spring flows at Worlds End • Estimated GW inflows same magnitude as estimated Q95 of Stoke Brook	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A
13. River continuity	• Dewatering could reduce flow depths and along-stream and lateral (riparian and floodplain) connectivity, and increase sediment deposition in the upper reaches	N/A	N/A	N/A	N/A	• The culvert would disconnect floodplains, out-of-bank flows, bank habitats and riparian habitats, and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel • Surveys show that the channel is over-deepened and incised, which probably means reduced floodplain connectivity. However, shortening the channel and reducing its	N/A
14. River depth and width variation bed	• Flow depths and widths could be decreased, with a reduction in wetted areas	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 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	• Dewatering could result in increases in sedimentation in the reaches of the watercourse that are unlikely to be affected be elevated sediment loadings due to urbanisation • However, the headwaters are small channels, so there is unlikely to be much diversity in bed form, and impacts may not be 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	N/A
16. Structure of riparian zone	• Reduced flows could result in decreased flow depths and reduced channel - riparian connectivity, in the headwaters of the water body which are the reaches unaffected by residential development	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

Element	Culverts on Lower Hartwell Ditches - including overbridge SBH/32 relocation AP4-011-072					Impacts from other WFD water bodies (assessed separately)
Description of scheme element impact	Crossings requiring culverts on Hartwell Ditches at CFA11-SWC9 to CFA11-SWC11, ~~including approximately 210m of diversion~~. Culvert lengths = 43m + 33m + 30m + 30m. Total = 136m. Relocation of overbridge and associated embankments is likely to slightly reduce the length of diverted watercourse. Negligible change in terms of length culverted					
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	N/A
2. Macrophytes and phytobenthos - macrophytes	Receptor is insensitive to impact	- Heavily shaded drainage ditch with therefore low potential for macrophytes. - No effect anticipated	- Heavily shaded drainage ditch with therefore low potential for macrophytes. - No effect anticipated.	- Heavily shaded drainage ditch with therefore low potential 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. There is no anticipated change in water quality.	No impact from upstream water bodies
3. Macroinvertebrates	Receptor is insensitive to impact	- Heavily shaded, slow flowing and sedimented drainage ditch, with low potential for macroinvertebrates. - Negligible effect anticipated.	- Heavily shaded, slow flowing and sedimented drainage ditch, with low potential for macroinvertebrates. - Negligible effect anticipated.	- Heavily shaded, slow flowing and sedimented drainage ditch, with low potential for macroinvertebrates. - 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.	No impact from upstream water bodies
4. Fish	- 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 temporally, low and highly localised, no measurable effects are anticipated.	- Heavily shaded, slow flowing and sedimented drainage ditch, considered unsuitable for fish. No salmonid recorded in Stoke Brook. - Negligible effect anticipated.	- Heavily shaded, slow flowing and sedimented drainage ditch, considered unsuitable for fish. No salmonid recorded in Stoke Brook. - Negligible effect anticipated.	- Heavily shaded, slow flowing and sedimented drainage ditch, considered unsuitable for fish. No salmonid recorded in Stoke Brook. - 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.	No impact from upstream water bodies
Physico-Chemical status						
5. 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 impact to upstream water bodies
6. pH	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No impact to upstream water bodies
7. 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 impact to upstream water bodies
8. Ammonia	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No impact to upstream water bodies
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	No impact to upstream water bodies
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 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 impact to upstream water bodies
Hydromorphological status						
11. Quantity and dynamics of river flow	N/A	N/A	N/A	• Survey report shows that the channel width varies from approximately 0.5 to 1m with primarily smooth laminar flow and no significant flow diversity. • 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. Channel capacity could be reduced. • Survey shows that the channel is over-deepened and incised, which probably means reduced floodplain connectivity. However, shortening the channel and reducing its capacity could help to rehabilitate floodplain flows. • Culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow	N/A	No impact to upstream water bodies
12. Connection to Groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	No impact to upstream water bodies
13. River continuity	N/A	N/A	N/A	• The culvert would disconnect floodplains, out-of-bank flows, bank habitats and riparian habitats, and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel • Surveys show that the channel is over-deepened and incised, which probably means reduced floodplain connectivity. However, shortening the channel and reducing its	N/A	No impact to upstream water bodies
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 size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A	No impact to upstream water bodies
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	No impact to upstream water bodies
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	No impact to upstream water bodies

Element	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	-
		Construction	Operation		
1.Macrophytes and phytobenthos - diatoms	N/A	N/A	N/A	N/A	-
2. Macrophytes and phytobenthos - macrophytes	- Baseline shows that Stoke Brook and its tributaries support poor macrophyte diversity and only common species were recorded in the area. - 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. Although poor macrophytes recorded in the area, water quality impacts may affect a greater distance downstream. - Other effects (from culverts/diversions etc.) likely to be more localised. - Following a precautionary approach, t 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 of the specific elements. - 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 WFD element.	- Baseline shows that Stoke Brook and its tributaries support poor macrophyte diversity and only common species were recorded. - 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, t is considered that an effect on the status of this element is possible.	-
3. Macroinvertebrates	- Baseline shows that Stoke Brook and its tributaries support poor to good macroinvertebrate diversity. - 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, t 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 of the specific elements. - Further investigation required to assess whether the changes in flow brought about by the construction of the cutting will affect this WFD element.	- Baseline shows that Stoke Brook and its tributaries support poor to good macroinvertebrate diversity. - 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, t is considered that an effect on the status of this element is possible.	-
4. Fish	- Other effects likely to be minor and localised. - Baseline data indicated that neither Stoke Brook nor its tributaries support suitable habitat for salmonid species, although localised potential for minor fish species. - 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 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 important to ensure that the culverts are designed and installed to allow fish passage. - Further investigation required to assess whether the changes in flow brought about by the construction of the cutting will affect this WFD element.	- Other effects likely to be minor and localised. - Baseline data indicated that neither Stoke Brook nor its tributaries support suitable habitat for salmonid species, although localised potential for minor fish species. - 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. - Residual effect 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	Potential minor and localised effects on element.	Implementation of CoCP measures and Best Practice Measures will ensure potential impacts only have a temporary, minor effect on water quality during construction	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.	-
6. pH	Receptor is insensitive to impact	None required.	None required.	-No effect on this element. Receptor is insensitive to impact	-
7. Phosphate	There is potential for an adverse effect and deterioration in Phosphate status within the Stoke Brook catchment, depending on the source of the upstream source.	Implementation of CoCP measures and Best Practice Measures will ensure potential impacts only have a temporary, minor effect on water quality during construction	Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS).	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. Construction impacts are likely to have only temporary, minor effects.	-
8. Ammonia	Potential minor and localised effects on element.	None required.	None required.	Construction impacts are likely to have only temporary, minor effects.	-
9. Temperature	Receptor is insensitive to impact	None required.	None required.	No effect on this element. Receptor is insensitive to impact	-
10. Specific Pollutants (Annex VIII)	Potential minor and localised effects on element.	Implementation of CoCP measures and Best Practice Measures will ensure potential impacts only have a temporary, minor effect on water quality during construction	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.	-
Hydromorphological status					**Hydromorphology Baseline**
11. Quantity and dynamics of river flow	• The impacts of diverting, culverting and dewatering ca. 300 m of the 9.59 km, Moderate overall status (according to the 2009 RBMP) Stoke Brook could be significant, because of extensive culverts disrupting stream processes and continuity of the undeveloped part of the principal watercourse of the water body, where macroinvertebrate status is moderate and could be sensitive to hydromorphological impacts • The culverts are likely to result in adverse effects on the water body hydromorphology that could place the overall status class at risk	Incorporate hydromorphological mitigation measures into detailed design where practicable. Mitigation measures might include: • Bank reprofiling (rehabilitation) • Create low flow channels in over-widened/over-deepened channels • 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		• The impacts of diverting and culverting Stoke Brook could be severe, because of extensive culverts on the principal watercourse of the water body. The culverts are likely to result in adverse effects on the water body that could affect (deteriorate) its overall status class	• The baseline Survey WFD-HM1-0008 indicated that the quantity and dynamics of flow and morphology appear to be historically modified, with significant fine sediment deposition on the bed due to a wide cross section. The channel appears to have been straightened. • The only watercourse requiring hydromorphological baseline is Stoke Brook • Stoke Brook is a small watercourse is small (approximately 0.5 - 2m channel width according to surveys) but is the principal watercourse of the water body, with a total length of ca. 9.5km and a catchment area of ca. 19.5 km • It is currently good overall status (according to online mapping) undeveloped part of the principal watercourse of the water body, although macroinvertebrate status is moderate (2012 data) • Channel is set in a low relief rural catchment dominated by arable agriculture with pockets of woodland • There is residential development close to the eastern side of the channel in the downstream reaches of the water body, and evidence of historic channel straightening. There are numerous existing crossings, including a ford, a railway an 'A' road and other minor roads • Channel is naturally sinuous and may have been realigned or deepened for the benefit of drainage of land gain • Map from the mid 1990s shows that channel planform has not changed significantly for at least ca. 20 years.
12. Connection to Groundwater					• Groundwater is not significant to the effects of HS2 on hydromorphology
13. River continuity					• No structures are visible in the channel from aerial imagery of the local area, although there are several crossings and a ford • Riparian zones are continuous and appear to well established mature vegetation in the vicinity of the proposed HS2 crossing • Floodplain appears to be well connected
14. River depth and width variation bed					• Channel width appears to be consistent, as would be expected for a small watercourse. Channel does not seem to be over-wide • Review of survey s suggest the channel is over-deep, probably in association with historic straightening.
15. Structure and substrate of river bed					• Low, small, calcareous RBMP channel type • Developed on Gault formation and upper greensand formation (undifferentiated) mudstone siltstone and sandstone • No faults mapped at the site that would suggest an influence on channel form Surveys show that the channel is dominated by sands and fine sediments, as would be expected from the underlying geology and adjacent land use being arable agriculture, and the fact that channels are straightened and overdeep.
16. Structure of riparian zone					• Continuous mature vegetation, but narrow because agriculture extends close to near bank tops • Good riparian continuity

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)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

CFA 16 - 22 Cover Sheet

						Risk to Overall Status				
Surface water body name	**Waterbody ID**	**Catchment**	**Geographical Area**	**CFA**	**No. AP4 Updates**	**Original Assessment**	**Post-Additonal Baseline survey**	**Post-AP2 Updates**	**Post-AP4 Updates**	**Assessment Summary**
Canley Bk - source to conf with Finham Bk	GB109054044520	Warwickshire Avon	North	18	1			No AP2 updates		Original + Baseline + AP4
Oxford Canal, summit pound	GB70910196	N/A	North	16	1		No baseline survey updates	No AP2 updates		Original + AP4
River Tame from Conf of the two arms to R Blythe	GB104028046840	Tame Anker and Mease	West	19, 20, 25, 26	2		No baseline survey updates	No AP2 updates		Original + AP4

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 AP4 Assessment Changes:

	In AP4 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 AP4 change

Water Body ID	GB109054044520
Surface Water Body Name	Canley Brook - source to confluence with Finham Brook
CFAs covered by Waterbody	18

CFA	18
AP4 ID	AP-C223-220
AP4 Name	Extend Burton Green tunnel south porous portal by 40m
AP4 Location	Warwickshire
New/Replacement Scheme Element	NEW
Scheme Element Type	(The scheme) will enter into tunnel just to the south-east of Burton Green. The tunnel is the Burton Green green tunnel; a 621m-long green tunnel, incorporating a 100m long porous portal at each end (Maps CT-06-099, E6, F6, G6 and H6).
Original Scheme	The south porous portal of Burton Green Tunnel is extended by 40m south-eastwards to comply with the latest aerodynamic modelling requirements. The length of the solid tunnel is unchanged. As a result of this change, the south portal area, including the tunnel portal buildings, are relocated proportionately further south-eastwards and the portal access road adjusted accordingly. The landscape mitigation earthworks around the portal are redesigned to accommodate these changes and screening levels are unchanged. No additional land is required on a temporary or permanent basis. This change will impact on the BP fuel line diversion that requires further modification following AP2, but is unlikely to require additional land.
AP4 Description	Additional small area of cutting next to Burton Green South Porous Portal (CFA18)
Changes to Previously Assessed Elements	Assessment of impact of changes on previously assessed portal
Drawings (Original and AP4) Construction Phase (05) Proposed Scheme (06)	AP-C223-220

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					Cutting	
	GB109054044520	Moderate	Good by 2027	Description of scheme element impact	Canley Brook - 900 m diversion from approximately 143+000 to 142+500 - to avoid cutting - includes viaduct above new channel (Canley Brook viaduct - 143+200)			Unnamed tributaries of Canley Brook: CFA18-SW-015 (143+500) - culvert and realignment, CFA18-SW-017 (145+030) - culvert and realignment, CFA18-SW-018 (146+000) - culvert and realignment					Canley Brook: Kenilworth cutting (141+400 approximately), Crackley Road cutting	
	Canley Brook - source to confluence with Finham 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	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.
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	-	-		There will be loss of marginal and channel macrophytes over the 500 m length of the existing Canley Brook that lies within the diverted section. Relatively high macrophyte diversity, including the notable *Ranunculus batrochian* spp. 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.	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. Relatively high macrophyte diversity, including the notable *Ranunculus batrochian* spp. As the length of the new channel will be increased in comparison to the existing channel, beneficial effect anticipated.	Potential impact to hydromorphology that could be detrimental to natural, self regulating and sustainable channel regime condition. As Canley Brook supports high macrophyte diversity in the reach impacted and as the diversion is approximately 1km long, potential adverse effect that could be adverse on the status objectives of this element at the scale of the waterbody.	Receptor not sensitive to impact. No likely effect anticipated.	The tributary located at chainage 145+030 is heavily shaded and supports no aquatic vegetation. Other tributaries are heavily shaded or dry at crossing points. No likely effect anticipated.	The tributary located at chainage 145+030 is heavily shaded and supports no aquatic vegetation (HS2 baseline surveys). Other tributaries are heavily shaded or dry at crossing points. No likely effect anticipated.	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. Relatively high macrophyte diversity, including the notable *Ranunculus batrochian* spp. Temporary adverse effect anticipated.	Potential changes to phosphates may adversely affect macrophyte communities present and have the potential to affect the WFD status of macrophytes.
	3. Macroinvertebrates	Moderate	Good by 2027 ?		There will be loss of marginal and channel macrophytes over the 500 m length of the existing Canley Brook that lies within the diverted section. Canley Brook currently supports good macroinverterbrate quality.Temporary adverse effect anticipated while the new channel re-establishes.	As the length of the new channel will be increased in comparison to the existing channel, the 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, will represent an improvement for macroinvertebrate communities. Canley Brook currently supports good macroinvertebrate quality (HS2 baseline surveys). Effect on macroinvertebrates is considered to be beneficial.	Potential impact to hydromorphology that could be detrimental to natural, self regulating and sustainable channel regime condition. As Canley Brook supports good macroinverterbrate quality with communities likely to be sensitive to changes in flows in the reach impacted and as the diversion is approximately 1km long, potential adverse effect that could be adverse on the status objectives of this element at the scale of the waterbody.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to a localised but permanent loss of macroinverterbrate habitat (i.e. streambed, riparian vegetation). The tributary located at chainage 143+500 currently supports moderately low macroinverterbrate quality (HS2 baseline surveys). Other tributaries dry or winterbourne character likely to dry out relatively often. Potential minor and localised adverse effect.	No additional effect anticipated (loss of habitat already included in the landtake impact), locally or at the scale of the water body.	Some minor change to hydromorphology within the vicinity of the culvert may lead to localised effects on macroinvertebrates.	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 currently supports good macroinverterbrate quality (HS2 baseline surveys), with communities adapted to moderate flows. Temporary and localised adverse effect anticipated.	Potential changes to water quality parameters may have significant effects on the diverse and sensitive macroinverterbrate communities present and have the potential to deteriorate macroinverterbrate WFD status.
	4. Fish	-	-		Temporary and localised loss of fish habitat within Canley Brook, while the new channels re-establish. Canley Brook supports good fish habitat and excellent brown trout population, with notably juveniles. Fish kills possible while dewatering existing channels, although translocation of fish will take place while dewatering (ES Ecology chapter Volume 2). Temporary adverse effect anticipated while the new channel re-establishes.	As the length of the new channel will be increased in comparison to the existing channel, the range of habitats incorporated into the diverted channel will represent an improvement for fish communities. Canley Brook supports good fish habitat and excellent brown trout population, with notably juveniles. Beneficial effect anticipated.	Potential impact to hydromorphology that could be detrimental to natural, self regulating and sustainable channel regime condition. As Canley Brook supports excellent brown trout population, including juveniles, in the reach impacted and as the diversion is approximately 1km long, potential adverse effect that could be adverse on the status objectives of this element at the scale of the waterbody.	Localised and temporary adverse effect during construction. No deterioration of the water body status of the element is however expected.	Likely to lead to very localised but permanent loss of fish habitat (i.e. riparian vegetation, slow flowing areas) and reduced connectivity with Canley Brook. Canley Brook currently supports brown trout population (HS2 baseline surveys). Tributaries assessed to be of poor value for migratory fish, dry or winterbourne character likely to dry out relatively often. In addition, as the culverts will be located at the very upstream end of each tributary, only localised adverse effect anticipated, with no significant effect at the scale of the water body.	No additional effect anticipated (loss of habitat already included in the landtake impact), locally or at the scale of the water body.	Some minor change to hydromorphology within the vicinity of the culvert may lead to localised effects on fish habitat. No fish data available for any of the tributaries. Canley Brook currently supports brown trout population (HS2 baseline surveys). However, as the culverts will be located at the very upstream end of each tributary, only localised adverse effect anticipated, with no significant 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.	Potential decrease in flows on Canley Brook during dewatering. Canley Brook supports good fish habitat and excellent brown trout population, with notably juveniles. Temporary adverse effect anticipated.	Potential changes to water quality parameters may have significant effects on the sensitive fish communities present and have the potential to deteriorate fish WFD status.
	Physico-Chemical status													
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, 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 in relation to the water body. • The new channel can provide, when re-established, similar/marginally improved dissolved oxygen levels as a result of the increased river length, allowing for improved habitat and subsequent increase in photosynthetic organisms. Overall effect likely to be minor beneficial, with opportunity to maintain the above good physico-chemical status of the water body.	• Potential drop in baseflow due to lack of alluvium in new channel. Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation. • CoCP measures (Section 16) implemented 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 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 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.	Potential decrease in flows on Canley Brook during 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.
	6. pH	High	-		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	Moderate	-		N/A	Receptor is insensitive to impact	• Potential drop in baseflow due to lack of alluvium in new channel. Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution. • CoCP measures (Section 16) implemented 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	• CoCP measures (Section 16) implemented 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	Potential decrease in flows on Canley Brook during 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.
	8. Ammonia	High	-		N/A	Receptor is insensitive to impact	• Potential drop in baseflow due to lack of alluvium in new channel. 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	Potential decrease in flows on Canley Brook during 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
	9. Temperature	-	-		N/A	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	Receptor is insensitive to impact	Receptor is insensitive to impact
	10. Specific Pollutants (Annex VIII)	-	-		N/A	Receptor is insensitive to impact	• Potential drop in baseflow due to lack of alluvium in new channel. 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 • CoCP measures (Section 16) implemented 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.	Potential decrease in flows on Canley Brook during 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
	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	• The existing channel has a natural meandering form, although it may have been realigned around the A429 • Lengthening the channel to this extent is likely to reduce flow rates and subdue hydrodynamics, resulting in decreased flow velocity, turbulence and mixing / aeration, and increased sediment deposition • The baseflow channel would need to be narrowed to maintain flow rates, so there may not be any significant gain in hydraulic habitats	• The survey walkover report indicated that the channel is approximately 4 - 6 m in width, with significant diversity of flow dynamics and bed conditions in some reaches. In other reaches, which appear to have been historically modified, than channel is noted as being deteriorated. • It appears that up to 1km of Canley Brook (the water body length is 11.3km) will be diverted (lengthened) and therefore could pose a significant impact to the hydromorphology of the watercourse. • Diverting this length of channel could be detrimental to natural, self regulating and sustainable channel regime conditions, and may require substantial engineering works to enforce the new flow path • The catchment is known to be affected by over-abstraction, and while morphological status supports good ecological condition, (Severn RBMP) quantity and dynamics of flow does not support good. • Lengthening the channel may reduce flow rates (velocity and turbulence / mixing / flow aeration) • The decreased flow rate could cause flows to back up upstream • Overall, it is considered that the impacts on flow dynamics are unlikely to be significant at water body scale, but the effect of lengthening the watercourse still needs to be flagged as a risk	N/A	N/A	N/A	• The survey indicates that the channel width varies from approximately 0.6 m to 1.8m and describes no significant diversity of flow dynamics • Out of bank flows could be cut-off in areas where the bank height is low (0.2 m) • 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 unnamed tributary to Canley 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	N/A	• The potential reduction of the groundwater contribution to surface water flows from Kenilworth Cutting could reduce flows and impact the general hydromorphology of the watercourse if the channel is diverted from alluvium to bedrock, and the flow regime could become more flashy • Reduction of flows in the 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 • An increasingly flashy regime could caused temporally-limited increases in scour, but not flushing of sediment in drawn-out receding hydrographs limbs, resulting in increased sediment loadings in the channel	• Water quality could be reduced in the depleted reaches impacted by the Crakley Cutting due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects
	12. Connection to 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	-	-		N/A	• Lengthening the channel may result in reduced flow rates and increased sediment deposition in this reach, and may reduce riparian and floodplain connectivity • The opportunity to implement mitigation measures to improve habitats could help to improve biological continuity, if designed appropriately	• Lengthening the channel may result in increased channel storage and reduced floodplain connectivity	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	• The diversion may need to narrow the channel baseflow to maintain flow rates, but could otherwise replicate existing (or possibly pre-alignment form if the channel was re-aligned around the A429) channel planform and cross section geometry • The extent of channel diversion means this could be a significant risk, since the general planform in this area appears to be naturally meandering. Channel form, e.g. around the A429 needs to be investigated further	• The diversion may need to narrow the channel baseflow to maintain flow rates, but could otherwise replicate existing (or possibly pre-alignment form if the channel was re-aligned around the A429) channel planform and cross section geometry, but the extent of channel diversion means this could be a significant risk • Lengthening the channel is likely to result in reduced flow depths, but this may be imperceptible	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 survey indicates that the tributary is more than a drainage ditch and a culvert could impact on flow conditions	N/A		
	15. Structure and substrate of river bed	-	-		N/A	• Lengthening the channel could result in increased sediment deposition and decreased competence to transport bed substrates, which could be detrimental to bed particle size composition and bed forms (e.g. structure and spacing of pools and riffles). • Lengthening a channel tends to reduce flow rates and out-of-bank flows and can increase deposition of sediment. • This could have a severely adverse effect on a large proportion of a water body that is already affected by over-abstraction, with implications for bed habitats. • The diversion path may flow over different geologic conditions impacting the rivers interaction with groundwater and potentially disrupting the stability of the new channel.	• Changing the natural channel course to this extent could result in channel adjustment as the watercourse tries to regain its existing planform through scour and associated sediment deposition, which would affect the existing hydraulic and sediment regimes. Hard engineering may be required to maintain the new channel course, which could further inhibit natural rates of bank erosion and sediment influx to the channel. It is impossible to predict the effects of a large scale channel diversion within the scope of this study, but this is a potentially severe risk to WFD objectives • Lengthening a channel tends to reduce flow rates and out-of-bank flows and can increase deposition of sediment • This could have a severely adverse effect on a large proportion of a water body that is already affected by over-abstraction, with implications for bed habitats	N/A	N/A	N/A	• The channel characteristics 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	• By replicating existing channel form in similar land cover, the quality of existing riparian connectivity and habitats should be preserved. However, hard engineering may be required to fix the channel in its new course • There could be a decrease in flow connectivity with riparian areas • Channel design could incorporate improved marginal habitats, but existing hydromorphology needs to be investigated in more detail	• By replicating existing channel form in similar land cover, the quality of existing riparian connectivity and habitats should be preserved. However, hard engineering may be required to fix the channel in its new course • There could be a decrease in flow connectivity with riparian areas	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 identified in Annex B of RBMP	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)

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

	Surface Water body	Current status	Status objective	Scheme Elements	Cutting		Retaining wall		Retaining wall		Tunnel Portal - BURTON GREEN TUNNEL SOUTH POROUS PORTAL EXTENSION - AP-C223-220		Impacts from other WFD water bodies (assessed separately)
	GB109054044520	Moderate	Good by 2027	Description of scheme element impact	Unnamed tributaries of Canley Brook: Rough Knowles Wood cutting, Burton Green cutting, North Crackley cutting		Canley Brook: Canley Brook Retaining Wall		Canley Brook: Burton Green retaining wall		Burton Green South porous portal to be extended 40m south east. Portal may locally influence flow towards tributary of Canley Brook. However, portal (and cutting for construction compound) does not penetrate whole aquifer.		
	Canley Brook - source to confluence with Finham Brook			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.	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
	2. Macrophytes and phytobenthos - macrophytes	-	-		Potential decrease in flows on tributaries of Canley Brook during dewatering. The tributary located at chainage 145+030 is heavily shaded and supports no aquatic vegetation (HS2 baseline surveys). Other tributaries are heavily shaded, dry or with very low flows, supporting no macrophytes.. No likely effect anticipated.	No changes in water quality expected. No likely effect anticipated on this quality element.	Potential temporary reduction in flows on headwaters and tributaries of Canley Brook. Baseline data showed that Canley Brook supports relatively high macrophyte diversity. Potential temporary adverse effect anticipated.	No significant changes in water quality expected. No likely effect anticipated on this quality element.	The water pumped from the River Blythe catchment at Burton Green retaining wall will be released on the Canley Brook catchment, upstream of the location of Canley brook retaining wall. Therefore, potential beneficial effect anticipated.	No changes in water quality expected. No likely effect anticipated on this quality element.	• The proposed AP4 changes may locally influence flow to tributary of Canley Brook, however, proposed embedded mitigation (reintroduction to ground via SuDS where possible or to surface water) will mean there is a negligible effect on flows. Therefore, only a negligible effect on macrophytes is anticipated.	No changes in water quality expected due to AP4 changes. No likely effect anticipated on this quality element.	No scheme element on upstream water body
	3. Macroinvertebrates	Moderate	Good by 2027 ?		Potential decrease in flows on tributaries of Canley Brook during dewatering. The tributary located at chainage 143+500 currently supports moderately low.Other tributaries dry or winterbourne character likely to dry out relatively often. Potential temporary and localised adverse effect.	No changes 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, baseline data showed that Canley Brook -Good macroinvertebrate quality. Communities were also identified to be sensitive to reduced flows. Potential temporary adverse effect anticipated at the scale of the water body.	No significant changes in water quality expected. No likely effect anticipated on this quality element.	The water pumped from the River Blythe catchment at Burton Green retaining wall will be released on the Canley Brook catchment, upstream of the location of Canley brook retaining wall. Therefore, potential beneficial effect anticipated.	No changes in water quality expected. No likely effect anticipated on this quality element.	• The proposed AP4 changes may locally influence flow to tributary of Canley Brook, however, proposed embedded mitigation (reintroduction to ground via SuDS where possible or to surface water) will mean there is a negligible effect on flows. Therefore, only a negligible effect on macroinvertebrates is anticipated.	No changes in water quality expected due to AP4 changes. No likely effect anticipated on this quality element.	No scheme element on upstream water body
	4. Fish	-	-		Potential decrease in flows on tributaries of Canley Brook during dewatering. Tributaries assessed to be of poor value for migratory fish, dry or winterbourne character likely to dry out relatively often. Negligible effect anticipated.	No changes in water quality expected. No likely effect anticipated on this quality element.	Potential temporary decrease in flows on tributaries of Canley Brook during dewatering. Canley Brook is a designated fisheries and supports excellent brown trout population (HS2 baseline surveys). Potential adverse effect at the scale of the water body anticipated.	No significant changes in water quality expected. No likely effect anticipated on this quality element.	The water pumped from the River Blythe catchment at Burton Green retaining wall will be released on the Canley Brook catchment, upstream of the location of Canley brook retaining wall. Therefore, potential beneficial effect anticipated.	No changes in water quality expected. No likely effect anticipated on this quality element.	• The proposed AP4 changes may locally influence flow to tributary of Canley Brook, however, proposed embedded mitigation (reintroduction to ground via SuDS where possible or to surface water) will mean there is a negligible effect on flows. Therefore, only a negligible effect on fish is anticipated.	No changes in water quality expected due to AP4 changes. No likely effect anticipated on this quality element.	No scheme element on upstream water body
	Physico-Chemical status												
WFD classification elements	**5. Dissolved Oxygen**	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	Potential decrease in flows on Canley Brook during dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	No changes in water quality expected. No likely effect anticipated on this quality element.	Potential temporary decrease in flows on Canley Brook during dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	No changes in water quality expected. No likely effect anticipated on this quality element.	Potential temporary increase in flows on headwaters and tributaries of Canley Brook, in a water body that has been deteriorated by abstractions. Only minor and temporary beneficial effect.	No changes in water quality expected. No likely effect anticipated on this quality element.	• The proposed AP4 porous tunnel portal extension and construction compound cutting may locally influence flow to tributary of Canley Brook, however, embedded mitigation will reintroduce water to ground via SuDS where possible or to surface water. The influence on flows is considered to be negligible and will have a negligible effect on this sub-element, therefore no change in status is anticipated.	• The proposed AP4 porous tunnel portal extension may discharge into the 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.	No scheme element on upstream water body
	6. pH	High	-		Receptor is insensitive to impact	No changes in water quality expected. No likely effect anticipated on this quality element.	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 element on upstream water body
	7. Phosphate	Moderate	-		Potential decrease in flows on Canley Brook during dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	No changes in water quality expected. No likely effect anticipated on this quality element.	Potential temporary decrease in flows on Canley Brook during dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	No changes in water quality expected. No likely effect anticipated on this quality element.	Potential temporary increase in flows on headwaters and tributaries of Canley Brook, in a water body that has been deteriorated by abstractions. Only minor and temporary beneficial effect.	No changes in water quality expected. No likely effect anticipated on this quality element.	• The proposed AP4 porous tunnel portal extension and construction compound cutting may locally influence flow to tributary of Canley Brook, however, embedded mitigation will reintroduce water to ground via SuDS where possible or to surface water. The influence on flows is considered to be negligible and will have a negligible effect on this sub-element, therefore no change in status is anticipated.	• The proposed AP4 porous tunnel portal extension may discharge into the 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.	No scheme element on upstream water body
	8. Ammonia	High	-		Potential decrease in flows on Canley Brook during dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	No changes in water quality expected. No likely effect anticipated on this quality element.	Potential temporary decrease in flows on Canley Brook during dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	No changes in water quality expected. No likely effect anticipated on this quality element.	Potential temporary increase in flows on headwaters and tributaries of Canley Brook, in a water body that has been deteriorated by abstractions. Only minor and temporary beneficial effect.	No changes in water quality expected. No likely effect anticipated on this quality element.	• The proposed AP4 porous tunnel portal extension and construction compound cutting may locally influence flow to tributary of Canley Brook, however, embedded mitigation will reintroduce water to ground via SuDS where possible or to surface water. The influence on flows is considered to be negligible and will have a negligible effect on this sub-element, therefore no change in status is anticipated	• The proposed AP4 porous tunnel portal extension may discharge into the 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.	No scheme element on upstream water body
	9. Temperature	-	-		Receptor is insensitive to impact	No changes in water quality expected. No likely effect anticipated on this quality element.	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 element on upstream water body
	10. Specific Pollutants (Annex VIII)	-	-		Potential decrease in flows on Canley Brook during dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	No changes in water quality expected. No likely effect anticipated on this quality element.	Potential temporary decrease in flows on Canley Brook during dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	No changes in water quality expected. No likely effect anticipated on this quality element.	Potential temporary increase in flows on headwaters and tributaries of Canley Brook, in a water body that has been deteriorated by abstractions. Only minor and temporary beneficial effect.	No changes in water quality expected. No likely effect anticipated on this quality element.	• The proposed AP4 porous tunnel portal extension and construction compound cutting may locally influence flow to tributary of Canley Brook, however, embedded mitigation will reintroduce water to ground via SuDS where possible or to surface water. The influence on flows is considered to be negligible and will have a negligible effect on this sub-element, therefore no change in status is anticipated.	• The proposed AP4 porous tunnel portal extension may discharge into the 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.	No scheme element on upstream water body
	Hydromorphological status												
WFD classification elements	**11. Quantity and dynamics of river flow**	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	The potential reduction of the groundwater contribution to surface water flows from Rough Knowles Wood cutting, Burton Green cutting, North Crackley cutting is unlikely to significantly impact the hydromorphology of the watercourse, especially considering the length of the watercourse impacted in the context of the wider catchment and water will be reintroduced to surface watercourses through SUDs.	No changes in water quality expected. No likely effect anticipated on this quality element.	• Potential temporary reduction in flows on headwaters and tributaries of Canley Brook • The Hydrology rating for Canley Brook is currently Moderate (does not support Good ecological status/potential) due to abstraction • Flow rates and dynamics could be decreased, but this would be temporary and reversible	N/A	• Potential temporary increase in flows on headwaters and tributaries of Canley Brook, in a water body that has been deteriorated by abstractions • The Hydrology rating for Canley Brook is currently Moderate (does not support Good ecological status/potential) due to abstraction • Flow rates and dynamics could be increased, presumably towards pre-abstraction regimes, but this would be temporary and reversible	N/A	Cutting not in the vicinity of surface water bodies and does not penetrate the whole aquifer. Surface water balance is unlikely to be impacted as dewatering requirements are anticipated to be limited, and embedded mitigation is intended to reintroduce water to ground via SuDS, which may even increase aquifer recharge. As a result no significant impacts to Canley Brook are anticipated.	N/A	No scheme element on upstream water body
	12. Connection to Groundwater	-	-				• Potential temporary reduction in flows on headwaters and tributaries of Canley Brook	N/A	• Potential temporary increase in flows on headwaters and tributaries of Canley Brook	N/A		N/A	No scheme element on upstream water body
	13. River continuity	-	-				• Continuity could be deteriorated due to the decrease in flows and potential increase in sedimentation. • Any effect would be temporary and reversible • However, the watercourses are sensitive habitats and any change could be significant	N/A	• Continuity could be improved due to the increase in flows and potential decrease in sedimentation. • Any effect would be temporary and reversible • Embedded mitigation to reintroduce water to ground via SuDS in catchment of Canley Brook (may help offset downstream impacts on Canley Brook)	N/A		N/A	No scheme element on upstream water body
	14. River depth and width variation bed	-	-				• Any decrease in flow depths and widths would be temporary and reversible, but this is a sensitive habitat and any effects on wetted areas could be significant	N/A	• Any increase in flow depths and widths and wetted areas is likely to be benefit this water body as a sensitive habitat, but any effects would be temporary and reversible,	N/A		N/A	No scheme element on upstream water body
	15. Structure and substrate of river bed	-	-				• Any decrease in flows and associated increase in sedimentation would be temporary and reversible, but this is a sensitive habitat for fish and invertebrates, and any effects on bed structures could be significant	N/A	• Any increase in flows and associated decrease in sedimentation, and associated effects on bed structures could be to the benefit of a sensitive habitat for fish and invertebrates, but would be temporary and reversible,	N/A		N/A	No scheme element on upstream water body
	16. Structure of riparian zone	-	-				• Any decrease in flow volumes and dynamics would be temporary and reversible, and impacts on riparian zones are unlikely to be significant	N/A	• Any increase in flow volumes and dynamics would be temporary and reversible, and impacts on riparian zones are unlikely to be significant	N/A		N/A	No scheme element on 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	-	-	-	-	-	-	-	-	-	-
None identified in Annex 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

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

	Surface Water body	Current status	Status objective	Scheme Elements	OVERALL effect on element	Additional Proposed Mitigation Measures: Construction	Additional Proposed Mitigation Measures: Operation	RESIDUAL effect on element (following any additional mitigation measures)	-
	GB109054044520	Moderate	Good by 2027	Description of scheme element impact					
	Canley Brook - source to confluence with Finham Brook			Identified biological impacts					
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	-
	2. Macrophytes and phytobenthos - macrophytes	-	-		Although the river diversion on Canley Brook (500 to 900 m in total) has the potential for beneficial effects through the creation of new habitats within the diverted channels, the hydromorphological changes associated could have a permanent adverse effects on this quality element. The small culverts present on the tributaries of Canley Brook are considered of having the potential for only very localised effects. Given the relatively short length of culverted sections on the tributaries (drainage ditches), their cumulative effects are considered as negligible at the scale of the water body. However, cuttings and the retaining wall are identified as having potential adverse effects on flows on Canley Brook and its tributaries. Although Burton Green retaining wall has the potential to have a beneficial effect on flows on the Canley Brook catchment, cumulative effects from the cuttings, retaining wall and the river diversion are considered to have the potential of being adverse on this quality element at the scale of the water body. Although its tributaries currently supports low to no aquatic vegetation, 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.	Detailed design of diversion will aim to address hydromorphological impacts. In addition, dewatering operations for cuttings should not take place at the same time, in order to avoid cumulative effects.	None required.	The overall effect of the scheme likely to be negligible. This quality element currently does not have a status.	-
	3. Macroinvertebrates	Moderate	Good by 2027 ?		Although the river diversion on Canley Brook (500 to 900 m in total) has the potential for beneficial effects through the creation of new habitats within the diverted channels, the hydromorphological changes associated could have a permanent adverse effects on this quality element. The small culverts present on the tributaries of Canley Brook are considered of having the potential for only very localised effects. Given the relatively short length of culverted sections on the tributaries (drainage ditches), their cumulative effects are considered as negligible at the scale of the water body. However, cuttings and the retaining wall are identified as having potential adverse effects on flows on Canley Brook and its tributaries. Although Burton Green retaining wall has the potential to have a beneficial effect on flows on the Canley Brook catchment, cumulative effects from the cuttings, retaining wall and the river diversion are considered to have the potential of being adverse on this quality element at the scale of the water body. The potential for deterioration in water quality due to the cuttings may affect the macroinvertebrate communities present. Therefore, the scheme is considered as having the potential to lead to a deterioration of the current WFD status (Moderate) and / or compromise achievement of status objectives of this quality element.	Detailed design of diversion will aim to address hydromorphological impacts. In addition, dewatering operations for cuttings should not take place at the same time, in order to avoid cumulative effects.	None required.	Assessment will be revisited following detailed design	-
	4. Fish	-	-		Although the river diversion on Canley Brook (500 to 900 m in total) has the potential for beneficial effects through the creation of new habitats within the diverted channels, the hydromorphological changes associated could have a permanent adverse effects on this quality element. The small culverts present on the tributaries (drainage ditches) of Canley Brook are considered of having the potential for only very localised effects, in reason of their location at the very upstream end of the tributaries. However, cuttings and the Canley Brook retaining wall are identified as having potential adverse effects on flows on Canley Brook and its tributaries. The potential for deterioration in water quality due to the cuttings may affect the fish communities present. Although Burton Green retaining wall has the potential to have a beneficial effect on flow on Canley Brook catchment, cumulative effects from the cuttings, retaining wall and the river diversion are considered to have the potential of being significant and adverse on this quality element at the scale of the water body, and having the potential to compromise achievement of the status objectives of this element at the scale of the waterbody.	Detailed design of diversion will aim to address hydromorphological impacts and ensure existing ecological communities are maintained. Fish rescue during dewatering operations will be considered. In addition, dewatering operations for cuttings should not take place at the same time, in order to avoid cumulative effects.	None required.	Assessment will be revisited following detailed design	-
	Physico-Chemical status								
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	The AP4 porous tunnel portal extension and construction compound cutting will not contribute to the cumulative impact on this physico-chemical sub-element and there will be no change in overall impact from the previous assessment. 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.	None required.	None required.	Construction impacts are likely to have only temporary, minor effects.	-
	6. pH	High	-		Receptor is insensitive to impact			No effect on this element.	
	7. Phosphate	Moderate	-		The AP4 porous tunnel portal extension and construction compound cutting will not contribute to the cumulative impact on this physico-chemical sub-element and there will be no change in overall impact from the previous assessment. 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. Nine sewage discharge consents to Canley Brook and its tributaries. Potential for reduced dilution potential, if a significant amount of flow is lost.			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. Construction impacts are likely to have only temporary, minor effects.	-
	8. Ammonia	High	-		The AP4 porous tunnel portal extension and construction compound cutting will not contribute to the cumulative impact on this physico-chemical sub-element and there will be no change in overall impact from the previous assessment. 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.			Construction impacts are likely to have only temporary, minor effects.	
	9. Temperature	-	-		Receptor is insensitive to impact			No effect on this element.	
	10. Specific Pollutants (Annex VIII)	-	-		The AP4 porous tunnel portal extension and construction compound cutting will not contribute to the cumulative impact on this physico-chemical sub-element and there will be no change in overall impact from the previous assessment. 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.			Construction impacts are likely to have only temporary, minor 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)	• The diversion of Canley Brook appears to be approximately 1 km in length and therefore has the potential to have an adverse effect on WFD status classifications • The water body is approximately 11km in length, about half of which is urbanised, so a 500 – 900m diversion could potentially have adverse effects on 10 – 20% of the non-developed stream corridor • The diversion would negate the need for a culvert and is probably a more preferable option. • This risks is flagged as having potential to have adverse effect • The tributary culvert is unlikely to have significant impact on the flow dynamics of the rest of the water body, considering the size of the channel. • The potential reduction in baseflow conditions as a result of cuttings could have adverse impacts on the Canley brook's hydromorphology • Cuttings and portal extension are not anticipated to have significant impact on surface water levels.	Hydromorphological mitigation should be incorporated into detailed design for Canley Brook diversion where practicable. Mitigation measures that might be incorporated into the detailed design include: • Create low flow channels in over-widened/over-deepened channels • Create reed fringes • Introduce riparian vegetation/green corridors where space allows • Narrow channel to sustain reach-scale flow processes • Recreate a sinuous river channel (re-meandering) as space allows • Remove weir near Stoneleigh Park if possible • Retain marginal vegetation • Use of engineering techniques to assist natural recovery • Use soft engineering techniques • Use SuDS to reintroduce water to the ground.		Assessment will be revisited following detailed design. Potential to drop to Yellow if mitigation incorporated into detailed design.	**Hydromorphological assessments of Canley Brook** • The survey area upstream reach is very similar in character to the detailed 200m stretch (WFD-PA1-00350). There is a mix of flow characters including pools and riffles. There are areas of woody debris, bed substrate is a mixture of sand, gravels and silts. The Downstream survey highlighted that the channel width was wider with a straight planform, but with little shading and in stream vegetation creating flow diversity. **Tributary Characteristics** • Unnamed tributary's channel banks were steep with a height that ranged from approximately 0.2 - 1.2m, with low flows (0.1-0.25m) and high levels of fine sediment on the bed. Photo 1663 indicated that there is potential for erosion creating flow and bed diversity. • The tributary is a small woodland stream with good planform, and a range of likely mesohabitats at elevated flows. However, most of these functional habitats not available at lower flows. Stream is tending towards winterbourne in character. • 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	-	-						
	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 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 Annex B of RBMP	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	-

Water Body ID	GB70910196
Surface Water Body Name	Oxford Canal
CFAs covered by Waterbody	16

CFA	16
AP4 ID	AP-C223-202
AP4 Name	Relocation of the viaduct crossing the Oxford Canal
AP4 Location	Warwickshire
New/Replacement Scheme Element	Replacement
Scheme Element Type	Viaduct
Original Scheme	In the hybrid Bill design, a viaduct for the Oxford Canal will be constructed with embankments located south of the Footpath SM116a realignment to south of the Oxford Canal Viaduct, as shown in the November 2013 ES, Volume 2, maps CT-05-080 and CT-05-081. It is anticipated that both the canal and towpath will be maintained during the construction of the Oxford Canal viaduct and will not be subject to any permanent realignment.
AP4 Description	The same span arrangement is to be maintained, with the viaduct shifted approximately 20m northwards so that the canal can pass through the southernmost span. The canal width is to be modified to allow the canal to pass through the shorter south span. This description has been modified to reflect the Technical Change Panel view that the 3-span arrangement should be maintained with modifications made to the canal to allow it to pass through the end span. The overall length of the viaduct remains unchanged from the hybrid Bill scheme and no additional land is required. Under this change, bridleway SM116 (where it passes under the Railway) will be shifted northwards and slightly realigned on the east side of the railway **There will be temporary narrowing of the canal locally to the viaduct,** south abutment followed by the south pier but not concurrently. Therefore, a suitable width for navigation will be maintained at all times. Whilst permanent narrowing of the canal is not currently anticipated, this is to be confirmed. A cautious approach assuming the narrowing is permanent has been taken for the purposes of this scoping matrix.
Changes to Previously Assessed Elements	Narrowing of canal
Additional Elements Assessment Requirement	None
Drawings (Original and AP4) Construction Phase (05) Proposed Scheme (06)	AP-C223-202

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

	Surface Water body	Current status	Status objective	Scheme Elements	Oxford Canal Underbridge					Oxford Canal Viaduct - AP-C223-202					Impacts from other WFD water bodies (assessed separately)	OVERALL impact on element	Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	-
	GB70910196			Description of scheme element impact	63m length clear span bridge with footings close to the banks edge					63m length clear span bridge with footings close to the banks edge. Assumed permanent narrowing of the canal as a result							Construction	Operation		
	Oxford Canal, summit pound	Moderate	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						
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.	No footings in watercourse.	- No baseline survey data available - 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 significant effect on water quality which would lead to an effect on macrophytes.	Receptor is insensitive to impact	No baseline plant data available Minor loss of macrophyte habitat due to the proposed APA narrowing of the canal within the footprint to the crossing. In addition, there is the potential for minor changes in water quality (e.g. influx of sediment and indirect effects on dissolved oxygen and phosphate levels, see below for further detail), which could indirectly affect plant communities in the area. Given the limited effects on water quality anticipated (see below) and very small area of the habitat loss, effects are likely to be minor, short term and localised at the very worst and will not affect the WFD status of the element	- No baseline survey data available - 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 hydromorphology.	Potentially very limited, localised and temporary effects on plants (e.g. during construction) due to construction site drainage, which would not affect the WFD status of the element.	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.	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 significant effect on water quality which would lead to an effect on macroinvertebrates.	Receptor is insensitive to impact	No baseline macroinvertebrate data available Minor loss of macroinvertebrate habitat due to the proposed APA narrowing of the canal within the footprint to the crossing. In addition, there is the potential for minor changes in water quality (e.g. influx of sediment and indirect effects on dissolved oxygen and phosphate levels, see below for further detail), which could indirectly affect invertebrate communities in the area. given the limited effects on water quality anticipated (see below) and very small area of the habitat loss, effects are likely to be minor, short term and localised at the very worst and will not affect the WFD status of the element.	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 hydromorphology.	Potentially very limited, localised and temporary effects on plants (e.g. during construction) due to construction site drainage, which would not affect the WFD status of the element.	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.	No footings in watercourse.	- Fish (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 significant effect on water quality which would lead to an effect on 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 baseline fish data available Minor loss of fish habitat due to the proposed APA narrowing of the canal within the footprint to the crossing. In addition, there is the potential for minor changes in water quality (e.g. influx of sediment and indirect effects on dissolved oxygen and phosphate levels, see below for further detail), which could indirectly affect fish communities in the area and will not affect the WFD status of the element. given the limited effects on water quality anticipated (see below) and very small area of the habitat loss, effects are likely to be minor, short term and localised at the very worst	- Fish (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 hydromorphology	Potentially very limited, localised and temporary effects on plants (e.g. during construction) due to construction site drainage, which would not affect the WFD status of the element.	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	Moderate	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	CoCP measures will control surface waters through the use of temporary drainage and attenuation ponds. Minor impact with negligible effect.	N/A	• The proposed APA narrowing of the canal will marginally increase the amount of landtake required for the viaduct. During construction of the viaduct and narrowing of the canal, it is predicted that there will be increased sediment influx. However, this 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. • 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.	• Some shading with negligible/no effect	• The proposed APA narrowing of the canal will have no impact on this sub-element, therefore no change in status from the previous assessment.	• The proposed APA narrowing of the canal will have no impact on this sub-element. The construction of the viaduct itself is predicted to result in no more than a temporary, minor impact on this sub-element. Therefore no change in status from the previous assessment. • 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.	None identified	The APA canal narrowing 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 effect	-
	6. pH	High	-		N/A	N/A	N/A	N/A	CoCP measures will control surface waters through the use of temporary drainage and attenuation ponds. Minor impact with negligible effect.	N/A	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	None identified	Receptor is insensitive to impact			YELLOW TO GREEN: Receptor is insensitive to impact	-
	7. Phosphate	High	-		N/A	N/A	N/A	N/A	Receptor is insensitive to impact	N/A	• The proposed APA narrowing of the canal will marginally increase the amount of landtake required for the viaduct. During construction of the viaduct and narrowing of the canal, it is predicted that there will be increased sediment influx. However, this 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. • 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 proposed APA narrowing of the canal will have no impact on this sub-element. The construction of the viaduct itself is predicted to result in no more than a temporary, minor impact on this sub-element. Therefore no change in status from the previous assessment. • 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.	None identified	The APA canal narrowing 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 effect	-
	8. Ammonia	High	-		N/A	N/A	N/A	N/A	CoCP measures will control surface waters through the use of temporary drainage and attenuation ponds. Minor impact with negligible effect.	N/A	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	None identified	Receptor is insensitive to impact			YELLOW TO GREEN: Receptor is insensitive to impact	-
	9. Temperature	-	-		N/A	N/A	Some slight shading with negligible/no effect.	N/A	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	• Some shading with negligible/no effect	Receptor is insensitive to impact	Receptor is insensitive to impact	None identified	Receptor is insensitive to impact			YELLOW TO GREEN: Receptor is insensitive to impact	-
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	N/A	CoCP measures will control surface waters through the use of temporary drainage and attenuation ponds. Minor impact with negligible effect.	N/A	• The proposed APA narrowing of the canal will marginally increase the amount of landtake required for the viaduct. During construction of the viaduct and narrowing of the canal, it is predicted that there will be an increased suspended influx. However, this 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. • 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 proposed APA narrowing of the canal will have no impact on this sub-element, therefore, no change in status from the previous assessment.	• The proposed APA narrowing of the canal will have no impact on this sub-element. The construction of the viaduct itself is predicted to result in no more than a temporary, minor impact on this sub-element. Therefore no change in status from the previous assessment. • 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.	None identified	The APA canal narrowing 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 effect	-
	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	N/A	N/A	N/A	• The proposed temporary narrowing of the Oxford canal at bridleway M116 is not anticipated to cause negative effects due to the limited hydromorphological regime at the site.	N/A	None identified	There are no anticipated overall impacts at canal waterbody scale because hydromorphological regime is generally not diverse or dynamic	Any possible impacts can be mitigated through the implementation of CoCP measures.		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	N/A	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	N/A	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	N/A	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	N/A	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	N/A	N/A	N/A		N/A						

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

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bank rehabilitation / reprofiling	-	-	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	None identified	Possible localised effects near to bridge (footings on banks may locally prevent bank profiling)	None required.	None required	N/A	N/A
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	-	-		Some loss of bankside habitat due to construction of viaduct					Some loss of bankside habitat due to construction of viaduct					None identified	N/A	None required.	None required	N/A	N/A
Phased de-watering and other techniques	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None identified	N/A	None required.	None required	N/A	N/A
Selective vegetation control regime	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None identified	N/A	None required.	None required	N/A	N/A
Appropriate vegetation control technique	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None identified	N/A	None required.	None required	N/A	N/A
Appropriate timing (vegetation control)	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None identified	N/A	None required.	None required	N/A	N/A
Appropriate techniques (invasive species)	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None identified	N/A	None required.	None required	N/A	N/A
Sediment management	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None identified	N/A	None required.	None required	N/A	N/A

Water Body ID	GB104028046840
Surface Water Body Name	River Tame from Conf of the two arms to R Blythe
CFAs covered by Waterbody	19, 20, 25, 26

CFA	19	
AP4 Name	AP-C223-112	AP-C223-233
AP4 Location	Chattle Hill Group	Coleshill Junction
New/Replacement Scheme Element	Replacement	Replacement
Scheme Element Type	Viaduct	Culvert
Original Scheme	An embankment, approximately 160m long and approximately 8m high, with a noise barrier on the east side; the southbound Leeds spur starts to split from the main line towards the northern end of this embankment	The railway will enter the area by crossing the M6, M6 slip road to the A446 Lichfield Road and M6/M42 junction; further crossings include over the B4114 Birmingham Road, the River Cole, the M42/M6 Toll, the B4117 Gilson Road, the A446 Lichfield Road, an existing railway referred to as the Birmingham to Nuneaton Line and the River Tame
AP4 Description	**Watton House south embankment changed to viaduct.** Additional landscape mitigation planting will be implemented to the area beneath and around the viaducts and will also be extended around the proposed Water Orton Viaducts No 1 and 3 to the east	Temporary improvements to the junction of the A446 Lichfield Road and Marsh Lane to the East of Water Orton to mitigate impacts arising from assessments undertaken in AP2. Additional earthworks on land outside the highway boundary to the west of the A446 Lichfield Road into Flood Zone 3. Modifications to the flood culverts beneath the A446 Lichfield Road to the north of Marsh Lane
Changes to Previously Assessed Elements	None	None
Additional Elements Assessment Requirement	New Viaduct	New Road Amendment
Drawings (AP4) Construction Phase (05) Proposed Scheme (06)	AP-C223-112	AP-C223-233

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

Surface Water body		Current status	Status objective	Scheme Elements	Bromford Bored Tunnel				Washwood Heath Brook Diversion			River Diversion - Dunlop Channel			Culvert - Dunlop Channel (on diversion)					River Diversion - River Tame (950 m) (Park Hall Nature Reserve)		
GB104028040840					Bored tunnel, with strengthening slab installed onto bed of River Tame. Details of construction methods for installation of strengthening slab not available, but may involve temporary disruption of the River Tame and will defined as part of the detailed design. CoCP measures will include measures to protect watercourse from contamination during construction. Any dewaterings from tunnel construction and drainage will be returned to the Tame in nearby area.				The proposed scheme will permanently redivert the Washwood Heath Brook to a new channel that pass through a culvert under Wolsley Driver (approximately 750m in length) and will enter the Tame approx. 100 m downstream of existing confluence.			Diversion of approximately 140 m of Dunlop Channel to pass under the proposed scheme and join the River Tame. Crossing of scheme includes culvert assessed separately (see 'Culvert - Dunlop Channel').			Two 5m span culvert under railway and road on minor watercourse. Each culvert approximately 40m in length.					Diversion of approximately 950m of the River Tame in order to facilitate the mainline of the proposed scheme. Proposed route will be along northern edge of Park Hall nature reserve, running parallel and south the existing alignment and re-joining the existing channel near Minworth STW.		
River Tame from Conf of the two arms to B Blythe		Moderate	Good Ecological Potential by 2027	Identified biological impacts	Noise and Vibration	Disruption/ contamination of watercourse during construction	Dewatering	Landtake (for slab or other surface infrastructure overlaying tunnel)	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 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	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
WFD classification elements	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
	2. Macrophytes and phytobenthos - macrophytes	n/a	-		Receptor is insensitive to impact	Likely temporary and localised effects on macrophytes in the Tame during construction.	No measurable effects on macrophytes likely - receptor not highly sensitive to impact, changes to flow from dewatering likely to be negligible and dewaterings to be returned to Tame.	Although there is no status for macrophytes, HS2 baseline surveys show there is a limited diversity of macrophytes in this area of the Tame (Nanumcuks sp). The impact will to lead to a spatially negligible loss of macrophyte habitat.	The section that will be diverted is currently culverted for much of its length in this area and thus the new channel will decrease the habitat diversity in this area. However, as the channel is currently shaded there will be overall adverse effect on macrophytes from this impact.	Likely improvements due to the Brook being taken out of the culvert, with beneficial effects on macrophytes.	• Washwood Heath Brook will be significantly improved in terms of macrophytes, as culverting will be significantly decreased and it be an open channel with greater morphological and habitat diversity. The design will include features such as riffles, berms and other features that locally increase sinuosity and promote greater diversity of flows and habitats that would favour colonisation of macrophytes. Localised improvement in macrophyte diversity.	Receptor is insensitive to impact	Although there is no status for macrophytes, HS2 baseline surveys show that the Dunlop Channel is characterised by low macrophyte diversity. The impact is likely to lead to a temporary deterioration in macrophyte habitat, but this will lead to similar approximately area of habitat to macrophytes while new channel it reestablishes. In the longer term, there would be no overall effect on macrophytes and there are limited opportunities for an improvement of quality.	Very limited improvement due to changes in river processes, which may decrease the macrophyte habitat and macrophyte colonisation. Possible localised improvements.	Possible improved habitat, improved bank/channel profile, inclusion of varying substrate in the new diverted channel proposed in the new diverted channel.	Receptor is insensitive to impact	Landtake will lead to direct loss of macrophytes while channel re-profiling will reduce the availability of macrophyte habitats within the area directly affected by landtake. However, there is limited diversity of macrophytes in the Dunlop Channel and improvements in habitat elsewhere will mitigate any significant loss of habitat.	Shading will reduce photosynthetic activity in macrophyte communities leading to reduced of macrophyte habitats within the area directly affected by landtake. However, there is limited diversity of macrophytes in the Dunlop Channel and improvements in habitat elsewhere will mitigate any significant loss of habitat.	Change to channel hydraulics may result localised and downstream changes in flow velocity. Increased velocity may cause wash out of macroinvertebrate communities. Reduction in velocity may increase accretion leading to blocking of interstitial spaces and loss of high DO dependent macroinvertebrate communities. Reduction in velocity may also increase siltation leading to burying of macrophytes. However, as the River Tame water body and the invertebrate community is relatively tolerant of poor water quality. Therefore any effects are likely to be spatially negligible.	Track drainage from bridges will be mitigated and therefore no change in status for physico-chemical quality affecting invertebrates is anticipated.	Although there is no status for macrophytes, HS2 baseline surveys show that this section of the Tame includes areas of emergent and submerged vegetation, notably Ranunculus sp. in shallower areas. The impact is likely to lead to a temporary deterioration in macrophyte habitat such as the loss of emergent vegetation and abundance of macrophytes while new channel re-establishes. As there will be no change in hydraulic gradients and the cross section profile and habitats will be as good or better for macrophytes than the current situation, there would be no long term effects.	Limited improvement due to changes in river processes (possible scour and downstream formation of bars etc.), which may favour improved habitat and macrophyte colonisation. Localised improvements 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. • The new channel can provide when re-established, habitat/ecologically improved dissolved oxygen levels. Overall effect likely to be minor beneficial with no degradation of current status anticipated.
	3. Macroinvertebrates	Poor	-		Receptor is insensitive to impact	Likely temporary and localised effects on macroinvertebrates in the Tame during construction. However, effects likely to be minor or negligible as receptor not highly sensitive to impact (baseline and EA data fish and fish habitat of poor quality and low sensitivity)	No measurable effects on macroinvertebrates likely - receptor not highly sensitive to impact (baseline and EA data macroinvertebrates of poor quality and low sensitivity), changes to flow from dewatering likely to be negligible and dewaterings to be returned to Tame.	Highly localised deterioration of invertebrate habitat, likely to spatially negligible effect on macroinvertebrate abundances and diversity. However, invertebrate habitat and diversity are currently poor within the stretch impacted.	The section that will be diverted is currently culverted for much of its length in this area and thus the new channel will increase the habitat diversity in this area. However, as the channel is currently shaded and culverted through much of its length, there will be no net loss of invertebrate habitat due to landtake and there will be overall adverse effect on macroinvertebrates from this impact.	Likely improvements due to the Brook being taken out of the culvert, with beneficial effects on macroinvertebrates.	Washwood Heath Brook will be of improved quality be significantly decreased and it be an open channel with greater morphological and habitat diversity. The design will include features such as riffles, berms and other features that locally increase sinuosity and promote greater diversity of flows and habitats that would favour colonisation of macroinvertebrates . Localised improvement in macroinvertebrate quality.	Receptor is insensitive to impact	Temporary localised deterioration of invertebrate habitat (while new channel re-establishes), likely to lead to a localised, short term adverse effect on invertebrate abundances and diversity. However, as invertebrate habitat and diversity are poor within the stretch impacted and the limited extent of the diversion, the invertebrate communities are likely to recover to a similar quality within a few months.	Very limited improvement to invertebrate habitat, due to changes in river processes. Possible localised improvements.	Possible improved habitat, improved bank/channel profile, inclusion of varying substrate in the new diverted channel proposed in the new diverted channel. Ultimately, invertebrates will be limited by the background water quality.	Receptor is insensitive to impact	Landtake will lead to direct loss of macroinvertebrates while channel re-profiling will reduce the habitats available for colonisation within the area directly affected by landtake. However, there is limited diversity of macroinvertebrates in the Dunlop Channel habitat is poor. Mitigation measures elsewhere in the Dunlop Channel and River Tame will mitigate any significant effects on macroinvertebrates.	Shading will be a localised impact with no anticipated effects on the wider water body	Change to channel hydraulics may result localised and downstream changes in flow velocity. Increased velocity may cause wash out of macroinvertebrate communities. Reduction in velocity may increase accretion leading to blocking of interstitial spaces and loss of high DO dependent macroinvertebrate communities. However, as the River Tame water body and the invertebrate community is relatively tolerant of poor water quality. Therefore any effects are likely to be spatially negligible.	Track drainage from bridges will be mitigated and therefore no change in status for physico-chemical quality affecting invertebrates is anticipated.	Although there is no status for macrophytes, HS2 baseline surveys show that this section of the Tame includes areas of emergent and submerged vegetation, notably Ranunculus sp. in shallower areas. The impact is likely to lead to a temporary deterioration in macrophyte habitat such as the loss of emergent vegetation and abundance of macrophytes while new channel re-establishes. As there will be no change in hydraulic gradients and the cross section profile and habitats will be as good or better for macrophytes than the current situation, there would be no long term effects.	Limited improvement due to changes in river processes (possible scour and downstream formation of bars etc.), which may favour improved habitat and macrophyte colonisation. Localised improvements anticipated.	Post-construction cross-section of channel will have less steep banks and shallow marginal areas, providing greater habitat for marginal vegetation. The hydraulic gradient will not change but the design will include features such as riffles, berms and other features that locally increase sinuosity and promote greater diversity of flows and habitats that would favour colonisation of macrophytes (such as the species present in the current channel). Possible localised minor improvement in macrophyte diversity.
	4. Fish	Poor	-		Possible temporary sub lethal effects on fish (e.g. displacement from impacted area.). However, effects are likely to be temporary and localised.	Likely temporary and localised effects on fish in the Tame during construction. However, effects likely to be minor or negligible as receptor not highly sensitive to impacts (baseline and EA data fish and fish habitat of poor quality and low sensitivity)	No measurable effects on fish likely - receptor not highly sensitive to impact (baseline and EA data fish and fish habitat of poor quality and low sensitivity), changes to flow from dewatering likely to be negligible and dewaterings to be returned to Tame.	Highly localised deterioration of fish habitat, which will lead to a spatially negligible effect. However, fish habitat and diversity are currently poor within the stretch impacted.	The section that will be diverted is currently culverted for much of its length in this area and thus the new channel will increase the habitat diversity in this area. However, as the channel is currently shaded and culverted through much of its length, there will be no net loss of invertebrate habitat due to landtake and there will be overall adverse effect on fish habitat from this impact.	Likely improvements due to the Brook being taken out of the culvert, with beneficial effects on fish.	Washwood Heath Brook will be of improved quality be significantly decreased and it be an open channel and the design will include features such as riffles, berms and other features that locally increase sinuosity and promote greater diversity of flows and habitats that would favour colonisation of fish . Localised improvement to fish habitat.	Possible temporary sub lethal effects on fish (e.g. displacement from impacted area.). However, effects are likely to be temporary and localised.	Temporary localised deterioration of approximately 120 m of fish habitat. Hydraulic modelling undertaken for the proposed scheme and data on fish species were collected, but habitat and water quality were recorded as being poor and not likely to support a diverse fish population.	Limited improvement to fish habitat, due to changes in river processes, however, fish species diversity in the channel are likely to be very low (given poor water quality, habitat and low flow). Therefore there is not likely to be any measurable improvement.	Possible improved fish habitat, improved bank/channel profile, inclusion of varying substrate in the new diverted channel. Ultimately, the fish community will be limited by the background water quality.	Possible temporary sub lethal effects on fish (e.g. displacement from impacted area.). However, effects are likely to be temporary and localised.	Landtake is unlikely to result in direct mortality of fish and Dunlop Channel is not considered to be of high importance for fish populations. Most habitat for fish within the Dunlop Channel is poor and the Dunlop Channel is not considered to be of importance for fish, although no fish survey data were available. Therefore only minor, temporary and localised effects are likely.	Noise and vibration may cause mortality or injury at high levels and behavioural responses at low levels, which would be temporary and localised. As the Dunlop Channel is not considered to be of importance for fish, although no fish survey data were available. Therefore only minor, temporary and localised effects are likely.	Landtake is unlikely to result in direct mortality of fish and Dunlop Channel is not considered to be of high importance for fish populations. Most habitat for fish within the Dunlop Channel is poor and the Dunlop Channel is not considered to be of importance for fish, although no fish survey data were available. Therefore only minor, temporary and localised effects are likely. The culvert will be appropriately designed so not to act as a barrier to any future migrating fish that may colonise the Dunlop Channel or upstream watercourses.	Shading will be a localised impact with no anticipated effects on the wider water body	Change to channel hydraulics may result localised and downstream changes in flow velocity. However, as there is currently poor habitat for fish habitat in the section affected so it is not likely that an effect would be suffered.	Track drainage from bridges will be mitigated and therefore no change in status for physico-chemical quality affecting fish is anticipated.	Temporary deterioration of approximately 1 km of fish habitat (while new channel re-establishes), likely to lead to a short term adverse effects on fish abundances and diversity. However, as invertebrate habitat and diversity are moderate to low within the stretch impacted (based on biotic scores - ASPT, BMWP etc. recorded during baseline surveys), the invertebrate communities are likely to recover to a similar / better quality within a few months, given the proposed habitat creation in new river channel.	Limited improvement to fish habitat, due to changes in river processes (possible scour and downstream formation of bars etc.), which may favour improved habitat and diversity. However, as the River Tame is currently a barrier to fish passage. The fish species present include bullhead (Cottus gobio(S)) habitats (Directive Annexe II)., but are generally are of poor quality (based on WFD status and survey data) and will recolonise the new section quickly.	Improved fish habitat (e.g. fish refuges etc.), due to the inclusion of features such as riffles, berms etc. (see above) proposed in the new diverted channel. However, the invertebrate diversity will be limited by the background water quality of the River Tame.
	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	Effects from dewatering likely to be negligible and dewaterings to be returned to Tame.	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, habitat/ecologically improved dissolved oxygen levels. Overall effect likely to be minor beneficial with no degradation of current status 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. • 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. • Realistically, the effects of urbanisation in the rest of the catchment and the space available for	N/A	N/A	Due to the short length of the culvert, there is unlikely to be any impact on dissolved oxygen. Any impact is likely to have a 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. • The new channel can provide when re-established, habitat/ecologically improved dissolved oxygen levels. Overall effect likely to be minor beneficial with no degradation of current status anticipated.
	6. pH	High	-		N/A	N/A	Receptor is insensitive to impact	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	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
	7. Phosphate	Bad	-		N/A	N/A	Effects from dewatering likely to be negligible and dewaterings to be returned to Tame.	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	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. • 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.	• CoCP measures (Section 16) implemented 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 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
	8. Ammonia	Poor	-		N/A	N/A	Effects from dewatering likely to be negligible and dewaterings to be returned to Tame.	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	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
	9. Temperature	-	-		N/A	N/A	Receptor is insensitive to impact	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	N/A	N/A	Due to the short length of the culvert, there is unlikely to be any impact on temperature. Any impact is likely to have a 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
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	Effects from dewatering likely to be negligible and dewaterings to be returned to Tame.	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	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	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
	Hydromorphological status																					
	11. Quantity and dynamics of river flow	-	-		N/A	Likely temporary effects of flow diversion during the construction phase	Effects from dewatering likely to be negligible and dewaterings to be returned to Tame.	It is assumed that the base slab would be set well below the bed surface to allow continuation of substrate transport, so any construction effects would be temporary and highly localised, with natural recovery of the existing bed structure following construction	N/A	• Existing channel is predominantly culverted • Proposed realignment includes 750m of open watercourse, but still includes 500 m culvert, and therefore the natural flow regime will not be possible to reconnect floodplain • Lengthening the existing watercourse may reduce flow velocities, but on balance daylighting is considered to be overwhelmingly beneficial	• Diversion would create 750m of new open channel	N/A	N/A	• Proposed realignment is also mainly straight due to space constraints • Retention of abandoned channel to provide wetlands habitat would help to reduce accelerated flows in straightened channel	• Retention of abandoned channel would provide wetlands habitat	N/A	N/A	N/A	• River diversions for the Dunlop Channel through one new culvert (and one replacement culvert) will have significant effects on the natural local flow velocity and turbulence • Peak flows could be constrained by culvert dimensions • Out of bank flows would be disconnected	N/A	N/A	N/A	• Proposed realignment is also mainly straight due to space constraints. • Retention of abandoned channel to provide wetlands habitat would help to reduce accelerated flows in straightened channel	• Retention of abandoned channel would provide wetlands habitat
	12. Connection to Groundwater	-	-		N/A	Effects from dewatering likely to be negligible and dewaterings to be returned to Tame	Effects from dewatering likely to be negligible and dewaterings to be returned to Tame.	Effects from dewatering likely to be negligible and dewaterings to be returned to Tame.	N/A	• Not significant to hydromorphology	• Not significant to hydromorphology	N/A	N/A	• Not significant to hydromorphology	• Not significant to hydromorphology	N/A	N/A	N/A		N/A	N/A	• Not significant to hydromorphology	• Not significant to hydromorphology
	13. River continuity	-	-		N/A	Likely temporary effects on river continuity during the construction phase due to the need for flow diversion	Effects from dewatering likely to be negligible and dewaterings to be returned to Tame.	It is assumed that the base slab would be set well below the bed surface to allow continuation of substrate transport, so any construction effects would be temporary and highly localised, with natural recovery of the existing bed structure following construction. The risk of temporary and localised disruption to river continuity is however, acknowledged	N/A	• Daylighting culvert is a strong benefit, even though the watercourse will continue to existing in heavily urbanised and industrialised catchment	• Diversion would create 750m of new open channel	N/A	N/A	• Two tight bends to route the stream under the new railway line could cause local increases in flow velocity and turbulence at crossing	• A wetlands habitat would improve local habitats, but they would remain fragmented	N/A	N/A	N/A	• Local scour, and the need for scour protection around the structures, could result in a stepped bed around these features, which would impede continuity • Culverts sever bank, riparian and floodplain continuity • The culvert is short, and effects would probably be localised	N/A	N/A	• Two tight bends to route the stream under the new railway line could cause local increases in flow velocity and turbulence at crossing	• A wetlands habitat would improve local habitats, but they would remain fragmented
	14. River depth and width variation bed	-	-		N/A	Likely temporary effects on river continuity during the construction phase due to the need for flow diversion	Effects from dewatering likely to be negligible and dewaterings to be returned to Tame.	It is assumed that the base slab would be set well below the bed surface to allow continuation of substrate transport, so any construction effects would be temporary and highly localised, with natural recovery of the existing bed structure following construction. The risk of temporary and localised disruption to river continuity is however, acknowledged	N/A	• Likely to be no difference in channel dimensions. The new channel will be mainly straight due to space constraints but will have two bends. The existing channel is approximately 2-3 in width, so significant morphological diversity or major habitat improvement is not practicable	N/A	N/A	N/A	• Some local variance in channel depth, width and thalweg would promote some diversity in otherwise straightened channel, but bends are unnaturally tight, so overall effect would probably balance out as neither beneficial nor adverse	• Creation of a backwater wetland habitat would be an improvement relative to the homogenised channel	N/A	N/A	N/A	• Out of bank flows would be cut off so channel width could be restricted at high flow. Local scour may result in some diversity in channel geometry	N/A	N/A	• Some local variance in channel depth, width and thalweg would promote some diversity in otherwise straightened channel, but bends are unnaturally tight, so overall effect would probably balance out as neither beneficial nor adverse	• Creation of a backwater wetland habitat would be an improvement relative to the homogenised channel
	15. Structure and substrate of river bed	-	-		N/A	Likely temporary effects on the river bed during the construction phase due to inevitable release of some increased sediment into the channel.	Effects from dewatering likely to be negligible and dewaterings to be returned to Tame.	It is assumed that the base slab would be set well below the bed surface to allow continuation of substrate transport, so any construction effects would be temporary and highly localised, with natural recovery of the existing bed structure following construction	N/A	• Nature of the upstream catchment probably means there are no natural substrates delivery to this area	• Some gravels could be put in place but significant morphological diversity or major habitat improvement is not practicable for a channel this size	N/A	N/A	• The tight bends at the crossing point may result in local scour and possibly formation of bars immediately downstream as a result of localised changes inflow properties. This could promote some bed habitat diversity	• Creation of a backwater wetland habitat would be an improvement relative to the homogenised channel • Sediment quality within the urbanised catchment is likely to limit ecological post-construction as the area have behave as a sediment and contaminant sink	N/A	N/A	N/A	• Tight bends for the channel diversion could result in local scour and possibly formation of bars immediately downstream as a result of localised changes inflow properties. Substrates likely to be lost if culvert base is not set well below bed level.	N/A	N/A	• The tight bends at the crossing point may result in local scour and possibly formation of bars immediately downstream as a result of localised changes inflow properties. This could promote some bed habitat diversity	• Creation of a backwater wetland habitat would be an improvement relative to the homogenised channel • Sediment quality within the urbanised catchment is likely to limit ecological post-construction as the area have behave as a sediment and contaminant sink
	16. Structure of riparian zone	-	-		N/A	The base slab would not impact riparian zones	Effects from dewatering likely to be negligible and dewaterings to be returned to Tame.	The base slab would not impact riparian zones	N/A	• A green corridor could be implemented, but extensive upstream culverting is likely to mean there would be little hydraulic connectivity to out-of-channel areas	• A green corridor could be implemented, but its width would be limited by space constraints for adjacent land use	N/A	N/A	• No net change to existing bank, riparian and floodplain structure and connectivity with channel	• No net change to existing bank, riparian and floodplain structure and connectivity with channel	N/A	N/A	N/A	• Direct loss of channel banks and riparian zone • Bank protection to control realignments could be discontinuous to natural banks, and could prevent natural sediment inputs to the channel	N/A	N/A	• No net change to existing bank, riparian and floodplain structure and connectivity with channel	• 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 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	Key present implementation of RBMP measure (green = Yes, GN, amber = possible, GN, red = likely, n/a)																			
Educate landowners on sensitive management practices (urbanisation)	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	-	-	-	• 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	-	-	-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	
Ensure that the thermal regime in waters downstream of the impounding works is consistent with good status conditions	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	-	-	-	• 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	-	-	-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	
Ensure that good status of dissolved oxygen levels is being achieved downstream of the impounding works	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	-	-	-	• 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	-	-	-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	In Place	-		-	-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	
Increase in channel morphological diversity	In Place	-		-	-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	
Removal of hard bank reinforcement / revetment, or replacement with soft engineering solution	In Place	-		-	-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	
Ensure there is an appropriate baseline flow regime downstream of the impoundment.	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	-	-	-	• 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	-	-	-	• Scale of this particular crossing means there is unlikely to be a proportional opportunity to implement significant wider water body improvements, but opportunities must be investigated	-	-	-	• 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	
Operational and structural changes to locks, sluices, weirs, beach recharge, etc.	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	-	-	-	• 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	-	-	-	-	-	-	-	• 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	
Structures or other mechanisms in place and managed to enable fish to access waters upstream and downstream of the impounding	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	-	-	-	• 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	-	-	-	-	-	-	-	• 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	
Preserve and, where possible, restore historic aquatic habitats	Not in place	-		-	-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	
Re-engineering of the river where the flow regime cannot be modified.	Not in place	-		-	-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	

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

	Surface Water body	Current status	Status objective	Scheme Elements	River Tame Viaduct (Birmingham Spur)				
	GB104028046840				775m long viaduct. Two footings within the river bed (in new diverted section of channel), causing localised loss of habitat.				
	River Tame from Conf of the two arms to R Blythe	Moderate	Good Ecological Potential 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
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
	2. Macrophytes and phytobenthos - macrophytes	n/a	-		Receptor is insensitive to impact	Macrophytes are of limited diversity and abundance in this area of the River Tame and as the footings are located within the new channel, which already includes improved habitat, there will be no additional impact on macrophytes to those assessed for the diversion of the River Tame.	Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. However, macrophyte diversity and abundance in the Tame is relatively low and there would only be a localised and minor effects on macrophyte communities, not affecting the status of this quality element. Mitigation measures are considered as part of the diversion of the River Tame.	Change to channel hydraulics will result in localised increase in flow velocity downstream of crossing and lead to scouring of habitat in vicinity. However, this would be highly localised and minor and not further degrade status in the medium to long term. Therefore there would only be a minor and localised/temporary impact.	No anticipated change in water quality
	3. Macroinvertebrates	Poor	-		Receptor is insensitive to impact	Landtake will reduce the habitats available for colonisation within directly affected area. Invertebrate community at poor status, is already impacted by poor water quality and considered relatively insensitive (based on biotic scores). Effect likely to be minor, localised and temporary impact. Mitigation measures to improve habitat of the Tame (diverted section) will be provided in the diverted Tame channel.	Shading will be a localised impact with no anticipated effects on the wider water body.	Change to channel hydraulics will result in localised increase in flow velocity downstream of crossing and lead to scouring of habitat in vicinity. However, due to poor invertebrate baseline, this would not further degrade status in the medium to long term. Therefore there would only be a minor and localised/temporary impact.	No anticipated change in water quality
	4. Fish	Poor	-		Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). However, effects are likely to be temporary and localised.	Landtake will lead to the localised loss of fish habitat. Effects would be minor, localised and temporary effect. Mitigation measures to improve habitat of the Tame (diverted section) will be provided in the diverted Tame channel.	No anticipated effect.	Change to channel hydraulics will result in localised increase in flow velocity downstream of crossing and lead to scouring of habitat in vicinity. However, this would be highly localised and minor and the fish community are not highly sensitive so it would not further degrade status in the medium to long term. Therefore there would only be a minor and localised/temporary impact.	No anticipated change in water quality
	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.
	6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact
	7. Phosphate	Bad	-		N/A	N/A	N/A	ffectively an open span bridge, so there would be no i	• CoCP measures (Section 16) implemented 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.
	8. Ammonia	Poor	-		N/A	N/A	N/A	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)	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.
	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	Footings in the watercourse would narrow the channel and cause local increase in flow velocity and turbulence. This would promote some hydraulic habitat diversity, but the bends would be unnaturally tight and the would probably be no ecological benefit	N/A
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	• Not significant to hydromorphology	N/A
	13. River continuity	-	-		N/A	N/A	N/A	• Footings in the watercourse would decrease continuity by the presence of physical obstacles and locally increased flow velocity and turbulence	N/A
	14. River depth and width variation bed	-	-		N/A	N/A	N/A	• Some localised scour is likely, but is unlikely to cause major deterioration; and promote some local diversity in hydraulic and bed habitats if substrates are deposited as bar formations immediately downstream	N/A
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• Some localised scour is likely, but is unlikely to cause major deterioration; and promote some local diversity in hydraulic and bed habitats if substrates are deposited as bar formations immediately downstream	N/A
	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 open space in the Park Hall Nature Reserve this is likely to be insignificant	N/A

	Water Orton Viaduct No1, Water Orton Viaduct No3 & River Tame Viaduct 164 L3 - Crossing of the River Tame				
	Carrying the HS2 Up North Line. Approx. 1357m in length.				
	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	Macrophytes are of limited diversity and abundance in this area of the River Tame and as the footings are located within the new channel, which already includes improved habitat, there will be no additional impact on macrophytes to those assessed for the diversion of the River Tame.	Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. However, macrophyte diversity and abundance in the Tame is relatively low and there would only be a localised and minor effects on macrophyte communities, not affecting the status of this quality element. Mitigation measures are considered as part of the diversion of the River Tame.	Change to channel hydraulics will result in localised increase in flow velocity downstream of crossing and lead to scouring of habitat in vicinity. However, this would be highly localised and minor and not further degrade status in the medium to long term. Therefore there would only be a minor and localised/temporary impact.	No anticipated change in water quality
3. Macroinvertebrates	Receptor is insensitive to impact	Landtake will reduce the habitats available for colonisation within directly affected area. Invertebrate community at poor status, is already impacted by poor water quality and considered relatively insensitive (based on biotic scores). Effect likely to be minor, localised and temporary impact. Mitigation measures to improve habitat of the Tame (diverted section) will be provided in the diverted Tame channel.	Shading will be a localised impact with no anticipated effects on the wider water body.	Change to channel hydraulics will result in localised increase in flow velocity downstream of crossing and lead to scouring of habitat in vicinity. However, due to poor invertebrate baseline, this would not further degrade status in the medium to long term. Therefore there would only be a minor and localised/temporary impact.	No anticipated change in water quality
4. Fish	Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). However, effects are likely to be temporary and localised.	Landtake will lead to the localised loss of fish habitat. Effects would be minor, localised and temporary effect. Mitigation measures to improve habitat of the Tame (diverted section) will be provided in the diverted Tame channel.	No anticipated effect.	Change to channel hydraulics will result in localised increase in flow velocity downstream of crossing and lead to scouring of habitat in vicinity. However, this would be highly localised and minor and the fish community are not highly sensitive so it would not further degrade status in the medium to long term. Therefore there would only be a minor and localised/temporary impact.	No anticipated change in water quality
Physico-Chemical status					
5. 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.
6. pH	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact
7. Phosphate	N/A	N/A	N/A	ffectively an open span bridge, so there would be no i	• CoCP measures (Section 16) implemented 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.
8. Ammonia	N/A	N/A	N/A	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	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.
Hydromorphological status					
11. Quantity and dynamics of river flow	N/A	N/A	N/A	• Footings in the watercourse would narrow the channel and cause local increase in flow velocity and turbulence. This would promote some hydraulic habitat diversity, but the bends would be unnaturally tight and the would probably be no ecological benefit	N/A
12. Connection to Groundwater	N/A	N/A	N/A	• Not significant to hydromorphology	N/A
13. River continuity	N/A	N/A	N/A	• Footings in the watercourse would decrease continuity by the presence of physical obstacles and locally increased flow velocity and turbulence	N/A
14. River depth and width variation bed	N/A	N/A	N/A	• Some localised scour is likely, but is unlikely to cause major deterioration; and promote some local diversity in hydraulic and bed habitats if substrates are deposited as bar formations immediately downstream	N/A
15. Structure and substrate of river bed	N/A	N/A	N/A	• Some localised scour is likely, but is unlikely to cause major deterioration; and promote some local diversity in hydraulic and bed habitats if substrates are deposited as bar formations immediately downstream	N/A
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 open space in the Park Hall Nature Reserve this is likely to be insignificant	N/A

	Water Orton viaduct no.1, 3 and 4, Water Orton Rail underbridge/viaduct 164-S1 Chattle Hill viaduct 164-L1, and associated structures - Crossings of minor River Tame tributaries (Ordinary Watercourses)					
	Various crossings on minor tributaries of the River Tame and feeder trains, including culverts, viaduct crossings and minor diversions					
	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
1.Macrophytes and phytobenthos - diatoms	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 any macrophytes and reduce the availability of macrophyte habitats within the area directly affected by landtake. No data are available on macrophytes distribution in these minor watercourses. However, given the relative size of the tributaries and the apparent channel modifications etc. any effects are likely to be relatively minor and will not effect the status of this element at the water body level.	Shading will reduce photosynthetic activity in macrophyte communities leading to reduced biomass, and potentially a change in community composition within the shaded area. However, given the relative size of the tributaries and the apparent channel modifications etc. any effects are likely to be relatively minor and will not effect the status of this element at the water body level.	Change to channel hydraulics may result localised and downstream changes in flow velocity. Increased velocity may cause wash out of macrophyte communities. Reduction in velocity may increase accretion leading to establishment of species with a higher RMHI. However, given the relative size of the tributaries and the apparent channel modifications etc. any effects are likely to be relatively minor and will not effect the status of this element at the water body level.	Track drainage from bridges will be mitigated and therefore no change in status for macrophytes element is anticipated.	Where possible, scheme elements such as diversions will allow for the creation of new or improved habitats (improvements to bank profile, inclusion shallow marginal areas, riffles, berms etc.), providing greater habitat for marginal vegetation. Possible localised minor improvement in macrophyte diversity.
3. Macroinvertebrates	Receptor is insensitive to impact	Landtake will lead to direct loss of any macroinvertebrates and reduce the availability of habitats within the area. No data are available on macroinvertebrates in these minor watercourses. However, given the relative size of the tributaries and the apparent channel modifications etc. any effects are likely to be relatively minor and will not effect the status of this element at the water body level.	Shading will be a localised impact with no anticipated effects on the wider water body.	Change to channel hydraulics may result localised and downstream changes in flow velocity. Increased velocity may cause wash out of macroinvertebrate communities. Reduction in velocity may increase accretion leading to blocking of interstitial spaces and loss of high DO dependent macroinvertebrate communities. However, given the relative size of the tributaries and the apparent channel modifications etc. any effects are likely to be relatively minor and will not effect the status of this element at the water body level.	Track drainage from bridges will be mitigated and therefore no change in status for macroinvertebrates is anticipated.	Where possible, scheme elements will include provision for improved invertebrate habitat, due to the inclusion features such as riffles, berms etc. in new diverted channel. Possible localised minor improvement in macroinvertebrate quality.
4. Fish	Noise and vibration may cause mortality or injury at high levels and behavioural responses at low levels, which would be limited to the vicinity of the noise source. However, these minor tributaries and feeder drains are considered to be of very importance for fish (although no survey data were available). Therefore only minor, temporary and localised effects are likely.	Landtake is unlikely to result in direct mortality of fish but will reduce the availability of habitats. However, given the relative size of the tributaries, their use and the apparent channel modifications etc. they are unlikely to be of significant importance for fish habitat fish for feeding and spawning. Therefore any effects are likely to be minor and spatially negligible and will not effect the status of this element at the water body level.	Shading will be a localised impact with no anticipated effects on the wider water body.	Change to channel hydraulics may result localised and downstream changes in flow velocity. However, given the relative size of the tributaries, their use and the apparent channel modifications etc. they are unlikely to be of significant importance for fish habitat fish for feeding and spawning. Therefore any effects are likely to be minor and spatially negligible and will not effect the status of this element at the water body level.	Track drainage from bridges will be mitigated and therefore no change in status for fish is anticipated.	Where possible, scheme elements will include provision for improved fish habitat (e.g. fish refuges etc.) due to the inclusion features such as riffles, berms etc. in new diverted channel. Possible localised minor improvement in macroinvertebrate quality.
Physico-Chemical status						
5. 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.	• 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 beneficial with no degradation of current status anticipated.
6. pH	N/A	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	N/A	ffectively an open span bridge, so there would be no i	• CoCP measures (Section 16) implemented 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.	Receptor is insensitive to impact
8. Ammonia	N/A	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	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.	Receptor is insensitive to impact
Hydromorphological status						
11. Quantity and dynamics of river flow	N/A	N/A	N/A	• Footings in the watercourse would narrow the channel and cause local increase in flow velocity and turbulence. This would promote some hydraulic habitat diversity, but the bends would be unnaturally tight and the would probably be no ecological benefit	N/A	• Retention of abandoned channel would provide wetlands habitat
12. Connection to Groundwater	N/A	N/A	N/A	• Not significant to hydromorphology	N/A	• Not significant to hydromorphology
13. River continuity	N/A	N/A	N/A	• Footings in the watercourse would decrease continuity by the presence of physical obstacles and locally increased flow velocity and turbulence	N/A	• A wetlands habitat would improve local habitats, but they would remain fragmented
14. River depth and width variation bed	N/A	N/A	N/A	• Some localised scour is likely, but is unlikely to cause major deterioration; and promote some local diversity in hydraulic and bed habitats if substrates are deposited as bar formations immediately downstream	N/A	• Creation of a backwater wetland habitat would be an improvement relative to the homogenised channel
15. Structure and substrate of river bed	N/A	N/A	N/A	• Some localised scour is likely, but is unlikely to cause major deterioration; and promote some local diversity in hydraulic and bed habitats if substrates are deposited as bar formations immediately downstream	N/A	• Creation of a backwater wetland habitat would be an improvement relative to the homogenised channel • Sediment quality inherited from the urbanised catchment is likely to limit ecological potential because the area have behave as a sediment and contaminant sink
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 open space in the Park Hall Nature Reserve this is likely to be insignificant	N/A	• No net change to existing bank, riparian and floodplain structure and connectivity with channel

	WATTON HOUSE SOUTH EMBANKMENT TO VIADUCT - Crossing a minor tributary (SWC-CFA19-011) of the River Tame AP-C223-112				
	Watton House Viaduct will be replacing embankment between Lichfield Road and the Birmingham to Nuneaton Train Line (164+000), where a minor tributary will be crossed				
	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	A review of OS maps and aerial photographs indicate that this is a small, urban drain with very limited potential for macrophytes. Potential impacts are therefore considered to be negligible.	While shading has the potential to reduce photosynthetic activity in macrophyte communities, a review of OS maps and aerial photographs indicate that this is a small, urban drain with very limited potential for macrophytes. Potential impacts are therefore considered to be negligible.	No significant hydromorphological impacts anticipated and thus no likely indirect impacts on ecology.	No significant impacts on water quality anticipated and thus no likely indirect impacts on ecology.
3. Macroinvertebrates	Receptor is insensitive to impact	Landtake has the potential to lead to direct loss of macroinvertebrates and reduce the availability of habitats within the area. No data are available on macroinvertebrates in this watercourse. However, OS maps and aerial photographs indicate that this is a small, urban drain with very limited potential for macroinvertebrates and the proposed landtake is minimal. Therefore, any effects are likely to be negligible.	No impacts on macrophytes anticipated and therefore there would be no indirect effects on macroinvertebrates.	No significant hydromorphological impacts anticipated and thus no likely indirect impacts on ecology.	No significant impacts on water quality anticipated and thus no likely indirect impacts on ecology.
4. Fish	Noise and vibration has the potential to cause mortality or injury at high levels and behavioural responses at low levels, which would be limited to the vicinity of the noise source. However, a review of OS maps and aerial photographs indicate that this is a small, urban drain with very limited potential for fish (although no survey data were available). Therefore, measurable effects are not	Landtake has the potential to lead to direct loss of fish habitat. However, OS maps and aerial photographs indicate that this is a small, urban drain with very limited potential for fish (although no survey data are available). Therefore, measurable effects are not considered to be likely.	No impacts on macrophytes anticipated and therefore there would be no indirect effects on macroinvertebrates.	No significant hydromorphological impacts anticipated and thus no likely indirect impacts on ecology.	No significant impacts on water quality anticipated and thus no likely indirect impacts on ecology.
Physico-Chemical status					
5. Dissolved Oxygen	N/A	N/A	• Minor tributary (SWC-CFA19-011) is shown to be within a culvert under A446 Lichfield Road in this location, therefore no change in amount of shaded watercourse as a result of the proposed AP4 viaduct. Therefore, no change in status from the previous assessment is anticipated.	• The construction of the proposed AP4 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 AP4 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.
6. pH	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact
7. Phosphate	N/A	N/A	N/A	• The proposed AP4 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 AP4 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.
8. Ammonia	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact
9. Temperature	N/A	N/A	• Minor tributary (SWC-CFA19-011) is shown to be within a culvert under A446 Lichfield Road in this location, therefore no change in amount of shaded watercourse as a result of the proposed AP4 viaduct. 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)	N/A	N/A	N/A	• The construction of the proposed AP4 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 AP4 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.
Hydromorphological status					
11. Quantity and dynamics of river flow	N/A	N/A	N/A	• Ordnance Survey maps and satellite imagery highlight that there is a culverted 'drain' that flows through the site and discharges in the River Tame in the vicinity of the Colehill sewage treatment works. • The proposed AP4 viaduct crossing is effectively an open span bridge, and as such so there should be no impact on the channel. • Viaduct footings would not interact with the minor tributary or have a significant impact in the greater context of the River Tame floodplain. • Overall, there are no significant impacts associated with the proposed AP4 amendment, Watton House Viaduct, anticipated for the minor tributary or the River Tame hydromorphology objective.	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 proposed AP4 viaduct crossing is effectively an open span bridge, and as such so there should be no impact on the channel. • The culverted tributary would have disconnected floodplains and out-of-bank flows, bank habitats and habitat continuity within the adjacent Floodplain have already been disconnected from previous watercourse manipulation. • Therefore, in waterbody terms, this is a minor feature and the existing culvert means that the viaduct (and associated footings) 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	• The proposed AP4 viaduct crossing is effectively an open span bridge, and as such so there should be no impact on the channel. • Out-of bank flows are severed by the existing culvert, and in-channel dimensions / flows are likely to have artificial depth and width variation. Therefore, Viaduct footings would not influence width and depth variation.	N/A
15. Structure and substrate of river bed	N/A	N/A	N/A	• The proposed AP4 viaduct crossing is effectively an open span bridge, and as such so there should be no impact on the channel. • Out-of bank flows are severed by the existing culvert, and in-channel dimensions / flows are likely to have artificial preventing bed substrate or transport or scour. Therefore, Viaduct footings would not influence width and depth variation.	N/A
16. Structure of riparian zone	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		River Tame Viaduct: Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology	Drainage
Educate landowners on sensitive management practices (urbanisation)	In Place	-	May prevent implementation of RBMP measure (green = No risk, amber = possible risk, red = likely risk)	-	-	-	• 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	-
Ensure that the thermal regime in waters downstream of the impounding works is consistent with good status conditions	In Place	-		-	-	-		-
Ensure that good status of dissolved oxygen levels is being achieved downstream of the impounding works	In Place	-		-	-	-		-
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	In Place	-		-	-	-		-
Increase in-channel morphological diversity	In Place	-		-	-	-		-
Removal of hard bank reinforcement / revetment, or replacement with soft engineering solution	In Place	-		-	-	-		-
Ensure there is an appropriate baseline flow regime downstream of the impoundment.	Not in place	-		-	-	-		-
Operational and structural changes to locks, sluices, weirs, beach control, etc.	Not in place	-		-	-	-		-
Structures or other mechanisms in place and managed to enable fish to access waters upstream and downstream of the impounding	Not in place	-		-	-	-		-
Preserve and, where possible, restore historic aquatic habitats	Not in place	-		-	-	-		-
Re-engineering of the river where the flow regime cannot be modified.	Not in place	-		-	-	-		-

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Water Orton Viaduct No1: Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology	Drainage
Educate landowners on sensitive management practices (urbanisation)	-	-	-	• 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	-
Ensure that the thermal regime in waters downstream of the impounding works is consistent with good status conditions	-	-	-		-
Ensure that good status of dissolved oxygen levels is being achieved downstream of the impounding works	-	-	-		-
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	-	-	-		-
Increase in-channel morphological diversity	-	-	-		-
Removal of hard bank reinforcement / revetment, or replacement with soft engineering solution	-	-	-		-
Ensure there is an appropriate baseline flow regime downstream of the impoundment.	-	-	-		-
Operational and structural changes to locks, sluices, weirs, beach control, etc.	-	-	-		-
Structures or other mechanisms in place and managed to enable fish to access waters upstream and downstream of the impounding	-	-	-		-
Preserve and, where possible, restore historic aquatic habitats	-	-	-		-
Re-engineering of the river where the flow regime cannot be modified.	-	-	-		-

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Minor River Tame tributaries: Noise and vibration	Landtake	Shading	Changes to water body hydromorphology	Drainage	Creation of new habitats
Educate landowners on sensitive management practices (urbanisation)	-	-	-	• 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	-	-
Ensure that the thermal regime in waters downstream of the impounding works is consistent with good status conditions	-	-	-		-	-
Ensure that good status of dissolved oxygen levels is being achieved downstream of the impounding works	-	-	-		-	-
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	-	-	-		-	-
Increase in-channel morphological diversity	-	-	-		-	-
Removal of hard bank reinforcement / revetment, or replacement with soft engineering solution	-	-	-		-	-
Ensure there is an appropriate baseline flow regime downstream of the impoundment.	-	-	-		-	-
Operational and structural changes to locks, sluices, weirs, beach control, etc.	-	-	-		-	-
Structures or other mechanisms in place and managed to enable fish to access waters upstream and downstream of the impounding	-	-	-		-	-
Preserve and, where possible, restore historic aquatic habitats	-	-	-		-	-
Re-engineering of the river where the flow regime cannot be modified.	-	-	-		-	-

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Watton House: Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology	Drainage
Educate landowners on sensitive management practices (urbanisation)	-	-	-	• 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	-
Ensure that the thermal regime in waters downstream of the impounding works is consistent with good status conditions	-	-	-		-
Ensure that good status of dissolved oxygen levels is being achieved downstream of the impounding works	-	-	-		-
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	-	-	-		-
Increase in-channel morphological diversity	-	-	-		-
Removal of hard bank reinforcement / revetment, or replacement with soft engineering solution	-	-	-		-
Ensure there is an appropriate baseline flow regime downstream of the impoundment.	-	-	-		-
Operational and structural changes to locks, sluices, weirs, beach control, etc.	-	-	-		-
Structures or other mechanisms in place and managed to enable fish to access waters upstream and downstream of the impounding	-	-	-		-
Preserve and, where possible, restore historic aquatic habitats	-	-	-		-
Re-engineering of the river where the flow regime cannot be modified.	-	-	-		-

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

	Surface Water body	Current status	Status objective	Scheme Elements	JUNCTION AND CULVERT EXTENTSION - River Tame Floodplain AP-C223-233					Impacts from other WFD water bodies (assessed separately)	Overall impact on element	Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
	GB104028046840				Temporary expansion of the A446 Lichfield Road and Marsh Lane junction (164+500) to relieve congestion during HS2 construction and will require the of existing flood culverts.							Construction	Operation		
	River Tame from Conf of the two arms to R Blythe	Moderate	Good Ecological Potential 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						
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	-
	2. Macrophytes and phytobenthos - macrophytes	n/a	-		Receptor is insensitive to impact	N/A	The expansion of existing flood culverts are not located over the River Tame or within areas that are likely to support marginal macrophyte species (based on OS maps and aerial photographs). Therefore no effects anticipated.	No significant hydromorphological impacts anticipated and thus no likely indirect impacts on ecology.	No significant impacts on water quality anticipated and thus no likely indirect impacts on ecology.	No significant effects on upstream watercourses (River Rea, Plants Brook) anticipated.	The Tame does not have a status for macrophytes. However, site surveys (River Corridor Surveys etc.) suggest that this element is not of very high quality. Although the scheme will lead to loss of habitat and photosynthetic activity (in shaded areas) the scheme includes several opportunities for improved macrophyte habitats, notably in marginal areas of diverted sections. In particular, there are likely to be significant but localised beneficial effects due to the diversions and removal of culverts from the Washwood Heath Brook and the diversion of the River Tame at Park Hall Nature Reserve. The overall effect on this element is likely to be minor beneficial, if benefits from the scheme are maximised.	Careful consideration must be given to in stream works, notably for the construction method for the installation of the River Tame strengthening slab for the Bromford Tunnel works.	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 on the diverted sections of River Tame, Washwood Heath Brook, Dunlop Channel and other minor tributaries. **The detailed design for the river diversions should be undertaken in consultation with the EA in order to ensure that these potential beneficial effects are maximised.**	Minor beneficial effects possible	
	3. Macroinvertebrates	Poor	-		Receptor is insensitive to impact	N/A	No impacts on macrophytes anticipated and therefore there would be no indirect effects on macroinvertebrates.	No significant hydromorphological impacts anticipated and thus no likely indirect impacts on ecology.	No significant impacts on water quality anticipated and thus no likely indirect impacts on ecology.	No significant effects on upstream watercourses (River Rea, Plants Brook) anticipated.	The field surveys supports the 'poor' WFD class for invertebrates in the River Tame. Most of the adverse effects on macroinvertebrates are minor and almost all are temporary. Given the current quality of macroinvertebrates, there are significant numbers of measures to permanently improve macroinvertebrate habitats within diverted river sections of up to 1 km. In particular, there are likely to be significant but localised beneficial effects associated with the diversions and removal of culverts from the Washwood Heath Brook and the diversion of the River Tame at Park Hall Nature Reserve. The overall effect on this element is likely to be minor beneficial provided that benefits from scheme elements (diversions) are maximised.		Measures to improve macroinvertebrate habitat and/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 on the diverted sections of River Tame, Washwood Heath Brook, Dunlop Channel and other minor tributaries. **The detailed design for the river diversions should be undertaken in consultation with the EA in order to ensure that these potential beneficial effects are maximised.**		
	4. Fish	Poor	-		Noise and vibration has the potential to cause mortality or injury at high levels and behavioural responses at low levels, which would be limited to the vicinity of the noise source. However, a review of OS maps and aerial photographs indicate that this is a small, urban drain with very limited potential for fish (although no survey data were available). Therefore, measurable effects are not considered to be likely.	N/A	No impacts on macrophytes anticipated and therefore there would be no indirect effects on macroinvertebrates.	No significant hydromorphological impacts anticipated and thus no likely indirect impacts on ecology.	No significant impacts on water quality anticipated and thus no likely indirect impacts on ecology.	No significant effects on upstream watercourses (River Rea, Plants Brook) anticipated.	The status of fish in the Tame is currently poor, which is also supported by the baseline field data collected. Most of the adverse effects on fish are minor, almost all are temporary and the scheme will not cause barriers to fish migration (now or in the future, if conditions improve so that more migrating fish species are able to colonise the river). There are measures to permanently improve fish habitats within diverted river sections of up to 1 km. In particular, there are likely to be significant but localised beneficial effects associated with the diversions and removal of culverts from the Washwood Heath Brook and the diversion of the River Tame at Park Hall Nature Reserve. The overall effect on this element is likely to be minor beneficial provided that benefits from scheme elements (diversions) are maximised.		Measures to improve fish 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 on the diverted sections of River Tame, Washwood Heath Brook, Dunlop Channel and other minor tributaries. **The detailed design for the river diversions should be undertaken in consultation with the EA in order to ensure that these potential beneficial effects are maximised.**		
	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	• Receptor is insensitive to impact. Proposed AP4 extension of flood culverts designed to help convey floodwaters will not have a significant 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. Proposed AP4 extension of flood culverts designed to help convey floodwaters will not have a significant 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. Proposed AP4 extension of flood culverts designed to help convey floodwaters will not have a significant 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 significant effects on upstream watercourses (River Rea, Plants Brook) anticipated.	Potential minor and localised effects on sub-element. The AP4 amendment to the Watton House viaduct and the expansion of A446 Litchfield Road and Marsh Lane junction and flood culverts could contribute slightly to the cumulative impact on this physico-chemical sub-element. However, the scale of is not considered to be significant and would be mitigated, and therefore on balance it is considered that there will be no change in overall impact status from the previous assessment.	No additional mitigation required	No additional mitigation required	No significant impact anticipated	-
	6. pH	High	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No significant effects on upstream watercourses (River Rea, Plants Brook) anticipated.	Receptor is insensitive to impact			Receptor is insensitive to impact	
	7. Phosphate	Bad	-		N/A	N/A	Receptor is insensitive to impact	• Receptor is insensitive to impact. Proposed AP4 extension of flood culverts designed to help convey floodwaters will not have a significant 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 significant effects on upstream watercourses (River Rea, Plants Brook) anticipated.	Potential minor and localised effects on sub-element. 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 AP4 amendment to the Watton House viaduct and the expansion of A446 Litchfield Road and Marsh Lane junction and flood culverts could contribute slightly to the cumulative impact on this physico-chemical sub-element. However, the scale of is not considered to be significant and would be mitigated, and therefore on balance it is considered that there will be no change in overall impact status from the previous assessment.			No significant impact anticipated	
	8. Ammonia	Poor	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No significant effects on upstream watercourses (River Rea, Plants Brook) anticipated.	Potential minor and localised effects on sub-element. The AP4 amendment to the Watton House viaduct and the expansion of A446 Litchfield Road and Marsh Lane junction and flood culverts could contribute slightly to the cumulative impact on this physico-chemical sub-element. However, the scale of is not considered to be significant and would be mitigated, and therefore on balance it is considered that there will be no change in overall impact status from the previous assessment.			No significant impact anticipated	
	9. Temperature	-	-		N/A	N/A	• Receptor is insensitive to impact. Proposed AP4 extension of flood culverts designed to help convey floodwaters will not have a significant 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	Receptor is insensitive to impact	No significant effects on upstream watercourses (River Rea, Plants Brook) 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	• Receptor is insensitive to impact. Proposed AP4 extension of flood culverts designed to help convey floodwaters will not have a significant 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. Proposed AP4 extension of flood culverts designed to help convey floodwaters will not have a significant 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 significant effects on upstream watercourses (River Rea, Plants Brook) anticipated.	Potential minor and localised effects on sub-element. The AP4 amendment to the Watton House viaduct and the expansion of A446 Litchfield Road and Marsh Lane junction and flood culverts could contribute slightly to the cumulative impact on this physico-chemical sub-element. However, the scale of is not considered to be significant and would be mitigated, and therefore on balance it is considered that there will be no change in overall impact status from the previous assessment.			No significant impact 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)	N/A	N/A	N/A	• The River Tame is a large and actively dynamic river that has disconnected floodplain connectivity as a result of urban expansion through Water Orton and at the AP4 site. • The expansion of the A446 Litchfield Road and Marsh Lane junction will result in the expansion of the existing road network within the floodplain. • The expansion of existing flood culverts are not located over the River Tame, and are designed to help convey floodwaters that are 'held' behind the Litchfield road embankment. • Overall, the proposed extension of flood culverts and carriageway are not anticipated to have significant impacts on the current state of floodplain connectivity or hydromorphological regime, and will help maintain the conveyance of floodwaters from the River Tame downstream from Water Orton.	N/A	No significant effects on upstream watercourses (River Rea, Plants Brook) anticipated.	• The existing watercourse is heavily modified and deteriorated from natural conditions • The proposed realignment would still have an unnatural channel form (e.g. it is very straight) but it appears to be defined by space constraints • The proposed changes the Watton House Viaduct and the expansion of A446 Litchfield Road and Marsh Lane junction and flood culverts are not anticipated to have a significant positive or negative impact at waterbody scale. • There is no apparent proposal to daylight the culvert, but that may not be cost effective. • Overall, the plan to realign the channel is considered to be beneficial, if the development opportunity is be used to implement some naturalisation of channel form and process	Undertake hydromorphological surveys to aid detailed design Incorporate hydromorphological measures into detailed design where practicable. Mitigation measures may include: • Bank reprofiling (rehabilitation) • Create low flow channels in over-widened/over-deepened channels • Create reed fringes • Creation of shallow margin in front of hard defence • Implementation of SUDS • 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 substrate bed through culvert where possible • Use of engineering techniques to assist natural recovery • Use soft engineering techniques • Daylight the existing culvert at Watton House		Minor beneficial effects possible	• Channel is heavily modified for flood risk and urbanisation and is realigned (straightened) and probably deepened with hard engineering • Channel would naturally be sinuous, but planform morphology would probably be quite stable. This is shown by the non-straightened reach ca. 1 km downstream of the viaduct crossing location where an administrative boundary (which is likely to have been established for decades) follows the channel centre line. • 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, which are indicative of channel meandering prior to straightening • Channel straightening has probably resulted in increased gradient and flow velocity. • Channel form, boundary conditions and therefore flow patterns are probably homogenised at present.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	No significant effects on upstream watercourses (River Rea, Plants Brook) anticipated.					
	13. River continuity	-	-		N/A	N/A	N/A	• The River Tame is a large and actively dynamic river that has disconnected floodplain connectivity as a result of urban expansion through Water Orton and at the AP4 site. • The expansion of existing flood culverts are not located over the River Tame but would disconnect floodplains and out-of-bank flows and habitat continuity, however, are the culvert is designed to help convey floodwaters that are 'held' behind the Litchfield road embankment. • Overall 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 on upstream watercourses (River Rea, Plants Brook) anticipated.					• No structures visible in channel in the vicinity of the site • Riparian zones and floodplains appear to absent to the north in realigned reach due to the railway line, but Park hall Nature Reserve is green space to the south • Bank habitat continuity severed by hard engineering for realignment • Extensive straightening would mean accelerated and homogenised flow, so fish migration may be difficult, especially with no channel diversity or rest areas
	14. River depth and width variation bed	-	-		N/A	N/A	N/A	• The size of the channel suggests there would not be significant loss of diversity in river depth and width as a result of the junction and culvert extension.	N/A	No significant effects on upstream watercourses (River Rea, Plants Brook) anticipated.					• Natural channel width seems to be maintained despite realignment • Straightened and homogenised channel means there is probably little depth variation in the realigned reaches, i.e. no pool - riffle sequence, as would be expected in sinuous channel
	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 as a result of the junction and culvert extension.	N/A	No significant effects on upstream watercourses (River Rea, Plants Brook) anticipated.					• Low, medium, calcareous RBMP channel type • Developed in alluvium (clay, silt, sand, gravel) over Mercia Mudstone. No faults mapped at the site that would suggest an influence on channel form • Channel sediments likely to be fines within a gravel matrix. Probably excess fines due to heavily urbanised catchment and disconnection of floodplains • Natural substrates could have been scoured out by effects of straightening • Bed substrates likely to be thin and dominated by sands and silts rather than gravels. Urbanisation upstream almost certainly includes weirs and flow controls so there may be reduced delivery of relatively large substrates to this site, and depletion of bed gravels • Channel bifurcates immediately downstream of straightened reach, suggesting this part of the non-straightened reach is a zone sediment deposition as a result of locally reduced bed gradient as hard engineering for realignments are removed. By inference, historic straightening and increased gradient and flow velocities in the realignment reach probably mean less sediment is deposited, so the sediment regime is disturbed at wider scale
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	• The culvert and junction expansion would result in temporary and non temporary land take from the vegetated riparian zones and impact the existing riparian habitat continuity within the floodplain. But this is a minor feature and in practical terms may not impact on deterioration of water body status.	N/A	No significant effects on upstream watercourses (River Rea, Plants Brook) anticipated.					• Whole catchment is heavily urbanised, with development frequently extending to the bank tops • Channel boundary appears to be irregular, i.e. banks not perfectly straight as they were probably engineered, suggesting channel it is trying to restore its natural sinuosity. • The rate of bank erosion and change in channel planform since straightening must be very slow; in the order of mm per year

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												
Educate landowners on sensitive management practices (urbanisation)	In Place	-	May prevent implementation of RBMP measure (green = No risk, amber = possible risk, red = likely risk)	-	-		• 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	-	-	N/A	N/A	N/A		-
Ensure that the thermal regime in waters downstream of the impounding works is consistent with good status conditions	In Place	-		-	-			-	-	No effect on implementation of this measure	No additional mitigation required	No additional mitigation required	🟩	
Ensure that good status of dissolved oxygen levels is being achieved downstream of the impounding works	In Place	-		-	-			-	-	In river engineering works will be designed to minimise sediment releases which could result in lowering of DO. Any effects with thus be minor and temporary and will not affect implementation of measure	No additional mitigation required	No additional mitigation required	🟩	
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	In Place	-		-	-			-	-	The proposed scheme is likely to modify the banks of the River Tame in a way that will make them less steep. Therefore, it is considered that the diversion of the Tame in the medium to long term is not likely to compromise the achievement of this measure and may contribute locally to meeting this objective.	No additional mitigation required	No additional mitigation required	🟦	
Increase in-channel morphological diversity	In Place	-		-	-			-	-	The design of the river diversions will include in channel and marginal habitats thus contributing to this measure within diverted sections River Tame	No additional mitigation required	No additional mitigation required	🟦	
Removal of hard bank reinforcement / revetment, or replacement with soft engineering solution	In Place	-		-	-			-	-	There will be increases in hard bank reinforcements at the viaduct location. Soft engineering solutions will be used where possible in the river diversions	No additional mitigation required	No additional mitigation required	🟨	
Ensure there is an appropriate baseline flow regime downstream of the impoundment.	Not in place	-		-	-			-	-	N/A	N/A	N/A		
Operational and structural changes to locks, sluices, weirs, beach control, etc.	Not in place	-		-	-			-	-	N/A	N/A	N/A		
Structures or other mechanisms in place and managed to enable fish to access waters upstream and downstream of the impounding	Not in place	-		-	-			-	-	No effect on implementation of this measure	No additional mitigation required	No additional mitigation required	🟩	
Preserve and, where possible, restore historic aquatic habitats	Not in place	-		-	-			-	-	The proposed new channel of the River Tame is likely to provide a wider range of habitat than the existing channel, notably for macroinvertebrates and fish. In addition, wetlands areas are going to be created as part of the scheme north of the river Tame. Therefore, it will be considered that the diversion of 1 km of the River Tame will not comprise the implementation of this measure, and could locally contribute to it.	No additional mitigation required	No additional mitigation required	🟦	
Re-engineering of the river where the flow regime cannot be modified.	Not in place	-		-	-			-	-	The scheme will restrict the implementation of this measure in those sections where the HS2 crosses the river, and within the river diversions.	No additional mitigation required	No additional mitigation required	🟨	

CFA 23 - 24 Cover Sheet

						Risk to Overall Status				
Surface water body name	**Waterbody ID**	**Catchment**	**Geographical Area**	**CFA**	**No. AP4 Updates**	**Original Assessment**	**Post-Additonal Baseline survey**	**Post-AP2 Updates**	**Post-AP4 Updates**	**Assessment Summary**
R Blythe from Patrick Bridge to R Tame	GB104028042572	Tame Anker and Mease	West	23, 24	3					Original + Baseline + AP2 + AP4

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 AP4 Assessment Changes:

	In AP4 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 AP4 change

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	AP-C224-025		
AP4 Name	A452 Kenilworth Road/Marsh Lane junction		
AP4 Location	Marsh Lane		
New/Replacement Scheme Element	Replacement	Replacement	Replacement
Scheme Element Type	Diversion	Culvert	Culvert
Original Scheme	Permanent realignment of the A452 Kenilworth Road over a distance of 1.7km, approximately 100m east of the existing alignment and raised up to 13.5m above ground level. Existing high voltage Western Power underground power line and telecommunications underground cables diverted along the realigned highway and through the new road bridge. Marsh Lane would be extended to join the realigned A452 Kenilworth Road. The existing gap in the central reserve would be closed, allowing for vehicles turning in left off the northbound carriageway and left onto the northbound carriageway only. Bayleys Brook would be diverted through a new culvert under the A452 Kenilworth Road and the existing culvert under the stopped up section of carriageway would be removed and replaced with an open channel.		
AP4 Description	A new roundabout will be provided at the A452 Kenilworth Road/Marsh Lane junction, providing all movement access northbound and southbound for traffic from Marsh Lane and Mercote Mill Lane, via Mercote Hall Lane (bridleway M218) accommodation overbridge. Bayleys Brook diversion will be amended (TBC).	Amendment to the Bayleys Brook diversion including an extended culvert under the Marsh Lane realignment. Assumption has been made that the existing Bayleys Brook culvert under the A452 Kenilworth Road will remain.	Amendment to the Bayleys Brook diversion including an increase in length of the culvert under Mercote Hall Lane.
AP4 Changes to Previously Assessed Elements	None	None	None
AP4 Additional Elements Assessment Requirement	New Road realignment	New Road realignment	New Road realignment
Drawings (AP2) Construction Phase (05) Proposed Scheme (06)	AP-224-025		

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

	Surface Water body	Current status	Status objective	Scheme Elements	River Blythe Bypass Culvert					Horn Brook and Horn Brook Trib - River Diversion			Horn Brook Culvert					Bayleys Brook River Diversions		
	GB104028042571	Moderate	Good Ecological Status by 2027	Description of scheme element impact	Culvert of 'River Blythe Bypass' watercourse - a tributary of the River Blythe (Culvert: 4.5 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 Baileys Brook (100 m, Lavender Hall Lane), tributary of Bayleys Brook (2 short diversions, Kenilworth Greenway) and Tributary of Bayleys Brook (1500 m diversion - due to construction of Marsh Farm viaduct - precise details not available)		
	River Blythe from Temple Balsall Brook to Patrick Bridge			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
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = new, 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
	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 habitat. The watercourse is heavily shaded by riparian vegetation in the stretch impacted and currently supports very low aquatic vegetation (ecology 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. The watercourse is heavily shaded by riparian vegetation in the stretch impacted and currently supports very low aquatic vegetation (ecology 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 continuity. The watercourse is heavily shaded by riparian vegetation in the stretch impacted and currently supports very low aquatic 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 diverted section while the new channels re-establish. Horn Brook and its tributary are currently heavily shaded and support low aquatic vegetation (ecology baseline survey). Effects on macrophytes likely to be locally negligible. No deterioration of the element status anticipated.	Potential reduced flows locally, with no significant effects on the Horn Brook and its tributary that lie within the heavily shaded and support low aquatic vegetation (ecology baseline survey). Effects on macrophytes likely to be locally negligible. No deterioration of the element status 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 (precise design details not available). Horn Brook and its tributary currently support low aquatic vegetation within the stretch impacted (ecology baseline surveys) will be less shaded.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to a localised but permanent loss of habitat. The watercourse is heavily shaded by riparian vegetation in the stretch impacted and currently supports low aquatic vegetation (baseline surveys). 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. The stream is heavily shaded by riparian vegetation in the stretch impacted and currently supports very low aquatic vegetation (baseline surveys). 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 effect at the water body scale. The watercourse currently supports low aquatic vegetation within the stretch impacted (baseline surveys). Negligible 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) while the new channels re-establish. Bayleys Brook currently heavily shaded and culverted at crossing point. Tributary at Kenilworth Greenway with low flows and culverted at crossing point. Tributary at Kenilworth Greenway is also heavily shaded. No additional data for other tributaries. Potential temporary and localised effects on tributaries, with no deterioration of the element status anticipated.	Cumulative impacts likely to affect flow depths within Bayleys Brook. Bayleys Brook currently heavily shaded and culverted at crossing point. Tributary at Kenilworth Greenway is also heavily shaded. No additional data for other tributaries. Potential temporary and localised adverse effects on tributaries, with no deterioration of the element status 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 (precise design details not available). Bayleys Brook currently heavily shaded and culverted at crossing point. Tributary at Kenilworth Greenway is also heavily shaded. No additional data for other tributaries. The effect on this quality element is considered to be beneficial.
	3. Macroinvertebrates	Good	Good		Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to very localised but permanent loss of habitat associated with the bank (i.e. subtidal, riparian vegetation). Macroinvertebrate quality of the watercourse currently low within the stretch impacted (ecology baseline survey). Effects would be localised and minor (only within or near to the culvert itself). No deterioration of the element status anticipated.	No additional effect anticipated (loss of habitat already included in the landtake impact).	Potential habitat diversification associated with increase in flow velocities within the bypass could be locally beneficial to macroinvertebrates and balance the effects of reduction of habitat. Macroinvertebrate quality of the watercourse is locally poor, with communities adapted to slow flows and sedimentation (ecology baseline survey). Neutral effect anticipated, with no deterioration of the status of the 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 WFD element.	Temporary loss of approximately 225 m of habitats of the existing Horn Brook and its tributary that lie within the diverted section while the new channels re-establish. Macroinvertebrate quality of Horn Brook currently poor. Localised effect on macroinvertebrates on Horn Brook and its tributary likely to be negligible. No deterioration of the element status anticipated.	Potential reduced flows locally and loss of riparian connectivity with no significant effect. Macroinvertebrate quality of Horn Brook currently poor. Localised effect on macroinvertebrates on Horn Brook and its tributary likely to be negligible. No deterioration of the element status anticipated.	The river diversions 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 (precise design details not available). Macroinvertebrate quality of Horn Brook currently poor; localised and temporary adverse effect on macroinvertebrates expected. Macroinvertebrate quality of Horn Brook currently poor; Localised effect on macroinvertebrates on Horn Brook and its tributary likely to be negligible. No deterioration of the element status anticipated.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to very localised but permanent loss of macroinvertebrate habitat (i.e. subtidal, riparian vegetation). Macroinvertebrate quality of Horn Brook currently poor within the stretch impacted (baseline survey). Effect likely to be localised and minor, with no deterioration of the element status anticipated.	No additional effect anticipated (loss of habitat already included in the landtake impact).	Potential increase in flow velocities within Horn Brook and local disconnection between channel and riparian vegetation, with no effect at the water body scale. Macroinvertebrate quality of Horn Brook currently poor within the stretch impacted (baseline survey). Neutral to potentially beneficial effect if habitat diversification associated with increase in flow velocities. No change 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.	Potential loss of macroinvertebrate habitats on Bayleys Brook and its tributaries (agricultural ditches) while the new channels re-establish. Bayleys Brook and tributary at Kenilworth Greenway with low flows and culverted at crossing points. No additional data for other tributaries. Potential temporary and localised effects on tributaries, with no deterioration of the element status anticipated.	Cumulative impacts likely to affect flow depths within Bayleys Brook. Bayleys Brook and tributary at Kenilworth Greenway with low flows and culverted at crossing points. No additional data for other tributaries. Potential temporary and localised adverse effects on tributaries, with no deterioration of the element status 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 characterise the reach (precise design details not available). Bayleys Brook and tributary at Kenilworth Greenway with low flows and culverted at crossing points. No additional data for other tributaries. The effect on this quality element is considered to be beneficial.
	4. Fish	High	High		Localised and temporary adverse effect during construction. No deterioration of the water body status of the element is however expected.	The River Blythe bypass channel is assessed of to be of poor value for fish, although it has isolated pockets of trout spawning habitat. Potential localised adverse effect anticipated.	No additional effect anticipated (loss of habitat already included in the landtake impact).	Hydromorphological impact considered to be minimal although there is potential for minor increases in flow velocities due to reduced out of bank flow and smooth culvert boundaries. Culverts will be designed to maintain habitat continuity (through use of lowered bed levels and natural bed). Macroinvertebrate quality of the watercourse in the River Blythe is of high status/ old line and the diverted channel currently supports moderately diverse and abundant fish communities, including brown trout (ecology baseline surveys). Although the River Blythe watercourse is assessed to be of poor value for fish, as it has isolated pockets of trout spawning habitat and the River Blythe supports brown trout populations, adverse effect on the status of this element cannot be ruled out.	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 and localised loss of fish habitat within Horn Brook and its tributary, while the new channels re-establish. Fish fully available for these watercourses. Effect considered by default as minor adverse, local and temporary with no deterioration of the status of this element expected at the water body scale.	Potential locally reduced flows, and loss of riparian connectivity with no significant effect. No adverse fish fully available for these watercourses. Effect considered by default as minor adverse and local with no deterioration of the status of this element expected at the water body scale.	The river diversions will be designed to include a range of channel habitats that are considered to represent an improvement for fish communities (precise design details not available). No data on fish is available for these watercourses. Effect considered by default as minor and local effect likely to be minor locally, with no deterioration of the element expected at the water body scale.	Localised and temporary adverse effect during construction. No deterioration of the water body status of the element is however expected	Likely to lead to very localised but permanent loss of fish habitat and reduced connectivity to the River Blythe. No data on fish is available for these watercourses. The channel currently supports moderately diverse and abundant fish communities, including brown trout (baseline survey). However, the effects of loss of habitat will be localised to this minor tributary and would not affect the River Blythe at a water body scale.	No additional effect anticipated (loss of vegetation already included in the landtake impact), locally or	Hydromorphological impacts considered to be minimal but there is potential for minor, localised increases in flow velocities within Horn Brook due to reduced out of bank flows and smooth culvert boundaries. Culverts will be designed to maintain habitat continuity (through use of lowered bed levels and natural bed). Macroinvertebrate quality of the watercourse in the R.Blythe, adverse effects on fish and possible change in status cannot be ruled out.	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 1600 m (precise design details not available) of fish habitat within Bayleys Brook and its tributaries, while the new channels re-establish. Bayleys Brook and tributary at Kenilworth Greenway with low flows and culverted at crossing points. No additional data for other tributaries. Potential localised effects anticipated on tributaries, with no deterioration of the element status anticipated	Cumulative impacts likely to affect flow depths within Bayleys Brook. Bayleys Brook and tributary at Kenilworth Greenway with low flows and culverted at crossing points. No additional data for other tributaries. Potential temporary and localised adverse effects on tributaries with no deterioration of the element status anticipated	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities (precise design details not available). Bayleys Brook and tributary at Kenilworth Greenway with low flows and culverted at crossing points. No additional data for other tributaries. The effect on this quality element is considered to be beneficial.
Physico-Chemical status																				
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = new, amber = possible, red = likely)	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 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.	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 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.	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 deterioration of the element status anticipated at the scale of the water body.
	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	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
	7. Phosphate	Moderate	-		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	• CoCP measures (Section 16) implemented 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 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	• CoCP measures (Section 16) implemented 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 minor/temporary in relation to timescale and the water body. Therefore, no change in status	Receptor is insensitive to impact	Receptor is insensitive to impact
	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	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
	9. Temperature	-	-		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 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	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. 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	N/A	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	• CoCP measures (Section 16) implemented 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.	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.	Receptor is insensitive to impact
Hydromorphological status																				
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = new, amber = possible, red = likely)	N/A	N/A	N/A	• Surveys report the channel width as approximately 0.5 m with very limited flow dynamics. • Cumulative impacts may affect the River Blythe Bypass at its downstream end due to the River Blythe Bypass Culvert and Horn Brook culvert and diversion, and existing A452 and Cornets End lane culverts and Cornets End lane gravel works. • Survey's indicate that the channel has been reaccloned and has the characteristics of a drainage ditch. There is potential for the out of bank flows to be contained in culvert crossings. • The new channel will comprise a new vegetation lined channel, which may result in increased flow velocities, scour and loss of existing diversity... but in practical terms, given the size of the watercourse, the impacts on hydromorphology are considered to be minimal	N/A	N/A	• Channel width appears to be 0.5m to 1m or less, so there is unlikely to be significant diversity of flow dynamics. • Cumulative impacts may affect the River Blythe Bypass at its downstream end due to the River Blythe Bypass Culvert and Horn Brook culvert and diversion, and existing A452 and Cornets End Lane culverts and Cornets End Lane gravel works. • The channel realignment would lengthen Horn Brook slightly, its catchment could be cut-off by the earthworks, which may reduce flows. • In practical terms the impacts on hydromorphology are considered to be minimal at water body scale	N/A Diversions not large enough to be considered to create significant new habitat	N/A	N/A	• Channel width appears to be 0.5m to 1m or less, so there is unlikely to be significant diversity of flow dynamics. • Cumulative impacts may affect the River Blythe Bypass at its downstream end due to the River Blythe Bypass Culvert and Horn Brook culvert and diversion, and existing A452 and Cornets End Lane culverts and Cornets End Lane gravel works. • 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 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	N/A	N/A	N/A	• The channel realignment was reported to be the Channel width was approximately 0.5 m or less, with limited diversity of flow dynamics. However, some discrete areas of riffle habitat were noted. • The short channel realignments would not have significant impacts. • Cumulative impacts of Bailey's Brook diversion, diversion of unnamed tributary that joins Bailey's Brook, Horn Brook diversion of the unnamed tributary of Bayleys Brook, and multiple culverts on Bayleys Brook, and earthworks at Marsh Lane farm are likely to be minimal due to the watercourse. • The 150 m diversion along the western side of Marsh Lane farm will involve some major realignment and would alter flow volumes and brings in extended reaches of the tributary and Bayleys Brook. • Aerial photography and the Ecologist's report, dated March 2021, of the Bayleys Brook catchment at Marsh Lane Farm and Elmdon Edge suggest that surface watercourses and out-of-channel local habitats are water dependent (marshy/wet grassland, wet woodland, groundwater dependent terrestrial ecosystems) receive inputs of water via soil through flow and superficial aquifers), so embankment could have detrimental impacts on local hydrology and habitats, especially in the area up to 500m upstream of the viaduct. • In practical terms the impacts on hydromorphology are considered to be	Diversions not large enough to be considered to create significant new habitat
	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	•Watercourse and water dependent habitats are likely to be reliant on sub-surface flows and Secondary A aquifers	
	13. River continuity	-	-		N/A	N/A	N/A	• The culvert could potentially disconnect floodplains and out-of-bank flows, bank habitats and effectively sever any existing habitat continuity, but this is a minor feature and in practical terms would not impact on deterioration of water body status	N/A	N/A	• The short diversion would not significantly affect river continuity		N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever any existing habitat continuity, but this is a minor feature and in practical terms would not impact on deterioration of water body status	N/A	N/A	• Crossing design means there will be no bridings in the watercourse • It is likely that floodplain and water-dependent habitat continuity would be lost due to the embankment and culverted crossing, especially in the area up to 500m upstream of the viaduct • This unlikely to have a detrimental effect at water body scale	
	14. River depth and width variation ind	-	-		N/A	N/A	N/A	• Out-of bank flows may be constrained by the culvert. The channel at the crossing location is not wide enough to be visible and no survey observations were recorded. There is unlikely to be significant diversity of river depth and width, and the culvert is unlikely to cause significant impacts, given the apparent size of the watercourse	N/A	N/A	• Out-of bank flows may be constrained by the culvert, but the channel at the crossing location is not wide enough to be visible or measurable from aerial imagery, so there is unlikely to be significant diversity of river depth and width, and the culvert is unlikely to cause significant impacts		N/A	N/A	N/A	• Out-of bank flows may be constrained by the culvert, but the channel at the crossing location is not wide enough to be visible or measurable from aerial imagery, so there is unlikely to be significant diversity of river depth and width, and the culvert is unlikely to cause significant impacts	N/A	N/A	• Crossing design means there will be no bridings in the watercourse • Open watercourse is very small and unlikely to have significant width and depth variation, although potential catchment cut-off by the embankment could affect • Flow dynamics • Comparison of historic maps suggests that channel planform is stable in the order of decades, so no impacts are anticipated	
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• Surveys report an aggrading system with little morphological value. Constrained flow in the culverts could flush fine sediment from the impacted reach, but the size and character of the watercourse means that overall there is unlikely to be any significant impact.	N/A	N/A	• The channel at the crossing location is not wide enough to be visible and no survey observations were recorded. From the apparent size of the channel, it is reasonable to assume that there is no valuable bed morphology • 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	• Channel water surface at the crossing location is not wide enough to be visible or measurable from aerial imagery, so 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	• The short diversion beneath the viaduct would not significantly affect bed conditions • The lengthy diversion is likely to alter flow dynamics, but the tributary is effectively a drainage ditch, and no diversity or high quality bed morphology would be expected	
	16. Structure of riparian zone	-	-		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 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	-- Some riparian hydraulic connectivity and associated habitats could be lost to the embankments		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 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	• The short diversion beneath the viaduct would not significantly affect the riparian zones	

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																		
Biological sub-elements currently at high status, so no mitigation measures. Water body at moderate status due to Phosphate or Total Nitrogen (N)	-	-	Predicted change to status elements (green = new, amber = possible, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

	Surface Water body	Current status	Status objective	Scheme Elements	Marsh Farm Viaduct						Balsall Common Viaduct (footings in or within riparian zone of watercourse)						Bayleys Brook/tributaries Culverts						AMENDMENT TO THE BAYLEYS BROOK DIVERSION - AP-C224-025						CULVERT EXTENSION - AP-C224-025					
	GB104028042571	Moderate	Good Ecological Status by 2027	Description of scheme element impact	Marsh 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 Hall Lane diversion, ~~new culvert (50 m at Monckton Lane/Kenilworth Road)~~, Tributary of Bayleys Brook (90m Culvert Beechwood underpass)						APA scheme change, Marsh Lane will be realigned to join the new junction at Mercote Hall Lane with earthworks raised to accommodate the new roundabout and tie into the new junction will require the diversion of Bayley Brook. Details not available						New culvert under the new Marsh Lane realignment (approximately 25m in length)					
	River Blythe from Temple Balsall Brook to Patrick Bridge			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/sunclitve 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 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	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	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 element (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
	2. Macrophytes and phytobenthos - macrophytes	Good	Good		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 loss of macrophytes due to shading from viaduct structure. However, Bayley Brook runs through wooded areas at crossing point, and is unlikely to support macrophytes. No likely effect anticipated.	Potential localised flow turbulences and detrimental effects on Bayleys Brook up to 500 m upstream of the viaduct, by changes in hydrology and loss of habitat continuity, although not considered to be significant at the scale of the waterbody. Bayleys Brook supports Good macroinvertebrate quality within stretch investigated, therefore 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 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 but permanent loss of macrophytes due to reduction in photosynthetic activity. Bayleys Brook is culverted in several locations at the crossing point. Effect on macrophytes likely to be negligible or no effect.	No significant hydromorphological change anticipated. Effect likely to be negligible/insignificant 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 loss of 200 m of macrophyte habitat at various locations on Bayleys Brook and its tributaries. Tributary of 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 culverted in riparian vegetation. Potential temporary and localised adverse effects on Bayleys Brook, with no deterioration of the element status anticipated.	Likely to lead to the loss of macrophytes, due to shading from viaduct structure. Tributary of 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 culverted in riparian vegetation. 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. Tributary of 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 culverted in riparian vegetation. 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.	N/A	APA changes will lead to the temporary loss of habitat of the existing Bayley Brook and its tributaries (agricultural ditches) while the new channels re-establish. The length of diversion and other details (compared to the original report 830 m) are available, but based on the scale plan showing the junction it is not likely to be significantly different and therefore the potential impacts are likely to be similar. Bayleys Brook and tributary at Kenilworth Greenway with low flows and culverted at crossing point. Tributary at Kenilworth Greenway is also heavily shaded. No additional data for other tributaries. Potential temporary and localised effects on tributaries, with no deterioration of the element status anticipated.	As the original proposal (as in the submitted Hybrid Bill) the APA change will have cumulative impacts that are likely to affect flow depths within Bayley Brook. Bayleys Brook is currently heavily shaded and culverted at crossing point. Tributary at Kenilworth Greenway is also heavily shaded. No additional data for other tributaries. Potential temporary and localised adverse effects on tributaries, with no deterioration of the element status 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 (precise design details not available). Bayleys Brook currently heavily shaded and culverted at crossing point. Tributary at Kenilworth Greenway is also heavily shaded. No additional data for other tributaries. The effect on this WFD element is considered to be beneficial.	N/A	Proposed APA changes would lead a further loss of approx. 25 m of macrophytes habitat (i.e. submerged, riparian vegetation). Bayleys Brook supports Good macroinvertebrate within the reach of the proposed culvert. Potential localised adverse effect anticipated.	Proposed APA changes runs through wooded areas and is unlikely to support macrophytes. Therefore no effect anticipated due decreased photosynthetic activity.	Proposed APA changes runs through wooded areas and is unlikely to support macrophytes. Therefore no effect anticipated due decreased photosynthetic activity.	Proposed APA changes will lead to a further potential reduction of habitat continuity and disconnection between channel and riparian vegetation. Bayleys Brook supports Good macroinvertebrate within the reach of the proposed culvert Reach 1 but this culvert will not affect this WFD element at the scale of the waterbody. 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.
	3. Macroinvertebrates	Good	Good		Receptor not sensitive to impact. No likely effect anticipated.	Footings in or near to riparian zone, but with no anticipated effect on macroinvertebrate habitats.	Although Bayleys Brook supports Good macroinvertebrate quality it runs through wooded areas at crossing point and is unlikely to support macrophytes. No likely effect anticipated.	Potential localised flow turbulences on Bayleys Brook and its tributaries up to 500 m upstream of the viaduct, by changes in hydrology and loss of habitat continuity, although not considered to be significant at the scale of the waterbody. Bayleys Brook supports Good macroinvertebrate quality within stretch investigated, therefore 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 invertebrates	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.	No significant effect on macrophytes anticipated (see above) therefore no likely indirect effects on macroinvertebrates.	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 likely effect anticipated.	Likely to lead to permanent loss of 200 m of macroinvertebrates habitat (i.e. substrate, riparian vegetation, margins) on Bayleys Brook and its tributary. 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 macroinvertebrates within the reach of Mercote Lane culvert. Potential localised adverse effect anticipated.	No additional effect anticipated (loss of vegetation already included in the landtake impact).	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. 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 macroinvertebrates 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	N/A	APA changes will lead to the temporary loss of habitat of the existing Bayley Brook and its tributaries (agricultural ditches) while the new channels re-establish. The length of diversion and other details (compared to the original report 830 m) are available, but based on the scale plan showing the junction it is not likely to be significantly different and therefore the potential impacts are likely to be similar. Bayleys Brook and tributary at Kenilworth Greenway with low flows and culverted at crossing point. Tributary at Kenilworth Greenway is also heavily shaded. No additional data for other tributaries. Potential temporary and localised adverse effects on tributaries, with no deterioration of the element status anticipated.	Cumulative impacts likely to affect flow depths within Bayleys Brook. Bayleys Brook and tributary at Kenilworth Greenway with low flows and culverted at crossing point. No additional data for other tributaries. Potential temporary and localised adverse effects on tributaries, with no deterioration of the element status 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 exist. Bayleys Brook is currently heavily shaded and culverted at Bayleys Brook and tributary at Kenilworth Greenway with low flows and culverted at crossing points. No additional data for other tributaries. The effect on this quality element is considered to be beneficial.	N/A	Receptor not sensitive to impact. No likely effect anticipated	Proposed APA changes would lead a further loss of approx. 25 m of macroinvertebrates habitat (i.e. submerged, riparian vegetation). Bayleys Brook supports Good macroinvertebrates within the reach of the proposed culvert. Potential localised adverse effect anticipated.	No additional effect anticipated due to APA changes locally or at the scale of the waterbody	No additional effect anticipated due to APA changes locally or at the scale of the waterbody	Proposed APA changes will lead to a further potential reduction of habitat continuity and disconnection between channel and riparian vegetation. Bayleys Brook supports Good macroinvertebrate within the reach of the proposed culvert Reach 1 but this culvert will not affect this WFD element at the scale of the waterbody. 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.
	4. Fish	High	High		Localised and temporary adverse effect during construction. No deterioration of the status of the element is however expected	Footings in or near to riparian zone, but with no anticipated effect on fish.	Shade increase likely to lead to localised but permanent loss of fish habitats (i.e. riparian vegetation, overhanging vegetation). Although Bayleys Brook currently supports a moderate fish abundances and low fish diversity, localised adverse effect with no deterioration of the status of the waterbody. Bayleys Brook currently supports Good fish abundance and low fish diversity, localised adverse effect with no deterioration of the status of the waterbody. Bayleys Brook supports Good fish populations at the location of the crossing, localised adverse effect with no deterioration of the status of this element expected.	Potential localised flow turbulences and detrimental effect on up to 500 m upstream of the viaduct, by changes in hydrology and loss of habitat continuity, although not considered to be significant at the scale of the waterbody. Bayleys Brook currently supports Good fish abundance and low fish diversity, localised adverse effect with no deterioration of the status of the waterbody. Bayleys Brook supports Good fish populations at the location of the crossing, localised adverse effect with no deterioration of the status of this element expected.	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.	Bayleys Brook is culverted in several locations at the crossing point and therefore assessed of no value for fish due to 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.	No significant effect on macrophytes anticipated (see above) therefore no likely indirect effects on fish.	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.	Localised and temporary adverse effect during construction. No deterioration of the water body status of the element is however expected	Likely to lead to permanent loss of 200 m fish habitat (i.e. substrate, riparian vegetation, margins) on Bayleys Brook and its tributary although tributaries are of poor value for fish, Bayleys Brook supports Good fish populations 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.	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 no additional baseline is available for Bayleys Brook at Lavender Hall Lane, and although tributaries are of poor value for fish, 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	N/A	APA changes will lead to the temporary loss of habitat of the existing Bayley Brook and its tributaries (agricultural ditches) while the new channels re-establish. The length of diversion and other details (compared to the original report 830 m) are available, but based on the scale plan showing the junction it is not likely to be significantly different and therefore the potential impacts are likely to be similar. Bayleys Brook and tributary at Kenilworth Greenway with low flows and culverted at crossing point. No additional data for other tributaries. Potential temporary and localised adverse effects on tributaries, with no deterioration of the element status anticipated.	Cumulative impacts likely to affect flow depths within Bayleys Brook. Bayleys Brook and tributary at Kenilworth Greenway with low flows and culverted at crossing points. No additional data for other tributaries. Potential temporary and localised adverse effects on tributaries, with no deterioration of the element status anticipated	The range of habitats incorporated into the diverted channel is considered important, in comparison to the current channel (precise design details not available). Bayleys Brook and tributary at Kenilworth Greenway with low flows and culverted at crossing points. No additional data for other tributaries. The effect on this quality element is considered to be beneficial.	N/A	Localised and temporary adverse effect during construction. No deterioration of the water body status of the element is however expected	Proposed APA changes are likely to lead to a further permanent loss of 25 m fish habitat (i.e. substrate, riparian vegetation, margins) on Bayleys Brook compared to the original proposal. Bayleys Brook supports Good fish populations available, and although tributaries are of poor value for fish, Bayleys Brook supports brown trout spawning habitat and brown trout populations downstream of the Marsh Lane culvert. Potential localised adverse effect anticipated	No additional effect anticipated (loss of vegetation already included in the landtake impact)	No additional effect anticipated (loss of vegetation already included in the landtake impact)	Proposed APA changes will lead to a further potential reduction of habitat continuity and disconnection between channel and riparian vegetation. Bayleys Brook will have the potential to act as obstructions to fish movements. However, as Bayleys Brook culvert will be designed so not to obstruct fish movements. Therefore, only localised adverse effects 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.
	Physico-Chemical status																																	
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status element (green = none, amber = possible, 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	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. The watercourse channel is locally heavily shaded and is already culverted under Oddington 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	• The construction of the APA roundabout and associated amendments to the Bayleys Brook diversion is predicted to result in no more than a temporary, minor impact on this sub-element. • Release of sediment during construction of the diversion 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 APA roundabout and associated amendments to the Bayleys Brook diversion is predicted to result in no more than a temporary, minor impact on this sub-element. • Release of sediment during construction of the diversion 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 additional length of the proposed APA 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 minor, local effect in relation to the overall water body. Therefore, no change in status from the previous assessment is anticipated.	• The additional length of the proposed APA 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 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 APA 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 APA 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.
	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	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	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	7. Phosphate	Moderate	-		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	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	N/A	• The construction of the APA roundabout and associated amendments to the Bayleys Brook diversion is predicted to result in no more than a temporary, minor impact on this sub-element. • Release of sediment during construction of the diversion 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	N/A	N/A	Receptor is insensitive to impact	• The construction of the proposed APA 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	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	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	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	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	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 Oddington 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	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	• The additional length of the proposed APA 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 minor, local effect in relation to the overall water body. Therefore, no change in status from the previous assessment is anticipated.	• The additional length of the proposed APA 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 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 APA 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 APA 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.
	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	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	• The construction of the APA roundabout and associated amendments to the Bayleys Brook 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 APA 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 APA 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																																	
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status element (green = none, amber = possible, red = likely)	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 footings in the watercourse/riparian zone are very close to the watercourse and appear to be in Flood Zone 2 (functional floodplain), so this may affect flow dynamics due to covering floodplain connectivity • The cumulative impacts of Bayleys Brook diversion, diversion of unnamed tributary into ditch to Marsh Farm and multiple culverts on Bayleys Brook, and earthworks at Marsh Lane farm are likely to be detrimental to the watercourse • Although the effect on the water surface is not visible or measurable from aerial imagery on at water body scale the effects may not be significant, but this is still considered to be a 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	N/A	N/A	N/A	N/A	N/A	N/A	N/A	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	•Watercourse and water dependent habitats are likely to be reliant on sub-surface flows and Secondary A aquifers	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	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	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	• Crossing design means there will be no footings in the watercourse • It is likely that floodplain and water dependent habitat continuity would be limited due to the embankment to the south of the crossing, especially in the area up to 500m upstream of the viaduct • This unlikely to have a detrimental effect at water body scale	N/A	N/A	N/A	N/A	N/A	• Crossing design means there will be no footings in the watercourse, and the size of the stream suggests that floodplain inundation and out of channel flows would be unlikely to be significantly affected at local or water body scale	N/A	N/A	N/A	N/A	N/A	• The culverts would potentially disrupt out of bank flows interacting with the floodplain, bank full flows would not be degraded from current hydromorphological state or cause significants effects • In practical terms the impacts on hydromorphology are considered to be minimal at water body scale	N/A	N/A	• The diversion may result in the shortening or lengthening of this reach, however as the brook flows under the A452 via culvert and there is unlikely to be significant bed substrate transport or scour. • Satellite imagery suggests that channel planform is stable, so no impacts are anticipated • However, diversion details are not currently available at the time of assessment, therefore, this diversion needs to be flagged as a risk until the scheme can be fully assessed.	• There are opportunities to enhance morphological diversity and to create physical habitats as part of the diversion. Bayleys Brook is currently heavily modified and culverted at the proposed crossing point and has poor riparian habitat. However, because the channel diversion is minor, WFD gains are likely to be very localised into waterbody-wide, so benefits are likely to be minor.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	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 • Open watercourse is small ranging from 1 - 1.5m in width with limited with and depth variation • The existing channel planform is stable in the channel platform is stable in the order of decades, in combination with walkover surveys, so no impacts are anticipated	N/A	N/A	N/A	N/A	N/A	• Crossing design means there will be no footings in the watercourse • Open watercourse is small with limited width and depth variation, although potential catchment cut-off by the embankment could affect watercourse flow depths • Comparison of historic maps and survey suggest that channel planform is stable in the order of decades, so no impacts are anticipated	N/A	N/A	N/A	N/A	N/A	• Channel width and depth characteristics could be impacted as a result of culverting however the A452 via culvert and there is unlikely to be significant bed substrate transport or scour 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	• The diversion may result in the shortening or lengthening of this reach, however as the brook flows under the A452 via culvert and there is unlikely to be significant bed substrate transport or scour. • Satellite imagery suggests that channel planform is stable, so no impacts are anticipated • However, diversion details are not currently available at the time of assessment, therefore, this diversion needs to be flagged as a risk until the scheme can be fully assessed.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	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	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	N/A	N/A	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	• The diversion may result in the shortening or lengthening of this reach, however as the brook flows under the A452 via culvert and there is unlikely to be significant bed substrate transport or scour. • Satellite imagery suggests that channel planform is stable, so no impacts are anticipated • However, diversion details are not currently available at the time of assessment, therefore, this diversion needs to be flagged as a risk until the scheme can be fully assessed.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	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 • Information collected during medium term survey (2 years) suggests that channel is not likely to be groundwater dependent therefore the presence of groundwater dependent species are likely to be found within the riparian structure of this viaduct embankment, in addition to the Local place names (Marsh Farm, Marsh Lane) and the presence of frogs which suggest that surface watercourses and out-of-channel local habitats are water dependent (local topography and Environmental Statements suggest reliance on soil through flow and groundwater), therefore the proposals could have non-temporary impacts on local habitats	N/A	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	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	• Some riparian hydraulic connectivity and associated habitats could be lost or gained as a result of the proposed diversion. • However, diversion details are not currently available at the time of assessment, therefore, this diversion needs to be flagged as a risk until the scheme can be fully assessed.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	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																																	
Hydrogical sub-elements currently at risk of failing WFD objectives measures. Water body at moderate status due to Phosphate or Total Dissolved Solids	-	-	Predicted change to status element (green = none, amber = possible, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

Surface Water body	Current status	Status objective	Scheme Elements	Impacts from other WFD water bodies (assessed separately)	CULVERT EXTENSION - AP-C224-025					Cutting		Cutting		OVERALL impact on element	Additional Mitigation Measures		Residual impact	
					Culvert extension is required to increase the length of culvert under Moncote Hall Lane from 26m to 46m.					Park Lane cutting - Bayleys Brook		Burton Green retaining wall - Bayleys Brook			Construction	Operation		
GB10402B042571																		
River Blythe from Temple Balsall Brook to Patrick Bridge	Moderate	Good Ecological Status by 2027	Description of scheme element impact		Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in the 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.					
			Identified biological impacts															
WFD classification elements	I. 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	
	I. Macrophytes and phytobenthos - macrophytes	Good	Good	No scheme elements on upstream water bodies	N/A	Proposed AP4 changes would lead a further loss of approx. 20 m of macrophytes habitat as Bayleys Brook compared with the original proposal. At crossing, Bayleys Brook mostly runs through wooded areas and is unlikely to support macrophytes although there may be some unshaded areas that are colonised by macrophytes. Potential localised adverse effect anticipated	Proposed AP4 changes would lead further shading of approx. 20 m of Bayleys Brook . At crossing, Bayleys Brook mostly runs through wooded areas and is unlikely to support macrophytes although there may be some unshaded areas that are colonised by macrophytes. Potential localised adverse effect anticipated.	Proposed AP4 changes will lead to a further alteration of habitat (i.e. substrate, riparian vegetation) and hydrology. Bayleys Brook supports Good macrophyte status. The reach of the culvert section its own this culvert would not affect the WFD element at the scale of the waterbody. Potential localised adverse effect anticipated.	Discharge (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.	These 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 in nature and therefore will no longer be considered as part of AP4 changes (particularly as where AP4 Bayleys Brook is a 'Good' quality) means that cumulatively, a deterioration of this WFD element cannot be ruled out if no further mitigation is employed. 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 macrophytes WFD element at the water body scale.	No additional mitigation required	No additional mitigation required	Minor and localised effects	
	I. Macroinvertebrates	Good	Good	No scheme elements on upstream water bodies	Receptor not sensitive to impact. No likely effect anticipated.	Proposed AP4 changes would lead a further loss of approx. 20 m of macroinvertebrate habitat (i.e. substrate, riparian vegetation) compared with the original proposal. Bayleys Brook supports Good macroinvertebrate status within the reach of the proposed culvert. Potential localised adverse effect anticipated	No additional effect anticipated (loss of vegetation already included in the landtake impact) likely at the scale of the waterbody.	Proposed AP4 changes will lead to a further alteration of habitat (i.e. substrate, riparian vegetation) and hydrology. Bayleys Brook supports Good macroinvertebrate status. The reach of the culvert section its own this culvert would not affect the WFD element at the scale of the waterbody. Potential localised adverse effect anticipated.	Discharge (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. Although 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 status of this element.	Potential minor adverse effects on water quality of Bayleys Brook. Although 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, not affecting the overall status of this element.	Only minor and temporary effects anticipated on base flows of Bayleys Brook. Although 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. Although 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.		No additional mitigation required - Additional in-stream habitat enhancements to streams and rivers should be implemented for any loss of in-stream habitat within Bayleys Brook or other tributaries due to culverting No additional mitigation required - Culverts on Hom Brook, the River Blythe bypass and Bayleys Brook and its tributaries to be regularly maintained - Construction and post-construction monitoring should be considered (if necessary)	Minor and localised effects Provided that mitigation measures are implemented as described, there would not be an effect on the WFD status of this element at the water body level.	
	I. Fish	High	High	No scheme elements on upstream water bodies	Localised and temporary adverse effect during construction. No deterioration of the water body status if the element is however expected.	Proposed AP4 changes are likely to lead to a further permanent loss of 15 m (in habitat length) of the Marsh Lane culvert. Bayleys Brook supports brown trout spawning habitat and brown trout populations upstream of the Marsh Lane culvert. Potential localised adverse effect anticipated.	No additional effect anticipated (loss of vegetation already included in the landtake impact)	Proposed AP4 changes will lead to a further permanent loss of 15 m (in habitat length) of the Marsh Lane culvert. Bayleys Brook supports brown trout spawning habitat and brown trout populations upstream of the Marsh Lane culvert. Potential localised adverse effect anticipated.	Discharge (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. Although Bayleys Brook is of good 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. Although Bayleys Brook is of good 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. Although Bayleys Brook is of good value for fish in its upstream reach, it supports good spawning habitat and brown trout populations on the downstream reach surveyed. 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. Although Bayleys Brook is of good value for fish in its upstream reach, it supports good spawning habitat and brown trout populations on the downstream reach surveyed. Potential localised and minor adverse effect expected, with no further effect at the water body level.	Slow culvert elements (6 culverts; 2 river diversions; 2 viaduct footings; one cutting and one retaining wall) are described as having the potential for adverse effects on fish. Of these, 2 culverts, on the River Blythe bypass, assessed to support low-level spawning habitat, and Hom 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. In addition, AP4 changes will lead to further loss of habitat at Bayleys Brook, which is represented by an 'Good' high' quality spawning habitat and which may also be the most suitable along the Bayleys Brook reach for brown trout spawning habitat and juvenile brown trout habitat. 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 fish WFD element at the water body scale.	An assessment of the culverts on the River Blythe bypass and Hom 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 passage, e.g. by the use of baffles or low-level low flow slots. Additional in-stream habitat enhancements to streams and rivers should be implemented for any loss of in-stream habitat within Bayleys Brook or other tributaries During dewatering of water bodies, fish rescue to be carried out.	- Culverts on Hom 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.	Minor and localised effects Provided that mitigation measures are implemented as described, there would not be an effect on the WFD status of this element at the water body level.	
	Physico-Chemical status																	
WFD classification elements	G. Dissolved Oxygen	High	-	No scheme elements on upstream water bodies	N/A	N/A	• The additional length of the proposed AP4 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 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 AP4 culvert 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.	• The construction of the proposed AP4 culvert 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.	• 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.	*Potential minor and localised effects on element*. The additional culvert length and amendments to the Bayleys Brook 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. where there is a risk that in combination the structures will impede the regime), the additional culvert length will be 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.	No additional mitigation required	No additional mitigation required	Minor and localised effects	
	G. pH	High	-	No scheme elements on upstream water bodies	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			No significant effects	
	T. Phosphate	Moderate	-	No scheme elements on upstream water bodies	N/A	N/A	Receptor is insensitive to impact	• The construction of the proposed AP4 culvert 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.	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.	Depending on how much flow is lost, potential minor and localised effects on element. The additional culvert length and amendments to the Bayleys Brook 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. where there is a risk that in combination the structures will impede the regime), the additional culvert length will be 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. 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	
	R. Ammonia	High	-	No scheme elements on upstream water bodies	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	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.					
	R. Temperature	-	-	No scheme elements on upstream water bodies	N/A	N/A	• The additional length of the proposed AP4 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 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	Receptor is insensitive to impact.	Receptor is insensitive to impact.	Receptor is insensitive to impact	Receptor is insensitive to impact					
	SI. Specific Pollutants (Annex VIII)	High	-	No scheme elements on upstream water bodies	N/A	N/A	Receptor is insensitive to impact	• The construction of the proposed AP4 culvert 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.	• The construction of the proposed AP4 culvert 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.	• 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.					
	Hydromorphological status																	**Hydromorphology Baseline**
WFD classification elements	I3. Quantity and dynamics of river flow	-	-	No scheme elements on upstream water bodies	N/A	N/A	N/A	• Channel width appear to be approximately 1m, with a bankfull cross-section that appears to have been modified/engineered for agricultural and infrastructure purposes • Cumulative impacts as a result of river diversions within previous AP's will be further impact as a result of Bayley's Brook diversion amendment which includes, additional culverts, the proposed widening two-west of Junction improvement and earthworks at Hrami Lane and Kenilworth Road which are likely to have an impact on current hydromorphological conditions.	N/A	N/A	N/A	N/A	N/A	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	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 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	**Hom 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. **Blythe Bypass** 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 microhabitats suitable for lithophilic fish and macroinvertebrate species in particular. There is potential for further improvement 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 was present
	I2. Connection to Groundwater	-	-	No scheme elements on upstream water bodies	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					
	I3. River continuity	-	-	No scheme elements on upstream water bodies	N/A	N/A	N/A	• The new length of culvert (25m) would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever any existing riparian continuity.	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 deposition/erosion processes) and in-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 deposition/erosion processes) and in-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				
	I4. River depth and width variation bed	-	-	No scheme elements on upstream water bodies	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 approximately 1m wide , and the size of the channel suggests there may not be a significant impact on flow widths and depths	N/A		N/A		N/A					
	I5. Structure and substrate of river bed	-	-	No scheme elements on upstream water bodies	N/A	N/A	N/A	• The channel water surface at the crossing location is approximately 1m wide, the brook is already extensively culverted because of the A4023 crossing, so there is unlikely to be significant impacts on flow widths • If the culvert base is set below the channel bed, the impacts on the river should be minimal, but this is a risk that should be mitigated.	N/A		N/A		N/A					
	I6. Structure of riparian zone	-	-	No scheme elements on upstream water bodies	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 continuity. However, the culvert is short and the loss of these features and on practical terms would not impact on deterioration of water body status.	N/A		N/A		N/A					

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

Other measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	Potential impacts from other WFD water bodies (assessed separately)															
Biological sub-elements currently at high status, so no mitigation measures. Water body at moderate status due to Phosphate or Total Phosphate (PSL).	-	-	N/A							-	-	-	-	N/A	N/A	N/A	N/A	

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

Water Body ID	Groundwater Body Name	CFA	River Basin District	AP4 Summary	AP4 Assessment	Current WFD Status		Changes from AP4 Assessments
						Quantitative	Qualitative	
GB40602G602800	Radlett Tertiaries	5, 6, 7, 8	Thames	Y	AP-C221-088	Poor	Poor	No elements requiring assessment
GB40601G601200	Mid-Chilterns Chalk	7, 8, 9, 10	Thames	Y	AP-C222-061, AP-C222-284	Poor	Poor	None
GB40601G604100	Chiltern Chalk Scarp	10, 11	Thames	-	-	Poor	Good	No elements requiring assessment
GB40602G600700	Headington Corallian	11, 12	Thames	-	-	Good	Good	No elements requiring assessment
GB40501G402300	Upper Bedford Ouse Oolite Principal	13, 14, 15	Anglian	-	-	Good	Poor	No elements requiring assessment
GB40502G401300	Upper Bedford Ouse Oolite Secondary	13, 14, 15	Anglian	-	-	Good	Good	No elements requiring assessment
GB40602G604200	Byfield Jurassic	15	Thames	-	-	Good	Good	No elements requiring assessment
GB40602G600200	Banbury Jurassic	15, 16	Thames	-	-	Good	Good	No elements requiring assessment
GB40902G990900	Warwickshire Avon - Secondary Mudrocks	16, 17, 18	Severn	Y (AP-C223-202)	none required	Good	Good	None
GB40901G300700	Warwickshire Avon - PT Sandstone Warwick/Avon Confined	17, 18	Severn	Y	CNO-137-002	Poor	Good	None
GB40902G302200	Warwickshire Avon - Coal Measures Coventry	17, 18, 23	Severn	Y	AP-C223-220 (CNO-145-008)	Poor	Poor	None
GB40401G302700	Tame Anker & Mease - PT Sandstone Nuneaton & Meriden	23	Humber	-	-	Good	Good	No elements requiring assessment
GB40402G990800	Tame Anker Mease - Secondary Combined	19, 20, 21, 22, 23, 24, 25, 26	Humber	Y	AP-C223-112, (AP-C223-233) AP-C224-025 CNO-172-001	Good	Poor	None
GB40401G301000	Tame Anker Mease - PT Sandstone Birmingham Lichfield	21, 22, 26	Humber	-	-	Poor	Poor	No elements requiring assessment
GB40402G300300	Staffordshire Trent Valley - Mercia Mudstone East & Coal Measures	22	Humber	-	-	Good	Good	No elements requiring assessment
GB40603G000300	Lower Thames Gravels	Off-route	Thames	-	-	Good	Poor	No elements requiring assessment

Key for AP4 Assessment Changes:

	In AP4 Summary sheet, this cell indicates where assessment is required for the Scheme Element.
Red text or **Bold Black** text	In assessment tab, where new assessment has been undertaken
~~In assessment tab, where Main ES Scheme element has been removed or replaced by AP4 change~~	

Water Body ID	GB40602G602800
Groundwater Body Name	Radlett Tertiaries
CFAs covered by Waterbody	5, 6, 7, 8

No Groundwater WFD surveys carried out on water body

CFA	7
AP4 ID	AP-C221-088
AP4 Location	Uxbridge Golf Course - Colne Valley
New/Replacement Scheme Element	NEW
AP4 Scheme Element Type	Temporary Road Construction
Original Scheme	The movement of construction vehicles carrying materials, plant, other equipment and workforce on public roads will be via designated construction traffic routes within the West Ruislip and Ickenham area. A temporary railhead to facilitate construction works and allow removal of surplus excavated material will be provided between Breakspear Road South and Harvil Road (in CFA6).
AP4 Description	The temporary provision of a haul road from A40 / Swakeleys Road roundabout to the western side of Harvil Road, through Uxbridge Golf Course, to carry construction traffic, bypassing the residential areas.
Changes to Previously assessed elements	none
AP4 Assessment Requirements	Temporary Road Construction
Drawings (Original, AP2 and AP4) Construction Phase (05) Proposed Scheme (06)	AP-C221-088 - Uxbridge Golf Course Haul Route

Requires Assessment

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

	Groundwater body					Scheme Elements	Bored Tunnel		Cutting		Retaining Wall		Tunnel Portal		Other 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
							Ruislip Tunnel (CFA6) - outside GWB in undesignated strata but close to boundary so included for completeness.		Copthall Cutting (CFA7)		West Ruislip Retaining Wall (CFA6)		West Ruislip Tunnel Portal (CFA6)		Uxbridge Golf Course Temporary Haul Road (CFA 7) AP-C221-088				
	GB40602G602800					Phase	Construction	Construction & Operation	Construction & Operation		Construction & Operation		Construction & Operation		Construction				
	Radlett Tertiaries	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	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				
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	Low	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 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.	Poor	Low	At Risk	Good Ecological Status by 2015		Crosses beneath East & West Arms of Yeading Brook. W end is in River Pinn catchment. Watercourses all well above bedrock water table and are assumed to have limited groundwater dependency in area. No significant impacts predicted.	Nearest watercourses are not GW dependent. No significant impacts identified.	Cutting CU 024-L3 will pass through the London Clay into the Lambeth Group but would not penetrate the Chalk. The cutting is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	The cutting is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	The retaining wall is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	The retaining wall is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	Portal will pass through the London Clay into the Lambeth Group but would not penetrate the Chalk. The portal is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	The portal is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	Close to River Colne (GB106039023090) and lakes in Frays Farm Meadow SSSI. Limited dewatering requirements anticipated, and limited reduction to water infiltration. No significant impacts identified.	No significant impacts identified.	No Significant Deterioration	None required	No Significant Deterioration
	3. Groundwater Dependent Terrestrial Ecosystems (GWDTE's). To assess the impact of groundwater abstractions on the condition of GWDTE'S.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		Islip Manor and Northolt Manor LNRs near E end of tunnel. Located above London Clay and well above bedrock water table so unlikely to be GWDTEs. No significant effects predicted.	No significant impacts identified.	Cutting CU 024-L3 will pass through the London Clay into the Lambeth Group but would not penetrate the Chalk. The cutting is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	The cutting is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	The retaining wall is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	The Retained Embankment is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	Portal will pass through the London Clay into the Lambeth Group but would not penetrate the Chalk. The portal is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	The portal is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	Haul road crosses part of Fray's Farm Meadow SSSI, and could lead to reduction in infiltration for the SSSI, but limited dewatering requirements are necessary so no significant impacts are identified.	Local or 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		W end of tunnel above water table. E end of tunnel below water table. TBM will have allow minor water ingress during construction. Inflow after grouting will be limited. Localised and temporary dewatering for shaft at South Ruislip.	Local influence on groundwater flow regime due to presence of tunnel in Chalk.	Cutting CU 024-L3 will pass through the London Clay into the Lambeth Group but would not penetrate the Chalk. The cutting is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	The cutting is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	The retaining wall is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	The Retained Embankment is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	Portal will pass through the London Clay into the Lambeth Group but would not penetrate the Chalk. The portal is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	The portal is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	No impacts identified as result of scheme element	Local or temporary effects	Remains Good Status	None required	Remains Good Status
	Quantitative status	Poor															Poor		Poor

	Groundwater body					Scheme Elements	Bored Tunnel		Cutting		Retaining Wall		Tunnel Portal		Other 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
							Ruislip Tunnel (CFA6) - outside GWB in undesignated strata but close to boundary so included for completeness.		Copthall Cutting (CFA7)		West Ruislip Retaining Wall (CFA6)		West Ruislip Tunnel Portal (CFA6)		Uxbridge Golf Course Temporary Haul Road (CFA 7) AP-C221-088				
	GB40602G602800					Phase	Construction	Construction & Operation	Construction & Operation		Construction & Operation		Construction & Operation		Construction				
	Radlett Tertiaries	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Disturbing or mobilising existing poor quality groundwater by depressurisation	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 depressurisation	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 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 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 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.	Poor	Low	At Risk	Good Chemical Status by 2015		Crosses beneath East & West Arms of Yeading Brook. W end is in River Pinn catchment. Watercourses all well above bedrock water table and are assumed to have limited groundwater dependency 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.	Crosses beneath East & West Arms of Yeading Brook. W end is in River Pinn catchment. Watercourses all well above bedrock water table and are assumed to have limited groundwater dependency. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element.	Cutting CU 024-L3 will pass through the London Clay into the Lambeth Group but would not penetrate the Chalk. The cutting is above the groundwater table. 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.	Retained Embankment is unlikely to encounter groundwater in the Chalk. 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.	Portal will pass through the London Clay into the Lambeth Group but would not penetrate the Chalk. The portal is above the groundwater table. 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 identified.	No Significant Deterioration	None required	No Significant Deterioration
	3. GWDTE's. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTE's.	Good	High	Probably Not At Risk	Good Chemical Status by 2015		Islip Manor and Northolt Manor LNRs near E end of tunnel. Located above London Clay and well above bedrock water table so unlikely to be GWDTEs. No significant effects predicted.	No significant impacts identified.	Cutting CU 024-L3 will pass through the London Clay into the Lambeth Group but would not penetrate the Chalk. The cutting is above the groundwater table. No GWDTEs located in vicinity of scheme element. No impacts identified as result of scheme element.	Cutting CU 024-L3 will pass through the London Clay into the Lambeth Group but would not penetrate the Chalk. The cutting is above the groundwater table. No GWDTEs located in vicinity of scheme element. No impacts identified as result of scheme element	Retained Embankment is unlikely to encounter groundwater in the Chalk. No GWDTEs located in vicinity of scheme element. No impacts identified as result of scheme element.	Retained Embankment is unlikely to encounter groundwater in the Chalk. No GWDTEs located in vicinity of scheme element. No impacts identified as result of scheme element.	Portal will pass through the London Clay into the Lambeth Group but would not penetrate the Chalk. The portal is above the groundwater table. No GWDTEs located in vicinity of scheme element. No impacts identified as result of scheme element.	Portal will pass through the London Clay into the Lambeth Group but would not penetrate the Chalk. The portal is above the groundwater table. No GWDTEs located in vicinity of scheme element. No impacts identified as result of scheme element	Road crosses Fray's Farm Meadow SSSI, likely to be a GWDTE due to the presence of MG8, Cynosurus cristatus. CoCP and best practice for design, construction and operations reduce risks to water quality.	Localised or temporary effects. No change in status predicted.	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		Designated DrWPA. Close to SPZ 1 at W end but tunnel is above water table here. Tunnelling and shaft construction potential to have moderate impact on groundwater quality due to migration of fluids and turbidity. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Minor or temporary change in groundwater quality predicted.	In DrWPA and near SPZ1. Inward head gradient. Tunnel grouted in place. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Designated groundwater DrWPA and located within SPZ1. Cutting is above the groundwater table. 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.	Designated groundwater DrWPA and located within SPZ1. Cutting is above the groundwater table. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	Designated groundwater DrWPA and located within SPZ1. Retained embankment unlikely to intersect groundwater. 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.	Designated groundwater DrWPA and located within SPZ1. Retained embankment unlikely to intersect groundwater. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	Designated groundwater DrWPA and located within SPZ1. Portal is above the groundwater table. 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.	Designated groundwater DrWPA and located within SPZ1. Portal is above the groundwater table. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	Not in Designated groundwater DrWPA. No impacts identified as result of scheme element	Localised/temporary or other minor 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		Tunnel extends below water table into Chalk. Tunnelling and shaft construction will have potential to impact groundwater quality due to fluids used in construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Minor or temporary change in groundwater quality predicted.	Inward head gradient. Tunnel grouted in place. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Cutting is above the groundwater table. 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.	Cutting is above the groundwater table. Potential for impact to groundwater quality through the unsaturated zone. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	Retained embankment unlikely to intersect groundwater. 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.	Retained embankment unlikely to intersect groundwater. Potential for impact to groundwater quality through the unsaturated zone. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	Portal is above the groundwater table. 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.	Portal is above the groundwater table. Potential for impact to groundwater quality through the unsaturated zone. 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. 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 or other minor effect. No change in status predicted.	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	Bored Tunnel		Cutting		Retaining Wall		Tunnel Portal		Other 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
						Ruislip Tunnel (CFA6)		Copthall Cutting (CFA7)		West Ruislip Retaining Wall (CFA6)		West Ruislip Tunnel Portal (CFA6)		Uxbridge Golf Course Temporary Haul Road (CFA 7) AP-C221-088				
2. Surface water (quantitative & chemical)	Poor			Good Status by 2015	Phase	Construction	Construction & Operation	Construction & Operation		Construction & Operation		Construction & Operation		Construction				
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 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 bodies, GWDTE's or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	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 depressurisation	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 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	None required	RBMP measure insensitive to impact
R&D on fate and transport of phosphate in groundwater to determine impact on surface water.	Thames RBD			2012		No significant effects predicted.	No significant effects predicted.	Cutting is above groundwater table. No impacts identified as result of scheme element.	Cutting is above groundwater table. No impacts identified as result of scheme element.	Retained embankment unlikely to intersect groundwater. No impacts identified as result of scheme element.	Retained embankment unlikely to intersect groundwater. No impacts identified as result of scheme element.	Portal is above the groundwater table. No impacts identified as result of scheme element.	Portal is above the groundwater table. No impacts identified as result of scheme element.	No impacts identified as result of scheme element.	No significant impacts identified.	No significant impacts identified.	None required	No significant impacts identified.
Investigation to improve confidence in groundwater quantitative status result	Radlett Tertiaries			2010		Include tunnel dewatering in any assessments for quantitative status	No significant effects predicted.	Cutting is above the groundwater table and would not interfere with groundwater flow. Therefore there is no potential for impact on water balance or groundwater flow.	Cutting is above groundwater table. No impacts identified as result of scheme element.	Retained embankment unlikely to intersect groundwater. No impacts identified as result of scheme element.	Retained embankment unlikely to intersect groundwater. No impacts identified as result of scheme element.	Portal is above the groundwater table. No impacts identified as result of scheme element.	Portal is above the groundwater table. No impacts identified as result of scheme element.	No impacts identified as result of scheme element.	No significant impacts identified.	No significant impacts identified.	None required	No significant impacts identified.

Ref:
Environment Agency (2013) Colne abstraction licensing strategy
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

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	9
AP4 ID	AP-C222-061	AP-C222-284
AP4 Location	Buckinghamshire	Buckinghamshire
New/Replacement Scheme Element	NEW	Replacement
AP4 Scheme Element Type	Foundations	Chiltern Tunnel Extension
Original Scheme	The Environmental Statement which supported the Bill described potential mitigation options to treat water abstractions affected by turbidity as a consequence of tunnelling and piling impacts on groundwater resources.	The original scheme would emerge from tunnel at Mantle's Wood and continue north-west mainly in deep cutting, as far as the B485 Chesham Road where it would enter the South Heath green tunnel. Upon emerging from the South Heath green tunnel, north of Frith Hill the original scheme would continue north-west in a cutting, up to 11m deep in this area, north to Leather Lane The original scheme provided for the permanent provision of the Chiltern tunnel north portal, located approximately 600m west of Hyde Heath including a portal building, access track and a 100m-long porous portal . In the AP2 scheme changes were made to extend the Chiltern tunnel north portal to 220m. The portal building was relocated approximately 120m north-west along the HS2 route to accommodate the longer portal. The permanent access track to the portal building and associated earthwork was extended by approximately 120m in length and realigned closer to the track .
AP4 Description	The Environmental Statement which supported the Bill described potential mitigation options to treat water abstractions affected by turbidity as a consequence of tunnelling and piling impacts on groundwater resources. Since the submission of the Bill mitigation options have been investigated further and the requirement to treat abstracted groundwater at three pump station sites has been identified. • Mill End Pumping Station located at the junction of Springwell Road and A412 Uxbridge Road; • Springwell Lake Pumping Station located between Springwell Lake and the Grand Union Canal; and • West Hyde Pumping Station located on Copper Mill Lane. In the AP4 revised scheme powers of additional temporary land acquisition are provided at these three locations to allow the project to install turbidity treatment equipment. Mill End and Springwell Pumping Station sites are unlikely to be impacted by the works; however, treatment of groundwater at these locations will increase their yield which are currently limited due to natural water quality constraints. These increased yields will help offset potential reductions from pumping stations in proximity to the Proposed Scheme that will be impacted by construction activity. West Hyde is also considered unlikely to be impacted by the scheme construction works, however, land acquisition powers are included on a precautionary basis to ensure that should any adverse impacts be identified appropriate mitigation can be quickly be implemented. The turbidity treatment equipment will be located within the curtilage of the existing pump stations on a concrete pad. They will utilise the existing abstraction and discharge points present within the existing pumping station facilities.	Extension of the bored Chiltern tunnel by 2.6km from Mantle's Wood, north west of Hyde Heath emerging at a revised Chiltern tunnel north portal north west of South Heath. The changes within CFA9 associated with the extension of the Chiltern tunnel are listed below: • extension of bored Chiltern tunnel by approximately 2.6km and an increase in depth and width of the bored tunnel alignment; • revised design of Little Missenden vent shaft and auto-transformer station (ATS); • new Chesham Road vent shaft and auto-transformer station (ATS) and associated satellite compound; • a temporary access from the A413 to the Chiltern Tunnel north portal construction compound; • removal of environmental mitigation i n the original scheme between Mantle's Wood and the new north portal; and • incorporation of landscape earthworks and planting around the new north portal to integrate the feature into the surrounding landform.
Changes to Previously assessed elements	Mitigation for impacts identified for Chilterns Tunnel and Colne Valley Viaduct	Bored Chiltern Tunnel is extended by 2.6 km, Chiltern tunnel North cutting has changed location, south heath cutting is shortened, and deepened at chiltern tunnel portal by around 10 m, embankments in the vicinity of chiltern tunnel, south heath cut and cover tunnel is removed, chiltern tunnel portal north has changed location and deepened by around 10 m.
AP4 Assessment Requirements	New detail on mitigation to be added to Chilterns Tunnel and Colne Valley Viaduct elements. The mitigation will need agreement with Affinity Water and the Environment Agency	Removal of South Heath Cut and cover tunnel, bored tunnel, chiltern tunnel north cutting, south heath cutting, chiltern tunnel portal north
Drawings (Original, AP2 and AP4) Construction Phase (05) Proposed Scheme (06)	CT-05_CFA07_AP4, CT-06_CFA07_AP4	CT-05_CFA09_AP4

Requires Assessment

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

							lengthened and deepened						deepened		removal				
	Groundwater body					Scheme Elements	Bored Tunnel		Cutting										Embankment
							Chiltern Tunnel (CFA7, CFA8, CFA9)		Tilehouse Lane Cutting (CFA7)		Chiltern Tunnel South Approach Cutting (CFA7)		Chiltern tunnel north approach cutting (CFA9)		South Heath Cutting (CFA9)		Rocky Lane South Cutting (CFA9, CFA10)		Embankments in vicinity of Chiltern Tunnel and South Harefield (CFA7)
							AP-C222-061, AP-C222-284	AP-C222-284					AP-C222-284	AP-C222-284	AP-C222-284	AP-C222-284			AP-C222-284
	GB40601G601200					Phase	Construction	Construction & Operation	Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation
	Mid-Chilterns Chalk	**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	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
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 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	High	At Risk	Good Ecological Status by 2015		Tunnelling may influence GW-SW interactions due to influence on local fracturing. May influence dry weather flows at Shardeloes Lake crossing. Misbourne does not always flow at Chalfont St Giles crossing during dry weather. Dewatering of the vent shafts during construction may cause moderate impact through reduction in flow in River Misbourne. However, negligible resultant impact to groundwater through mitigation where dewatering effluent will be returned to the aquifer through reinjection/recharge wells adjacent to each shaft. No net abstraction and impact on river flows. Potential to exacerbate occasional flooding in River Misbourne due to mounding of groundwater unlikely due to small tunnel diameter in relation to thickness of Chalk aquifer so change to groundwater flow regime will be negligible.	Tunnelling may influence GW-SW interactions due to influence on local fracturing and grouting. May influence dry weather flows at Shardeloes Lake crossing. Misbourne does not always flow at Chalfont St Giles crossing during dry weather. Potential to exacerbate occasional flooding in River Misbourne due to mounding of groundwater unlikely due to small tunnel diameter in relation to thickness of Chalk aquifer so change in flows will be negligible.	Scheme element is greater than 10m above maximum recorded groundwater levels in bedrock aquifer. Perched groundwater in superficial deposits may be present. No significant impacts on groundwater / surface water interactions predicted.	No significant impacts identified as result of scheme element	No impact on surface water / groundwater interaction as scheme element above groundwater table and no dewatering proposed.	No impact on surface water / groundwater interaction as scheme element above groundwater table	No impact on surface water / groundwater interaction as scheme element above groundwater table and no dewatering proposed.	No impact on surface water / groundwater interaction as scheme element above groundwater table	No impact on surface water / groundwater interaction as scheme element above groundwater table and no dewatering proposed.	No impact on surface water / groundwater interaction as scheme element above groundwater table	No impact on surface water / groundwater interaction as scheme element above groundwater table and no dewatering proposed.	No impact on surface water / groundwater interaction as scheme element above groundwater table	No impacts identified as result of scheme element
	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		Dewatering of the vent shafts during construction may cause moderate impact through reduction in flow in River Misbourne. However, negligible resultant impact to groundwater through mitigation where dewatering effluent will be returned to the aquifer through reinjection/recharge wells adjacent to each shaft. No net abstraction and impact on river flows. Potential to exacerbate occasional flooding in River Misbourne due to mounding of groundwater unlikely due to small tunnel diameter in relation to thickness of Chalk aquifer so change to groundwater flow regime will be negligible.	Potential to exacerbate occasional flooding in River Misbourne due to mounding of groundwater unlikely due to small tunnel diameter in relation to thickness of Chalk aquifer so change in flows will be negligible.	Scheme element is greater than 10m above maximum recorded groundwater levels in bedrock aquifer. Perched groundwater in superficial deposits may be present. No significant impacts on nearby GWDTEs predicted.	No significant impacts identified as result of scheme element	No known GWDTEs located in vicinity of scheme element. Scheme element is above groundwater table and no dewatering proposed.	No impact as scheme element above groundwater table.	No potential impact on GWDTEs as scheme element above groundwater table and no dewatering proposed.	No impact as scheme element above groundwater table.	No potential impact on GWDTEs as scheme element above groundwater table and no dewatering proposed.	No impact as scheme element above groundwater table.	No known GWDTEs located in vicinity of scheme element. Scheme element is above groundwater table and no dewatering proposed.	No impact as scheme element above groundwater table.	No impacts identified as result of scheme element
	4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Poor	Low	At Risk	Good Ecological Status by 2015		Dewatering during construction of the tunnel likely to cause minor impact on groundwater quality and flows in the chalk aquifer. Reinjection of dewatering effluent will mean that there is no net abstraction. Negligible impacts after mitigation.	Potential disruption to groundwater flow in the Chalk. An altered flow regime may reduce source output to abstractions close to the route. Considering the size of the tunnels and vent shafts and because Chilterns Tunnel roughly parallel to groundwater flow, scheme element is unlikely to form obstruction to flow. Effects on flow regime expected to be localised.	Scheme element is greater than 10m above maximum recorded groundwater levels. Perched groundwater in superficial deposits (sand and gravels) may be intersected by cutting. No significant impacts on water balance of bedrock aquifer predicted.	No impacts identified as result of scheme element	Scheme element is 10 to 15m above maximum recorded groundwater levels. No impact as no dewatering proposed.	No impacts identified as result of scheme element	Scheme element is 10-40m above maximum recorded groundwater levels. No impact as no dewatering proposed.	No impacts identified as result of scheme element	Scheme element is 10-40m above maximum recorded groundwater levels. No impact as no dewatering proposed.	No impacts identified as result of scheme element	Scheme element is at least 30m above maximum recorded groundwater levels. No impact as no dewatering proposed.	No impacts identified as result of scheme element	Minor influence on local recharge patterns. No significant impacts identified as result of scheme element.

Quantitative status	Poor

	Groundwater body					Scheme Elements	Bored Tunnel		Cutting										Embankment
							Chiltern Tunnel (CFA7, CFA8, CFA9)		Tilehouse Lane Cutting (CFA7)		Chiltern Tunnel South Approach Cutting (CFA7)		Chiltern tunnel north approach cutting (CFA9)		South Heath Cutting (CFA9)		Rocky Lane South Cutting (CFA9, CFA10)		Embankments in vicinity of Chiltern Tunnel and South Harefield (CFA7)
	GB40601G601200					Phase	AP-C222-061, AP-C222-284 Construction	AP-C222-284 Construction & Operation	Construction & Operation		Construction & Operation		AP-C222-284 Construction & Operation	AP-C222-284	AP-C222-284 Construction & Operation	AP-C222-284	Construction & Operation		AP-C222-284 Construction & Operation
	Mid-Chilterns Chalk	**Current status**	**Confidence**	**Risk**	**Status objective**	**Identified chemical impacts**	Disturbing or mobilising existing poor quality groundwater by depressurisation	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	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
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)**	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
	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		Tunnel passes under surface water bodies of Shardeloes Lake and River Misbourne. Tunnelling and shaft construction potential to have minor impact on groundwater quality due to fluids used during construction, piling and diaphragm walls. Water quality issues within groundwater likely to diminish within groundwater towards surface water receptors. Dewatering effluent will be returned to the aquifer through reinjection/recharge wells adjacent to each shaft. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Tunnelling may influence GW-SW interactions due to influence on local fracturing and grouting. May influence water chemistry in Misbourne & Shardeloes Lake during dry weather.	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 pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed.	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 pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed.	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 pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed.	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 pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed.	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. 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		Tunnel passes under groundwater dependent habitats of Shardeloes Lake and River Misbourne. Tunnelling and shaft construction potential to have minor impact on groundwater quality due to fluids used during construction, piling and diaphragm walls. Water quality issues within groundwater likely to diminish within groundwater towards surface water receptors. Dewatering effluent will be returned to the aquifer through reinjection/recharge wells adjacent to each shaft. No net abstraction and impact on GWDTE. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Tunnelling may influence GW-SW interactions due to influence on local fracturing and grouting. May influence water chemistry in Misbourne & Shardeloes Lake during dry weather.	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 potential pollutant linkage as no known GWDTEs located in vicinity of scheme element. Scheme element is above groundwater table.	No impacts identified as result of scheme element	Scheme element is 20-50m above groundwater table. No impacts identified as result of scheme element	Scheme element is 10-40m above groundwater table. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact on GWDTEs following mitigation.	Scheme element is 10-40m above groundwater table. No impacts identified as result of scheme element	Scheme element is 10-40m above groundwater table. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact on GWDTEs following mitigation.	No potential pollutant linkage as no known GWDTEs located in vicinity of scheme element. Scheme element is above groundwater table.	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.	Poor	High	At Risk	Good Chemical Status by 2015		Designated DrWPA, located within SPZ1 to 3 and near private abstractions. Landfills and existing poor quality groundwater in vicinity. Tunnelling and shaft construction potential to have moderate impact on groundwater quality at nearby PWS / SPZ due to migration of fluids and turbidity. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Temporary change in groundwater quality predicted. Additional mitigation for PWS still to be finalised. Additional Provision for use of land for installation of treatment systems for treating abstracted groundwater at three pump station sites: • Mill End Pumping Station located at the junction of Springwell Road and A412 Uxbridge Road; • Springwell Lake Pumping Station located between Springwell Lake and the Grand Union Canal; and • West Hyde Pumping Station located on Copper Mill Lane. Increased yields at these stations will offset reductions from other pumping stations in proximity to the Proposed Scheme that will be impacted by construction activity.	In DrWPA and within SPZ1 and SPZ2. Tunnel grouted in place. Inward head gradient. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts predicted as result of scheme element but sensitive setting in SPZ1.	Designated DrWPA and located within SPZ1 (from 3 PWS abstractions) and private abstractions. 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. Major change in groundwater quality predicted.	Designated DrWPA, located within SPZ1 (from 3 PWS abstractions) and private abstractions. Creation of new preferential pathways to groundwater / within aquifer. CoCP and best practice for design, construction and operations reduce risks to groundwater quality.	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 SPZ2. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Designated DrWPA and located within SPZ3 catchment (from PWS). CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Minor or temporary change in groundwater quality predicted.	In DrWPA and SPZ3. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Designated DrWPA and located within SPZ2 (from PWS). CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Minor or temporary change in groundwater quality predicted.	In DrWPA and SPZ2. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Designated DrWPA and located within SPZ2 (from PWS). 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.	Designated DrWPA and located within SPZ1 and SPZ2 (from PWS). CoCP and best practice for design, construction and operations reduce risks to water 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		Landfills and existing poor quality groundwater in vicinity. Tunnelling and shaft construction will have potential to impact groundwater quality due to fluids used in construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Temporary change in groundwater quality predicted.	Inward head gradient. Tunnel grouted in place. 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	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

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**	Bored Tunnel		Cutting										Embankment
						Chiltern Tunnel (CFA7, CFA8, CFA9)		Tilehouse Lane Cutting (CFA7)		Chiltern Tunnel South Approach Cutting (CFA7)		Chiltern tunnel north approach cutting (CFA9)		South Heath Cutting (CFA9)		Rocky Lane South Cutting (CFA9, CFA10)		Embankments in vicinity of Chiltern Tunnel and South Harefield (CFA7)
2. Surface water (quantitative), 4. Water balance (quantitative), 1. Saline or other intrusions (chemical)	Poor			Good Status by 2015		AP-C222-061, AP-C222-284	AP-C222-284					AP-C222-284	AP-C222-284	AP-C222-284	AP-C222-284			AP-C222-284
					Phase	Construction	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 poor quality groundwater by depressurisation	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	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
Follow up 1990s report using recent data and knowledge of groundwater surface water inter-relationship, including use of groundwater modelling (hazardous substances and non-hazardous pollutants; Priority Substances & Specific Pollutants).	Mid-Chilterns Chalk			2010	**Predicted change to status elements (green = none, amber = possibly, red = likely)**	Tunnel passes under surface water bodies of Shardeloes Lake and River Misbourne. Tunnelling and shaft construction potential to have minor impact on groundwater quality due to fluids used during construction, piling and diaphragm walls. Water quality issues within groundwater likely to diminish within groundwater towards surface water receptors. Dewatering effluent will be returned to the aquifer through reinjection/recharge wells adjacent to each shaft. No net abstraction and impact on river flows. 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	No significant pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed.	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 pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed.	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 pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed.	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 pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed.	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
Thames Groundwater Pollution Prevention project.	Mid-Chilterns Chalk			2010		Tunnelling and shaft construction will have potential to impact groundwater quality due to fluids used in construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Minor or temporary change in groundwater quality predicted.	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	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
Comply with Pt 2a Contaminated Land Remediation Notice served to clean up bromate (and bromide) groundwater pollution plume.	Mid-Chilterns Chalk			2010		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
Targeted Pollution Prevention campaign and advice to industry driven by groundwater pollution.	Mid-Chilterns Chalk			2012		Tunnelling and shaft construction will have potential to impact groundwater quality due to fluids used in construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Minor or temporary change in groundwater quality predicted.	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	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
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		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
Appropriate policies in Local Development Plans to ensure protection of groundwater.	Mid-Chilterns Chalk			2010		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
Improvements to 2 water company sewage treatment works to protect groundwater quality (PR09).	Mid-Chilterns Chalk			2015		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
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	No significant pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed.	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 pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed.	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 pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed.	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 pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed.	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

Ref:
Environment Agency (2013) Colne abstraction licensing strategy
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

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

| | | | | | Version1 | | | | |

Water Body ID	GB40901G300700
Groundwater Body Name	Warwickshire Avon - PT Sandstone Warwick/Avon Confined
CFAs covered by Waterbody	17, 18

CFA	18
AP4 ID	CNO-137-002
AP4 Location	Stoneleigh
New/Replacement Scheme Element	UTILITIES
AP4 Scheme Element Type	Gas Utilities Diversion
Original Scheme	This utility diversion is referred to within para 2.3.38 of Vol2 (CFA 18) of the ES but not specifically mentioned in any other chapter.
AP4 Description	National Grid (Gas Distribution) – diversion of 600mm steel high pressure main at Stoneleigh, Intersecting A445 Leicester Lane, Close to Furzenhill Farm. Construction methodology to include stopple pits.
Changes to Previously assessed elements	Previously assessed element: A445 Leicester Lane Overbridge (CFA18)
A42 Assessment Requirements	Assessment of construction method including stopple pits
Drawings (Original, AP2 and AP4) Construction Phase (05) Proposed Scheme (06)	

Requires Assessment

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
							Cubbington Cutting (CFA18)		Stonehouse Cutting (CFA18)		Cubbington Embankment (CFA18)	Coventry Road Overbridge (CFA17)	A445 Leicester Lane Overbridge (CFA18)	A445 Gas Utilities Diversion				
							136-L1		137-L3		137-L2	137-L1	137-S1	CNO-137-002				
	GB40901G300700					Phase	Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction				
	Warwickshire Avon - PT Sandstone Warwick/Avon Confined	**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	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	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	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	**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 significant impacts predicted.	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		Cutting is 3m deep into Bromsgrove Sandstone. Limited dewatering may be required. ROI is estimated to be 50m. Cutting is oriented parallel to surface water divide. Water returned to ground via SuDS. No significant impacts on surface waters predicted.	Cutting is oriented parallel to surface water divide. No significant impacts on surface waters predicted.	Cutting is oriented parallel to surface water divide. Water returned to ground via SuDS; pumped to attenuation pond close to River Avon. No significant impacts on surface waters predicted.	Cutting is oriented parallel to surface water divide. No significant impacts on surface waters predicted.	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.	Overbridge construction will require the diversion of existing road drainage. If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	unnamed stream, a tributary of the River Avon is close to the area of the Gas diversion. If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	Local or temporary effects. No change in status predicted.	No Significant Deterioration	None required	No Significant Deterioration
	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		Cutting is 3m deep into Bromsgrove Sandstone. Limited dewatering may be required. ROI is estimated to be 50m. There are no GWDTEs found within the 50m ROI of cutting. Pond near Leicester Lane (potential GWDTE) identified 160m from cutting. No significant impacts predicted.	No impacts identified as result of scheme element	River Avon LWS is within ROI of cutting. Cutting crosses Stoneleigh Park LWS; not considered a GWDTE. Water returned to ground via SuDS; pumped to attenuation pond close to River Avon. No significant impacts on GWDTEs predicted	No 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.	Pond near Leicester Lane (potential GWDTE) identified 160m from cutting and realigned road drainage. If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	Pond near Leicester Lane (potential GWDTE) identified in surrounding area. If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	Local or temporary effects. No change in status predicted.	Remains Good Status	None required	Remains Good Status
	4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Poor	Low	At Risk	Good Ecological Status by 2015		Cutting is 3m deep into Bromsgrove Sandstone. Limited dewatering may be required. Water returned to ground via attenuation pond within GWB; some water transferred in from WA SM GWB. CoCP and best practice for design, construction and operations reduce risks to groundwater.	No impacts identified as result of scheme element	Cutting is 5m deep and in Bromsgrove Sandstone at S end. Water returned to ground via attenuation pond next to River Avon within WA CMC GWB.	No 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.	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.	Groundwater transferred out of GWB. GWB is already at Poor Status for water balance. GWB is small so limited capacity to absorb abstraction impacts.	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	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
							Cubbington Cutting (CFA18)		Cubbington Cutting (CFA18)		Cubbington Embankment (CFA18)	Coventry Road Overbridge (CFA17)	A445 Leicester Lane Overbridge (CFA18)	A445 Gas Utilities Diversion				
							136-L1		136-L1		137-L2	137-L1	137-S1	CNO-137-002				
	GB40901G300700					Phase	Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction				
	Warwickshire Avon - PT Sandstone Warwick/Avon Confined	**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	None identified	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	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 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 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		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	Water returned to ground via SuDS; pumped to attenuation pond close to River Avon. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Water returned to ground via SuDS; pumped to attenuation pond close to River Avon. 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	Overbridge construction will require the diversion of an existing road drain. This has the potential to provide preferential pathway between surface water and groundwater. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	The pipeline diversion has the potential to provide preferential pathway between surface water and groundwater. 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 effects. No change in status predicted.	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	Not At Risk	Good Chemical Status by 2015		There are no GWDTEs found within the 50m ROI 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	There are no GWDTEs found within the 50m ROI 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	Water returned to ground via SuDS; pumped to attenuation pond close to River Avon. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Water returned to ground via SuDS; pumped to attenuation pond close to River Avon. 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	Local or temporary effects. No change in status predicted.	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	High	Probably At Risk	Good Chemical Status by 2015		In DrWPA and SPZ3. Minor dewatering may be required. 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. Negligible impact following mitigation.	In DrWPA and SPZ3. Minor dewatering may be required. 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. Negligible impact following mitigation.	In DrWPA and SPZ3. Private abstractions located to northeast. 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. Negligible impact following mitigation.	In DrWPA and SPZ3. There are private abstractions to the east. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	In DrWPA and SPZ3. There are private abstractions to the east. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Local or temporary effects. 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. Negligible impact following mitigation.	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. Negligible impact following mitigation.	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. Negligible impact following mitigation.	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. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	No significant impacts 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	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
						Cubbington Cutting (CFA18)		Stonehouse Cutting (CFA18)		Cubbington Embankment (CFA18)	Coventry Road Overbridge (CFA17)	A445 Leicester Lane Overbridge (CFA18)	A445 Gas Utilities Diversion				
						136-L1		137-L3		137-L2	137-L1	137-S1	CNO-137-002				
2. Surface water (quantitative), 4. Water balance (quantitative)	Poor			Good Status by 2015	**Phase**	Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction				
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**	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	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control				
Investigations under PR09 (AMP5) Water Industry Investment programme - Investigation to determine cost effective action to manage abstraction to support good GW quantitative status.	Severn RBD			2012		Any minor dewatering required should be considered within abstraction review assessments.	No impacts identified as result of scheme element	Any minor dewatering required should be considered within abstraction review assessments.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Any temporary dewatering required should be considered within abstraction review assessments.	Any temporary dewatering required should be considered within abstraction review assessments.	Any temporary dewatering required should be considered within abstraction review assessments.	Local or temporary effects.	Local or temporary effects.	None required	Local or temporary effects.

Ref:
Environment Agency (2013) Warwickshire Avon abstraction licensing strategy - Warwickshire Avon PT Sandstone Warwick/ Avon Confined, Avon GWMU
Environment Agency website; What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx
Environment Agency (2009) River Basin Management Plan - Severn River Basin District - Annex C Actions to deliver objectives

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	
AP4 ID	AP-C223-220	CNO-145-008
AP4 Location	Burton Green	Burton Green
New/Replacement Scheme Element	NEW	UTILITIES
AP4 Scheme Element Type	Cutting for construction services compound next to extended portal	Pipeline Diversion Construction
Original Scheme	(The scheme) will enter into tunnel just to the south-east of Burton Green. The tunnel is the Burton Green green tunnel; a 621m-long green tunnel, incorporating a 100m long porous portal at each end (Maps CT-06-099, E6, F6, G6 and H6).	Main ES: The pipeline diversion is not labelled on ES Vol2 Maps (CT-05-098, CT-05-099;. However, the ES Vol2 para 2.3.38 refers to the fuel pipeline diversion and generally assesses the impacts of the construction of the Burton Green green tunnel. AP1: AP1-018-030: Additional working area required temporarily to accommodate installation of the pipeline and for sections of pipe to be welded, tested and commissioned prior to installation of the diversion. Permanent access is required to allow access in case of emergency or potential future maintenance requirements.
AP4 Description	The south porous portal of Burton Green Tunnel is extended by 40m south-eastwards to comply with the latest aerodynamic modelling requirements. The length of the solid tunnel is unchanged. As a result of this change, the south portal area, including the tunnel portal buildings, are relocated proportionately further south-eastwards and the portal access road adjusted accordingly. The landscape mitigation earthworks around the portal are redesigned to accommodate these changes and screening levels are unchanged. No additional land is required on a temporary or permanent basis. This change will impact on the BP fuel line diversion that requires further modification following AP2, but is unlikely to require additional land.	British Pipelines Agency – 250mm fuel pipeline at Burton Green Diversion is located at Burton Green, cutting through Brockendon Grange and adjacent to Red Lane and Hob Lane. Changes relate to construction methodology. 250mm 1200psi fuel pipeline to be diverted under HS2 in concrete sleeve. Additional protective measures required for additional impact due to highway being built over line. Pipeline diversion will require liaising between British Pipelines Agency (BPA), HS2 tunnels and the drainage team for the culvert.
Changes to Previously assessed elements	Additional small area of cutting next to Burton Green South Porous Portal (CFA18)	utilities change relates to construction methods. Excavation and dewatering for the pipeline diversion will be temporary and is included in the assessment for the Bockenden Cutting.
AP4 Assessment Requirements	Assessment of impact of changes on previously assessed portal	No assessment required
Drawings (Original, AP2 and AP4) Construction Phase (05) Proposed Scheme (06)		

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

Groundwater body					Scheme Elements	Cutting								Embankment							Green Tunnel	
GB40902GS003R					Phase	Gloucester Wood Cutting (CTA18)	Kenilworth Cutting (CTA19)		Crackley Road Cutting (CTA18)		North Crackley Cutting (CTA19)		Roughmeeks Wood Cutting (CTA18)	Beckenden Cutting (CTA18)	Cromwell Lane Underpass/Cutting		Agricultural Centre Embankment (CTA19)	Gloucester Wood Embankment (CTA18)	Dalehouse Embankment (CTA19)	Crackley Wood Embankment (CTA18)	Broadwells Wood Embankment (CTA18)	Black Waste Wood Embankment (CTA18)	Rahall Common South Embankment (CTA18/19)	Burton Green Tunnel (CTA18)	
Warwickshire Avon - Coal Measures Coventry	Current status	Confidence	Risk	Status objective		14B11	14C12		14E12		14F14		14F12	14G13	AP1223-107		13F11	13F11	14C12	14D11	14B11	14E12	14F12	14B11	14B12	
						Construction & Operation	Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation		None identified	Construction & Operation	Construction & Operation	Construction & Operation	None identified	Construction & Operation	Construction & Operation	None identified	Construction & Operation	
					Identified pollutive impacts	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, DWETS 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, DWETS 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, DWETS 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, DWETS 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, DWETS 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	None identified	None identified	None identified	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, DWETS or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions
Poor/not at risk or risk unknown (green = none, amber = possible, red = likely)	1. Saline or other intrusions. To assess the impact of groundwater 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 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
	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	Cutting runs between Pinburn Brook and River Avon. Water returned to ground via SuDS at S end of cutting. Water returned to ground via SuDS at S end of cutting. Water returned to ground via SuDS at S end of cutting. Water returned to ground via SuDS at S end of cutting. Water transferred from Pinburn Brook to River Avon catchment.	Cutting crosses surface water divide. Cross drainage installed water from Pinburn Brook to Avon catchment. Cutting does not penetrate whole aquifer.		Cutting does not penetrate whole aquifer. No significant impacts predicted.		Cutting near Ullenhall/Crackley Brook and a minor tributary. Watercourse is within predicted ROI of cutting. Water pumped to attenuation pond in near Crackley Brook. Possible zone of impact to stream/spring. Ullenhall stretch but water is retained within Crackley Brook catchment. Crackley Brook is not currently fed/abstracted by/from any WFD bodies so support flood ecological potential due to abstraction.	Cutting may influence flow towards diverted Crackley Brook and tributary. However, cutting does not penetrate whole aquifer. No significant impact on watercourse predicted.		Cutting near Ullenhall/Cockley Brook and a minor tributary. Watercourse is within predicted ROI of cutting. Water pumped to attenuation pond in near Cockley Brook. Possible zone of impact to stream/spring. Ullenhall stretch but water is retained within Cockley Brook catchment. Cockley Brook is not currently fed/abstracted by/from any WFD bodies so support flood ecological potential due to abstraction.	Cutting may influence flow towards diverted Cockley Brook and tributary. However, cutting does not penetrate whole aquifer. No significant impact on watercourse predicted.		Cutting near tributary of Cockley Brook. Possible zone of impact to stream/spring. Cutting to be dry to deepening requirements to minimise water in ground via SuDS. No significant impact predicted.	Cutting may influence flow towards tributary of Cockley Brook. However, cutting does not penetrate whole aquifer. No significant impact on watercourse predicted.	Cutting near tributary of Cockley Brook. Possible zone of impact to stream/spring. Cutting to be dry to deepening requirements to minimise water in ground via SuDS. No significant impact predicted.	Cutting may influence flow towards tributary of Cockley Brook. However, cutting does not penetrate whole aquifer. No significant impact on watercourse predicted.	Cutting not in the vicinity of surface water bodies. Cutting to be dry to deepening requirements to minimise water in ground via SuDS. No significant impact on watercourses.	Cutting may influence flow towards tributaries of Cockley Brook. However, cutting does not penetrate whole aquifer. No significant impact on watercourse predicted.	In floodplain of River Avon. No significant impacts identified as result of scheme element	In floodplain of River Avon. No significant impacts identified as result of scheme element	In floodplain of Pinburn Brook. No significant impacts identified as result of scheme element	Embankment crosses a tributary to the Cockley Brook. No significant impacts on groundwater predicted.	Embankment crosses a tributary to the Cockley Brook. No significant impacts on groundwater predicted.	Embankment crosses a tributary to the Cockley Brook. No significant impacts on groundwater predicted.	Embankment crosses a tributary to the River Alne. No impacts to groundwater predicted.	Embankment crosses a tributary to the Cockley Brook. No significant impacts on groundwater predicted.	Tunnel is in surface water divide between Pinburn Brook and River Avon. Tunnel is in interfluve and is mainly built in catchment of Cockley Brook. Localised impacts on headwaters possible	Tunnel is in surface water divide. Backfill around tunnel. Cutoff and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element
	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	Cutting runs between Pinburn Brook and River Avon. Water returned to ground via SuDS at S end of cutting. Water returned to ground via SuDS at S end of cutting. Water transferred from Pinburn Brook to River Avon catchment.	Cutting crosses surface water divide. Cutting drainage installed water from Pinburn Brook to Avon catchment. Water transferred from Pinburn Brook to Avon catchment.	Cutting near Cockley Brook and Pinburn Brook, both watercourse currently have Modern Ecology hydrology with flows unable to support Good ecological potential due to abstraction. Cutting to be dry to deepening requirements to minimise water in ground via SuDS. No significant impacts predicted.	Cutting does not penetrate whole aquifer. No significant impacts predicted.		Cutting near Ullenhall/Cockley Brook, which is within predicted ROI of cutting. Water pumped to attenuation pond in near Cockley Brook. Possible zone of impact to stream/spring. Ullenhall stretch but water is retained within Cockley Brook catchment. Cockley Brook is not currently fed/abstracted by/from any WFD bodies so support Good ecological potential due to abstraction.	Cutting may influence flow towards diverted Cockley Brook and tributary. However, cutting does not penetrate whole aquifer. No significant impact on watercourse predicted.		Cutting near Ullenhall/Cockley Brook, which is within predicted ROI of cutting. Cockley Wood North (14E) that is outside ROI. However, cutting does not penetrate whole aquifer. No significant impact on watercourse predicted.	Cutting near tributary of Cockley Brook. Possible zone of impact to stream/spring. Cutting to be dry to deepening requirements to minimise water in ground via SuDS. No significant impact predicted.	Adjacent Ullenhall to Balsall Pathway Embankment (4B), which is not GWDTE. Black Wood Wood to north but is not within ROI. No impacts identified as result of scheme element	No GWDTEs within ROI. No impacts identified as result of scheme element	Adjacent Ullenhall to Balsall Pathway Embankment (4B), which is not GWDTE. Black Wood Wood to north but is not within ROI. No impacts identified as result of scheme element	No GWDTEs within ROI. No impacts identified as result of scheme element	Embankment crosses tributary/ies that is/are not GWDTE. Loss of habitat beneath scheme element footprint not assessed. No significant impacts on groundwater dependent habitats as result of scheme element	Embankment crosses a tributary to the Cockley Brook. Embankment runs parallel to GWDTE. Loss of habitat beneath scheme element footprint not assessed. No significant impacts on groundwater dependent habitats as result of scheme element	Embankment crosses a tributary to the Cockley Brook. Embankment runs parallel to GWDTE. Loss of habitat beneath scheme element footprint not assessed. No significant impacts on groundwater dependent habitats as result of scheme element	Embankment built on floodworth to Balsall Pathway Embankment (4B), which is not GWDTE and crosses Black Waste Wood (4B). Loss of habitat beneath scheme element footprint not assessed. No significant impacts on groundwater dependent habitats as result of scheme element	Crosses Big Plants & Little Plants Wood (4B) and near to Black Waste Wood (4B), both potential GWDTEs. Cutting crosses bookworth to Balsall Pathway Embankment (4B), which is not GWDTE and runs Hedge (4B), neither considered GWDTE. Loss of habitat beneath scheme element footprint not assessed. No significant impacts on groundwater dependent habitats as result of scheme element	Crosses Big Plants & Little Plants Wood (4B) and near to Black Waste Wood (4B), both potential GWDTEs. Cutting crosses bookworth to Balsall Pathway Embankment (4B), which is not GWDTE and runs Hedge (4B), neither considered GWDTE. Loss of habitat beneath scheme element footprint not assessed. No significant impacts on groundwater dependent habitats as result of scheme element. Localised impacts possible	Backfill around tunnel. Cutoff and best practice for design, construction and operations reduce risks to groundwater quality. No significant 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	Cutting will require dewatering. Water returned to ground via SuDS at S end of cutting.	Cutting does not penetrate whole aquifer. Local influence on flow regime. No significant impacts predicted.	Cutting will require dewatering. Embedded mitigation to reintroduce water to ground via SuDS. Nearby abstractions are outside predicted ROI.	Cutting will require dewatering. Water pumped to attenuation pond in stream		Cutting will require dewatering. Embedded mitigation to reintroduce water to ground via SuDS. Nearby abstractions are outside predicted ROI.	Cutting does not penetrate whole aquifer. Local influence on flow regime. No significant impacts predicted.		Local external impact on superficial aquifer.	Cutting will require dewatering. Embedded mitigation to reintroduce water to ground via SuDS. Nearby abstractions are outside predicted ROI.	Local external impact on superficial aquifer.	Cutting to be dry to deepening requirements to minimise water in ground via SuDS. No significant impact predicted.	Local influence on flow regime. No significant impacts predicted.	Dewatering requirements likely to be limited, however cutting to be dry to deepening requirements to minimise water in ground via SuDS.	Local influence on flow regime. 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	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Cutting will require dewatering during construction. Embedded mitigation to reintroduce water to ground via SuDS	Backfilling around tunnel reduces need for ongoing dewatering

Quantitative status: Poor

Groundwater body					Scheme Elements	Cutting								Embankment							Green Tunnel	
GB40902GS003R					Phase	Gloucester Wood Cutting (CTA18)	Kenilworth Cutting (CTA19)		Crackley Road Cutting (CTA18)		North Crackley Cutting (CTA19)		Roughmeeks Wood Cutting (CTA18)	Beckenden Cutting (CTA18)	Cromwell Lane Underpass/Cutting		Agricultural Centre Embankment (CTA19)	Gloucester Wood Embankment (CTA18)	Dalehouse Embankment (CTA19)	Crackley Wood Embankment (CTA18)	Broadwells Wood Embankment (CTA18)	Black Waste Wood Embankment (CTA18)	Rahall Common South Embankment (CTA18/19)	Burton Green Tunnel (CTA18)	
Warwickshire Avon - Coal Measures Coventry	Current status	Confidence	Risk	Status objective		14B11	14C12		14E12		14F14		14F12	14G13	AP1223-107		13F11	13F11	14C12	14D11	14B11	14E12	14F12	14B11	14B12	
						Construction & Operation	Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation		None identified	Construction & Operation	Construction & Operation	Construction & Operation	None identified	Construction & Operation	Construction & Operation	None identified	Construction & Operation	
					Identified chemical impacts	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathway 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 pathway 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 pathway 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 pathway 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 pathway along which existing poor quality groundwater can migrate	None identified	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 pathway along which existing poor quality groundwater can migrate
Poor/not at risk or risk unknown (green = none, amber = possible, red = likely)	1. Saline or other intrusions. To assess the impact of groundwater 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.	Poor	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 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
	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	Water returned to ground via SuDS at S end of cutting. Water returned to ground via SuDS at S end of cutting. Water returned to ground via SuDS at S end of cutting. Water returned to ground via SuDS at S end of cutting. Water transferred from Pinburn Brook to River Avon catchment. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element.	Cutting adjacent to Cornley Brook and Pinburn Brook, which are potential GWDTE. Water returned to ground via SuDS at S end 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. Negligible impact following mitigation.	Cutting adjacent to Cornley Brook and Pinburn Brook, both watercourse currently have Poor Ecology hydrology with flows unable to support Good ecological potential due to abstraction. Cutting to be dry to deepening requirements to minimise water in 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. Negligible impact following mitigation.		Cutting near Ullenhall/Cockley Brook, which is within predicted ROI of cutting. Water pumped to attenuation pond in near Cockley 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	Cutting near Ullenhall/Cockley Brook and a minor tributary. Watercourse is within predicted ROI of cutting. Water pumped to attenuation pond in near Cockley Brook. Possible zone of impact to stream/spring. Ullenhall stretch but water is retained within Cockley Brook catchment. Cockley Brook is not currently fed/abstracted by/from any WFD bodies so support Good ecological potential due to abstraction.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Cutting near Ullenhall/Cockley Brook, which is within predicted ROI of cutting. Water pumped to attenuation pond in near Cockley Brook. Possible zone of impact to stream/spring. Ullenhall stretch but water is retained within Cockley Brook catchment. Cockley Brook is not currently fed/abstracted by/from any WFD bodies so support Good ecological potential due to abstraction.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Cutting near tributary of Cockley Brook. Possible zone of impact to stream/spring. Cutting to be dry to deepening requirements to minimise water in ground via SuDS. 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	Cutting near tributary of Cockley Brook. Possible zone of impact to stream/spring. Cutting to be dry to deepening requirements to minimise water in ground via SuDS. 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	Embedded mitigation to reintroduce water 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	Backfill around the tunnel. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element
	3. GWDTEs. To assess the impact of nutrient concentrations in groundwater (primarily phosphorus) on GWDTEs.	Good	High	Not At Risk	Good Chemical Status by 2015	Cutting near Ullenhall/Cockley Brook, which is within predicted ROI of cutting. Water pumped to attenuation pond in near Cockley 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		Cutting near Ullenhall/Cockley Brook, which is within predicted ROI of cutting. Water pumped to attenuation pond in near Cockley Brook. Possible zone of impact to stream/spring. Ullenhall stretch but water is retained within Cockley Brook catchment. Cockley Brook is not currently fed/abstracted by/from any WFD bodies so support Good ecological potential due to abstraction. 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		Cutting near Ullenhall/Cockley Brook, which is within predicted ROI of cutting. Cockley Wood North (14E) that is outside ROI. However, cutting does not penetrate whole aquifer. 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	Cutting near tributary of Cockley Brook. Possible zone of impact to stream/spring. Cutting to be dry to deepening requirements to minimise water in ground via SuDS. 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	Adjacent Ullenhall to Balsall Pathway Embankment (4B), which is not GWDTE. Black Wood Wood to north but is not within ROI. 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	Adjacent Ullenhall to Balsall Pathway Embankment (4B), which is not GWDTE. Black Wood Wood to north but is not within ROI. 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	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	Crosses Big Plants & Little Plants Wood (4B) and near to Black Waste Wood (4B), both potential GWDTEs. Cutting crosses bookworth to Balsall Pathway Embankment (4B), which is not GWDTE and runs Hedge (4B), neither considered GWDTE. Loss of habitat beneath scheme element footprint not assessed. No significant impacts on groundwater dependent habitats as result of scheme element. Localised impacts possible	Backfill 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
	4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives as defined in Article 7 of the WFD or at risk of failing in the future.	Good	High	At Risk	Good Chemical Status by 2015	In DrWPA and SPZ1. 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 SPZ1. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element

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

Groundwater body						Scheme Elements
	GB40902G302200					Phase
	Warwickshire Avon - Coal Measures Coventry	Current status	Confidence	Risk	Status objective	Identified quantitative impacts
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)
	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	
	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	
	4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Poor	Low	Probably At Risk	Good Ecological Status by 2015	

Scheme Elements	Retaining Wall					
	Stoneleigh Park Retaining Wall (Cut) (CFA18)		Canley Brook Retaining Wall (Cut) (CFA18)		Burton Green Retaining Wall (Cut) (CFA18)	
	137-L1		142-L3		146-L2	
Phase	Construction & Operation		Construction & Operation		Construction & Operation	
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
1.Saline or other intrusions.	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.	River Avon (Claycoton GB109054043920) adjacent to scheme element, River Avon (Warks GB109054043840) at N end. Water pumped to attenuation pond adjacent to River Avon (Claycoton), reducing impacts on surface flows. Cut-off walls will help reduce dewatering volumes.	Retaining wall may reduce baseflow to the River Avon locally, particularly over the stretch where the cutting is approximately parallel to the river. Effects offset by discharge point.	Canley Brook (GB109054044520) diverted around cutting. Embedded mitigation to reintroduce water to ground via SuDS within former river channel to N of cutting. Construction impacts only as structure has retaining walls and base slab. Possible adverse impacts on baseflow to diverted stretch but water is retained within surface water catchment. However, Canley Brook currently Moderate hydrology with flows unable to support Good ecological potential due to abstraction.	Cutting does not penetrate whole aquifer. No significant impacts predicted.	Cutting near surface water divide, near headwaters of tributaries of River Blythe, Canley Brook and Finham Brook. Cut-off walls should reduce inflows. Embedded mitigation to reintroduce water to ground via SuDS in catchment of Canley Brook (may help offset downstream impacts on Canley Brook). Possible slight influence on headwaters of River Blythe and Finham Brook.	Cutting is in surface water divide. Cutting does not penetrate whole aquifer. No significant impacts predicted.
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs).	River Avon LWS is within ROI of cutting. Cutting crosses Stoneleigh Park LWS; not considered a GWDTE. Water pumped to attenuation pond adjacent to River Avon (Claycoton), reducing impacts on surface flows. Cut-off walls will help reduce dewatering volumes.	River Avon LWS is within ROI of cutting. Retaining wall may reduce baseflow to the River Avon locally, particularly over the central stretch where the cutting is approximately parallel to the river. Effects offset by discharge point.	Canley Brook, potential (undesignated) GWDTE, diverted around cutting. Diverted stretch may not be GWDTE. Embankment built on Kenilworth to Balsall Railway Embankment LWS; not considered a GWDTE. No impacts identified as result of scheme element	Cutting and retaining wall does not intercept whole aquifer. No impacts identified as result of scheme element	Cutting crosses Kenilworth to Balsall Railway Embankment LWS and is near to Beanit Farm Hedge LWS, Beanit Spinney LWS, Catchems Meadow LWS and Green Lane LWS; none considered GWDTE. Loss of habitat beneath scheme element footprint not assessed. Embedded mitigation to reintroduce water to ground via SuDS. Minor change to catchment divide with River Blythe catchment, 5km upstream of Berkswell Marsh SSSI.	Cutting and retaining wall does not intercept whole aquifer. No impacts identified as result of scheme element
4. Water balance.	Cutting will require dewatering. Water pumped to attenuation pond adjacent to River Avon. Nearby abstractions are outside predicted RoI.	Local influence on flow regime. No significant impacts predicted.	Cutting will require dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	Local influence on flow regime. No significant impacts predicted.	Cutting will require dewatering. Embedded mitigation to reintroduce water to ground via SuDS.	Local influence on flow regime. No significant impacts predicted.

Scheme Elements	Tunnel Portal			
	Burton Green South Porous Portal (CFA18)		Burton Green North Porous Portal (CFA18)	
	146-L3 (AP-C223-107), (AP-C223-220)		146-L4 (AP-C223-107)	
Phase	Construction & Operation		Construction & Operation	
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
1.Saline or other intrusions.	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.	Portal near tributary of Canley Brook. Watercourse is within predicted RoI of portal. Embedded mitigation to reintroduce water to ground via SuDS.	Portal may locally influence flow towards tributary of Canley Brook. However, portal (and cutting for construction compound) does not penetrate whole aquifer (Slight increase in south portal depth under AP-C223-107 (2-3 m) will increase penetration of aquifer but not to a significant level). No significant impact on watercourse predicted.	No surface waters within RoI. Embedded mitigation to reintroduce water to ground via SuDS.	Portal is in surface water divide and does not penetrate whole aquifer (Reduction in north portal depth under AP-C223-107 will reduce penetration of aquifer). No significant impacts predicted.
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs).	Adjacent Kenilworth to Balsall Railway Embankment LWS, which is not GWDTE. Black Waste Wood to north but is not within ROI. No impacts identified as result of scheme element	No GWDTEs within ROI. No impacts identified as result of scheme element	Adjacent Beanit Farm Hedge LWS, which not identified as GWDTE in EIA. No significant impacts predicted.	No GWDTEs within ROI. No impacts identified as result of scheme element
4. Water balance.	Portal will require dewatering during construction. Embedded mitigation to reintroduce water to ground via SuDS.	Local influence on flow regime. No significant impacts predicted.	Portal will require dewatering during construction. (Reduction in north portal depth under AP-C223-107 will reduce dewatering required). Embedded mitigation to reintroduce water to ground via SuDS.	Local influence on flow regime. No significant impacts predicted.

Scheme Elements	Viaduct			
	River Avon Viaduct (CFA18)	Finham Brook Viaduct (CFA18)	Cranley Brook Viaduct (CFA18)	Ballsall Common Viaduct (CFA23)
	139-L2	141-L1	143-L3	149-L1
Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation
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
1.Saline or other intrusions.	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.	Crosses River Avon. 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.	Crosses Finham Brook. 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.	Crosses diverted route of Cranley Brook. 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.	Crosses tributary of River Blythe. 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.
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs).	Crosses Stoneleigh Park LWS, not considered a GWDTE, and River Avon LWS, a potential GWDTE. 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.	Near River Sowe & Finham Brook & Lakes LWS. Finham Brook is potential GWDTE. 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.	Crosses diverted route of Cranley Brook; brook is potential GWDTE downstream. 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.	Crosses tributary of River Blythe, upstream of Berkswell Marsh SSSI. No GWDTEs within RoI. 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.
4. Water balance.	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.	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.	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.	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.

Scheme Elements	Other Key Structures						
	B4113 Stoneleigh Road Overbridge	B4115 Ashow Road Overbridge	A46 Kenilworth Bypass Overbridge	Coventry Leamington Rail Overbridge	A429 Kenilworth Road Overbridge	B4101 Waste Lane Overbridge	Carol Green Rail Underbridge
	138-S1	140-S1	140-S2	142-S2	142-S3	147-S4	148-S3
Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation
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
1.Saline or other intrusions.	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.	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.	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.
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs).	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.	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.
4. Water balance.	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.	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.

	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
1.Saline or other intrusions.	No significant impacts predicted	Remains at Good Status	None required	Remains at Good Status
2. Surface water.	Localised / temporary impacts predicted. However, combined impacts of all design elements have the potential to have an adverse effect on the WFD element for Canley Brook and Finham Brook 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
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs).	Localised / temporary impacts	Remains at Good Status	None required	Remains at Good Status
4. Water balance.	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

Quantitative status	Poor

Groundwater body						Scheme Elements
	GB40902G302200					Phase
	Warwickshire Avon - Coal Measures Coventry	Current status	Confidence	Risk	Status objective	Identified chemical impacts
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)
	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	
	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	
	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	High	At Risk	Good Chemical Status by 2015	
	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	

Scheme Elements	Retaining Wall					
	Stoneleigh Park Retaining Wall (Cut) (CFA18)		Canley Brook Retaining Wall (Cut) (CFA18)		Burton Green Retaining Wall (Cut) (CFA18)	
	137-L1		142-L3		146-L2	
Phase	Construction & Operation		Construction & Operation		Construction & Operation	
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
1. Saline or other intrusions.	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.	Water pumped to attenuation pond adjacent to River Avon (Claycoton). CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	River Avon is within ROI of cutting. Water pumped to attenuation pond adjacent to River Avon (Claycoton). CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Cranley Brook to be diverted around 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	Cutting near surface water divide, near headwaters of tributaries of River Blythe, Canley Brook and Finham Brook. Embedded mitigation to reintroduce water to ground via SuDS in catchment of Canley 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
3. GWDTEs.	River Avon LWS is within ROI of cutting. Cutting crosses Stoneleigh Park LWS; not considered a GWDTE. Water pumped to attenuation pond adjacent to River Avon (Claycoton). CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	River Avon LWS is within ROI of cutting. Water pumped to attenuation pond adjacent to River Avon (Claycoton). CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Cranley Brook, potential GWDTE, diverted around cutting. Embankment built on Kenilworth to Balsall Railway Embankment LWS; not considered a GWDTE. 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
4. Drinking Water Protected Areas (DrWPAs).	In DrWPA and partly within 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 and partly within 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 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 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
5. General quality assessment.	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

Scheme Elements	Tunnel Portal			
	Buton Green South Porous Portal (CFA18)		Burton Green North Porous Portal (CFA18)	
	146-L3 (AP-C223-107), (AP-C223-220)		146-L4 (AP-C223-107)	
Phase	Construction & Operation		Construction & Operation	
Identified chemical impacts	Disturbing or mobilising existing poor quality groundwater by depressurisation	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by depressurisation	Creating or altering of pathways along which existing poor quality groundwater can migrate
1. Saline or other intrusions.	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.	Portal near tributary of Canley Brook. Abstractions returned to ground via SuDS where possible or to surface water. 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
3. GWDTEs.	Adjacent Kenilworth to Balsall Railway Embankment LWS, which is not GWDTE. Black Waste Wood to north but is not within ROI. 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
4. Drinking Water Protected Areas (DrWPAs).	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
5. General quality assessment.	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

Scheme Elements	Viaduct			
	River Avon Viaduct (CFA18)	Finham Brook Viaduct (CFA18)	Cranley Brook Viaduct (CFA18)	Ballsall Common Viaduct (CFA23)
	139-L2	141-L1	143-L3	149-L1
Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation
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
1. Saline or other intrusions.	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.	Crosses River Avon. 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 (particularly selection of piling method), construction and operations reduce risks to water quality. No significant residual impacts predicted.	Crosses Finham Brook. 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 (particularly selection of piling method), construction and operations reduce risks to water quality. No significant residual impacts predicted.	Crosses diverted route of Cranley Brook. 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 (particularly selection of piling method), construction and operations reduce risks to water quality. No significant residual impacts predicted.	Crosses tributary of River Blythe. Close to Lavender Hall Landfill. Upstream of Berkswell Marsh SSSI. 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 (particularly selection of piling method), construction and operations reduce risks to water quality. No significant residual impacts predicted.
3. GWDTEs.	Crosses Stoneleigh Park LWS, not considered a GWDTE, and River Avon LWS, a potential GWDTE. 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 (particularly selection of piling method), construction and operations reduce risks to water quality. No significant residual impacts predicted.	Near River Sowe & Finham Brook & Lakes LWS. Finham Brook is potential GWDTE. 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 (particularly selection of piling method), construction and operations reduce risks to water quality. No significant residual impacts predicted.	Crosses diverted route of Cranley Brook; brook is potential GWDTE downstream. Creation of new preferential pathways into bedrock aquifer 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 (particularly selection of piling method), construction and operations reduce risks to water quality. No significant residual impacts predicted.	Close to Lavender Hall Landfill. Upstream of Berkswell Marsh SSSI. 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 (particularly selection of piling method), construction and operations reduce risks to water quality. No significant residual impacts predicted.
4. Drinking Water Protected Areas (DrWPAs).	In DrWPA and SPZ3. 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 (particularly selection of piling method), construction and operations reduce risks to water quality. No significant residual impacts predicted.	In DrWPA and SPZ3. 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 (particularly selection of piling method), construction and operations reduce risks to water quality. No significant residual impacts predicted.	In DrWPA and SPZ3. Creation of new preferential pathways into bedrock aquifer 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 (particularly selection of piling method), construction and operations reduce risks to water quality. No significant residual impacts predicted.	Close to Lavender Hall Landfill. 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 (particularly selection of piling method), construction and operations reduce risks to water quality. No significant residual impacts predicted.
5. General quality assessment.	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 (particularly selection of piling method), construction and operations reduce risks to water quality. No significant residual impacts predicted.	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 (particularly selection of piling method), construction and operations reduce risks to water quality. No significant residual impacts predicted.	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 (particularly selection of piling method), construction and operations reduce risks to water quality. No significant residual impacts predicted.	Close to Lavender Hall Landfill. 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 (particularly selection of piling method), construction and operations reduce risks to water quality. No significant residual impacts predicted.

Scheme Elements	Other Key Structures						
	B4113 Stoneleigh Road Overbridge	B4115 Ashow Road Overbridge	A46 Kenilworth Bypass Overbridge	Coventry Leamington Rail Overbridge	A429 Kenilworth Road Overbridge	B4101 Waste Lane Overbridge	Carol Green Rail Underbridge
	138-S1	140-S1	140-S2	142-S2	142-S3	147-S4	148-S3
Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation
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	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
1. Saline or other intrusions.	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.	Close to River Avon - Claycoton Yelverton Brook. 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 River Avon. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Between River Avon and Finham Brook. 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 Canley Brook. 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 Canley 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
3. GWDTEs.	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	Upstream of Berkswell Marsh. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element
4. Drinking Water Protected Areas (DrWPAs).	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 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 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. 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
5. General quality assessment.	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

	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
1. Saline or other intrusions.	No significant impacts predicted	No Significant Deterioration	None required	No Significant Deterioration
2. Surface water.	Localised / temporary impacts	Remains at Good Status	None required	Remains at Good Status
3. GWDTEs.	Localised / temporary impacts	Remains at Good Status	None required	Remains at Good Status
4. Drinking Water Protected Areas (DrWPAs).	Localised / temporary impacts	Remains at Good Status	None required	Remains at Good Status
5. General quality assessment.	Localised / temporary impacts	Remains at Good Status	None required	Remains at Good Status
Chemical status		Poor		Poor
Overall status		Poor		Poor

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
2. Surface water (quantitative), 4. Water balance (quantitative), 1. Saline or other intrusions (chemical)	Poor			Good Status by 2015	Phase
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
Implement new regulatory approach arising from new Groundwater Directive (2006/116/EC), including Registration in conjunction with Standard Rules.	Severn RBD			2012	Predicted change to status elements (green = none, amber = possibly, red = likely)
Investigations under PR09 (AMP5) Water Industry Investment programme - Investigation to determine cost effective action to manage abstraction to support good GW quantitative status.	Severn RBD			2012	
R&D on fate and transport of phosphate in groundwater to determine impact on surface water.	Severn RBD			2012	
Investigations under PR09 (AMP5) Water Industry Investment programme - Investigation of drinking water source catchments to identify problems and appraise options to facilitate compliance with Article 7 of WFD at four drinking water sources in the Warwickshire Avon catchment.	Warwickshire Avon - Coal Measures Coventry			2012	
Severn Trent Water catchment investigation at Brownshill Green to establish source of pollutant.	Warwickshire Avon - Coal Measures Coventry			2012	
Local pollution prevention campaigns & education to include emphasis on solvent use.	Warwickshire Avon - Coal Measures Coventry			2010	
Investigations under PR09 (AMP5) Water Industry Investment programme - Investigation to determine cost effective action to manage abstraction to support good ecological potential, and local measures: River Sherbourne, North Kilworth.	Warwickshire Avon - Coal Measures Coventry			2012	

Scheme Elements	Retaining Wall					
	Stoneleigh Park Retaining Wall (Cut) (CFA18)		Canley Brook Retaining Wall (Cut) (CFA18)		Burton Green Retaining Wall (Cut) (CFA18)	
	137-L1		142-L3		146-L2	
Phase	Construction & Operation		Construction & Operation		Construction & Operation	
Identified chemical 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
Implement new regulatory approach arising from new Groundwater Directive (2006/116/EC), including Registration in conjunction with Standard Rules.	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.
Investigations under PR09 (AMP5) Water Industry Investment programme - Investigation to determine cost effective action to manage abstraction to support good GW quantitative status.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.
R&D on fate and transport of phosphate in groundwater to determine impact on surface water.	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.
Investigations under PR09 (AMP5) Water Industry Investment programme - Investigation of drinking water source catchments to identify problems and appraise options to facilitate compliance with Article 7 of WFD at four drinking water sources in the Warwickshire Avon catchment.	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.
Severn Trent Water catchment investigation at Brownshill Green to establish source of pollutant.	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source
Local pollution prevention campaigns & education to include emphasis on solvent use.	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.
Investigations under PR09 (AMP5) Water Industry Investment programme - Investigation to determine cost effective action to manage abstraction to support good ecological potential, and local measures: River Sherbourne, North Kilworth.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.

Scheme Elements	Tunnel Portal			
	Buton Green South Porous Portal (CFA18)		Burton Green North Porous Portal (CFA18)	
	146-L3 (AP-C223-107), (AP-C223-220)		146-L4 (AP-C223-107)	
Phase	Construction & Operation		Construction & Operation	
Identified chemical 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
Implement new regulatory approach arising from new Groundwater Directive (2006/116/EC), including Registration in conjunction with Standard Rules.	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.
Investigations under PR09 (AMP5) Water Industry Investment programme - Investigation to determine cost effective action to manage abstraction to support good GW quantitative status.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.
R&D on fate and transport of phosphate in groundwater to determine impact on surface water.	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.
Investigations under PR09 (AMP5) Water Industry Investment programme - Investigation of drinking water source catchments to identify problems and appraise options to facilitate compliance with Article 7 of WFD at four drinking water sources in the Warwickshire Avon catchment.	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.
Severn Trent Water catchment investigation at Brownshill Green to establish source of pollutant.	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source
Local pollution prevention campaigns & education to include emphasis on solvent use.	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.
Investigations under PR09 (AMP5) Water Industry Investment programme - Investigation to determine cost effective action to manage abstraction to support good ecological potential, and local measures: River Sherbourne, North Kilworth.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.

Scheme Elements	Viaduct			
	River Avon Viaduct (CFA18)	Finham Brook Viaduct (CFA18)	Cranley Brook Viaduct (CFA18)	Ballsall Common Viaduct (CFA23)
	139-L2	141-L1	143-L3	149-L1
Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation
Identified chemical 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
Implement new regulatory approach arising from new Groundwater Directive (2006/116/EC), including Registration in conjunction with Standard Rules.	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.
Investigations under PR09 (AMP5) Water Industry Investment programme - Investigation to determine cost effective action to manage abstraction to support good GW quantitative status.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.
R&D on fate and transport of phosphate in groundwater to determine impact on surface water.	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.
Investigations under PR09 (AMP5) Water Industry Investment programme - Investigation of drinking water source catchments to identify problems and appraise options to facilitate compliance with Article 7 of WFD at four drinking water sources in the Warwickshire Avon catchment.	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.
Severn Trent Water catchment investigation at Brownshill Green to establish source of pollutant.	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source
Local pollution prevention campaigns & education to include emphasis on solvent use.	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.
Investigations under PR09 (AMP5) Water Industry Investment programme - Investigation to determine cost effective action to manage abstraction to support good ecological potential, and local measures: River Sherbourne, North Kilworth.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.

Scheme Elements	Other Key Structures						
	B4113 Stoneleigh Road Overbridge	B4115 Ashow Road Overbridge	A46 Kenilworth Bypass Overbridge	Coventry Leamington Rail Overbridge	A429 Kenilworth Road Overbridge	B4101 Waste Lane Overbridge	Carol Green Rail Underbridge
	138-S1	140-S1	140-S2	142-S2	142-S3	147-S4	148-S3
Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation
Identified chemical 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
Implement new regulatory approach arising from new Groundwater Directive (2006/116/EC), including Registration in conjunction with Standard Rules.	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.
Investigations under PR09 (AMP5) Water Industry Investment programme - Investigation to determine cost effective action to manage abstraction to support good GW quantitative status.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.
R&D on fate and transport of phosphate in groundwater to determine impact on surface water.	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.
Investigations under PR09 (AMP5) Water Industry Investment programme - Investigation of drinking water source catchments to identify problems and appraise options to facilitate compliance with Article 7 of WFD at four drinking water sources in the Warwickshire Avon catchment.	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.
Severn Trent Water catchment investigation at Brownshill Green to establish source of pollutant.	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source
Local pollution prevention campaigns & education to include emphasis on solvent use.	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.
Investigations under PR09 (AMP5) Water Industry Investment programme - Investigation to determine cost effective action to manage abstraction to support good ecological potential, and local measures: River Sherbourne, North Kilworth.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.

	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
Implement new regulatory approach arising from new Groundwater Directive (2006/116/EC), including Registration in conjunction with Standard Rules.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	None required	RBMP Measure is insensitive to scheme element.
Investigations under PR09 (AMP5) Water Industry Investment programme - Investigation to determine cost effective action to manage abstraction to support good GW quantitative status.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	None required	Any dewatering required should be considered within abstraction review assessments.
R&D on fate and transport of phosphate in groundwater to determine impact on surface water.	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.	None required	CoCP and best practice for design, construction and operations reduce risks to water quality.
Investigations under PR09 (AMP5) Water Industry Investment programme - Investigation of drinking water source catchments to identify problems and appraise options to facilitate compliance with Article 7 of WFD at four drinking water sources in the Warwickshire Avon catchment.	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.	None required	CoCP and best practice for design, construction and operations reduce risks to water quality.
Severn Trent Water catchment investigation at Brownshill Green to establish source of pollutant.	Not within SPZ for source	Not within SPZ for source	None required	Not within SPZ for source
Local pollution prevention campaigns & education to include emphasis on solvent use.	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.	None required	CoCP and best practice for design, construction and operations reduce risks to water quality.
Investigations under PR09 (AMP5) Water Industry Investment programme - Investigation to determine cost effective action to manage abstraction to support good ecological potential, and local measures: River Sherbourne, North Kilworth.	Not within catchment.	Not within catchment.	None required	Not within catchment.

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

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		23	24, 25, 26
AP4 ID	AP-C223-112	AP-C223-233	CNO-172-001	AP-224-025	No scoped in APs
AP4 Location	Coleshill Junction	Coleshill Junction	Curdworth to Middleton	Solihull Metropolitan Borough, Parish of Hampton-in-Arden	NA
New/Replacement Scheme Element	REPLACEMENT	EXISTING - New land requirement	NEW	NEW	NA
AP4 Scheme Element Type	Viaduct	Junction Widening	Stopple Pit Excavations	Roundabout Works	NA
Original Scheme	Scheme elements described in November 2013 ES and affected by the amendment are: • a short embankment (Watton House South Embankment) through the Coleshill Industrial Estate carrying the main line and Leeds Spur up line between the A446 Lichfield Road (Chattle Hill) box structure to the south and crossing of the Birmingham to Nuneaton Line on viaduct to the north; • diversion of a National Grid high-pressure gas main near Bromwich Court, A446 Lichfield Road; and • National Grid high voltage overhead line diversion - Feckenham to Hams Hall 400kV	The Coleshill Junction comprises three sections of railway line – the main line, the Birmingham spur and the north chord, which together comprise a triangular 'Delta' junction. The railway will enter the area by crossing the M6, M6 slip road to the A446 Lichfield Road and M6/M42 junction; further crossings include over the B4114 Birmingham Road, the River Cole, the M42/M6 Toll, the B4117 Gilson Road, the A446 Lichfield Road, an existing railway referred to as the Birmingham to Nuneaton Line and the River Tame. The scheme element relevant to the amendment is the effect of construction of HS2 as a whole on the traffic flows/volumes using the local highway network.	The main ES included provisions for the diversion of a high-pressure 600mm-diameter gas main near Church Lane as stated in 2.3.32, Utilities (refer to the main ES Volume 2 CFA20 Map Book, sheets CT-05-115 and CT-06-115 and CT-05-116a and CT-06-116a). The main ES identifies the area of the proposed utility works as land potentially required during construction.	The A452 Kenilworth Road would be realigned over a distance of 1.7km, approximately 100m east of the existing alignment and would be raised up to 13.5m above ground level. Marsh Lane would be extended to join the realigned A452 Kenilworth Road where vehicles can turn left out onto the northbound carriageway only. Mercote Hall Lane (Bridleway M218) accommodation overbridge will carry Mercote Hall Lane over the route of HS2. Access to the overbridge and to a balancing pond for maintenance purposes would be provided from the A452 Kenilworth Road southbound carriageway only. Bayleys Brook would be diverted through a new culvert under the A452Kenilworth Road and the existing culvert under the stopped up section of carriageway would be removed and replaced with an open channel.	NA
AP4 Description	A) Watton House south embankment changed to viaduct - this provides additional space to the side of the original IAC building to address the loss of circulation space and restriction of future use of the property. It addresses a technical issue of track support stiffness (due to embankment being less than the recommended length). Additional landscape mitigation planting will be implemented to the area beneath and around the viaducts and will also be extended around the proposed Water Orton Viaducts No 1 and 3 to the east. B) Re-route high pressure Gas Main - Initially the realignment of a 12 inch HPGM was proposed as its currently proposed location severely impacts upon the Coleshill Sewage Treatment Works (STW) which serves a significant part of the Birmingham suburban conurbation. In reconsidering its routing it was also realised that there were relative benefits in rationalising the other 3 HPGM diversions in this area, notably two 24 inch and an 18 inch HPGM. A 16 inch HPGM which crosses under the A446 Lichfield Road and then runs parallel with the road to the south will remain unaffected as the south east wingwall to the Chattle Hill Box Structure will be increased in length to avoid it. East of the Lichfield Road Embankment the gas mains will be re-routed as follows: - The 18 inch high HPGM will be re-routed south west and then westwards under the M42/M6 toll via via HDD techniques to align with the Birmingham Spur (North Chord) heading west. From this point the gas main remains on its original course. - Both 24 inch HPGM will be re-routed north west under the Water Orton 1 & 3 viaducts, one will then divert westwards under the M42/M6 toll to a stopple pit and be connect back into the existing mains network; the other will follow a northerly route under the B4117, Watton Lane to a stopple pit situated to the immediate south of the Birmingham to Nuneaton Railway Line. At this point it will also reconnect with the existing gas network. - The 12 inch high pressure gas main will be re-routed north west under the Water Orton 1 & 3 viaducts, north under Watton Lane, through Coleshill Industrial Estate and under the Birmingham to Nuneaton Railway. It will then divert eastwards around the proposed balancing pond, through Coleshill Sewage Works Grasslands Local Wildlife Site (LWS) on a northerly course contiguous with the access track at the eastern edge of the LWS until the River Tame. At this point it will be routed under the River Tame and through the sludge beds and flood compensation area newly designated as Coleshill Sludge Lagoon LWS via a prepared corridor. It then changes course eastwards under the Water Orton viaducts to a stopple pit located to the immediate south of an existing gas pressure reducing station. At this point it will be connected back into the existing gas mains network. Stopple pits will be used at the point where the gas main will be diverted and or reconnected back into the existing network. This includes an area by the Bovis Homes Building, and between the A446 and the route of the Proposed Scheme. A new area of land will also be taken at Gorsey Lane, by the Bovis Home building to be used for storage during construction. It is anticipated that the works to the gas mains will be undertaken as advanced works in 2017/2018. C) Re-route High Voltage Power Line - this amendment provides the opportunity for an improved route of the power line by avoiding multiple crossings of the HS2 route which would require two 75m high pylons to enable the power lines to cross over the Proposed Scheme. The proposed diversion route will therefore remain on the east side of the HS2 route, running broadly parallel with it. This will facilitate a reduction in land take to the west of the Proposed Scheme, especially through the Coleshill Sewage Grassland Local Wildlife Site (LWS) and the newly designated Coleshill Sludge Lagoon LWS. The re-routed line will be closer to Bromwich Court (Bovis) and other neighbouring properties. The positioning of the power line will require the relocation of the Chattle Hill Box Structure and Cudworth Viaduct (South) satellite compounds from the east side of HS2 to the west. Coupled with this the haul road will be re-sited the west with a temporary bridge over the River Tame negating the requirement to use the Severn Trent's bridge. New land will be required along the eastern side of the Proposed Scheme for the proposed diversion. E) Passive provision for the dualling of the A446, to include alignment of the balancing pond and access pond. Adjustment to position of balancing pond and access road on north side of Birmingham to Nuneaton Railway to accommodate east side carriageway of future dualled A446 to be provided by the local highway authority. Works to the other 4 HPGM in the vicinity of Bromwich Court will be as follows: - 24 inch HPGM will be re-routed from a stopple pit within the IAC carpark, it will then divert under the A446 Lichfield Road. - 12 HPGM will be re-routed from a stopple pit situated in front of Bromwich Court building, it will then divert under the A446 Lichfield Road. - An additional 24 inch and an 18 inch HPGM already exist under the A446 Lichfield Road, these will be intercepted in stopple pits situated on the opposite side of the A446 Lichfield Road at the foot of the HS2 Lichfield Embankment. All four will be realigned under the HS2 Lichfield Embankment and will be protected from HS2 construction works by a piled raft slab.	The temporary improvement to the Junction of A446 Lichfield Road and B4118 Marsh Lane to the east of Water Orton to provide additional traffic capacity to address the increased congestion caused by HS2 construction traffic. The AP2 Environment Statement identified a need for additional mitigation resulting from the increased congestion caused by HS2 construction traffic at the T-junction between the A446 Lichfield Road and B4118 Marsh Lane to the east of Water Orton. Temporary improvements to the junction have been identified which require widening the northbound carriageway of the A446 to two lanes on both the approach and exit of the junction. The works will require: Additional earthworks on land outside the highway boundary to the west of the A446 Lichfield Road; Modifications to the flood culverts beneath the A446 Lichfield Road to the north of Marsh Lane.	The construction methodology will include an area of approximately 75m by 40m for stopple points at both ends of the diverted high-pressure 600mm-diameter gas main. The segment of the existing gas main which will be replaced by the diversion route will be abandoned in place. The northern most stopple pit will be excavated adjacent to Gallows Brook.	Provision of an all movement roundabout at the A452 Kenilworth Road/Marsh Lane junction. Marsh Lane will be realigned to join the new junction and Mercote Hall Lane and earthworks raised slightly to accommodate the new roundabout and tie into the new junction. Amendment to the Bayleys Brook diversion including a new culvert under the new Marsh Lane (approximately 25m in length) and an increase in length of the culvert under Mercote Hall Lane from 26m to 46m. New permanent road lighting and advanced signage provided along the A452 Kenilworth Road from the new roundabout junction to the existing A452 Kenilworth Road/Bradnocks Marsh Lane roundabout. Mitigation planting provided west of the balancing pond and east of Marsh Lane will be reduced.	NA
Changes to Previously assessed elements	**Existing:** Watton House Embankment **Replacement:** South part of Embankment is replaced by Watton House Viaduct, Watton House Embankment Altered to Watton House North Embankment	None	None	None	NA
AP4 Assessment Requirements	Change from Embankment to Viaduct	No assessment required AP covers alterations to Flood culverts	Excavation of Stopple Pits	New Road realignment - A452 Roundabout Works	NA
Drawings (Original, AP2 and AP4) Construction Phase (05) Proposed Scheme (06)					

Requires Assessment

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

Groundwater body					Scheme Elements	Bonred Tunnel		Cutting																							
						Bromford Tunnel (CFA02S)		Hornbrook Cutting (CFA23)		Patrick Cutting (CFA23)		Doddington Cutting (CFA23/CFA24)		Bickenhill Cutting (CFA24)		Coleshill Manor Cutting (CFA19)		Gilson Cutting (CFA19)		Curdworth Cutting (CFA20)		Middleton Pool Cutting (CFA20)		Coppice Lane Cutting (CFA20)		Drayton Lane Cutting (CFA21)		Water Orton Cutting (CFA19/20)		A51 Cutting (CFA22)		Dartford Cutting (CFA22)	
GB404022090800					Phase	B-168-L7		152-L4		153-L4		155-L2		156-L3		B-161-L2		163-L1		166-L2		170-L1		175-L3		173-L3		N-02-L1		AP-C223-103		AP-C223-103	
Tame Anker Mease - Secondary Combined	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	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	
						Disturbing 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 (GWDTEs) or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions

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

	Groundwater body					Scheme Elements	Embankment							
							Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA24)
							152-L1	152-L3	153-L1	153-L3	153-L5	154-L2	155-L1	156-L1
	GB40402G990800					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation
	Tame Anker Mease - Secondary Combined	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified
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
	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		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 (GWDTEs). To assess the impact of groundwater abstractions on the condition of GWDTEs.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		Embankment crosses Berkswell Hall Wood and Berkswell Marsh Meadow LWSs. Close to Berkswell Marsh SSSI. Loss of habitat beneath footprint of scheme not assessed. Mitigation through drainage design.	No impacts identified as result of scheme element	Embankment crosses Marsh Lane Nature Reserve LWS. Loss of habitat beneath footprint of scheme not assessed. Mitigation through drainage design.	Embankment crosses Patrick Farm Meadow LWS. Loss of habitat beneath footprint of scheme not assessed. Mitigation through drainage design.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Embankment crosses Disused Railway & Sidings LWS and the Holywell Brook LWS. Loss of habitat beneath footprint of scheme not assessed. Mitigation through drainage design.
	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	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

	Scheme Elements	Embankment (CFA24)	Pool Wood Embankment (CFA24)	Coleshill Embankment No.1 (CFA19)	Coleshill Embankment No.2 (CFA19)	Coleshill Embankment No.3 (CFA19)	Coleshill Embankment No.3 (CFA19)	Coleshill Embankment No.4 (CFA19)	Gilson Embankment (CFA19)
		157-L1	158-L2	160-L4	160-L2	161-L4	B-161-L1	161-L2	162-L1
GB40402G990800	Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation
Tame Anker Mease - Secondary Combined	Identified quantitative impacts	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified
1.Saline or other intrusions.	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
2. Surface water.		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 (GWDTEs).		No impacts identified as result of scheme element	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.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Embankment crosses Coleshill Hall Farm LWS. Loss of habitat beneath footprint of scheme not assessed. Mitigation through drainage design.	Embankment crosses Coleshill Hall Farm LWS. Loss of habitat beneath footprint of scheme not assessed. Mitigation through drainage design.	Adjacent to River Cole LWS. Loss of habitat beneath footprint of scheme not assessed. Mitigation through drainage design.	No impacts identified as result of scheme element
4. Water balance.		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

	Scheme Elements	Lichfield Road Embankment (CFA19)	Watton House North Embankment (CFA19)	Embankment (CFA19)	Sewage Works Embankment (CFA19)	Faraday Avenue Embankment (CFA20)	Dunton Wood Embankment (CFA20)	Mill Pool Embankment (CFA20)	North Wood Embankment (CFA20)
		163-L2	164-L2 (AP-C223-112)	164-L6	164-L4	165-L1	167-L1	167-L4	168-L2
GB40402G990800	Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation
Tame Anker Mease - Secondary Combined	Identified quantitative impacts	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified
1.Saline or other intrusions.	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
2. Surface water.		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 (GWDTEs).		No impacts identified as result of scheme element	Close to River Tame LWS. Loss of habitat beneath footprint of scheme not assessed. Mitigation through drainage design.	Crosses Lea Marston Sludge Beds LWS. Close to River Tame LWS. Loss of habitat beneath footprint of scheme not assessed. Mitigation through drainage design.	Crosses Lea Marston Sludge Beds LWS. Close to River Tame LWS. Loss of habitat beneath footprint of scheme not assessed. Mitigation through drainage design.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Close to Cuttle Mill Pools LWS.	Embankment crosses North Wood LWS / AW. Loss of habitat beneath footprint of scheme not assessed. Mitigation through drainage design.
4. Water balance.		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

Quantitative status	Good

	Groundwater body					Scheme Elements	Embankment							
							Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA24)
							152-L1	152-L3	153-L1	153-L3	153-L5	154-L2	155-L1	156-L1
	GB40402G990800					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	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	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 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	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	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
	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		Embankment crosses Berkswell Hall Wood and Berkswell Marsh Meadow LWSs. Close to Berkswell Marsh SSSI. Loss of habitat beneath footprint of scheme not assessed. 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	Embankment crosses Marsh Lane Nature Reserve LWS. Loss of habitat beneath footprint of scheme not assessed. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Embankment crosses Patrick Farm Meadow LWS. Loss of habitat beneath footprint of scheme not assessed. 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	Embankment crosses Disused Railway & Sidings LWS and the Holywell Brook LWS. Loss of habitat beneath footprint of scheme not assessed. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant 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.	Poor	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	Adjacent to landfill. 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
	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	Adjacent to landfill. 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

	Scheme Elements	Embankment (CFA24)	Pool Wood Embankment (CFA24)	Coleshill Embankment No.1 (CFA19)	Coleshill Embankment No.2 (CFA19)	Coleshill Embankment No.3 (CFA19)	Coleshill Embankment No.3 (CFA19)	Coleshill Embankment No.4 (CFA19)	Gilson Embankment (CFA19)
		157-L1	158-L2	160-L4	160-L2	161-L4 + B-161-L1	161-L4 + B-161-L1	161-L2	162-L1
GB40402G990800	Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation
Tame Anker Mease - Secondary Combined	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	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
1. Saline or other intrusions.	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
2. Surface water.		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
3. GWDTEs.		No impacts identified as result of scheme element	Embankment crosses Coleshill Pool Wood LWS. Close to Coleshill & Bannerly Pools SSSI. Loss of habitat beneath footprint of scheme not assessed. 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	Embankment crosses Coleshill Hall Farm LWS. Loss of habitat beneath footprint of scheme not assessed. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Embankment crosses Coleshill Hall Farm LWS. Loss of habitat beneath footprint of scheme not assessed. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Adjacent to River Cole LWS. Loss of habitat beneath footprint of scheme not assessed. 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
4. Drinking Water Protected Areas (DrWPAs).		Adjacent to landfill. 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	Crosses Made Ground and adjacent to landfill. 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
5. General quality assessment.		Adjacent to landfill. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Crosses Made Ground and adjacent to landfill. 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

	Scheme Elements	Lichfield Road Embankment (CFA19)	Watton House North Embankment (CFA19)	Embankment (CFA19)	Sewage Works Embankment (CFA19)	Faraday Avenue Embankment (CFA20)	Dunton Wood Embankment (CFA20)	Mill Pool Embankment (CFA20)	North Wood Embankment (CFA20)
		163-L2	164-L2 (AP-C223-112)	164-L6	164-L4	165-L1	167-L1	167-L4	168-L2
GB40402G990800	Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation
Tame Anker Mease - Secondary Combined	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	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
1. Saline or other intrusions.	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
2. Surface water.		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
3. GWDTEs.		No impacts identified as result of scheme element	Close to River Tame LWS. Loss of habitat beneath footprint of scheme not assessed. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Crosses Lea Marston Sludge Beds LWS. Close to River Tame LWS. Loss of habitat beneath footprint of scheme not assessed. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Crosses Lea Marston Sludge Beds LWS. Close to River Tame LWS. Loss of habitat beneath footprint of scheme not assessed. 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	Close to Cuttle Mill Pools LWS.	Embankment crosses North Wood LWS / AW. Loss of habitat beneath footprint of scheme not assessed. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element
4. Drinking Water Protected Areas (DrWPAs).		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	Crosses sludge beds. 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	Adjacent to landfill. 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
5. General quality assessment.		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	Crosses sludge beds. 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	Adjacent to landfill. 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

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	Embankment							
						Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA24)
						152-L1	152-L3	153-L1	153-L3	153-L5	154-L2	155-L1	156-L1
4. Drinking Water Protected Areas (DrWPAs) (chemical)	Poor			Good Status by 2015	Phase	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 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	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.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.

	Scheme Elements	Embankment (CFA24)	Pool Wood Embankment (CFA24)	Coleshill Embankment No.1 (CFA19)	Coleshill Embankment No.2 (CFA19)	Coleshill Embankment No.3 (CFA19)	Coleshill Embankment No.3 (CFA19)	Coleshill Embankment No.4 (CFA19)	Gilson Embankment (CFA19)
		157-L1	158-L2	160-L4	160-L2	161-L4 + B-161-L1	161-L4 + B-161-L1	161-L2	162-L1
4. Drinking Water Protected Areas (DrWPAs) (chemical)	Phase	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)	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	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.	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.

	Scheme Elements	Lichfield Road Embankment (CFA19)	Watton House North Embankment (CFA19)	Embankment (CFA19)	Sewage Works Embankment (CFA19)	Faraday Avenue Embankment (CFA20)	Dunton Wood Embankment (CFA20)	Mill Pool Embankment (CFA20)	North Wood Embankment (CFA20)
		163-L2	164-L2 (AP-C223-112)	164-L6	164-L4	165-L1	167-L1	167-L4	168-L2
4. Drinking Water Protected Areas (DrWPAs) (chemical)	Phase	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)	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	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.	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.

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

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

	Groundwater body					Scheme Elements	Embankment																			
							Middleton House Farm Embankment (CFA20)	Bodymoor Heath Embankment (CFA20)	Church Lane Embankment (CFA20)	Trickley Coppice Embankment (CFA20/21)	Drayton Lane Embankment (CFA20/21)	Hints Embankment (CFA21)	Green Lane Embankment (CFA19)	Attleboro Farm Embankment (CFA19)	Lanchester Way Embankment (CFA19)	Parkhall Wood Embankment (CFA025)	Embankment (CFA25)	Langley Hill Embankment (CFA025)	Unnamed Embankment (CFA26)	Marsh Lane Embankment (CFA19)	Watton Lane Embankment (CFA19)	Fulfen Farm Embankment (CFA22)	Streethay Embankment (CFA22)	Drayton Bassett Embankment (and culverts) (CFA21)	Whittington Heath Embankment (CFA22)	Curborough Embankment (CFA22)
							169-L2	169-L4	171-L2	172-L1	173-L2	175-L3	B-162-L1	B-163-L2	B-164-L3	B-165-L1	B-166-L1	B-166-L2	No DE_ID_NO	N-01-L2	N-00-L5	183-L5	185-L1	AP-C223-104	AP-C223-103	AP-C223-103
	GB40402G990800					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	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation
	Tame Anker Mease - Secondary Combined	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified
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 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
	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		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 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 (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	Close to Langley Brook LWS. Loss of habitat beneath footprint of scheme not assessed. Mitigation through drainage design.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Embankment crosses Coleshill Park Belt LWS. Habitat loss beneath scheme footprint not assessed. No significant impacts on groundwater body identified.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Embankment crosses Park Hall SINC & AW. Habitat loss beneath scheme footprint not assessed. No significant impacts on groundwater body identified.	Embankment crosses Park Hall SINC & AW and adjacent to River Tame. Habitat loss beneath scheme footprint not assessed. No significant impacts on groundwater body identified.	Embankment crosses Park Hall SINC & AW and adjacent to River Tame. Habitat loss beneath scheme footprint not assessed. No significant impacts on groundwater body 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	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts 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
	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	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 impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element

Quantitative status	Good

	Groundwater body					Scheme Elements	Embankment																			
							Middleton House Farm Embankment (CFA20)	Bodymoor Heath Embankment (CFA20)	Church Lane Embankment (CFA20)	Trickley Coppice Embankment (CFA20/21)	Drayton Lane Embankment (CFA20/21)	Hints Embankment (CFA21)	Green Lane Embankment (CFA19)	Attleboro Farm Embankment (CFA19)	Lanchester Way Embankment (CFA19)	Parkhall Wood Embankment (CFA025)	Embankment (CFA25)	Langley Hill Embankment (CFA025)	Unnamed Embankment (CFA26)	Marsh Lane Embankment (CFA19)	Watton Lane Embankment (CFA19)	Fulfen Farm Embankment (CFA22)	Streethay Embankment (CFA22)	Drayton Bassett Embankment (and culverts) (CFA21)	Whittington Heath Embankment (CFA22)	Curborough Embankment (CFA22)
							169-L2	169-L4	171-L2	172-L1	173-L2	175-L3	B-162-L1	B-163-L2	B-164-L3	B-165-L1	B-166-L1	B-166-L2	No DE_ID_NO	N-01-L2	N-00-L5	183-L5	185-L1	AP-C223-104	AP-C223-103	AP-C223-103
	GB40402G990800					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	Construction & Operation	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	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	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	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 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
	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	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	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	Crosses tributary of Langley Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant residual impacts predicted.	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. 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	Close to Langley Brook LWS. Loss of habitat beneath footprint of scheme not assessed. 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	Embankment crosses Coleshill Park Belt LWS. Habitat loss beneath scheme footprint not assessed. No significant impacts on groundwater body identified.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Embankment crosses Park Hall SINC & AW. Habitat loss beneath scheme footprint not assessed. No significant impacts on groundwater body identified.	Embankment crosses Park Hall SINC & AW and adjacent to River Tame. Habitat loss beneath scheme footprint not assessed. No significant impacts on groundwater body identified.	Embankment crosses Park Hall SINC & AW and adjacent to River Tame. Habitat loss beneath scheme footprint not assessed. No significant impacts on groundwater body 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	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Embankment crosses Whittington Heath Golf Club LWS. Habitat loss beneath scheme footprint not assessed. No significant impacts on groundwater body identified.	Route crosses Big Lyntus Wood. 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. Habitat loss beneath scheme footprint not assessed.
	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		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	Adjacent to landfill. 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	Adjacent to landfill. 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 SPZ3. 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. 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
	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	Adjacent to landfill. 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	Adjacent to landfill. 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	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

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	Embankment																			
						Middleton House Farm Embankment (CFA20)	Bodymoor Heath Embankment (CFA20)	Church Lane Embankment (CFA20)	Trickley Coppice Embankment (CFA20/21)	Drayton Lane Embankment (CFA20/21)	Hints Embankment (CFA21)	Green Lane Embankment (CFA19)	Attleboro Farm Embankment (CFA19)	Lanchester Way Embankment (CFA19)	Parkhall Wood Embankment (CFA025)	Embankment (CFA25)	Langley Hill Embankment (CFA025)	Unnamed Embankment (CFA26)	Marsh Lane Embankment (CFA19)	Watton Lane Embankment (CFA19)	Fulfen Farm Embankment (CFA22)	Streethay Embankment (CFA22)	Drayton Bassett Embankment (and culverts) (CFA21)	Whittington Heath Embankment (CFA22)	Curborough Embankment (CFA22)
						169-L2	169-L4	171-L2	172-L1	173-L2	175-L3	B-162-L1	B-163-L2	B-164-L3	B-165-L1	B-166-L1	B-166-L2	No DE_ID_NO	N-01-L2	N-00-L5	183-L5	185-L1	AP-C223-104	AP-C223-103	AP-C223-103
4. Drinking Water Protected Areas (DrWPAs) (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	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 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	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	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	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.	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.	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.

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

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

Groundwater body					Scheme Elements	Retaining Wall					Station	Tunnel Portal			Viaduct						
						Park Hall Retained FB (CFA025)	Castle Bromwich Retained Cut (CFA025)	Washwood Heath Retained Cut (CFA026)	Saltley Retained FB (CFA026)	Streethay Retained Cut (CFA22)	Birmingham Interchange Station (CFA24)	Bromford Tunnel East Portal (CFA025)	Bromford Tunnel West Portal (CFA026)	Marsh Farm Viaduct (CFA23)	River Blythe Bypass Viaduct (CFA23)	River Blythe Viaduct (CFA23)	Shadow Brook Viaduct (CFA23)	M42 Motorway Viaduct (CFA24)	M6 Motorway Viaduct No.1 (CFA24/19)	M6 Motorway Viaduct No. 2 (CFA23)	M6 Motorway Viaduct No. 3 (CFA23)	Coleshill Viaduct No. 1 (CFA19)	Coleshill Viaduct No. 1 (CFA19)
						R-166-L1	R-167-L3	R-170-L4	R-172-L2	AP-C223-103	156-L2	R-167-L8	R-170-L3	152-L2	153-L2	154-L3	154-L4	158-L1	160-L1	160-L3	160-L5	160-L3	R-160-L4
GB404023090800					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	Construction & Operation	Construction & Operation
Tame Anker Mease - Secondary Combined	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Lowering of groundwater levels and reduction in groundwater contributions to surface water features and groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions

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

Groundwater body					Scheme Elements	Viaduct																							
						Colchrill Viaduct No. 2 - A (CFA19)	Colchrill Viaduct No. 3 - A (CFA19)	Colchrill Viaduct No. 3 - A (CFA19)	Colchrill Viaduct No. 4 (CFA19)	Colchrill Viaduct No. 5 (CFA19)	Chattle Hill Viaduct (CFA19)	River Tame Viaduct (CFA19/20)	Cudworth Viaduct (CFA20)	Birmingham & Fazeley Canal Viaduct No. 1 (CFA19)	Birmingham & Fazeley Canal Viaduct No. 2 (CFA19)	Cuttle Mill Viaduct (CFA20)	North Wood Viaduct (CFA20)	Hunts Green Viaduct (CFA20)	Langley Brook Viaduct (CFA20)	Drayton Bassett Viaduct (CFA20/21) AP2 Replaced by Drayton Bassett Embankment and Culverts	River Cole Viaduct (CFA19)	M42 - M6 Motorway Link Viaduct No. 1 (CFA19)	River Tame Viaduct (CFA20/21)	River Tame Diversion (CFA20/21)	Dudderston Junction Viaduct (CFA20/21)	Curzon Street No.1 Viaduct (CFA20/21)	Curzon Street No.2 Viaduct (CFA20/21)	Curzon Street No. 3 Viaduct (CFA20/21)	Water Orton Viaduct No. 1 (CFA19)
						161-L1	161-L3	161-L3	162-L2	162-L3	164-L1	164-L3	164-L5	167-L2	167-L5	168-L1	169-L1	169-L3	171-L1	173-L1	B-161-L4	B-163-L1	B-165-L2	B-166-51	B-173-L1	B-173-L2	B-174-L1	B-174-L2	N-00-L1
					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	Construction & Operation	Construction & Operation	Construction & Operation	Construction	Construction & Operation	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	"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	No impacts identified as result of scheme element	No impacts identified as result of scheme element	"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	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies/springs/ "Damming" of groundwater obstructions 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	"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	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element

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

	Groundwater body					Scheme Elements	Viaducts								Other Key Structures																
							Water Orton Viaduct No. 4 (CFA19)	Water Orton Viaduct No. 3 (CFA19)	Streethay Viaduct (CFA22)	Coppers Lane Viaduct (CFA22)	Watton House Viaduct (CFA19)	A452 Kenilworth Road Overbridge	B4102 Meriden Road Underbridge	A45 Coventry Road Overbridge	A45/M42 Jnt Roundabout	People Mover to NEC/Airport	A452 Chester Road Highway Works	A452/A446 Roundabout Overbridges	A452 Chester Road Roundabout Highway Works	A452 Link Road Overbridge	M6 Jn4 Roundabout Highway Works	A452/B4438 Roundabout Highway Works	B4114 Birmingham Road Underbridge	Birmingham Spur Diversion Underbridge	River Cole Diversion	B4117 Gilson Road Realignment	A446 Hams Hall Island	Leeds Spur Diversion	A4097 Kingsbury Road Overbridge	Park Lane Diversion Highway Works	A4091 Tamworth Road Overbridge	A453 Sutton Road Overbridge
	GB404020390800					Phase	N-01-L1	N-00-L4	184-L1	AP-C223-103	AP-C223-112	153-51	153-54	155-54	156-51	156-59	156-510	157-59 & 510	157-54	157-56	157-58	158-52	161-51	162-52	162-53	163-51	165-52	166-54	166-52	170-52	170-51	174-53
							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
	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

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

	Groundwater body					Scheme Elements	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
							B4118 Water Orton Road Overbridge	Washwood Heath Depot	Washwood Heath Brook Diversion	River Rea Overflow Channel Realignment	B4114 Saltley Viaduct	Duddeston Mill Road Rail Bridge	Revised construction access near Cuttle Mill Fishery (CFA20)	Lichfield Road Underbridge (CFA22)	WCML Underbridge (CFA22)	Wood End Lane Realignment (CFA22)	Diddington Lane Road Realignment Works (CFA23)	Diddington Lane Field Access Provision Works (CFA23)	Chipping Warden Relief Road (CFA15)	A452 Roundabout Works (CFA23)	Gas main diversion stopple pits (CFA20)				
							B-165-S1	B-170-S3	B-170-S9	B-172-S3	B-173-S4	B-173-S4	AP-C223-085	AP-C223-103	AP-C223-103	AP-C223-103	AP-C224-027	SES-C224-051	AP-C222-214	AP-C224-025	CNO-172-001				
	GB40402G990800					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	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	"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	"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	**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 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	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.	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.	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.	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.	Crosses Bayleys Brook, which is to be diverted. 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.	Close to Gallows Brook. Dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. 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.	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.	Close to Cuttle Mill Pools LWS. Dewatering will be temporary and localised. Abstracted water returned to ground via SuDS or to adjacent stretch of surface water body. 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.	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.	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.	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.	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	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
							B4118 Water Orton Road Overbridge	Washwood Heath Depot	Washwood Heath Brook Diversion	River Rea Overflow Channel Realignment	B4114 Saltley Viaduct	Duddeston Mill Road Rail Bridge	Revised construction access near Cuttle Mill Fishery (CFA20)	Lichfield Road Underbridge (CFA22)	WCML Underbridge (CFA22)	Wood End Lane Realignment (CFA22)	Diddington Lane Road Realignment Works (CFA23)	Diddington Lane Field Access Provision Works (CFA23)	Chipping Warden Relief Road (CFA15)	A452 Roundabout Works (CFA23)	Gas main diversion stopple pits (CFA20)				
							B-165-S1	B-170-S3	B-170-S9	B-172-S3	B-173-S4	B-173-S4	AP-C223-085	AP-C223-103	AP-C223-103	AP-C223-103	AP-C224-027	SES-C224-051	AP-C222-214	AP-C224-025	CNO-172-001				
	GB40402G990800					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	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	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	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 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	Low	Not At Risk	Good Chemical Status by 2015		Close to River Tame. 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 River Tame. 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	Close to 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	Close to 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	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	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	In catchment of River Blythe SSSI. 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 Gallows Brook. 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
	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	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	Close to Cuttle Mill Pools LWS.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	In catchment of River Blythe SSSI. 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		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. 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	Near to landfill. 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	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	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	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. 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		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	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	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 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	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	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
							B4118 Water Orton Road Overbridge	Washwood Heath Depot	Washwood Heath Brook Diversion	River Rea Overflow Channel Realignment	B4114 Saltley Viaduct	Duddeston Mill Road Rail Bridge	Revised construction access near Cuttle Mill Fishery (CFA20)	Lichfield Road Underbridge (CFA22)	WCML Underbridge (CFA22)	Wood End Lane Realignment (CFA22)	Diddington Lane Road Realignment Works (CFA23)	Diddington Lane Field Access Provision Works (CFA23)	Chipping Warden Relief Road (CFA15)	A452 Roundabout Works (CFA23)	Gas main diversion stopple pits (CFA20)				
							B-165-S1	B-170-S3	B-170-S9	B-172-S3	B-173-S4	B-173-S4	AP-C223-085	AP-C223-103	AP-C223-103	AP-C223-103	AP-C224-027	SES-C224-051	AP-C222-214	AP-C224-025	CNO-172-001				
	4. Drinking Water Protected Areas (DrWPAs) (chemical)	Poor			Good Status by 2015	Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction	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 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	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	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.	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.	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, 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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