

High Speed Rail (West Midlands - Crewe)

Environmental Statement

Volume 5: Technical appendices

Water resources

Route-wide Water Framework Directive compliance assessment (WR-001-000) – Part 2

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Department
for Transport

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

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A report prepared for High Speed Two (HS2) Limited:

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Table 48: Pyford Brook Catchment (trib of Trent) (GB104028047250) detailed impact assessment - effects on current status

Surface water body: Pyford Brook Catchment (trib of Trent)				Detailed Impact Assessment				Detailed Impact Assessment Results					
Water body ID	Scheme component	Description of scheme component	Summary of embedded mitigation	Pyford Brook		Cumulative effects - effects on element from scheme component(s) located in other WFD water bodies	Overall effects on element	Additional mitigation requirements		Residual effect on element	WFD compliance outcome - potential for deterioration of current status		
				WFD-PYB-W-01-01 Viaduct	WFD-PYB-W-01-02 Access road culvert			Construction	Operation				
Hydromorphological designation:	Not A/HMWB			Pyford Brook Viaduct; Approx. viaduct width: 15m; Approx. viaduct length: 180m; Viaduct height: 10m	Approx. culvert length: 10m; Approx. culvert diameter: 0.9m								
Overall Status:	Bad												
Status Objective:	Good by 2027			Clear span viaduct. Viaducts designed to cross perpendicular to river channel wherever possible to reduce shading impact.	Culvert length has been reduced as far as reasonably practicable. Invert of culvert to be buried 300mm below the existing bed level to reduce disruption to sediment transfer and maintain natural substrate. Culvert sized to minimise impact on flow continuity. Detailed design to be developed in general accordance with CIRA and Environment Agency guidance and to ensure appropriate low flow water depths and velocities for fish passage. Hydromorphological improvements to be undertaken to river channel immediately upstream and downstream of the culvert to compensate for footprint loss.								
WFD Classification Elements	Current Status	Status Objective	Shading	Footprint	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Summary of scheme components proposed on watercourses within water body catchment with the potential to effect element status	Summary of effects on elements	Overall effect on element	Construction	Operation	Residual effect on element	WFD compliance outcome - potential for deterioration of current status
Biological Quality Elements	Macrophytes and Phytobenthos - combined	Moderate	Good by 2027	Some minor, localised and periodic shading of river channel. However negligible effect on macrophytes and phytobenthos anticipated. No measurable change in quality element	Localised but permanent loss of open river habitat. Localised adverse effects on macrophytes and phytobenthos anticipated, but no change in quality element when balanced against mitigation embedded in the scheme.	Localised but permanent shading of section of river channel. Localised adverse effect on macrophytes and phytobenthos anticipated (due to a reduction in photosynthetic activity), but no change in quality element when balanced against mitigation embedded in the scheme.	Localised but permanent changes to hydromorphology regime. However negligible effect anticipated on river processes and macrophytes and phytobenthos habitat upstream and downstream of culvert. No measurable change in quality element.	Viaducts Pyford Brook - viaduct (WFD-PYB-W-01-01) Culverts Pyford Brook - culvert (WFD-PYB-W-01-02) - 10m Total length of new culverted river channel = 10m Resultant net loss of open river channel = 10m	Viaducts The viaduct will cause some minor, localised and periodic shading of river channel. This will have a negligible effect on macrophytes and phytobenthos, macroinvertebrates and fish. Culverts The 10m length of new culverting will cause a localised but permanent loss of existing river habitat and shading. This will have a minor, localised adverse effect on macrophytes and phytobenthos, macroinvertebrates and fish.			N/A	
	Macroinvertebrates	Bad	Good by 2027	Some minor, localised and periodic shading of river channel. However negligible effect on macroinvertebrates anticipated. No measurable change in quality element	Localised but permanent loss of open river habitat. Localised adverse effects on macroinvertebrates anticipated, but no change in quality element when balanced against mitigation embedded in the scheme.	Localised but permanent shading of section of river channel. Localised adverse effects on macroinvertebrates anticipated (including due to a reduction in flow of riparian and aquatic vegetation), but no change in quality element when balanced against mitigation embedded in the scheme.	Localised but permanent changes to hydromorphology regime. However negligible effect anticipated on river processes and macroinvertebrate habitat upstream and downstream of culvert. No measurable change in quality element.	None. Water body downstream (Trent from Moreton Brook to River Tame) affected by Proposed Scheme but no widespread adverse impacts identified with the potential to propagate upstream and affect water body (e.g. restrictive structures significantly affecting biological continuity). Also Proposed Scheme effects to downstream water body all occur upstream of confluence with this water body.	Localised adverse effect anticipated when scheme component effects considered in combination. No change in quality element when balanced against mitigation embedded in the scheme.	None required.	None required.	N/A	Compliant - no change in biological status of water body
	Fish			Some minor, localised and periodic shading of river channel. However negligible effect on fish anticipated. No measurable change in quality element	Localised but permanent loss of open river habitat. Localised adverse effects on fish anticipated (including due to a reduction in flow of riparian and aquatic vegetation), but no change in quality element when balanced against mitigation embedded in the scheme.	Localised but permanent shading of culverted section of channel. Localised adverse effects on fish anticipated (including due to a reduction in flow of riparian and aquatic vegetation), but no change in quality element when balanced against mitigation embedded in the scheme.	Localised but permanent changes to hydromorphology regime. However negligible effect anticipated on river processes and fish habitat upstream and downstream of culvert. No measurable change in quality element.		Localised adverse effect anticipated when scheme component effects considered in combination. No change in quality element when balanced against mitigation embedded in the scheme.				N/A
Physicochemical Quality Elements	Dissolved oxygen	Bad	Good by 2021	Some minor, localised and periodic shading of river channel (with potential associated reduction in photosynthetic activity by aquatic flora). However negligible effect on dissolved oxygen concentrations anticipated. No measurable change in quality element.	Element is insensitive to impact	Localised but permanent shading of culverted section of channel. Potential to lead to minor and localised impact on dissolved oxygen concentrations (due to reduced photosynthetic activity by aquatic flora). Localised adverse effects anticipated, but no change in quality element when balanced against mitigation embedded in the scheme.	Localised but permanent changes to hydromorphology regime. However negligible effect anticipated on river processes and dissolved oxygen upstream and downstream of culvert. No measurable change in quality element.		Viaducts The viaduct will cause some minor, localised and periodic shading of river channel. This will have a negligible effect on dissolved oxygen and water temperature. Culverts The 10m length of new culverting will cause localised but permanent shading of river channel. This will have a minor, localised adverse effect on dissolved oxygen and water temperature	Localised adverse effect anticipated when scheme component effects considered in combination. No change in quality element when balanced against mitigation embedded in the scheme.			N/A
	pH	High	Good by 2015	Element is insensitive to impact	Element is insensitive to impact	Element is insensitive to impact	Element is insensitive to impact	None	Element is insensitive to impact. No measurable change to quality element.			N/A	
	Phosphate	Bad	Good by 2021	Element is insensitive to impact	Element is insensitive to impact	Element is insensitive to impact	Element is insensitive to impact		Element is insensitive to impact. No measurable change to quality element	None required.	None required.	N/A	Compliant - no change in physicochemical status of water body
	Ammonia (phys-chem)	Bad	Good by 2021	Element is insensitive to impact	Element is insensitive to impact	Element is insensitive to impact	Element is insensitive to impact		Element is insensitive to impact. No measurable change to quality element			N/A	
	Temperature	High	Good by 2015	Some minor, localised and periodic shading of river channel. However negligible effect on water temperature anticipated. No measurable change in quality element.	Element is insensitive to impact	Localised but permanent shading of culverted section of channel. Potential to lead to minor and localised impact on water temperature. Localised adverse effects anticipated, but no change in quality element when balanced against mitigation embedded in the scheme.	Element is insensitive to impact	None. Water body downstream (Trent from Moreton Brook to River Tame) affected by Proposed Scheme but no widespread adverse impacts identified with the potential to propagate upstream and affect water body. Also Proposed Scheme effects to downstream water body all occur upstream of confluence with this water body.	Localised adverse effect anticipated when scheme component effects considered in combination. No change in quality element when balanced against mitigation embedded in the scheme.			N/A	
Specific Pollutants	Ammonia, Copper, Triclosan, Zinc	High	High by 2015	N/A - Specific pollutants effects screened out for scheme design component	N/A - Specific pollutants effects screened out for scheme design component								
Hydromorphological Quality Elements	Quantity and dynamics of water flow			Localised but permanent changes to hydromorphology regime. Localised adverse effects on flow dynamics (including potential localised increases in flow velocity) anticipated, but no change in quality element when balanced against mitigation embedded in the scheme.	Element is insensitive to impact	Localised but permanent changes to hydromorphology regime. However negligible effect anticipated on river processes and quantity and dynamics of flow upstream and downstream. No measurable change in quality element.		Culverts The 10m length of new culverting will cause a localised but permanent change in hydromorphological regime. This will have a minor, localised adverse effect on flow dynamics, river continuity, river widths and depth, structure of substrate, and structure of riparian zone.	Localised adverse effect anticipated when scheme component effects considered in combination. No change in quality element when balanced against mitigation embedded in the scheme.			N/A	
	Connection to groundwater bodies			Localised but permanent loss of connection to surrounding shallow groundwater within superficial deposits. However no likely effect anticipated on connection to groundwater bodies. No measurable change in quality element.	Element is insensitive to impact	Element is insensitive to impact	None		Negligible effect anticipated when scheme component effects considered in combination. No measurable change in quality element.			N/A	
	River continuity	Supports Good	Supports Good by 2015	N/A - Hydromorphology effects screened out for scheme design component	N/A - Hydromorphology effects screened out for scheme design component				Localised adverse effect anticipated when scheme component effects considered in combination. No change in quality element when balanced against mitigation embedded in the scheme.			N/A	Compliant - no change in hydromorphological status of water body
	River depth and width variation			Localised but permanent changes to hydromorphology regime. Localised adverse effects on river depth and width anticipated, but no change in quality element when balanced against mitigation embedded in the scheme.	Element is insensitive to impact	Localised but permanent changes to hydromorphology regime. However negligible effect anticipated on river processes and river depth and variation upstream and downstream. No measurable change in quality element.	None. Water body downstream (Trent from Moreton Brook to River Tame) affected by Proposed Scheme but no widespread adverse impacts identified with the potential to propagate upstream and affect water body. Also Proposed Scheme effects to downstream water body all occur upstream of confluence with this water body.		Localised adverse effect anticipated when scheme component effects considered in combination. No change in quality element when balanced against mitigation embedded in the scheme.			N/A	
	Structure and substrate of the river bed			Localised but permanent changes to hydromorphology regime. Localised adverse effects on structure of river bed anticipated, but no change in quality element when balanced against mitigation embedded in the scheme.	Element is insensitive to impact	Localised but permanent changes to hydromorphology regime. However negligible effect anticipated on river processes and structure and substrate of river bed upstream and downstream. No measurable change in quality element.			Localised adverse effect anticipated when scheme component effects considered in combination. No change in quality element when balanced against mitigation embedded in the scheme.			N/A	
	Structure of the riparian zone			Localised but permanent loss of riparian zone. Localised adverse effects on structure of riparian zone anticipated, but no change in quality element when balanced against mitigation embedded in the scheme.	Element is insensitive to impact	Element is insensitive to impact			Localised adverse effect anticipated when scheme component effects considered in combination. No change in quality element when balanced against mitigation embedded in the scheme.			N/A	

Project Information		Detailed Project Description																				Summary and Status				
Project ID	Name	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	Phase 9	Phase 10	Phase 11	Phase 12	Phase 13	Phase 14	Phase 15	Phase 16	Phase 17	Phase 18	Phase 19	Phase 20	Overall Status	Priority	Start Date	End Date	Responsible
Project A	Task A.1	Task A.1.1	Task A.1.2	Task A.1.3	Task A.1.4	Task A.1.5	Task A.1.6	Task A.1.7	Task A.1.8	Task A.1.9	Task A.1.10	Task A.1.11	Task A.1.12	Task A.1.13	Task A.1.14	Task A.1.15	Task A.1.16	Task A.1.17	Task A.1.18	Task A.1.19	Task A.1.20	On Track	High	2023-01-01	2023-03-31	John Doe
		Task A.2.1	Task A.2.2	Task A.2.3	Task A.2.4	Task A.2.5	Task A.2.6	Task A.2.7	Task A.2.8	Task A.2.9	Task A.2.10	Task A.2.11	Task A.2.12	Task A.2.13	Task A.2.14	Task A.2.15	Task A.2.16	Task A.2.17	Task A.2.18	Task A.2.19	Task A.2.20	At Risk	Medium	2023-04-01	2023-06-30	Jane Smith
		Task A.3.1	Task A.3.2	Task A.3.3	Task A.3.4	Task A.3.5	Task A.3.6	Task A.3.7	Task A.3.8	Task A.3.9	Task A.3.10	Task A.3.11	Task A.3.12	Task A.3.13	Task A.3.14	Task A.3.15	Task A.3.16	Task A.3.17	Task A.3.18	Task A.3.19	Task A.3.20	Delayed	Low	2023-07-01	2023-09-30	Mike Johnson
		Task A.4.1	Task A.4.2	Task A.4.3	Task A.4.4	Task A.4.5	Task A.4.6	Task A.4.7	Task A.4.8	Task A.4.9	Task A.4.10	Task A.4.11	Task A.4.12	Task A.4.13	Task A.4.14	Task A.4.15	Task A.4.16	Task A.4.17	Task A.4.18	Task A.4.19	Task A.4.20	Completed	Low	2023-10-01	2023-12-31	Sarah Lee
Project B	Task B.1	Task B.1.1	Task B.1.2	Task B.1.3	Task B.1.4	Task B.1.5	Task B.1.6	Task B.1.7	Task B.1.8	Task B.1.9	Task B.1.10	Task B.1.11	Task B.1.12	Task B.1.13	Task B.1.14	Task B.1.15	Task B.1.16	Task B.1.17	Task B.1.18	Task B.1.19	Task B.1.20	On Track	High	2023-01-01	2023-03-31	John Doe
		Task B.2.1	Task B.2.2	Task B.2.3	Task B.2.4	Task B.2.5	Task B.2.6	Task B.2.7	Task B.2.8	Task B.2.9	Task B.2.10	Task B.2.11	Task B.2.12	Task B.2.13	Task B.2.14	Task B.2.15	Task B.2.16	Task B.2.17	Task B.2.18	Task B.2.19	Task B.2.20	At Risk	Medium	2023-04-01	2023-06-30	Jane Smith
		Task B.3.1	Task B.3.2	Task B.3.3	Task B.3.4	Task B.3.5	Task B.3.6	Task B.3.7	Task B.3.8	Task B.3.9	Task B.3.10	Task B.3.11	Task B.3.12	Task B.3.13	Task B.3.14	Task B.3.15	Task B.3.16	Task B.3.17	Task B.3.18	Task B.3.19	Task B.3.20	Delayed	Low	2023-07-01	2023-09-30	Mike Johnson
		Task B.4.1	Task B.4.2	Task B.4.3	Task B.4.4	Task B.4.5	Task B.4.6	Task B.4.7	Task B.4.8	Task B.4.9	Task B.4.10	Task B.4.11	Task B.4.12	Task B.4.13	Task B.4.14	Task B.4.15	Task B.4.16	Task B.4.17	Task B.4.18	Task B.4.19	Task B.4.20	Completed	Low	2023-10-01	2023-12-31	Sarah Lee

Table 53: Trent and Mersey Canal, summit to Alrewas (GB70410142) detailed impact assessment - effects on current status

Detailed Impact Assessment				Detailed Impact Assessment Results																															
Watercourse		Scheme component		Cumulative effects - effects on element from scheme component(s) located in other WFD water bodies	Summary of scheme components proposed on watercourse within water body catchment with the potential to effect element status	Summary of effects on elements	Overall effect on element	Additional mitigation requirements		Residual effect on element	WFD compliance outcome potential for deterioration of current status																								
Trent and Mersey Canal		WFD-TMC-W-01-01 Viaduct						Construction	Operation																										
Description of scheme component		Summary of embedded mitigation																																	
Water body ID:	GB70410142	Great Haywood Viaduct; Approx. viaduct width: 15m; Approx. viaduct length: 780m; Approx. viaduct height: 16m		None	Viaducts Trent and Mersey Canal; viaduct (WFD-TMC-W-01-01)	Viaducts The viaduct will cause some minor, localised and periodic shading of river channel. This will have a negligible effect on macrophytes and phytoplankton, macroinvertebrates and fish.	Negligible effect anticipated in when effects considered in combination. No measurable change in quality element	None required	None required	N/a	Compliant - no change in biological status of water body																								
Hydromorphological designation:	Artificial Water Body (AWB)	Clear span viaduct. Viaducts designed to cross perpendicular to river channel wherever possible to reduce shading impact.																																	
Overall Status:	Good																																		
Status Objective:	Good by 2015																																		
WFD Classification Elements												Current Status	Status Objective	Shading																					
Biological Quality Elements	Macrophytes and Phytoenthos - combined	-	Not assessed by 2015	None	Viaducts Trent and Mersey Canal; viaduct (WFD-TMC-W-01-01)	Viaducts The viaduct will cause some minor, localised and periodic shading of river channel. This will have a negligible effect on macrophytes and phytoplankton, macroinvertebrates and fish.	Negligible effect anticipated in when effects considered in combination. No measurable change in quality element	None required	None required	N/a	Compliant - no change in biological status of water body																								
	Macroinvertebrates	-	Not assessed by 2015									None	Viaducts Trent and Mersey Canal; viaduct (WFD-TMC-W-01-01)	Viaducts The viaduct will cause some minor, localised and periodic shading of river channel. This will have a negligible effect on macrophytes and phytoplankton, macroinvertebrates and fish.	Negligible effect anticipated in when effects considered in combination. No measurable change in quality element	None required	None required	N/a	Compliant - no change in biological status of water body																
	Fish	-	Not assessed by 2015																	None	Viaducts Trent and Mersey Canal; viaduct (WFD-TMC-W-01-01)	Viaducts The viaduct will cause some minor, localised and periodic shading of river channel. This will have a negligible effect on macrophytes and phytoplankton, macroinvertebrates and fish.	Negligible effect anticipated in when effects considered in combination. No measurable change in quality element	None required	None required	N/a	Compliant - no change in biological status of water body								
Physicochemical Quality Elements	Dissolved oxygen	Good	-																									None	Viaducts Trent and Mersey Canal; viaduct (WFD-TMC-W-01-01)	Viaducts The viaduct will cause some minor, localised and periodic shading of river channel. This will have a negligible effect on dissolved oxygen and water temperature.	Negligible effect anticipated in when effects considered in combination. No measurable change in quality element	None required	None required	N/a	Compliant - no change in physicochemical status of water body
	pH	High	Good by 2015																																
	Phosphate	-	-	None	Viaducts Trent and Mersey Canal; viaduct (WFD-TMC-W-01-01)	Viaducts The viaduct will cause some minor, localised and periodic shading of river channel. This will have a negligible effect on dissolved oxygen and water temperature.	Negligible effect anticipated in when effects considered in combination. No measurable change in quality element	None required	None required	N/a	Compliant - no change in physicochemical status of water body																								
	Ammonia	High	Good by 2015									None	Viaducts Trent and Mersey Canal; viaduct (WFD-TMC-W-01-01)	Viaducts The viaduct will cause some minor, localised and periodic shading of river channel. This will have a negligible effect on dissolved oxygen and water temperature.	Negligible effect anticipated in when effects considered in combination. No measurable change in quality element	None required	None required	N/a	Compliant - no change in physicochemical status of water body																
	Temperature	High	Good by 2015																	None	Viaducts Trent and Mersey Canal; viaduct (WFD-TMC-W-01-01)	Viaducts The viaduct will cause some minor, localised and periodic shading of river channel. This will have a negligible effect on dissolved oxygen and water temperature.	Negligible effect anticipated in when effects considered in combination. No measurable change in quality element	None required	None required	N/a	Compliant - no change in physicochemical status of water body								
Specific Pollutants	Ammonia (Annex 8), Copper, Triclosan, Zinc	-	Not assessed by 2015																									None	Viaducts Trent and Mersey Canal; viaduct (WFD-TMC-W-01-01)	Viaducts The viaduct will cause some minor, localised and periodic shading of river channel. This will have a negligible effect on dissolved oxygen and water temperature.	Negligible effect anticipated in when effects considered in combination. No measurable change in quality element	None required	None required	N/a	Compliant - no change in physicochemical status of water body
	Hydromorphological Quality Elements	Quantity and dynamics of water flow	-																																
Connection to groundwater bodies		-	Not assessed by 2015	None	Viaducts Trent and Mersey Canal; viaduct (WFD-TMC-W-01-01)	Viaducts The viaduct will cause some minor, localised and periodic shading of river channel. This will have a negligible effect on dissolved oxygen and water temperature.	Negligible effect anticipated in when effects considered in combination. No measurable change in quality element	None required	None required	N/a	Compliant - no change in physicochemical status of water body																								
River continuity		-	Not assessed by 2015									None	Viaducts Trent and Mersey Canal; viaduct (WFD-TMC-W-01-01)	Viaducts The viaduct will cause some minor, localised and periodic shading of river channel. This will have a negligible effect on dissolved oxygen and water temperature.	Negligible effect anticipated in when effects considered in combination. No measurable change in quality element	None required	None required	N/a	Compliant - no change in physicochemical status of water body																
River depth and width variation		-	Not assessed by 2015																	None	Viaducts Trent and Mersey Canal; viaduct (WFD-TMC-W-01-01)	Viaducts The viaduct will cause some minor, localised and periodic shading of river channel. This will have a negligible effect on dissolved oxygen and water temperature.	Negligible effect anticipated in when effects considered in combination. No measurable change in quality element	None required	None required	N/a	Compliant - no change in physicochemical status of water body								
Structure and substrate of the river bed		-	Not assessed by 2015																									None	Viaducts Trent and Mersey Canal; viaduct (WFD-TMC-W-01-01)	Viaducts The viaduct will cause some minor, localised and periodic shading of river channel. This will have a negligible effect on dissolved oxygen and water temperature.	Negligible effect anticipated in when effects considered in combination. No measurable change in quality element	None required	None required	N/a	Compliant - no change in physicochemical status of water body
Structure of the riparian zone	-	Not assessed by 2015	None																																

Project Information		Project Name		Project ID		Project Manager		Project Sponsor		Project Start		Project End		Project Status		Project Risk		Project Budget		Project Resources		Project Deliverables		Project Milestones		Project Summary												
Project Name	Project ID	Project Manager	Project Sponsor	Project Start	Project End	Project Status	Project Risk	Project Budget	Project Resources	Project Deliverables	Project Milestones	Project Summary	Project Name	Project ID	Project Manager	Project Sponsor	Project Start	Project End	Project Status	Project Risk	Project Budget	Project Resources	Project Deliverables	Project Milestones	Project Summary	Project Name	Project ID	Project Manager	Project Sponsor	Project Start	Project End	Project Status	Project Risk	Project Budget	Project Resources	Project Deliverables	Project Milestones	Project Summary
Project A	001	John Doe	Jane Smith	2023-01-01	2023-03-31	Completed	Low	\$100,000	5 FTE	Website Development	Phase 1 Complete	On Track	Project B	002	John Doe	Jane Smith	2023-04-01	2023-06-30	In Progress	Medium	\$200,000	10 FTE	Mobile App Development	Phase 2 Complete	On Track	Project C	003	John Doe	Jane Smith	2023-07-01	2023-09-30	On Hold	High	\$50,000	2 FTE	Cloud Migration	Phase 1 Complete	On Track
Project D	004	John Doe	Jane Smith	2023-10-01	2023-12-31	On Hold	High	\$75,000	3 FTE	AI Integration	Phase 1 Complete	On Track	Project E	005	John Doe	Jane Smith	2024-01-01	2024-03-31	On Hold	High	\$150,000	7 FTE	Blockchain Research	Phase 1 Complete	On Track	Project F	006	John Doe	Jane Smith	2024-04-01	2024-06-30	On Hold	High	\$125,000	6 FTE	AR/VR Development	Phase 1 Complete	On Track

Table 57: Checkley Brook - Upper (GB11206805230) detailed impact assessment - effects on current status

Surface water body: Checkley Brook - Upper				Detailed Impact Assessment		Detailed Impact Assessment Results							
Water body ID: GB11206805230		Watercourse: Checkley Brook		Cumulative effects - effects on element from scheme component(s) located in other WFD water bodies	Summary of scheme components proposed on watercourses within water body catchment with the potential to effect element status	Summary of effects on elements	Overall effect on element	Additional mitigation requirements		Residual effect on element	WFD compliance outcome - potential for deterioration of current status		
Hydromorphological Registration: Not A/M/MWB		Scheme component: WFD-CBU-W-01-01 Viaduct						Construction	Operation				
Overall Status: Good		Description of scheme component: Checkley Brook Viaduct; Approx. viaduct width: 15m; Approx. viaduct length: 180m; Approx. viaduct height: 15m											
Status Objective: Good by 2015		Summary of embedded mitigation: Clear span viaduct. Viaducts designed to cross perpendicular to river channel wherever possible to reduce shading impact.		Clear span viaduct. Viaducts designed to cross perpendicular to river channel wherever possible to reduce shading impact.									
WFD Classification Elements		Current Status	Status Objective	Shading									
Biological Quality Elements	Macrophytes and Phytoenthos - combined	High	Good by 2015	Some minor, localised and periodic shading of river channel. However negligible effect on macrophytes and phytoenthos anticipated. No measurable change in quality element.	None	Viaducts Checkley Brook viaduct (WFD-CBU-W-01-01)	Viaducts The viaduct will cause some minor, localised and periodic shading of river channel. This will have a negligible effect on macrophytes, phytoenthos, macroinvertebrates and fish.	Negligible effect anticipated in when effects considered in combination. No measurable change in quality element.	None required.	None required.	N/a	Compliant - no change in biological status of water body	
	Macroinvertebrates	High	Good by 2015	Some minor, localised and periodic shading of river channel. However negligible effect on macroinvertebrates anticipated. No measurable change in quality element.							Negligible effect anticipated in when effects considered in combination. No measurable change in quality element.		N/a
	Fish	-	-	Some minor, localised and periodic shading of river channel. However negligible effect on fish anticipated. No measurable change in quality element.							Negligible effect anticipated in when effects considered in combination. No measurable change in quality element.		N/a
Physicochemical Quality Elements	Dissolved oxygen	High	Good by 2015	Some minor, localised and periodic shading of river channel (with potential associated reduction in photosynthetic activity by aquatic flora). However, negligible effect on dissolved oxygen concentrations anticipated. No measurable change in quality element.		Viaducts The viaduct will cause some minor, localised and periodic shading of river channel. This will have a negligible effect on dissolved oxygen and water temperature.	Negligible effect anticipated in when effects considered in combination. No measurable change in quality element.	Element is insensitive to impact.	None required.	None required.	N/a	Compliant - no change in physicochemical status of water body	
	pH	High	Good by 2015	Element is insensitive to impact.							N/a		
	Phosphate	High	Good by 2015	Element is insensitive to impact.							N/a		
	Ammonia	High	Good by 2015	Element is insensitive to impact.							N/a		
	Temperature	High	Good by 2015	Some minor, localised and periodic shading of river channel. However, negligible effect on water temperature anticipated. No measurable change in quality element.							Negligible effect anticipated in when effects considered in combination. No measurable change in quality element.		N/a
Specific Pollutants	Copper, Triclosan, Zinc	-	Not assessed by 2015	N/A - Specific pollutants effects screened out for scheme design component									
Hydromorphological Quality Elements	Quantity and dynamics of water flow	Supports good	Supports good by 2015	N/A - Hydromorphology effects screened out for scheme design component									
	Connection to groundwater bodies												
	River continuity												
	River depth and width variation												
	Structure and substrate of the river bed												
Structure of the riparian zone													

Table 59: Betley Mere (G83123430) detailed impact assessment - effects on current status

Surface water body: Betley Mere				Detailed Impact Assessment			Detailed Impact Assessment Results														
Watercourse		Scheme component			Borrow pit - north of Checkley Lane			Cumulative effects - effects on element from scheme component(s) located in other WFD water bodies	Summary of scheme components proposed on watercourses within water body catchment with the potential to effect element status	Summary of effects on elements	Overall effect on element	Additional mitigation requirements		Residual effect on element	WFD compliance outcome - potential for deterioration of current status						
Water body ID:	G83123430	Description of scheme component			Summary of embedded mitigation							Construction	Operation								
Hydromorphological Designation:		Overall Status:			Status Objective:			WFD Classification Elements	Current Status	Status Objective	Footprint	Changes in flow velocity and volume due to dewatering	Changes to water body hydromorphology leading to changes in lake processes and habitat	None	Borrow pit (the borrow pit north of Checkley Lane) - minimum approx. 470m from mere	Borrow pit (the borrow pit north of Checkley Lane) will comprise approximately 2.4% of the Betley Mere catchment. A vertical buffer above local groundwater levels will be applied during excavation of the borrow pit, and any surface water runoff intercepted by the borrow pit will be treated and re-circulated into the downstream catchment at an appropriate rate and location. These measures will ensure that there are negligible impacts on surface and groundwater flows and the water level of the mere. This will therefore have a negligible effect on phytoplankton.	Negligible effect anticipated in when effects considered in combination. No measureable change in quality element.	None required.	None required.	N/a	Compliant - no change in biological status of water body
Heavily Modified Water Body (HMWB)		Poor			Poor by 2015																
Approx. total borrow pit surface area: 0.4km ² (approximately 0.2km ² located within catchment area of Betley Mere). Maximum excavation depth: above local groundwater level; Excavation material: sand and gravel; Approx. distance from borrow pit to mere (at nearest point): 470m; Approx. catchment area of Betley Mere: 8.2km ²		A vertical buffer will be provided between the base of the borrow pit excavations and the groundwater level, ensuring that there are no impacts on groundwater flows. Excavations will be in accordance with the measures described in the draft CoCP and any rainfall and surface water runoff intercepted by the borrow pit will be treated and re-circulated into the downstream catchment at an appropriate rate and location, therefore ensuring that there is no significant impact on the volume or quality of water reaching the mere. Following construction, the areas excavated as borrow pit will be restored to the existing levels and land use in accordance with the Phase 2a Borrow Pits Agricultural Restoration Strategy. The materials used to backfill the borrow pit as part of the restoration plan are assumed to consist of a lower permeability than the current material. Drainage measures will be designed to control groundwater levels and to sustain baseflow to the watercourse.			Footprint		Changes in flow velocity and volume due to dewatering		Changes to water body hydromorphology leading to changes in lake processes and habitat												
Biological Quality Elements	Phytoplankton	Poor	Poor by 2015	No direct physical impact on lake. No likely effects anticipated on phytoplankton. No measureable change in quality element.	Localised and temporary excavation of area of catchment area (approximately 2.4%). Potential for dewatering activities to disrupt surface and groundwater flows towards the mere, in turn reducing water levels during the construction phase. However, a vertical buffer will be implemented between the base of the borrow pit excavations and the local groundwater level and any rainfall and surface water runoff intercepted by the borrow pit will be re-circulated into the downstream catchment at an appropriate rate and location. These embedded measures will ensure that there are negligible impacts on flows to and the water level of the mere. Therefore negligible effects anticipated on phytoplankton. No measureable change in quality element.	No direct physical impact on lake processes and habitat. No likely effects anticipated on phytoplankton. No measureable change in quality element.	None	Borrow pit (the borrow pit north of Checkley Lane) - minimum approx. 470m from mere	Borrow pit (the borrow pit north of Checkley Lane) will comprise approximately 2.4% of the Betley Mere catchment. A vertical buffer above local groundwater levels will be applied during excavation of the borrow pit, and any surface water runoff intercepted by the borrow pit will be treated and re-circulated into the downstream catchment at an appropriate rate and location. These measures will ensure that there are negligible impacts on surface and groundwater flows and the water level of the mere. This will therefore have a negligible effect on phytoplankton.	Negligible effect anticipated in when effects considered in combination. No measureable change in quality element.	None required.	None required.	N/a	Compliant - no change in biological status of water body							
	Physicochemical Quality Elements	Salinity	High	Good by 2015	No direct physical impact on lake. No likely effects anticipated on salinity. No measureable change in quality element.	Localised and temporary excavation of area of catchment area (approximately 2.4%). Potential for dewatering activities to disrupt surface and groundwater flows towards the mere, in turn reducing water levels during the construction phase. However, a vertical buffer will be implemented between the base of the borrow pit excavations and the local groundwater level and any rainfall and surface water runoff intercepted by the borrow pit will be re-circulated into the downstream catchment at an appropriate rate and location. These embedded measures will ensure that there are negligible impacts on flows to and the water level of the mere. Therefore negligible effects anticipated on salinity. No measureable change in quality element.									Element is insensitive to impact	Borrow pits (The excavation of the borrow pit north of Checkley Lane will comprise approximately 2.4% of the Betley Mere catchment. A vertical buffer above local groundwater levels will be applied during excavation of the borrow pit, and any surface water runoff intercepted by the borrow pit will be treated and re-circulated into the downstream catchment at an appropriate rate and location. These measures will ensure that there are negligible impacts on surface and groundwater flows and the water level of the mere. This will therefore have a negligible effect on salinity and total phosphorus.	Negligible effect anticipated in when effects considered in combination. No measureable change in quality element.	None required.	None required.	N/a	Compliant - no change in physicochemical status of water body
		Total phosphorus	Bad	Bad by 2015	No direct physical impact on lake. No likely effects anticipated on total phosphorus. No measureable change in quality element.	Localised and temporary excavation of area of catchment area (approximately 2.4%). Potential for dewatering activities to disrupt surface and groundwater flows towards the mere, in turn reducing water levels during the construction phase. However, a vertical buffer will be implemented between the base of the borrow pit excavations and the local groundwater level and any rainfall and surface water runoff intercepted by the borrow pit will be re-circulated into the downstream catchment at an appropriate rate and location. These embedded measures will ensure that there are negligible impacts on flows to and the water level of the mere. Therefore negligible effects anticipated on total phosphorus. No measureable change in quality element.									Element is insensitive to impact						
Specific Pollutants	Ammonia (Phys-Chem), Copper, Triclosan, Zinc	-	Not assessed by 2015	No direct physical impact on lake. No likely effects anticipated on specific pollutant concentrations. No measureable change in quality element.	Localised and temporary excavation of area of catchment area (approximately 2.4%). Potential for dewatering activities to disrupt surface and groundwater flows towards the mere, in turn reducing water levels during the construction phase. However, a vertical buffer will be implemented between the base of the borrow pit excavations and the local groundwater level and any rainfall and surface water runoff intercepted by the borrow pit will be re-circulated into the downstream catchment at an appropriate rate and location. These embedded measures will ensure that there are negligible impacts on flows to and the water level of the mere. Therefore negligible effects anticipated on specific pollutant concentrations. No measureable change in quality element.	Element is insensitive to impact															
Hydromorphological Quality Elements	Lake depth variation	-	-	No direct physical impact on lake. No likely effects anticipated on lake depth variation. No measureable change in quality element.	Localised and temporary excavation of area of catchment area (approximately 2.4%). Potential for dewatering activities to disrupt surface and groundwater flows towards the mere, in turn reducing water levels during the construction phase. However, a vertical buffer will be implemented between the base of the borrow pit excavations and the local groundwater level and any rainfall and surface water runoff intercepted by the borrow pit will be re-circulated into the downstream catchment at an appropriate rate and location. These embedded measures will ensure that there are negligible impacts on lake depth variations. No measureable change in quality element.	No direct physical impact on lake processes and habitat. No likely effects anticipated on lake depth variation. No measureable change in quality element.	None	Borrow pits (The excavation of the borrow pit north of Checkley Lane will comprise approximately 2.4% of the Betley Mere catchment. A vertical buffer above local groundwater levels will be applied during excavation of the borrow pit, and any surface water runoff intercepted by the borrow pit will be treated and re-circulated into the downstream catchment at an appropriate rate and location. These measures will ensure that there are negligible impacts on surface and groundwater flows and the water level of the mere. This will therefore have a negligible effect on lake depth variation, quantity, structure and substrate of lake bed, and structure of the lake shore.	Negligible effect anticipated in when effects considered in combination. No measureable change in quality element.	None required.	None required.	N/a	Compliant - no change in hydromorphological status of water body								
	Quantity, structure and substrate of lake bed	Supports Good	Supports good by 2015	No direct physical impact on lake. No likely effects anticipated on quantity, structure and substrate of lake bed. No measureable change in quality element.	Element is insensitive to impact	No direct physical impact on lake processes and habitat. No likely effects anticipated on quantity, structure and substrate of lake bed. No measureable change in quality element.								Borrow pits (The excavation of the borrow pit north of Checkley Lane will comprise approximately 2.4% of the Betley Mere catchment. A vertical buffer above local groundwater levels will be applied during excavation of the borrow pit, and any surface water runoff intercepted by the borrow pit will be treated and re-circulated into the downstream catchment at an appropriate rate and location. These measures will ensure that there are negligible impacts on surface and groundwater flows and the water level of the mere. This will therefore have a negligible effect on lake depth variation, quantity, structure and substrate of lake bed, and structure of the lake shore.	Negligible effect anticipated in when effects considered in combination. No measureable change in quality element.	None required.	None required.	N/a			
	Structure of lake shore	-	-	No direct physical impact on lake. No likely effects anticipated on structure of lake shore. No measureable change in quality element.	Element is insensitive to impact	No direct physical impact on lake processes and habitat. No likely effects anticipated on structure of lake shore. No measureable change in quality element.															

3 Groundwater

- 3.1.1 The baseline assessment has identified six groundwater bodies as being affected by the Proposed Scheme (see Section 5, main report and Annex D).
- 3.1.2 The preliminary assessment has then identified the relevant impacts of the various scheme components and the associated likely effects on the different WFD status elements of the surface water bodies affected by the Proposed Scheme (see Section 7.1, main report and Annex F1.2). This, in turn, has identified which quality elements are screened-in for detailed assessment for each water body.
- 3.1.3 The detailed impact assessment results for the groundwater bodies affected by the Proposed Scheme are summarised here in Tables 60 – 65.

Project Information				Detailed Analysis Columns																				Summary		Overall Status			
Project ID	Name	Phase	Priority	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10	Column 11	Column 12	Column 13	Column 14	Column 15	Column 16	Column 17	Column 18	Column 19	Column 20	Score	Weighted Score	Category	Sub-category	Value	
001	Project A	Phase 1	High	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	85	85	High	Priority	90
002	Project B	Phase 2	Medium	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	75	75	Medium	Standard	80
003	Project C	Phase 3	Low	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	65	65	Low	Standard	70
004	Project D	Phase 4	High	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	90	90	High	Priority	95

Project Information				Detailed Analysis Columns																				Summary		Overall Status			
Project ID	Name	Phase	Priority	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10	Column 11	Column 12	Column 13	Column 14	Column 15	Column 16	Column 17	Column 18	Column 19	Column 20	Score	Weighted Score	Category	Sub-category	Value	
005	Project E	Phase 1	High	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	85	85	High	Priority	90
006	Project F	Phase 2	Medium	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	75	75	Medium	Standard	80
007	Project G	Phase 3	Low	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	65	65	Low	Standard	70
008	Project H	Phase 4	High	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	90	90	High	Priority	95
009	Project I	Phase 1	High	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	85	85	High	Priority	90
010	Project J	Phase 2	Medium	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	75	75	Medium	Standard	80
011	Project K	Phase 3	Low	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	65	65	Low	Standard	70
012	Project L	Phase 4	High	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	90	90	High	Priority	95

Groundwater body: South Cheshire and North Staffordshire Permo-Triassic Sandstone Aquifers (GALWS0403070)					Bored Tunnel						Overall Effect	Impact on Current WFD Status	Additional Mitigation Requirements	Residual Effect on Current WFD Element Status	WFD compliance outcome - potential for deterioration of current status
Scheme Component					Southern portal of the Maddy tunnel		The twin bore section of the Maddy tunnel		Northern portal of the Maddy tunnel						
Phase	Current Status	Confidence	Status objective	Identified potential quantitative impacts	WFD-GW-CSPF-BT-01 Temporary and Permanent Construction	WFD-GW-CSPF-BT-02 Temporary and Permanent Construction	WFD-GW-CSPF-BT-03 Temporary and Permanent Construction	WFD-GW-CSPF-BT-04 Temporary and Permanent Construction	WFD-GW-CSPF-BT-05 Temporary and Permanent Construction						
1. Saline or other intrusions	Good	Uncertain	Good by 2015	No likely saline or other intrusion of poor quality water as no sources of poor water quality identified in vicinity of scheme element	"Damping" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWOTE or groundwater abstractions by temporary dewatering/permanent groundwater control	"Damping" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWOTE or groundwater abstractions by temporary dewatering/permanent groundwater control	"Damping" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWOTE or groundwater abstractions by temporary dewatering/permanent groundwater control	No impacts identified	Remains Good Status	None required	Remains Good Status	Compliant - no change in status
2. Surface water	Good	Uncertain	Good by 2015	The southern portal may intersect the saturated zone of the aquifer and some dewatering may be required during construction. The dewatering assessment for the portal was undertaken along with the adjacent Maddy cutting and the radius of influence has been assessed as a minimum of 4.5m. There are no surface water features within this radius.	If within the saturated zone, could influence local groundwater level by acting as a dam to groundwater flow. There are no surface water courses in proximity which could be influenced by any local damping impacts.	The northernmost section of the Maddy twin bore tunnel may intersect the saturated zone of the aquifer, however it will be constructed using a tunnel boring machine in close face mode designed to be watertight throughout construction. Therefore dewatering of the aquifer is not required and impacts on nearby surface water will be negligible.	If within the saturated zone, construction of the tunnel will create a cylinder of no flow through the aquifer, and potentially decrease the hydraulic conductivity of the aquifer in the area immediately adjacent to the tunnel lining. There are no surface water courses nearby which could be impacted on nearby surface water will be negligible.	The northern portal will mostly intersect unsaturated deposits, but may also intersect a narrow saturated zone of the aquifer and some minor dewatering may be required during construction. There are no surface water features within this radius which are thought to be hydraulically connected with the dewatered zone.	No impacts identified as a result of scheme element.	No impacts identified	Remains Good Status	None required	Remains Good Status	Compliant - no change in status	
3. Groundwater Dependent Terrestrial Ecosystems (GWDTES)	Good	Very Certain	Good by 2015	No impacts identified as a result of scheme element.	No impacts identified as a result of scheme element.	No impacts identified as a result of scheme element.	No impacts identified as a result of scheme element.	No impacts identified as a result of scheme element.	No impacts identified as a result of scheme element.	No impacts identified as a result of scheme element.	No impacts identified	Remains Good Status	None required	Remains Good Status	Compliant - no change in status
4. Water balance	Good	Uncertain	Good by 2015	The southern portal may intersect the saturated zone of the aquifer and some dewatering may be required during construction. There may be local impacts on water balance however any water which may be removed from the aquifer during construction (dewatering) will where reasonably practicable, be discharged back to ground using SUDS or to the adjacent. Dewatering and discharge arrangements would be designed in detail following site investigation in consultation with, and ensuring appropriate permits are in place with the Environment Agency.	No impact on water balance is expected due to potential groundwater damping, with only localized impacts on the flow regime.	The bored tunnel will be constructed in closed face mode and designed to be watertight therefore no impact on water balance is expected.	No impact on water balance is expected due to potential groundwater damping, with only localized impacts on flow regime.	The southern portal may intersect the saturated zone of the aquifer and some dewatering may be required during construction. There may be local impacts on water balance however any water which may be removed from the aquifer during construction (dewatering) will where reasonably practicable, be discharged back to ground using SUDS or to the adjacent. Dewatering and discharge arrangements would be designed in detail following site investigation in consultation with, and ensuring appropriate permits are in place with the Environment Agency.	No impact on water balance is expected due to potential groundwater damping, with only localized impacts on the flow regime.	Potential localized impacts identified, negligible impact with embedded mitigation	Remains Good Status	None required	Remains Good Status	Compliant - no change in status	
Overall Chemical Status					Good	Uncertain	Good by 2015								

Groundwater body: South Cheshire and North Staffordshire Permo-Triassic Sandstone Aquifers (GALWS0403070)					Bored Tunnel						Overall Effect	Impact on Current WFD Status	Additional Mitigation Requirements	Residual Effect on Current WFD Element Status	WFD compliance outcome - potential for deterioration of current status
Scheme Component					Southern portal of the Maddy tunnel		The twin bore section of the Maddy tunnel		Northern portal of the Maddy tunnel						
Phase	Current Status	Confidence	Status objective	Identified potential chemical impacts	WFD-GW-CSPF-BT-01 Temporary and Permanent Construction	WFD-GW-CSPF-BT-02 Temporary and Permanent Construction	WFD-GW-CSPF-BT-03 Temporary and Permanent Construction	WFD-GW-CSPF-BT-04 Temporary and Permanent Construction	WFD-GW-CSPF-BT-05 Temporary and Permanent Construction						
1. Saline or other intrusions	Good	Uncertain	Good by 2015	No likely saline or other intrusion of poor quality water as no sources of poor water quality identified in vicinity of scheme element	Disturbing or mobilising existing poor quality groundwater by temporary dewatering or dewatering and 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 or dewatering and 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 or dewatering and permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	No impacts identified	Remains Good Status	None required	Remains Good Status	Compliant - no change in status
2. Surface water	Good	Uncertain	Good by 2015	No impacts identified as a result of scheme element. No existing poor quality groundwater expected to be disturbed or mobilised in the vicinity of the portal or general dewatering radius of influence. CoCP and best practice for design, construction and operation reduce risks to surface water quality.	No impacts identified as a result of scheme element. No poor quality groundwater expected in the vicinity of the portal, or connection with surface water. CoCP and best practice for design, construction and operation reduce risks to water quality due to preferential pathways.	No dewatering proposed during construction of the twin bore tunnel and no existing poor quality groundwater expected in this area. CoCP and best practice for design, construction and operation reduce risks to water quality.	No impacts identified as a result of scheme element. No poor quality groundwater expected in the vicinity of the twin bore tunnel. CoCP and best practice for design, construction and operation reduce risks to surface water quality due to preferential pathways.	No impacts identified as a result of scheme element. No existing poor quality groundwater expected to be disturbed or mobilised in the vicinity of the portal or general dewatering radius of influence. CoCP and best practice for design, construction and operation reduce risks to surface water quality.	No impacts identified as a result of scheme element. No poor quality groundwater expected in the vicinity of the portal, or connection with surface water. CoCP and best practice for design, construction and operation reduce risks to water quality due to preferential pathways.	No impacts identified as a result of scheme element. No poor quality groundwater expected in the vicinity of the portal, and the element is not within an SPZ.	No impacts identified	Remains Good Status	None required	Remains Good Status	Compliant - no change in status
3. Groundwater Dependent Terrestrial Ecosystems (GWDTES)	Good	Very Certain	Good by 2015	No impacts identified as a result of scheme element.	No impacts identified as a result of scheme element.	No impacts identified as a result of scheme element.	No impacts identified as a result of scheme element.	No impacts identified as a result of scheme element.	No impacts identified as a result of scheme element.	No impacts identified as a result of scheme element.	No impacts identified	Remains Good Status	None required	Remains Good Status	Compliant - no change in status
4. Drinking Water Protected Areas (DWPA)	Good	Uncertain	Good by 2015	No existing poor quality groundwater is expected in the vicinity of the portal, and the element is not within an SPZ. CoCP and best practice for design, construction and operation reduce risks to water quality.	No impacts identified as a result of scheme element. No poor quality groundwater expected in the vicinity of the portal, and the element is not within an SPZ.	No existing poor quality groundwater is expected in the vicinity of the tunnel, and the element is not within an SPZ. CoCP and best practice for design, construction and operation reduce risks to water quality.	No impacts identified as a result of scheme element. No poor quality groundwater expected in the vicinity of the twin bore tunnel, and the element is not within an SPZ.	No existing poor quality groundwater is expected in the vicinity of the portal, and the element is not within an SPZ. CoCP and best practice for design, construction and operation reduce risks to water quality.	No impacts identified as a result of scheme element. No poor quality groundwater expected in the vicinity of the portal, and the element is not within an SPZ.	No impacts identified as a result of scheme element. No poor quality groundwater expected in the vicinity of the portal, and the element is not within an SPZ.	No impacts identified	Remains Good Status	None required	Remains Good Status	Compliant - no change in status
5. General quality assessment	Good	Uncertain	Good by 2015	No existing poor quality groundwater expected. Potentially little or no unsaturated zone therefore a greater potential impact to groundwater quality during construction in this area and the portal could provide a preferential pathway for poor quality water during construction. Application of the CoCP will ensure materials and flush used during construction are managed so that there is no significant effect on general groundwater quality.	No existing poor quality groundwater expected. Little or no unsaturated zone therefore a greater potential impact to groundwater quality during construction in this area and the portal could provide a preferential pathway for poor quality water during construction. Application of the CoCP will ensure materials and flush used during construction are managed so that there is no significant effect on general groundwater quality.	No existing poor quality groundwater expected. Little or no unsaturated zone therefore a greater potential impact to groundwater quality during construction in this area and the portal could provide a preferential pathway for poor quality water during construction. Application of the CoCP will ensure materials and flush used during construction are managed so that there is no significant effect on general groundwater quality.	No existing poor quality groundwater expected. Little or no unsaturated zone therefore a greater potential impact to groundwater quality during construction in this area and the portal could provide a preferential pathway for poor quality water during construction. Application of the CoCP will ensure materials and flush used during construction are managed so that there is no significant effect on general groundwater quality.	No existing poor quality groundwater expected. Potentially little or no unsaturated zone therefore a greater potential impact to groundwater quality during construction in this area and the portal could provide a preferential pathway for poor quality water during construction. Application of the CoCP will ensure materials and flush used during construction are managed so that there is no significant effect on general groundwater quality.	No impacts identified as a result of scheme element. No poor quality groundwater expected in the vicinity of the portal, and the element is not within an SPZ.	Potential localized impacts identified, negligible impact with embedded mitigation	Remains Good Status	None required	Remains Good Status	Compliant - no change in status	
Overall Chemical Status					Good	Uncertain	Good by 2015								

Entity	Country	Sector	Sub-sector	Activity	ESG Risk Assessment																		Overall Risk Rating	Materiality	Stakeholder Interest	Reporting Status	Disclosure Status	Transition Plan
					Climate Change	Water	Waste	Energy	Greenhouse Gas Emissions	Pollution	Environmental	Social	Human Rights	Labour Practices	Community Relations	Product Safety	Consumer Protection	Information Security	Business Integrity	Anti-Corruption	Compliance							
Company A	USA	Manufacturing	Automotive	Production	Climate Change	Water	Waste	Energy	Greenhouse Gas Emissions	Pollution	Environmental	Social	Human Rights	Labour Practices	Community Relations	Product Safety	Consumer Protection	Information Security	Business Integrity	Anti-Corruption	Compliance	High	Material	Disclosed	Compliant	Transition Plan		
					Climate Change	Water	Waste	Energy	Greenhouse Gas Emissions	Pollution	Environmental	Social	Human Rights	Labour Practices	Community Relations	Product Safety	Consumer Protection	Information Security	Business Integrity	Anti-Corruption	Compliance	Medium	Material	Disclosed	Compliant	Transition Plan		
					Climate Change	Water	Waste	Energy	Greenhouse Gas Emissions	Pollution	Environmental	Social	Human Rights	Labour Practices	Community Relations	Product Safety	Consumer Protection	Information Security	Business Integrity	Anti-Corruption	Compliance	Low	Material	Disclosed	Compliant	Transition Plan		
					Climate Change	Water	Waste	Energy	Greenhouse Gas Emissions	Pollution	Environmental	Social	Human Rights	Labour Practices	Community Relations	Product Safety	Consumer Protection	Information Security	Business Integrity	Anti-Corruption	Compliance	Low	Material	Disclosed	Compliant	Transition Plan		
Company B	USA	Manufacturing	Automotive	Production	Climate Change	Water	Waste	Energy	Greenhouse Gas Emissions	Pollution	Environmental	Social	Human Rights	Labour Practices	Community Relations	Product Safety	Consumer Protection	Information Security	Business Integrity	Anti-Corruption	Compliance	High	Material	Disclosed	Compliant	Transition Plan		
					Climate Change	Water	Waste	Energy	Greenhouse Gas Emissions	Pollution	Environmental	Social	Human Rights	Labour Practices	Community Relations	Product Safety	Consumer Protection	Information Security	Business Integrity	Anti-Corruption	Compliance	Medium	Material	Disclosed	Compliant	Transition Plan		
					Climate Change	Water	Waste	Energy	Greenhouse Gas Emissions	Pollution	Environmental	Social	Human Rights	Labour Practices	Community Relations	Product Safety	Consumer Protection	Information Security	Business Integrity	Anti-Corruption	Compliance	Low	Material	Disclosed	Compliant	Transition Plan		
					Climate Change	Water	Waste	Energy	Greenhouse Gas Emissions	Pollution	Environmental	Social	Human Rights	Labour Practices	Community Relations	Product Safety	Consumer Protection	Information Security	Business Integrity	Anti-Corruption	Compliance	Low	Material	Disclosed	Compliant	Transition Plan		
Company C	USA	Manufacturing	Automotive	Production	Climate Change	Water	Waste	Energy	Greenhouse Gas Emissions	Pollution	Environmental	Social	Human Rights	Labour Practices	Community Relations	Product Safety	Consumer Protection	Information Security	Business Integrity	Anti-Corruption	Compliance	High	Material	Disclosed	Compliant	Transition Plan		
					Climate Change	Water	Waste	Energy	Greenhouse Gas Emissions	Pollution	Environmental	Social	Human Rights	Labour Practices	Community Relations	Product Safety	Consumer Protection	Information Security	Business Integrity	Anti-Corruption	Compliance	Medium	Material	Disclosed	Compliant	Transition Plan		
					Climate Change	Water	Waste	Energy	Greenhouse Gas Emissions	Pollution	Environmental	Social	Human Rights	Labour Practices	Community Relations	Product Safety	Consumer Protection	Information Security	Business Integrity	Anti-Corruption	Compliance	Low	Material	Disclosed	Compliant	Transition Plan		
					Climate Change	Water	Waste	Energy	Greenhouse Gas Emissions	Pollution	Environmental	Social	Human Rights	Labour Practices	Community Relations	Product Safety	Consumer Protection	Information Security	Business Integrity	Anti-Corruption	Compliance	Low	Material	Disclosed	Compliant	Transition Plan		

