M5 Junction 10 Improvements Scheme

Environmental Statement

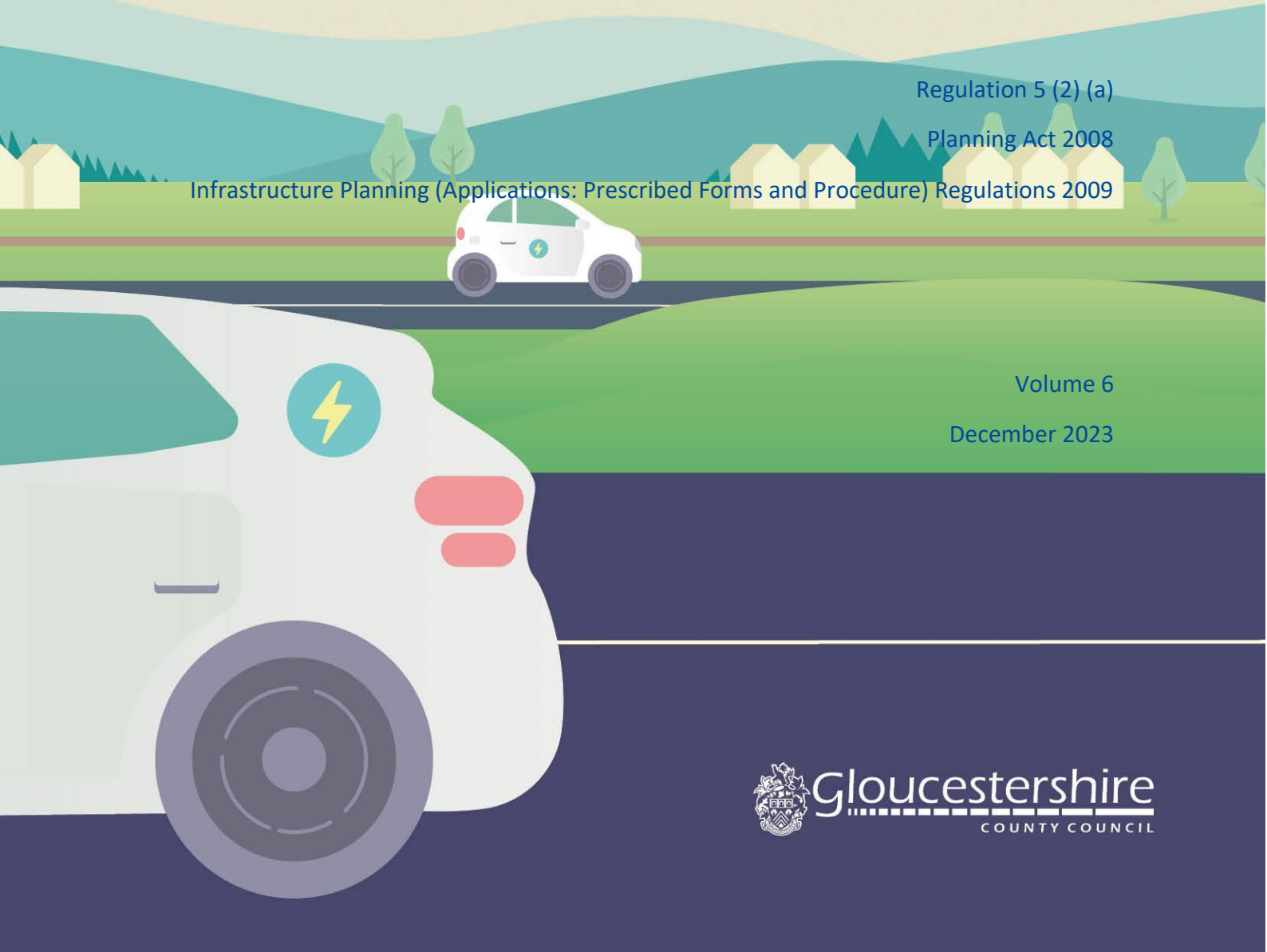
Appendix 8.2A WFD Surface Water Impact Assessment

TR010063 - APP 6.15

Regulation 5 (2) (a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009



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Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

M5 Junction 10 Improvement Scheme

Development Consent Order 202[x]

Environmental Statement: Appendix 8.2A WFD Surface Water Impact Assessment

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Regulation Number:	Regulation 5 (2) (a)
Planning Inspectorate Scheme Reference	TR010063
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Author:	M5 Junction 10 Improvements Scheme Project Team

Version	Date	Status of Version
Rev 0	December 2023	DCO Application

Project Name: M5 Junction 10 Improvements Scheme

Screening assessment

Water body Name	Water body ID	Overall Status	Ecological Status	Chemical Status	Hydromorphological Designations	Reasons for not achieving Good	Linked Protected Areas	Screened in/out	Reasons for Screening out
Chelt – source to M5	GB109054032820	Moderate	Moderate	Fail	Heavily Modified	Physical modifications from Local and Central Government and Urban transport	Thames (Churn to Coln) NVZ S457 River Chelt NVZ S580 River Swilgate NVZ S582 Hatherley Bk - conf Norman's Bk to conf R Severn NVZ S579	In	
Chelt – M5 to conf. R. Severn	GB109054032810	Poor	Poor	Fail	Not Heavily Modified or Artificial	Diffuse and Point source pollution from Agricultural land management, Water industry and Urban and transport	River Chelt NVZ S580 Hatherley Bk - conf Norman's Bk to conf R Severn NVZ S580 River Chelt Urban Waste Water Treatment Directive (UKENRI46)	In	
Leigh Bk – source to conf. R. Chelt	GB109054039770	Moderate	Moderate	Fail	Not Heavily Modified or Artificial	Diffuse and Point source pollution from Agricultural land management, Domestic general public and Urban and transport	River Chelt NVZ S580 River Swilgate NVZ S582	In	
Swilgate – source to conf. R. Avon	GB109054039780	Moderate	Moderate	Fail	Not Heavily Modified or Artificial	Diffuse and Point source pollution from Agricultural land management, Water industry, Domestic general public, and Urban and transport	River Chelt NVZ S580 River Swilgate NVZ S583 River Avon (to conf with River Severn) NVZ S590 Hyde Brook Urban Waste Water Treatment Directive (UKENRI152)	Out	No hydrological connectivity to physical works with red long boundary extending north, past Villa Farm M5 Road Bridge, to incorporate signage works which involve limited vegetation removal.
Hatherley Bk - source to conf R Seve	GB109054032801	Moderate	Moderate	Fail	Not Heavily Modified or Artificial	Diffuse and Point source pollution from Agricultural land management, Water industry and Urban and transport	Thames (Churn to Coln) NVZ S457 River Chelt NVZ S580 Hatherley Bk - conf Norman's Bk to conf R Severn NVZ S579	Out	No hydrological connectivity to physical works with red long boundary extending south, past the River Chelt, to incorporate signage works which involve limited vegetation removal.
Severn – conf R Avon to conf Upper	GB109054044404	Moderate	Moderate	Fail	Heavily Modified	Local and Central Government and Urban transport, Urban and transport, Navigation, Water Industry	River Chelt NVZ S580 River Swilgate NVZ S582 Hatherley Bk - conf Norman's Bk to conf R Severn NVZ S579 R Leadon - Glynch Bk to conf R Severn (W Channel) NVZ S578 River Chelt Urban Waste Water Treatment Directive (UKENRI46) River Avon (Warwickshire) Urban Waste Water Treatment Directive (UKENRI10)	In	Included following consultation with Environment Agency

Project Name: M5 Junction 10 Improvements Scheme
Scoping assessment

Water body Name	Watercourse	Scheme activity type	Scheme activity	Scheme activity design details (if applicable)	Screened in/out	Reasons for Screening in/out	Potential scheme impact type (✓/✗) and associated WFD elements to be assessed post embedded mitigation																			
							Biological							Physico-chemical			Specific pollutants			Hydromorphological				Chemical		
							Direct loss or alteration of open channel	Habitat severance	Shading*	Changes in water quantity (due to discharge of surface water runoff to surface water body)	Changes in surface water runoff	Changes in flood mechanisms within the surface water bodies	Creation of new habitats	Changes in water quantity (due to discharge of surface water runoff to surface water body)	Changes in surface water runoff	Changes in flood mechanisms within the surface water bodies	Changes in water quantity (due to discharge of surface water runoff to surface water body)	Changes in surface water runoff	Changes in flood mechanisms within the surface water bodies	Direct loss or alteration of open channel	Habitat severance (changes to watercourse and riparian zone structure that act to reduce watercourse continuity)	Changes in surface water runoff	Creation of new habitats	Changes in water quantity (due to discharge of surface water runoff to surface water body)	Changes in surface water runoff	Changes in flood mechanisms within the surface water bodies
Chelt – source to M5	River Chelt	New bridge	West Cheltenham Link Road River Chelt Bridge	New bridge with structure width of 20.8m and abutments set back minimum of 4m from the bank top. Inclusion of bank protection in the form of rip-rap as worst case scenario.	In	Potential for shading and habitat severance as a result of a new bridge structure. Potential reduction of hydromorphological and ecological diversity due bank protection.	✓	✓	✓	✗		✗	✗	✗		✗	✗		✗	✓	✓		✗	✗	✗	✗
		Culvert	River Chelt Culvert	No changes to the upstream section of the river Chelt culvert.	Out	No change in culvert proposed.	N/A	N/A	N/A	N/A		N/A	N/A	N/A		N/A	N/A		N/A	N/A	N/A		N/A	N/A	N/A	N/A
		Drainage	Drainage discharge to the River Chelt	Receiving water body from the A4019 main line at Elms park drainage catchment.	In	Potential for changes in water quality and/or quantity as a result of new drainage discharges to the River Chelt.	✗	✗	✗	✗	✓	✗	✗	✗	✓	✗	✗	✓	✗	✗	✗	✓	✗	✗	✓	✗
	MW5	N/A	N/A	N/A	Out	Does not fall within the Scheme footprint. No works proposed. No downstream hydrological connectivity to a Scheme activity.	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Uckington Moat	N/A	N/A	N/A	Out	Does not fall within the Scheme footprint. No works proposed. No downstream hydrological connectivity to a Scheme activity.	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Drain 21	Drainage	Drainage discharge to Drain 21	Drainage pathway into the River Chelt from the A4019 main line at Elms park drainage catchment.	In	Potential for changes in water quality and/or quantity as a result of new drainage discharges to the River Chelt.	✗	✗	✗	✗	✓	✗	✗	✗	✓	✗	✗	✓	✗	✗	✗	✓	✗	✗	✓	✗
Chelt – M5 to conf. R. Severn	River Chelt	Culvert	River Chelt Culvert	No changes to the river Chelt culvert	Out	No change in culvert proposed.	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
		Drainage	Drainage discharge to the River Chelt	Final receiving water body from S1, S1 South, M5 South of River Chelt, Link Road, and B Road Outfall.	In	Potential for changes in water quality and/or quantity as a result of new drainage discharges to the River Chelt.	✗	✗	✗	✗	✓	✗	✗	✗	✓	✗	✗	✓	✗	✗	✗	✓	✗	✗	✓	✗
	MW3	Drainage	Drainage discharge to MW3	Drainage pathway into the River Chelt from the S1 drainage catchment	In	Potential for changes in water quality and/or quantity as a result of new drainage discharges to MW3.	✗	✗	✗	✗	✓	✗	✗	✗	✓	✗	✗	✓	✗	✗	✗	✓	✗	✗	✓	✗
	MW4	N/A	N/A	N/A	Out	Does not fall within the Scheme footprint. No works proposed. No downstream hydrological connectivity to a Scheme activity.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Drain 12	Culvert	New culvert	New culvert 31.85m long.	In	Potential for direct loss of habitat, habitat severance and changes to hydromorphology as a result of a new culvert.	✓	✓	✗	✗		✗	✗	✗		✗	✗		✗	✓	✓		✗	✗	✗	✗
	Drain 13a	N/A	N/A	N/A	Out	Does not fall within the Scheme footprint. No works proposed. No downstream hydrological connectivity to a Scheme activity.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Drain 14	N/A	N/A	N/A	Out	No change in culvert or drainage. No works proposed.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Drain 15	Culvert extension	Culvert extension	Culvert replacement with new length of 25.89m. Original dimensions unknown.	In	Potential for direct loss of open channel and habitat severance	✓	✓	✗	✗		✗	✗	✗		✗	✗		✗	✓	✓		✗	✗	✗	✗
		Drainage	Drainage discharge to Drain 15	Receiving water body from the Link Road drainage catchment	In	Potential for changes in water quality and/or quantity as a result of new drainage discharges to Drain 15.	✗	✗	✗	✗	✓	✗	✗	✗	✓	✗	✗	✓	✗	✗	✗	✓	✗	✗	✓	✗
	Drain 16	Encroachment	Encroachment	Encroachment due to widening Old Gloucester Road with channel being re-established at the foot of new embankment as outlined in the landscape and drainage plans	Out	Potential for changes in hydromorphology as a result of encroachment. Mitigated for as part of the landscape and drainage plans.	✗	✗	✗	✗		✗	✗	✗		✗	✗		✗	✗	✗		✗	✗	✗	✗
	Drain 17	N/A	N/A	N/A	Out	Does not fall within the Scheme footprint. No works proposed. No downstream hydrological connectivity to a Scheme activity.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Drain 19	N/A	N/A	N/A	Out	Does not fall within the Scheme footprint. No works proposed. No downstream hydrological connectivity to a Scheme activity.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Drain 20	Encroachment	Encroachment	Encroachment due to widening Old Gloucester Road with channel being re-established at the foot of new embankment as outlined in the landscape and drainage plans	Out	Potential for changes in hydromorphology as a result of encroachment. Mitigated for as part of the landscape and drainage plans.	✗	✗	✗	✗		✗	✗	✗		✗	✗		✗	✗	✗		✗	✗	✗	✗
Leigh Bk – source to conf. R. Chelt	Leigh Brook	Culvert extension	Culvert extension (Leigh Brook Culvert)	8.45m US and 7.9m DS extension to existing culvert. An approximate 30% increase.	In	Potential for direct loss of habitat as a result of a new culvert.	✓	✓	✗	✗		✗	✗	✗		✗	✗		✗	✓	✓		✗	✗	✗	✗
		Severance of flood flows	Reduction in flood flow within a section of the Leigh Brook.	Removal of the twin culverts beneath the A4019 and elevation of the A4019 reduces flood flows from the River Chelt catchment to the Leigh Brook catchment in the 1 in 100 year + CC and higher events. As a result of the A4019 elevation and removal of the culverts, the peak flow in the Leigh Brook culvert will be reduced from 9.4m3/s to 3.2 m3/s in the 100 year + CC event.	In	Potential for changes in water quantity as a result of operation of flood compensation areas.	✗	✗	✗	✗		✓	✗	✗		✓	✗		✓	✓	✗		✗	✗	✗	✓
		Drainage	Drainage discharge to Leigh Brook	Final receiving water body for J1, S2 and combined basin drainage catchments.	In	Potential for changes in water quality and/or quantity as a result of new drainage discharges to the Leigh Brook.	✗	✗	✗	✗	✓	✗	✗	✗	✓	✗	✗	✓	✗	✗	✗	✓	✗	✗	✓	✗
	Drain 22 (Piffs Elm)	Culvert extension	Culvert extension (Piffs Elm Culvert)	Extension of 42.24m US and 53.015m DS extension to existing culvert. An approximate 200% increase.	In	Potential for direct loss of habitat, habitat severance and changes to hydromorphology as a result of a culver extension.	✓	✓	✗	✗		✗	✗	✗		✗	✗		✗	✓	✓		✗	✗	✗	✗
		Severance of flood flows	Increased flood flow through the Piffs Elm Culvert	Elevation of A4019 and removal of the twin culverts severs flood flows into the leigh brook catchment east of the M5 increasing flood flows through the Piffs Elm culvert. The Scheme (in present day) does not impact events lower than the 1 in 100 year+CC.	In		✓	✓	✗	✗		✗	✗	✗		✗	✗		✓	✓	✓		✗	✗	✗	✗
	Drain 3	N/A	N/A	N/A	Out	Does not fall within the Scheme footprint. No works proposed. No downstream hydrological connectivity to a Scheme activity.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Drain 4	N/A	N/A	N/A	Out	Does not fall within the Scheme footprint. No works proposed. No downstream hydrological connectivity to a Scheme activity.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Drain 5	N/A	N/A	N/A	Out	Does not fall within the Scheme footprint. No works proposed. No downstream hydrological connectivity to a Scheme activity.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Drain 6	N/A	N/A	N/A	Out	Does not fall within the Scheme footprint. No works proposed. No downstream hydrological connectivity to a Scheme activity.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Drain 7	N/A	N/A	N/A	Out	Does not fall within the Scheme footprint. No works proposed. No downstream hydrological connectivity to a Scheme activity.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Drain 8	Encroachment	Encroachment	Encroachment due to widening the A4019 with channel being re-established at the foot of new embankment as outlined in the landscape and drainage plans	Out	Potential for changes in hydromorphology as a result of encroachment. Mitigated for as part of the landscape and drainage plans.	✗	✗	✗	✗		✗	✗	✗		✗	✗		✗	✗	✗		✗	✗	✗	✗
		Drainage	Drainage discharge to Drain 8	Drainage pathway for J1 and S2 drainage catchment into the Leigh Brook.	In	Potential for changes in water quality and/or quantity as a result of new drainage discharges to Drain 8.	✗	✗	✗	✗	✓	✗	✗	✗	✓	✗	✗	✓	✗	✗	✗	✓	✗	✗	✓	✗
		Culvert extension	Culvert extension	Culvert extension. Dimensions unknown.	In	Potential for direct loss of open channel and habitat severance	✓	✓	✗	✗		✗	✗	✗		✗	✗		✗	✓	✓		✗	✗	✗	✗
	Drain 9	Encroachment	Encroachment	Encroachment due to widening the A4019 with channel being re-established at the foot of new embankment as outlined in the landscape and drainage plans	Out	Potential for changes in hydromorphology as a result of encroachment. Mitigated for as part of the landscape and drainage plans.	✗	✗	✗	✗		✗	✗	✗		✗	✗		✗	✗	✗		✗	✗	✗	✗
	Drain 10	Encroachment	Encroachment	Encroachment due to widening the A4019 with channel being re-established at the foot of new embankment as outlined in the landscape and drainage plans	Out	Potential for changes in hydromorphology as a result of encroachment. Mitigated for as part of the landscape and drainage plans.	✗	✗	✗	✗		✗	✗	✗		✗	✗		✗	✗	✗		✗	✗	✗	✗
		Culvert extension	Culvert extension	Culvert extension. Dimensions unknown.	In	Potential for direct loss of open channel and habitat severance	✓	✓	✗	✗		✗	✗	✗		✗	✗		✗	✓	✓		✗	✗	✗	✗
	Drain 11	Encroachment	Encroachment	Encroachment due to widening the A4019 and Withybridge Lane with channel being re-established at the foot of new embankment as outlined in the landscape and drainage plans	Out	Potential for changes in hydromorphology as a result of encroachment. Mitigated for as part of the landscape and drainage plans.	✗	✗	✗	✗		✗	✗	✗		✗	✗		✗	✗	✗		✗	✗	✗	✗
	Drain 13	N/A	N/A	N/A	Out	Does not fall within the Scheme footprint. No works proposed. No downstream hydrological connectivity to a Scheme activity.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Swilgate – source to conf. R. Avon	River Swilgate	N/A	N/A	N/A	Out	No hydrological connectivity to physical works with red long boundary extending north, past Villa Farm M5 Road Bridge, to incorporate signage works which involve limited vegetation removal.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Dean Brook	N/A	N/A	N/A	Out	Does not fall within the Scheme footprint. No works proposed. No downstream hydrological connectivity to a Scheme activity.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hatherley Bk - source to conf R Seve	Hatherley Brook	N/A	N/A	N/A	Out	No hydrological connectivity to physical works with red long boundary extending south, past the River Chelt, to incorporate signage works which involve limited vegetation removal.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Severn – conf R Avon to conf Upper	River Severn	N/A	N/A	N/A	Out	Included following consultation with Environment Agency. There are no barriers to fish proposed as part of the Scheme. The drainage strategy is in place to manage the risk of pollution and spillage into the surface water system. Impacts from temporary works will be managed as part of the CEMP with relation to pollution (including sediment pollution).	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

* shading is only assessed where it is an isolated impact. Where shading occurs as a result of direct loss of open watercourse (e.g. in the case of a new culvert) shading is assessed as part of the habitat loss as a whole.

Project Name: M5 Junction 10 Improvements Scheme

Detailed Impact Assessment - Effects on current status

Test A: Cause of deterioration at the water body scale

Chelt – source to M5 GB109054032820									Detailed Impact Assessment Outcome				
Water body type:	River	Watercourse (receptor value):		River Chelt				Drain 21	Cumulative effects - effects on quality element from scheme component(s) located in other WFD water bodies	Overall effect on quality element at water body scale	Additional mitigation requirements	Residual effect on quality element at water body scale	WFD compliance outcome - potential for deterioration of current status of quality element at water body scale
Hydromorphological designation:	Heavily Modified	Scheme activity:		West Cheltenham Link Road River Chelt Bridge			Drainage discharge to the River Chelt	Drainage discharge					
Overall Status (2015):	Moderate	Description of scheme activity:		*New bridge with structure width of 20.8m and abutments set back minimum of 4m from the bank top. Inclusion of bank protection in the form of rip-rap as worst case scenario.*			*Receiving water body from the A4019 main line at Elms park drainage catchment.*	*Drainage pathway into the River Chelt from the A4019 main line at Elms park drainage catchment.*					
Overall Status Objective:	Good by 2027	Impact type from scheme activity:		Habitat severance	Shading	Direct loss or alteration to open channel	Changes in surface water runoff	Changes in surface water runoff					
WFD Status Element	WFD Quality Element	RBMP Cycle 2 2015 Status	RBMP Cycle 2 Status Objective										
Biological	Fish	Good	Good by 2015	At present the River Chelt in this location provides suitable habitat for fish recruitment. The proposed River Chelt Bridge is clear span but will incorporate bank protection. Whilst not acting to cause a physical barrier to fish movement the new bridge will cause modification of this reach which may result in reduced habitat quality and fragmentation of upstream and downstream habitat continuity or become a deterrent to fish passage. Localised adverse effect anticipated when balanced against embedded mitigation. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	At present the River Chelt in this location provides suitable habitat for fish recruitment. The proposed River Chelt Bridge will result in shading of the channel under the structure which has a bridge deck width of approximately 20.8 m. This shading will result in a reduction in macrophyte and riparian plant cover which may lead to reduced shelter for fish and recruitment potential within this short section of channel. Localised reduction in habitat and flow diversity as a result of reduced plant cover will potentially reduce the resource value to fish under the footprint of the bridge. Localised adverse effect anticipated when balanced against embedded mitigation. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	At present the River Chelt in this location provides suitable habitat for fish recruitment. The proposed River Chelt Bridge is clear span but will incorporate some bank protection which will result in modification of this reach which. There is potential for reduction in habitat quality or the bank protection becoming a deterrent to fish passage. Localised adverse effect anticipated when balanced against embedded mitigation. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.	None	Localised adverse effect anticipated when scheme component effects considered in combination. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	N/A	Localised adverse effect anticipated when scheme component effects considered in combination. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	Compliant - no deterioration in quality element status anticipated
	Invertebrates	High	Good by 2015	At present the River Chelt in this location contains a species rich invertebrate community indicative of a community typically living in good water quality (WHPT ASPT >5 for 3 of the 4 survey sites) and a slightly to moderately sedimented channel (species PSI ranged from 55.6 to 79.4). The community also has a high sensitivity to reduced flows (species LIFE scores >7 at each of the sites surveyed). This indicates that the community is likely to be sensitive to channel modifications and changes in water quality and flow. The proposed River Chelt Bridge is clear span with a width of 20.8 m. Whilst not acting to cause a physical barrier to invertebrate recruitment/colonisation the new bridge will cause modification of this reach which may result in localised reduced habitat quality (particularly associated with shading effects, see cell F11) and fragmentation of upstream and downstream habitat continuity. Localised adverse effect anticipated when balanced against embedded mitigation. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	At present the River Chelt in this location contains a species rich invertebrate community indicative of a community typically living in good water quality (WHPT ASPT >5 for 3 of the 4 survey sites) and a slightly to moderately sedimented channel (species PSI ranged from 55.6 to 79.4). The community also has a high sensitivity to reduced flows (species LIFE scores >7 at each of the sites surveyed). This indicates that the community is likely to be sensitive to channel modifications and changes in water quality and flow. The proposed River Chelt Bridge will result in shading of the channel under the structure which has a bridge deck width of 20.8 m. This shading will result in a reduction in macrophyte and riparian plant cover which may lead to reduced habitat diversity for invertebrates within this short section of channel. Localised reduction in habitat and flow diversity as a result of reduced plant cover will potentially reduce the resource value to invertebrates under the footprint of the bridge. Localised adverse effect anticipated when balanced against embedded mitigation. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	At present the River Chelt in this location contains a species rich invertebrate community indicative of a community typically living in good water quality (WHPT ASPT >5 for 3 of the 4 survey sites) and a slightly to moderately sedimented channel (species PSI ranged from 55.6 to 79.4). The community also has a high sensitivity to reduced flows (species LIFE scores >7 at each of the sites surveyed). This indicates that the community is likely to be sensitive to channel modifications. The proposed River Chelt Bridge is clear span with a width of 20.8 m and will incorporate bank protection. The new structure will cause modification of this reach which may result in localised reduced habitat quality (particularly associated with shading effects, see cell F11) and fragmentation of upstream and downstream habitat continuity. Localised adverse effect anticipated when balanced against embedded mitigation. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.			None	Localised adverse effect anticipated when scheme component effects considered in combination. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	N/A	Localised adverse effect anticipated when scheme component effects considered in combination. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	Compliant - no deterioration in quality element status anticipated
	Macrophytes and Phytobenthos - combined	Good	Good by 2015	At present the River Chelt in this location (River Chelt Bridge) contains a limited macrophyte community. With only one species, branched bur-reed, recorded with a percentage cover of <1%. The proposed River Chelt Bridge is clear span with a width of 20.8 m. Whilst not acting to cause a physical barrier to macrophyte colonisation the new bridge will result in shading to the channel (see cell F12) acting to affect the localised distribution of these species through fragmentation of habitat. Localised adverse effect anticipated when balanced against embedded mitigation. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	At present the River Chelt in this location (River Chelt Bridge) contains a limited macrophyte community. With only one species, branched bur-reed, recorded with a percentage cover of <1%. The proposed River Chelt Bridge will result in shading of the channel under the structure which has a bridge deck width of 20.8 m. This shading will result in a reduction of macrophyte and riparian plant cover at this location. Localised adverse effect anticipated when balanced against embedded mitigation. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	At present the River Chelt in this location (River Chelt Bridge) contains a limited macrophyte community. With only one species, branched bur-reed, recorded with a percentage cover of <1%. The proposed River Chelt Bridge is clear span with a width of 20.8 m and will incorporate bank protection. Whilst not acting to cause a physical barrier to macrophyte colonisation the new bridge will result in shading to the channel (see cell F12) acting to affect the localised distribution of these species through fragmentation of habitat. Localised adverse effect anticipated when balanced against embedded mitigation. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.			None	Localised adverse effect anticipated when scheme component effects considered in combination. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	N/A	Localised adverse effect anticipated when scheme component effects considered in combination. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	Compliant - no deterioration in quality element status anticipated
Physicochemical	Physico-chemical quality elements comprise: Ammonia, Dissolved Oxygen, pH, Phosphate and Temperature.	Good	Good by 2015	Element is insensitive to impact. No measurable change to quality element.	Element is insensitive to impact. No measurable change to quality element.	Element is insensitive to impact. No measurable change to quality element.	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.	None	Negligible effect anticipated when Scheme component effects are considered in combination. No measurable change in quality element anticipated. Additional mitigation not required.	N/A	Negligible effect anticipated when Scheme component effects are considered in combination. No measurable change in quality element anticipated. Additional mitigation not required.	Compliant - no deterioration in quality element status anticipated
Specific Pollutants	Copper, Triclosan, Zinc	N/A	N/A	Element is insensitive to impact. No measurable change to quality element.	Element is insensitive to impact. No measurable change to quality element.	Element is insensitive to impact. No measurable change to quality element.	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.	None	Negligible effect anticipated when Scheme component effects are considered in combination. No measurable change in quality element anticipated. Additional mitigation not required.	N/A	Negligible effect anticipated when Scheme component effects are considered in combination. No measurable change in quality element anticipated. Additional mitigation not required.	Compliant - no deterioration in quality element status anticipated
Hydromorphological		Supports Good	Supports Good by 2015	There will be simplification/loss of in-channel and riparian structure associated with shading and bankside abutments which will act to cause localised loss of watercourse continuity through the modification and simplification of in-channel and riparian habitat complexity at a localised scale. Localised adverse effect anticipated when balanced against embedded mitigation. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	There will be simplification/loss of in-channel and riparian vegetation structure associated with shading. This will act to cause localised changes in hydromorphology (namely sediment and flow dynamics) under the bridge footprint. Localised adverse effect anticipated when balanced against embedded mitigation. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	There will be simplification/loss of in-channel and riparian vegetation structure associated with shading, vegetation loss and bank protection. This will act to cause localised changes in hydromorphology (namely sediment and flow dynamics) under the bridge footprint. Localised adverse effect anticipated when balanced against embedded mitigation. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	Embedded mitigation ensures no change in outfall rates as a result in changes to surface water runoff. No alteration in Hydromorphology as a result. Additional mitigation not required.	Embedded mitigation ensures no change in outfall rates as a result in changes to surface water runoff. No alteration in Hydromorphology as a result. Additional mitigation not required.	None	Localised adverse effect anticipated when balanced against embedded mitigation. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	N/A	Localised adverse effect anticipated when balanced against embedded mitigation. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	Compliant - no deterioration in quality element status anticipated
Chemical	Priority substances	Does not require assessment	Good by 2015	Element is insensitive to impact. No measurable change to quality element.	Element is insensitive to impact. No measurable change to quality element.	Element is insensitive to impact. No measurable change to quality element.	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.	None	Negligible effect anticipated when Scheme component effects are considered in combination. No measurable change in quality element anticipated. Additional mitigation not required.	N/A	Negligible effect anticipated when Scheme component effects are considered in combination. No measurable change in quality element anticipated. Additional mitigation not required.	Compliant - no deterioration in quality element status anticipated

Test B: Effects on future attainment of status objectives

Chelt – source to M5 GB109054032820									Outcome				
	RNAGs / Measures scoped in as potentially at risk from Proposed			River Chelt									
WFD Status Objective Element	RNAG / Measure ID	Relevant WFD Quality Element / RNAG(s)	Title / Details	West Cheltenham Link Road River Chelt Bridge			Drainage discharge to the River Chelt	Drainage discharge	Cumulative effects - effects on RNAG / Measure from scheme component(s) located in other WFD water bodies	Overall effect at water body scale	Additional mitigation requirements	Residual overall effect at water body scale following consideration of additional mitigation	WFD compliance outcome - potential to prevent future attainment of status objective of quality element.
Reasons for Not Achieving Good (RNAG)	479871	Physical modification	Flood Protection	RNAG is insensitive to impact. No measurable impact to Test B	RNAG is insensitive to impact. No measurable impact to Test B	RNAG is insensitive to impact. No measurable impact to Test B	RNAG is insensitive to impact. No measurable impact to Test B	RNAG is insensitive to impact. No measurable impact to Test B	None	Element is insensitive to impact. No measurable change to quality element.	N/A	Compliant - no prevention of future attainment of quality element status objective.	Compliant - no prevention of future attainment of quality element status objective.
	479872	Physical modification	Urbanisation	RNAG is insensitive to impact. No measurable impact to Test B	RNAG is insensitive to impact. No measurable impact to Test B	RNAG is insensitive to impact. No measurable impact to Test B	RNAG is insensitive to impact. No measurable impact to Test B	RNAG is insensitive to impact. No measurable impact to Test B	None	Element is insensitive to impact. No measurable change to quality element.	N/A	Compliant - no prevention of future attainment of quality element status objective.	Compliant - no prevention of future attainment of quality element status objective.
	532185	RFD	High to Good deterioration, no action required (RFD only)	RNAG is insensitive to impact. No measurable impact to Test B	RNAG is insensitive to impact. No measurable impact to Test B	RNAG is insensitive to impact. No measurable impact to Test B	RNAG is insensitive to impact. No measurable impact to Test B	RNAG is insensitive to impact. No measurable impact to Test B	None	Element is insensitive to impact. No measurable change to quality element.	N/A	Compliant - no prevention of future attainment of quality element status objective.	Compliant - no prevention of future attainment of quality element status objective.
RBMP Mitigation Measures	None available	None available	Remove obsolete structure	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	None	Element is insensitive to impact. No measurable change to quality element.	N/A	Compliant - no prevention of future attainment of quality element status objective.	Compliant - no prevention of future attainment of quality element status objective.
			Re-engineer river	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	None	Element is insensitive to impact. No measurable change to quality element.	N/A	Compliant - no prevention of future attainment of quality element status objective.	Compliant - no prevention of future attainment of quality element status objective.
			Remove or soften hard bank	At this stage, the details of the bank protection have not been determined. However, given the lack of sunlight from the above bridge deck, reducing vegetation growth, it has been assumed this would comprise hard bank protection (e.g. rip-rap or non-biodegradable geotextile) as a worse case scenario. This has also been applied across the length of the proposed abutments on both banks of the River Chelt. Green infrastructure would be used to tie in and transition from the grey bank protection to the natural (reprofiled) banks. At the detailed design stage, further assessment and consultation with the Environment Agency will determine the most pragmatic solution and confirm the need for bank protection, specify the materials and general arrangement which will endeavour to minimise and, where possible, exclude hard bank protection. Where this is not possible further measures to mitigate for this will be explored, such as naturalised toe frontages comprising wood etc. At the worst case, these impacts are expected to be minor and localised on a stretch of 20.8m (0.18% of the overall water body length). Embedded mitigation has been adopted into the preliminary design which includes 360 m of enhancements to the River Chelt comprising: Enhanced riparian and marginal aquatic planting to enhance biodiversity and allow for dappled lighting; bank reprofiling or the creation of berms and two stage channels to enhance flood plain connectivity (TR010063 – APP 2.13); and, installation of in channel morphological enhancements for example: riffle pool sequences and/or large wood .			Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	None	Localised adverse effect on Mitigation Measure anticipated when scheme component effects considered in combination. However, effect will impact 0.18% of water body length.	At the detailed design stage, further assessment and consultation with the Environment Agency will determine the most pragmatic solution and confirm the need for bank protection, specify the materials and general arrangement which will endeavour to minimise and, where possible, exclude hard bank protection. Where this is not possible further measures to mitigate for this will be explored, such as naturalised toe frontages comprising wood etc.	Compliant - The implementation of soft bank protection or softening of hard bank protection will ensure no impact on Mitigation Measure.	Compliant - The implementation of soft bank protection or softening of hard bank protection will ensure no impact on Mitigation Measure.
			Preserve or restore habitats	At present the River Chelt in this location provides suitable habitat for fish recruitment. The proposed River Chelt Bridge is clear span. Whilst not acting to cause a physical barrier to fish movement the new bridge will cause modification of this reach which may result in reduced habitat quality and fragmentation of upstream and downstream habitat continuity or become a deterrent to fish passage. Embedded mitigation has been adopted into the preliminary design which includes 360 m of enhancements to the River Chelt comprising: Enhanced riparian and marginal aquatic planting to enhance biodiversity and allow for dappled lighting; bank reprofiling or the creation of berms and two stage channels to enhance flood plain connectivity (TR010063 – APP 2.13); and, installation of in channel morphological enhancements for example: riffle pool sequences and/or large wood . These measures work towards this Mitigation Measure, improving 17 times the length which may be negatively impacted by the structure.			Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	None	**Project will not effect Mitigation Measure at a water body scale.** Localised adverse effect balanced by localised benefits from enhancements when scheme component effects considered in combination. Overall neutral effects.	N/A	Compliant - no prevention of implementation of Mitigation Measure.	Compliant - no prevention of implementation of Mitigation Measure.
			In-channel morph diversity	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	None	**Project will contribute to Mitigation Measure**. Localised benefit anticipated when scheme component effects considered in combination. Support of Mitigation Measure.	N/A	Compliant - Scheme is supporting the implementation of Mitigation Measures.	Compliant - Scheme is supporting the implementation of Mitigation Measures.
			Bank rehabilitation	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	None	**Project will contribute to Mitigation Measure**. Localised benefit anticipated when scheme component effects considered in combination. Support of Mitigation Measure.	N/A	Compliant - Scheme is supporting the implementation of Mitigation Measures.	Compliant - Scheme is supporting the implementation of Mitigation Measures.
			Re-opening culverts	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	None	Element is insensitive to impact. No measurable change to quality element.	N/A	Compliant - no prevention of future attainment of quality element status objective.	Compliant - no prevention of future attainment of quality element status objective.
			Alter culvert channel bed	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	None	Element is insensitive to impact. No measurable change to quality element.	N/A	Compliant - no prevention of future attainment of quality element status objective.	Compliant - no prevention of future attainment of quality element status objective.
			Flood bunds	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	None	**Project will contribute to Mitigation Measure**. Localised benefit anticipated when scheme component effects considered in combination. Support of Mitigation Measure.	N/A	Compliant - Scheme is supporting the implementation of Mitigation Measures.	Compliant - Scheme is supporting the implementation of Mitigation Measures.
			Set-back embankments	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	None	**Project will contribute to Mitigation Measure**. Localised benefit anticipated when scheme component effects considered in combination. Support of Mitigation Measure.	N/A	Compliant - Scheme is supporting the implementation of Mitigation Measures.	Compliant - Scheme is supporting the implementation of Mitigation Measures.
			Floodplain connectivity	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	None	**Project will contribute to Mitigation Measure**. Localised benefit anticipated when scheme component effects considered in combination. Support of Mitigation Measure.	N/A	Compliant - Scheme is supporting the implementation of Mitigation Measures.	Compliant - Scheme is supporting the implementation of Mitigation Measures.
			Fish passes	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	None	Element is insensitive to impact. No measurable change to quality element.	N/A	Compliant - no prevention of future attainment of quality element status objective.	Compliant - no prevention of future attainment of quality element status objective.
			Fish pass flow releases	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	None	Element is insensitive to impact. No measurable change to quality element.	N/A	Compliant - no prevention of future attainment of quality element status objective.	Compliant - no prevention of future attainment of quality element status objective.
			Reduce fish entrainment	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	None	Element is insensitive to impact. No measurable change to quality element.	N/A	Compliant - no prevention of future attainment of quality element status objective.	Compliant - no prevention of future attainment of quality element status objective.
			Enhance ecology	The River Chelt is currently suitable for fish and invertebrate recruitment. The new bridge will cause modification of this reach which may result in reduced habitat quality for invertebrate and fish. These impacts have the potential to work against the Mitigation Measure on a localised scale of approximately 20.8m of watercourse which equates to 0.18% of the waterbody length. There is potential for localised disturbance of macrophyte through shading under the structure. embedded mitigation has been adopted into the preliminary design which includes 360 m of enhancements to the River Chelt comprising: Enhanced riparian and marginal aquatic planting to enhance biodiversity and allow for dappled lighting; bank reprofiling or the creation of berms and two stage channels to enhance flood plain connectivity (TR010063 – APP 2.13); and, installation of in channel morphological enhancements for example: riffle pool sequences and/or large wood . These measures work towards this Mitigation Measure, improving 17 times the length which may be negatively impacted by the structure.			Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	None	**Project will not effect Mitigation Measure at a water body scale.** Localised adverse effect balanced by localised benefits from enhancements when scheme component effects considered in combination. Overall neutral effects.	N/A	Compliant - Scheme is supporting the implementation of Mitigation Measures.	Compliant - Scheme is supporting the implementation of Mitigation Measures.
			Changes to locks etc	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	None	Element is insensitive to impact. No measurable change to quality element.	N/A	Compliant - no prevention of future attainment of quality element status objective.	Compliant - no prevention of future attainment of quality element status objective.
			Selective vegetation control	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	None	**Project will contribute to Mitigation Measure**. Localised benefit anticipated when scheme component effects considered in combination. Support of Mitigation Measure.	N/A	Compliant - Scheme is supporting the implementation of Mitigation Measures.	Compliant - Scheme is supporting the implementation of Mitigation Measures.
			Vegetation control	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	None	**Project will contribute to Mitigation Measure**. Localised benefit anticipated when scheme component effects considered in combination. Support of Mitigation Measure.	N/A	Compliant - Scheme is supporting the implementation of Mitigation Measures.	Compliant - Scheme is supporting the implementation of Mitigation Measures.
			Vegetation control timing	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	None	Element is insensitive to impact. No measurable change to quality element.	N/A	Compliant - no prevention of future attainment of quality element status objective.	Compliant - no prevention of future attainment of quality element status objective.
			Invasive species techniques	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	None	Element is insensitive to impact. No measurable change to quality element.	N/A	Compliant - no prevention of future attainment of quality element status objective.	Compliant - no prevention of future attainment of quality element status objective.
			Retain habitats	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	None	Element is insensitive to impact. No measurable change to quality element.	N/A	Compliant - no prevention of future attainment of quality element status objective.	Compliant - no prevention of future attainment of quality element status objective.
			Sediment management strategy	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	None	Element is insensitive to impact. No measurable change to quality element.	N/A	Compliant - no prevention of future attainment of quality element status objective.	Compliant - no prevention of future attainment of quality element status objective.
			Maintain channel bed/margins	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	None	Element is insensitive to impact. No measurable change to quality element.	N/A	Compliant - no prevention of future attainment of quality element status objective.	Compliant - no prevention of future attainment of quality element status objective.
			Woody debris	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	None	**Project will contribute to Mitigation Measure**. Localised benefit anticipated when scheme component effects considered in combination. Support of Mitigation Measure.	N/A	Compliant - Scheme is supporting the implementation of Mitigation Measures.	Compliant - Scheme is supporting the implementation of Mitigation Measures.
			Water level management	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	None	Element is insensitive to impact. No measurable change to quality element.	N/A	Compliant - no prevention of future attainment of quality element status objective.	Compliant - no prevention of future attainment of quality element status objective.
			Align and attenuate flooding	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	None	**Project will contribute to Mitigation Measure**. Localised benefit anticipated when scheme component effects considered in combination. Support of Mitigation Measure.	N/A	Compliant - Scheme is supporting the implementation of Mitigation Measures.	Compliant - Scheme is supporting the implementation of Mitigation Measures.
			Educate landowners	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	Mitigation Measure is insensitive to impact. No measurable impact to Test B	None	Element is insensitive to impact. No measurable change to quality element.	N/A	Compliant - no prevention of future attainment of quality element status objective.	Compliant - no prevention of future attainment of quality element status objective.

Project Name: M5 Junction 10 Improvements Scheme

Detailed Impact Assessment - Effects on current status

Test A: Cause of deterioration at the water body scale

Chelt – M5 to conf. R. Severn GB109054032810												Detailed Impact Assessment Outcome				
Water body type:	River	Watercourse (receptor value):		River Chelt	MW3	Drain 12		Drain 15								
Hydromorphological designation:	Not Heavily Modified or Artificial	Scheme activity:		Drainage discharge	Drainage discharge	New Culvert		Culvert Extension		Drainage Discharge						
Overall Status (2015):	Poor	Description of scheme activity:		*Final receiving water body from S1, S1 South, M5 South of River Chelt, Link Road, and B Rood Outfall.*	*Drainage pathway into the River Chelt from the S1 drainage catchment*	*New culvert 31.85m long.*		*Culvert replacement with new length of 25.89m. Original dimensions unknown.*		*Receiving water body from the Link Road drainage catchment*						
Overall Status Objective:	Good by 2027	Impact type from scheme activity:		Changes in surface water runoff	Changes in surface water runoff	Direct loss of open channel	Habitat severance	Direct loss of open channel	Habitat severance	Changes in surface water runoff		Cumulative effects - effects on quality element from scheme component(s) located in other WFD water bodies	Overall effect on quality element at water body scale	Additional mitigation requirements	Residual effect on quality element at water body scale	WFD compliance outcome - potential for deterioration of current status of quality element at water body scale
WFD Status Element	WFD Quality Element	RBMP Cycle 2 2015 Status	RBMP Cycle 2 Status Objective													
Biological	Fish	N/A	Good by 2027 (disproportionate burdens)	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.	At present Drain 12 is an ephemeral drain which is not considered to provide suitable fish habitat. It's primary function is to facilitate land drainage, and is unlikely to support significant fish movement and recruitment. As such, the feature is not likely to support/contribute to the overall water body fish classification. Direct loss of 34 m of open channel is therefore considered to have a negligible effect on fish. No measurable change in quality element anticipated. Additional mitigation not required.	At present Drain 12 is an ephemeral drain which is not considered to provide suitable fish habitat. It's primary function is to facilitate land drainage, and is unlikely to support significant fish movement and recruitment. As such, the feature is not likely to support/contribute to the overall water body fish classification. Habitat severance associated with the new culvert is therefore considered to have a negligible effect on fish. No measurable change in quality element anticipated. Additional mitigation not required.	At present Drain 15 is an ephemeral drain which is not considered to provide suitable fish habitat. It's primary function is to facilitate land drainage, and is unlikely to support significant fish movement and recruitment. As such, the feature is not likely to support/contribute to the overall water body fish classification. Minor direct loss of open channel is therefore considered to have a negligible effect on fish. No measurable change in quality element anticipated. Additional mitigation not required.	At present Drain 15 is an ephemeral drain which is not considered to provide suitable fish habitat. It's primary function is to facilitate land drainage, and is unlikely to support significant fish movement and recruitment. As such, the feature is not likely to support/contribute to the overall water body fish classification. Habitat severance associated with the new culvert is therefore considered to have a negligible effect on fish. No measurable change in quality element anticipated. Additional mitigation not required.	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.	None	Negligible effect anticipated when Scheme component effects are considered in combination. No measurable change in quality element anticipated. Additional mitigation not required.	N/A	Negligible effect anticipated when Scheme component effects are considered in combination. No measurable change in quality element anticipated. Additional mitigation not required.	Compliant - no deterioration in quality element status anticipated
	Invertebrates	Good	Good by 2015			At present Drain 12 is likely to contain an impoverished invertebrate community adapted to prolonged dry periods. Direct loss of 34 m of open channel is considered to have a negligible effect on invertebrates at the water body scale. No measurable change in quality element anticipated. Additional mitigation not required.	At present Drain 12 is likely to contain an impoverished invertebrate community adapted to prolonged dry periods. Fragmentation of this open channel will result in minor localised change in habitat for invertebrates. However, the embedded mitigation includes the incorporation of embedded culvert invert levels to below the existing channel bed to facilitate natural bed sediments throughout the new culvert. As such, this will reduce severance of the habitat. No measurable change in quality element anticipated. Additional mitigation not required.	At present Drain 15 is likely to contain an impoverished invertebrate community adapted to prolonged dry periods. Direct loss of 34 m of open channel is considered to have a negligible effect on invertebrates at the water body scale. No measurable change in quality element anticipated. Additional mitigation not required.	At present Drain 15 is likely to contain an impoverished invertebrate community adapted to prolonged dry periods. Fragmentation of this open channel will result in minor localised change in habitat for invertebrates. However, the embedded mitigation includes the incorporation of embedded culvert invert levels to below the existing channel bed to facilitate natural bed sediments throughout the new culvert. As such, this will reduce severance of the habitat. No measurable change in quality element anticipated. Additional mitigation not required.		None	Negligible effect anticipated when Scheme component effects are considered in combination. No measurable change in quality element anticipated. Additional mitigation not required.	N/A	Negligible effect anticipated when Scheme component effects are considered in combination. No measurable change in quality element anticipated. Additional mitigation not required.	Compliant - no deterioration in quality element status anticipated
	Macrophytes and Phytobenthos - combined	Poor	Good by 2027			At present Drain 12 supports very limited macrophyte growth. Plants within the channel are dominated by terrestrial herbs, grasses and scrub, with hedgerow trees alongside the drain shading parts of the channel. Direct loss of 34 m of open channel is considered to have a negligible effect on macrophytes at the water body scale. No measurable change in quality element anticipated. Additional mitigation not required.	At present Drain 12 supports very limited macrophyte growth. Plants within the channel are dominated by terrestrial herbs, grasses and scrub, with hedgerow trees alongside the drain shading parts of the channel. Fragmentation of this open channel is considered to have negligible effect on macrophytes at the water body scale. No measurable change in quality element anticipated. Additional mitigation not required.	At present Drain 15 supports very limited macrophyte growth. Plants within the channel are dominated by terrestrial herbs, grasses and scrub, with hedgerow trees alongside the drain shading parts of the channel. Direct loss of 34 m of open channel is considered to have a negligible effect on macrophytes at the water body scale. No measurable change in quality element anticipated. Additional mitigation not required.	At present Drain 15 supports very limited macrophyte growth. Plants within the channel are dominated by terrestrial herbs, grasses and scrub, with hedgerow trees alongside the drain shading parts of the channel. Fragmentation of this open channel is considered to have negligible effect on macrophytes at the water body scale. No measurable change in quality element anticipated. Additional mitigation not required.		None	Negligible effect anticipated when Scheme component effects are considered in combination. No measurable change in quality element anticipated. Additional mitigation not required.	N/A	Negligible effect anticipated when Scheme component effects are considered in combination. No measurable change in quality element anticipated. Additional mitigation not required.	Compliant - no deterioration in quality element status anticipated
Physicochemical	Physico-chemical quality elements comprise: Ammonia, Dissolved Oxygen, pH, Phosphate and Temperature.	Moderate	Good by 2027 (disproportionate burdens)	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.	Element is insensitive to impact. No measurable change to quality element.	Element is insensitive to impact. No measurable change to quality element.	Element is insensitive to impact. No measurable change to quality element.	Element is insensitive to impact. No measurable change to quality element.	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.	None	Negligible effect anticipated when Scheme component effects are considered in combination. No measurable change in quality element anticipated. Additional mitigation not required.	N/A	Negligible effect anticipated when Scheme component effects are considered in combination. No measurable change in quality element anticipated. Additional mitigation not required.	Compliant - no deterioration in quality element status anticipated
Specific Pollutants	Copper, Triclosan, Zinc	High	High by 2015	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.					HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.	None	Negligible effect anticipated when Scheme component effects are considered in combination. No measurable change in quality element anticipated. Additional mitigation not required.	N/A	Negligible effect anticipated when Scheme component effects are considered in combination. No measurable change in quality element anticipated. Additional mitigation not required.	Compliant - no deterioration in quality element status anticipated
Hydromorphological		Supports Good	Supports Good by 2015	Embedded mitigation ensures no change in outfall rates as a result in changes to surface water runoff. No alteration in Hydromorphology as a result. Additional mitigation not required.	Embedded mitigation ensures no change in outfall rates as a result in changes to surface water runoff. No alteration in Hydromorphology as a result. Additional mitigation not required.	There is potential for riparian and in channel vegetation loss and simplification which is likely to be mitigated for as part of the landscape plans. There will be no loss of hydromorphological connectivity within the system as this feature is not hydrologically connected to downstream water courses. Environmentally sensitive culvert design, including lowered invert allowing natural bed continuation will reduce impacts further. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Additional mitigation not required.	Element is insensitive to impact. No measurable change to quality element.	Culvert extension on a drain which has minimal flow and is heavily sediment laden. Environmentally sensitive culvert design will reduce any impact to the hydromorphological functioning of the feature and vegetation management will mitigate against additional changes to sediment loads which could result for vegetation loss or simplification. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Additional mitigation not required.	Element is insensitive to impact. No measurable change to quality element.	Embedded mitigation ensures no change in outfall rates as a result in changes to surface water runoff. No alteration in Hydromorphology as a result. Additional mitigation not required.	None	Negligible effect anticipated when Scheme component effects are considered in combination. No measurable change in quality element anticipated. Additional mitigation not required.	N/A	Negligible effect anticipated when Scheme component effects are considered in combination. No measurable change in quality element anticipated. Additional mitigation not required.	Compliant - no deterioration in quality element status anticipated
Chemical	Priority substances	Does not require assessment	Good by 2015	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.	Element is insensitive to impact. No measurable change to quality element.		Element is insensitive to impact. No measurable change to quality element.		HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.	None	Negligible effect anticipated when Scheme component effects are considered in combination. No measurable change in quality element anticipated. Additional mitigation not required.	N/A	Negligible effect anticipated when Scheme component effects are considered in combination. No measurable change in quality element anticipated. Additional mitigation not required.	Compliant - no deterioration in quality element status anticipated

Test B: Effects on future attainment of status objectives

Chelt – M5 to conf. R. Severn GB109054032810										Outcome				
	RNAGs / Measures scoped in as potentially at risk from Proposed			River Chelt	MW3	Drain 12	Drain 15							
WFD Status Objective Element	RNAG / Measure ID	Relevant WFD Quality Element / RNAG(s)	Title / Details	Drainage discharge	Drainage discharge	New Culvert	Culvert Extension	Drainage Discharge		Cumulative effects - effects on RNAG / Measure from scheme component(s) located in other WFD water bodies	Overall effect at water body scale	Additional mitigation requirements	Residual overall effect at water body scale following consideration of additional mitigation	WFD compliance outcome - potential to prevent future attainment of status objective of quality element.
Reasons for Not Achieving Good (RNAG)	517691	Phosphate	Point Source pollution (water industry)	RNAG is insensitive to impact. No measurable impact to Test B	RNAG is insensitive to impact. No measurable impact to Test B	RNAG is insensitive to impact. No measurable impact to Test B	RNAG is insensitive to impact. No measurable impact to Test B	RNAG is insensitive to impact. No measurable impact to Test B		None	Element is insensitive to impact. No measurable change to quality element.	N/A	Negligible effect anticipated when balanced against embedded mitigation. HEWRAT routine runoff assessment passes for all surface water tests. No measurable change in quality element anticipated. Test B will not be impacted by the Scheme.	Compliant - no prevention of future attainment of quality element status objective.
	517693	Phosphate	Diffuse pollution (agriculture)							None	Element is insensitive to impact. No measurable change to quality element.	N/A	Negligible effect anticipated when balanced against embedded mitigation. HEWRAT routine runoff assessment passes for all surface water tests. No measurable change in quality element anticipated. Test B will not be impacted by the Scheme.	Compliant - no prevention of future attainment of quality element status objective.
	517696	Phosphate	Diffuse pollution (roads)	Negligible effect anticipated when balanced against embedded mitigation. HEWRAT routine runoff assessment passes for all surface water tests. No measurable change in quality element anticipated. Test B will not be impacted by the Scheme.	Negligible effect anticipated when balanced against embedded mitigation. HEWRAT routine runoff assessment passes for all surface water tests. No measurable change in quality element anticipated. Test B will not be impacted by the Scheme.			Negligible effect anticipated when balanced against embedded mitigation. HEWRAT routine runoff assessment passes for all surface water tests. No measurable change in quality element anticipated. Test B will not be impacted by the Scheme.		None	Negligible effect anticipated when balanced against embedded mitigation. HEWRAT routine runoff assessment passes for all surface water tests. No measurable change in quality element anticipated. Test B will not be impacted by the Scheme.	N/A	Negligible effect anticipated when balanced against embedded mitigation. HEWRAT routine runoff assessment passes for all surface water tests. No measurable change in quality element anticipated. Test B will not be impacted by the Scheme.	Compliant - no prevention of future attainment of quality element status objective.
	517704	Macrophytes and Phytobenthos - combined	Nutrients (phosphate)	RNAG is insensitive to impact. No measurable impact to Test B	RNAG is insensitive to impact. No measurable impact to Test B					None	Element is insensitive to impact. No measurable change to quality element.	N/A	Negligible effect anticipated when balanced against embedded mitigation. HEWRAT routine runoff assessment passes for all surface water tests. No measurable change in quality element anticipated. Test B will not be impacted by the Scheme.	Compliant - no prevention of future attainment of quality element status objective.
	517705	Macrophytes and Phytobenthos - combined	Nutrients (phosphate)							None	Element is insensitive to impact. No measurable change to quality element.	N/A	Negligible effect anticipated when balanced against embedded mitigation. HEWRAT routine runoff assessment passes for all surface water tests. No measurable change in quality element anticipated. Test B will not be impacted by the Scheme.	Compliant - no prevention of future attainment of quality element status objective.
	517707	Macrophytes and Phytobenthos - combined	Nutrients (phosphate)							None	Element is insensitive to impact. No measurable change to quality element.	N/A	Negligible effect anticipated when balanced against embedded mitigation. HEWRAT routine runoff assessment passes for all surface water tests. No measurable change in quality element anticipated. Test B will not be impacted by the Scheme.	Compliant - no prevention of future attainment of quality element status objective.
RBMP Programme of measures (PoM)	No Programme of measures are considered to be at risk from the Proposed Scheme for this water body.													

Project Name: M5 Junction 10 Improvements Scheme

Detailed Impact Assessment - Effects on current status

Test A: Cause of deterioration at the water body scale

Leigh Bk – source to conf. R. Chelt GB109054039770

Water body type:	River
Hydromorphological designation:	Not Heavily Modified or Artificial
Overall Status (2015):	Moderate
Overall Status Objective:	Moderate by 2015

Watercourse (receptor value):	Leigh Brook			
Scheme activity:	Culvert extension		Severance of flood flows	Drainage discharge
Description of scheme activity:	*8.45m US and 7.9m DS extension to existing culvert. An approximate 30% increase.*		*Removal of the twin culverts beneath the A4019 and elevation of the A4019 reduces flood flows from the River Chelt catchment to the Leigh Brook catchment in the 1 in 100 year + CC and higher events. As a result of the A4019 elevation and removal of the culverts, the peak flow in the Leigh Brook culvert will be reduced from 9.4m3/s to 3.2 m3/s in the 100 year + CC event.*	*Final receiving water body for J1, S2 and combined basin drainage catchments.*
Impact type from scheme activity:	Direct loss or alteration of open channel	Habitat severance	Changes in flood mechanisms within the surface water bodies	Changes in surface water runoff

WFD Status Element	WFD Quality Element	RBMP Cycle 2 2015 Status	RBMP Cycle 2 Status Objective	Leigh Brook – Direct loss or alteration of open channel	Leigh Brook – Habitat severance	Leigh Brook – Changes in flood mechanisms within the surface water bodies	Leigh Brook – Changes in surface water runoff
Biological	Fish	N/A	N/A	Survey of the Leigh Brook at this location identified the channel as being unsuitable for fish. The channel at this location resembles a ditch and is unlikely to support significant fish movement and recruitment. As such, the feature is not likely to support/contribute to the overall water body fish classification. 10 m direct loss of open channel up and downstream of the existing crossing is therefore considered to have a negligible effect on fish. No measurable change in quality element anticipated. Additional mitigation not required.	Survey of the Leigh Brook at this location identified the channel as being unsuitable for fish. The channel at this location resembles a ditch and is unlikely to support significant fish movement and recruitment. As such, the feature is not likely to support/contribute to the overall water body fish classification. Habitat severance associated with the new culvert is therefore considered to have a negligible effect on fish. No measurable change in quality element anticipated. Additional mitigation not required.	Survey of the Leigh Brook at this location identified the channel as being unsuitable for fish. The channel at this location resembles a ditch and is unlikely to support significant fish movement and recruitment. As such, the feature is not likely to support/contribute to the overall water body fish classification. Changes in flows associated with the removal of the twin culverts and elevation of the A4019 is therefore considered to have a negligible effect on fish. No measurable change in quality element anticipated. Additional mitigation not required.	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.
	Invertebrates	Good	Good by 2015	Biological metrics from invertebrate survey for the project are indicative of an impoverished community with high tolerance to organic pollution (WHPT ASPT 3.96), moderate sensitivity to reduced flow velocity conditions (species LIFE 6.30) and heavy sedimentation (species PSI 10.3). Given the watercourse in this location forms the headwaters of the water body's reportable river it is considered that the invertebrate population at this location may support the overall invertebrate classification for water body. As such, approximately 16 m loss of open channel may result in a localised adverse effect when balanced against embedded mitigation. However, no deterioration in status of quality element anticipated at the water body scale given the small scale nature of the impact. Additional mitigation not required.	Biological metrics from invertebrate survey for the project are indicative of an impoverished community with high tolerance to organic pollution (WHPT ASPT 3.96), moderate sensitivity to reduced flow velocity conditions (species LIFE 6.30) and heavy sedimentation (species PSI 10.3). Fragmentation of this open channel will result in minor localised change in habitat for invertebrates. However, the embedded mitigation includes the incorporation of embedded culvert invert levels to below the existing channel bed to facilitate natural bed sediments throughout the new culvert. As such, this will reduce severance of the habitat. No measurable change in quality element anticipated. Additional mitigation not required.	Biological metrics from invertebrate survey within the Site are indicative of a highly tolerant invertebrate community (WHPT ASPT 3.96), moderate sensitivity to reduced flow velocity conditions (species LIFE 6.30) and heavy sedimentation (species PSI 10.3). During survey the channel was observed to be dry in sections and ponded in other areas. As such, the invertebrate community is adapted to regular drying of the channel. However, further downstream it is likely that the leigh Brook provides more permanent aquatic habitat for invertebrates as it picks up more water from the wider catchment. Changes in flows as a result of the elevation of the A4019 will only be observed during flood events (100 year+CC and higher). As such, the impact will be relatively infrequent and short lived. The Scheme is not expected to impact normal (base) flows within the channel. However, flood flows can provide important flushing of sediments and pollutants. As such, a localised adverse effect is anticipated when balanced against embedded mitigation. However, no deterioration in status of the quality element is anticipated at the water body scale. Additional mitigation not required.	
	Macrophytes and Phytobenthos - combined	Moderate	Moderate by 2015 (Unfavourable balance of cost and benefits)	Macrophyte survey of the Leigh Brook at this location identified a species poor community, with only one macrophyte species (fool's watercress) recorded with <1% cover. As such, this section of the Leigh Brook is not considered to significantly support the overall macrophyte classification for the water body. 10 m direct loss of open channel up and downstream of the existing crossing is therefore considered to have a negligible effect on macrophyte cover. No measurable change in quality element anticipated. Additional mitigation not required.	Macrophyte survey of the Leigh Brook at this location identified a species poor community, with only one macrophyte species (fool's watercress) recorded with <1% cover. As such, this section of the Leigh Brook is not considered to significantly support the overall macrophyte classification for the water body. Fragmentation of this open channel is considered to have negligible effect on macrophytes at the water body scale. No measurable change in quality element anticipated. Additional mitigation not required.	Macrophyte survey of the Leigh Brook within the Site identified a species poor community, with only one macrophyte species (fool's watercress) recorded with <1% cover. As such, this section of the Leigh Brook is not considered to significantly support the overall macrophyte classification for the water body. However, further downstream it is likely that the Leigh Brook provides more permanent aquatic habitat for a more diverse macrophyte assemblage as it picks up from water from the wider catchment. Changes in flows as a result of the elevation of the A4019 will only be observed during flood events higher than 1 in 100 year+CC event. As such, the impact will be relatively infrequent and short lived. The Scheme is not expected to impact normal (base) flows within the channel. However, flood flows can provide important flushing of sediment and pollutants. As such, a localised adverse effect is anticipated when balanced against embedded mitigation. However, no deterioration in status of the quality element is anticipated at the water body scale. Additional mitigation not required.	
Physicochemical	Physico-chemical quality elements comprise: Ammonia, Dissolved Oxygen, pH, Phosphate and Temperature.	Moderate	Moderate by 2015 (Unfavourable balance of cost and benefits)	Element is insensitive to impact. No measurable change to quality element.	Element is insensitive to impact. No measurable change to quality element.	Element is insensitive to impact. No measurable change to quality element.	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.
Specific Pollutants	Copper, Triclosan, Zinc	N/A (high)	N/A				HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.
Hydromorphological		Supports Good	Supports Good by 2015	Culvert extension on a watercourse which has minimal flow and is heavily sediment laden. Environmentally sensitive culvert design will reduce any impact to the hydromorphological functioning of the feature and vegetation management will mitigate against additional changes to sediment loads. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Additional mitigation not required.		In the higher events (1 in 100 year+CC and above), flow through the Leigh Brook culvert will be reduced by approximately 60% due to the severance of flood flow over the A4019 and removal of the twin culverts. This may cause reduced flushing of sediments through the system and lower erosion rates within the channel. However, it is expected that the effects are likely to be localised when balanced against embedded mitigation. No deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	Embedded mitigation ensures no change in outfall rates as a result in changes to surface water runoff. No alteration in Hydromorphology as a result. Additional mitigation not required.
Chemical	Priority substances	Good	Does not require assessment 2015	Element is insensitive to impact. No measurable change to quality element.		Element is insensitive to impact. No measurable change to quality element.	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.

Watercourse (receptor value):	Drain 22			
Scheme activity:	Culvert Extension		Severance of flood flows	Drainage discharge
Description of scheme activity:	*Extension of 42.24m US and 53.015m DS extension to existing culvert. An approximate 200% increase.*		*Elevation of A4019 and removal of the twin culverts severs flood flows into the leigh brook catchment east of the M5 increasing flood flows through the Piffs Elm culvert. The Scheme (in present day) does not impact events lower than the 1 in 100 year+CC.*	*Drainage pathway for J1 and S2 drainage catchment into the Leigh Brook.*
Impact type from scheme activity:	Direct loss or alteration of open channel	Habitat severance	Changes in flood mechanisms within the surface water bodies	Changes in surface water runoff

WFD Status Element	WFD Quality Element	Drain 22 – Direct loss or alteration of open channel	Drain 22 – Habitat severance	Drain 22 – Changes in flood mechanisms within the surface water bodies	Drain 22 – Changes in surface water runoff
Biological	Fish	The drain associated with Piffs Elm culvert was not visited during survey. However, review of culvert inspection/drainage survey results and photos indicate that this culvert is associated with highways drainage from the M5 and is heavily overgrown with terrestrial vegetation. It therefore is assumed that it is an ephemeral drain which is not considered to provide suitable fish habitat. Its primary function is to facilitate drainage and is unlikely to support fish movement and recruitment. As such, the feature is not likely to support/contribute to the overall water body fish classification. Direct loss of open channel is therefore considered to have a negligible effect on fish. No measurable change in quality element anticipated. Additional mitigation not required.	The drain associated with Piffs Elm culvert was not visited during survey. However, review of culvert inspection/drainage survey results and photos indicate that this culvert is associated with highways drainage from the M5 and is heavily overgrown with terrestrial vegetation. It therefore is assumed that it is an ephemeral drain which is not considered to provide suitable fish habitat. Its primary function is to facilitate drainage and is unlikely to support fish movement and recruitment. As such, the feature is not likely to support/contribute to the overall water body fish classification. Habitat severance associated with the new culvert is therefore considered to have a negligible effect on fish. No measurable change in quality element anticipated. Additional mitigation not required.	The drain associated with Piffs Elm culvert was not visited during survey. However, review of culvert inspection/drainage survey results and photos indicate that this culvert is associated with highways drainage from the M5 and is heavily overgrown with terrestrial vegetation. It therefore is assumed that it is an ephemeral drain which is not considered to provide suitable fish habitat. Its primary function is to facilitate drainage and is unlikely to support fish movement and recruitment. As such, the feature is not likely to support/contribute to the overall water body fish classification. changes in water quality associated with the change inflow is therefore considered to have a negligible effect on fish. No measurable change in quality element anticipated. Additional mitigation not required.	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.
	Invertebrates	The drain associated with Piffs Elm culvert was not visited during survey. However, review of culvert inspection/drainage survey results and photos indicate that this culvert is associated with highways drainage from the M5 and is heavily overgrown with terrestrial vegetation. It therefore is assumed that the drain is likely to contain an impoverished invertebrate community adapted to prolonged dry periods. Direct loss of open channel is considered to have a negligible effect on invertebrates at the water body scale. No measurable change in quality element anticipated. Additional mitigation not required.	The drain associated with Piffs Elm culvert was not visited during survey. However, review of culvert inspection/drainage survey results and photos indicate that this culvert is associated with highways drainage from the M5 and is heavily overgrown with terrestrial vegetation. It therefore is assumed that the drain is likely to contain an impoverished invertebrate community adapted to prolonged dry periods. Fragmentation of this open channel will result in minor localised change in habitat for invertebrates. However, the embedded mitigation includes the incorporation of embedded culvert invert levels to below the existing channel bed to facilitate natural bed sediments throughout the new culvert. As such, this will reduce severance of the habitat. No measurable change in quality element anticipated. Additional mitigation not required.	The drain associated with Piffs Elm culvert was not visited during survey. However, review of culvert inspection/drainage survey results and photos indicate that this culvert is associated with highways drainage from the M5 and is heavily overgrown with terrestrial vegetation. It therefore is assumed that the drain is likely to contain an impoverished invertebrate community adapted to prolonged dry periods. There will be an increase in flow to this drain as a result of the elevation of the A4019. However, this will only be observed during flood events (1 in 100 year+CC). As such, the impact will be relatively infrequent and short lived. The Scheme is not expected to impact normal (base) flows within the channel. However, an increase in flood flow could provide some localised and temporary changes in available aquatic habitat, but no measurable change in quality element is anticipated. Additional mitigation not required.	
	Macrophytes and Phytobenthos - combined	The drain associated with Piffs Elm culvert was not visited during survey. However, review of culvert inspection/drainage survey results and photos indicate that this culvert is associated with highways drainage from the M5 and is heavily overgrown with terrestrial vegetation. It therefore is assumed that the drain supports limited macrophyte growth and is dominated by terrestrial species. Direct loss of open channel is considered to have a negligible effect on macrophytes at the water body scale. No measurable change in quality element is anticipated. Additional mitigation not required.	The drain associated with Piffs Elm culvert was not visited during survey. However, review of culvert inspection/drainage survey results and photos indicate that this culvert is associated with highways drainage from the M5 and is heavily overgrown with terrestrial vegetation. It therefore is assumed that the drain supports limited macrophyte growth and is dominated by terrestrial species. Fragmentation of this open channel is considered to have negligible effect on macrophytes at the water body scale. No measurable change in quality element anticipated. Additional mitigation not required.	The drain associated with Piffs Elm culvert was not visited during survey. However, review of culvert inspection/drainage survey results and photos indicate that this culvert is associated with highways drainage from the M5 and is heavily overgrown with terrestrial vegetation. It therefore is assumed that the drain supports limited macrophyte growth and is dominated by terrestrial species. There will be an increase in flow to this drain as a result of the elevation of the A4019. However, this will only be observed during flood events (1 in 100 year+CC). As such, the impact will be relatively infrequent and short lived. The Scheme is not expected to impact normal (base) flows within the channel. However, an increase in flood flow could provide some localised and temporary changes in available aquatic habitat, but no measurable change in quality element is anticipated. Additional mitigation not required.	
Physicochemical	Physico-chemical quality elements comprise: Ammonia, Dissolved Oxygen, pH, Phosphate and Temperature.	Element is insensitive to impact. No measurable change to quality element.	Element is insensitive to impact. No measurable change to quality element.	Element is insensitive to impact. No measurable change to quality element.	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.
Specific Pollutants	Copper, Triclosan, Zinc				HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.
Hydromorphological		The scale of the culvert extension is significant and may cause some changes to hydromorphology within the feature. However, effects are expected to be localised adverse when balanced against embedded mitigation. No deterioration in status of quality element is anticipated at the water body scale. Additional mitigation not required.		In the higher events (1 in 100 year+CC and above), flow through the Piffs Elm culvert will be increased due to storage of water south of the A4019. This may cause increased flushing of sediments through the system and higher erosion rates within the feature. However, it is expected that the effects are likely to be localised when balanced against embedded mitigation. No deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	Embedded mitigation ensures no change in outfall rates as a result in changes to surface water runoff. No alteration in Hydromorphology as a result. Additional mitigation not required.
Chemical	Priority substances	Element is insensitive to impact. No measurable change to quality element.		Element is insensitive to impact. No measurable change to quality element.	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.

Watercourse (receptor value):	Drain 8			Drain 10	
Scheme activity:	Drainage discharge	Culvert Extension		Culvert Extension	
Description of scheme activity:	*Drainage pathway for J1 and S2 drainage catchment into the Leigh Brook.*	*Culvert extension. Dimensions unknown.*		*Culvert extension. Dimensions unknown.*	
Impact type from scheme activity:	Changes in surface water runoff	Direct loss or alteration of open channel	Habitat severance	Direct loss or alteration of open channel	Habitat severance

WFD Status Element	WFD Quality Element	Drain 8 – Changes in surface water runoff	Drain 8 – Direct loss or alteration of open channel	Drain 8 – Habitat severance	Drain 10 – Direct loss or alteration of open channel	Drain 10 – Habitat severance
Biological	Fish	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates Additional mitigation not required.	At present Drain 8 is an ephemeral drain which is not considered to provide suitable fish habitat. It's primary function is to facilitate land drainage, and is unlikely to support significant fish movement and recruitment. As such, the feature is not likely to support/contribute to the overall water body fish classification. Minor direct loss of open channel is therefore considered to have a negligible effect on fish. No measurable change in quality element anticipated. Additional mitigation not required.	At present Drain 8 is an ephemeral drain which is not considered to provide suitable fish habitat. It's primary function is to facilitate land drainage, and is unlikely to support significant fish movement and recruitment. As such, the feature is not likely to support/contribute to the overall water body fish classification. Habitat severance associated with the new culvert is therefore considered to have a negligible effect on fish. No measurable change in quality element anticipated. Additional mitigation not required.	At present Drain 10 is an ephemeral drain which is not considered to provide suitable fish habitat. It's primary function is to facilitate land drainage, and is unlikely to support significant fish movement and recruitment. As such, the feature is not likely to support/contribute to the overall water body fish classification. Minor direct loss of open channel is therefore considered to have a negligible effect on fish. No measurable change in quality element anticipated. Additional mitigation not required.	At present Drain 10 is an ephemeral drain which is not considered to provide suitable fish habitat. It's primary function is to facilitate land drainage, and is unlikely to support significant fish movement and recruitment. As such, the feature is not likely to support/contribute to the overall water body fish classification. Habitat severance associated with the new culvert is therefore considered to have a negligible effect on fish. No measurable change in quality element anticipated. Additional mitigation not required.
	Invertebrates		At present Drain 8 is likely to contain an impoverished invertebrate community adapted to prolonged dry periods. Direct loss a small section of channel associated with widening of a section of Stanboro Lane is considered to have a negligible effect on invertebrates at the water body scale. No measurable change in quality element anticipated. Additional mitigation not required.	At present Drain 8 is likely to contain an impoverished invertebrate community adapted to prolonged dry periods. as the system is already severed due to the existing culvert, the small section of extension due to widening around Stanboro Lane is considered to have a negligible effect on invertebrates at the water body scale. No measurable change in quality element anticipated. Additional mitigation not required.	At present Drain 10 is likely to contain an impoverished invertebrate community adapted to prolonged dry periods. Direct loss a small section of channel associated with widening of a section of Withy bridge Lane is considered to have a negligible effect on invertebrates at the water body scale. No measurable change in quality element anticipated. Additional mitigation not required.	At present Drain 10 is likely to contain an impoverished invertebrate community adapted to prolonged dry periods. as the system is already severed due to the existing culvert, the small section of extension due to widening around Withybridge Lane is considered to have a negligible effect on invertebrates at the water body scale. No measurable change in quality element anticipated. Additional mitigation not required.
	Macrophytes and Phytobenthos - combined		At present Drain 8 supports very limited macrophyte growth. Plants within the channel are dominated by terrestrial herbs, grasses and scrub, with hedgerow trees alongside the drain shading parts of the channel. Direct loss of open channel is considered to have a negligible effect on macrophytes at the water body scale. No measurable change in quality element anticipated. Additional mitigation not required.	At present Drain 8 supports very limited macrophyte growth. Plants within the channel are dominated by terrestrial herbs, grasses and scrub, with hedgerow trees alongside the drain shading parts of the channel. Fragmentation of this open channel is considered to have negligible effect on macrophytes at the water body scale. No measurable change in quality element anticipated. Additional mitigation not required.	At present Drain 10 supports very limited macrophyte growth. Plants within the channel are dominated by terrestrial herbs, grasses and scrub, with hedgerow trees alongside the drain shading parts of the channel. Direct loss of open channel is considered to have a negligible effect on macrophytes at the water body scale. No measurable change in quality element anticipated. Additional mitigation not required.	At present Drain 10 supports very limited macrophyte growth. Plants within the channel are dominated by terrestrial herbs, grasses and scrub, with hedgerow trees alongside the drain shading parts of the channel. Fragmentation of this open channel is considered to have negligible effect on macrophytes at the water body scale. No measurable change in quality element anticipated. Additional mitigation not required.
Physicochemical	Physico-chemical quality elements comprise: Ammonia, Dissolved Oxygen, pH, Phosphate and Temperature.	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates Additional mitigation not required.	Element is insensitive to impact. No measurable change to quality element.	Element is insensitive to impact. No measurable change to quality element.	Element is insensitive to impact. No measurable change to quality element.	Element is insensitive to impact. No measurable change to quality element.
Specific Pollutants	Copper, Triclosan, Zinc	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.				
Hydromorphological		Embedded mitigation ensures no change in outfall rates as a result in changes to surface water runoff. No alteration in Hydromorphology as a result. Additional mitigation not required.	Culvert extension on a drain which has minimal flow and is heavily sediment laden. Environmentally sensitive culvert design will reduce any impact to the hydromorphological functioning of the feature and vegetation management will mitigate against additional changes to sediment loads which could result for vegetation loss or simplification. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Additional mitigation not required.		Culvert extension on a drain which has minimal flow and is heavily sediment laden. Environmentally sensitive culvert design will reduce any impact to the hydromorphological functioning of the feature and vegetation management will mitigate against additional changes to sediment loads which could result for vegetation loss or simplification. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Additional mitigation not required.	
Chemical	Priority substances	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Embedded mitigation ensures no alteration in quantity within the receiving water body. outfall rates will be no greater than greenfield runoff rates. Additional mitigation not required.	Element is insensitive to impact. No measurable change to quality element.		Element is insensitive to impact. No measurable change to quality element.	

WFD Status Element	WFD Quality Element	Detailed Impact Assessment Outcome – Cumulative effects - effects on quality element from scheme component(s) located in other WFD water bodies	Overall effect on quality element at water body scale	Additional mitigation requirements	Residual effect on quality element at water body scale	WFD compliance outcome - potential for deterioration of current status of quality element at water body scale
Biological	Fish	None	Localised adverse effect anticipated when scheme component effects considered in combination. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	N/A	Localised adverse effect anticipated when scheme component effects considered in combination. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	Compliant - no deterioration in quality element status anticipated
	Invertebrates	None	Localised adverse effect anticipated when scheme component effects considered in combination. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	N/A	Localised adverse effect anticipated when scheme component effects considered in combination. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	Compliant - no deterioration in quality element status anticipated
	Macrophytes and Phytobenthos - combined	None	Localised adverse effect anticipated when scheme component effects considered in combination. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	N/A	Localised adverse effect anticipated when scheme component effects considered in combination. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	Compliant - no deterioration in quality element status anticipated
Physicochemical	Physico-chemical quality elements comprise: Ammonia, Dissolved Oxygen, pH, Phosphate and Temperature.	None	Negligible effect anticipated when Scheme component effects are considered in combination. No measurable change in quality element anticipated. Additional mitigation not required.	N/A	Negligible effect anticipated when Scheme component effects are considered in combination. No measurable change in quality element anticipated. Additional mitigation not required.	Compliant - no deterioration in quality element status anticipated
Specific Pollutants	Copper, Triclosan, Zinc	None	Negligible effect anticipated when Scheme component effects are considered in combination. No measurable change in quality element anticipated. Additional mitigation not required.	N/A	Negligible effect anticipated when Scheme component effects are considered in combination. No measurable change in quality element anticipated. Additional mitigation not required.	Compliant - no deterioration in quality element status anticipated
Hydromorphological		None	Localised adverse effect anticipated when scheme component effects considered in combination. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	N/A	Localised adverse effect anticipated when scheme component effects considered in combination. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	Compliant - no deterioration in quality element status anticipated
Chemical	Priority substances	None	Negligible effect anticipated when Scheme component effects are considered in combination. No measurable change in quality element anticipated. Additional mitigation not required.	N/A	Negligible effect anticipated when Scheme component effects are considered in combination. No measurable change in quality element anticipated. Additional mitigation not required.	Compliant - no deterioration in quality element status anticipated

Test B: Effects on future attainment of status objectives

Leigh Bk – source to conf. R. Chelt GB109054039770

WFD Status Objective Element	RNAG / Measure ID	Relevant WFD Quality Element / RNAG(s)	Title / Details	Leigh Brook – Culvert extension		Leigh Brook	Leigh Brook – Drainage discharge	Drain 22 – Culvert Extension		Drain 22 – Severance of flood flows	Drain 22 – Drainage discharge
Reasons for Not Achieving Good (RNAG)	512632	Phosphate	Diffuse pollution (agriculture)	Element is insensitive to impact. No measurable change to quality element.	Element is insensitive to impact. No measurable change to quality element.	Element is insensitive to impact. No measurable change to quality element.	Element is insensitive to impact. No measurable change to quality element.	Element is insensitive to impact. No measurable change to quality element.	Element is insensitive to impact. No measurable change to quality element.	Element is insensitive to impact. No measurable change to quality element.	Element is insensitive to impact. No measurable change to quality element.
	512633	Phosphate	Point source (Sewage discharge)								
	519436	Macrophytes and phytobenthos	Phosphate (livestock management)								
	519437	Macrophytes and phytobenthos	Phosphate (Nutrient management)								
	519438	Macrophytes and phytobenthos	Phosphate (Urban and transport)				HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Additional mitigation not required.				HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Additional mitigation not required.
RBMP Programme of measures (PoM)	No Programme of measures are considered to be at risk from the Proposed Scheme for this water body.										

RNAG / Measure ID	Drain 8 – Drainage discharge	Drain 8 – Culvert Extension		Drain 10 – Culvert Extension		Outcome – Cumulative effects - effects on RNAG / Measure from scheme component(s) located in other WFD water bodies	Overall effect at water body scale	Additional mitigation requirements	Residual overall effect at water body scale following consideration of additional mitigation	WFD compliance outcome - potential to prevent future attainment of status objective of quality element.
512632	Element is insensitive to impact. No measurable change to quality element.	Element is insensitive to impact. No measurable change to quality element.	Element is insensitive to impact. No measurable change to quality element.	Element is insensitive to impact. No measurable change to quality element.	Element is insensitive to impact. No measurable change to quality element.	None	Element is insensitive to impact. No measurable change to quality element.	N/A	Element is insensitive to impact. No measurable change to quality element.	Compliant - no deterioration in quality element status anticipated
512633						None	Element is insensitive to impact. No measurable change to quality element.	N/A	Element is insensitive to impact. No measurable change to quality element.	Compliant - no deterioration in quality element status anticipated
519436						None	Element is insensitive to impact. No measurable change to quality element.	N/A	Element is insensitive to impact. No measurable change to quality element.	Compliant - no deterioration in quality element status anticipated
519437						None	Element is insensitive to impact. No measurable change to quality element.	N/A	Element is insensitive to impact. No measurable change to quality element.	Compliant - no deterioration in quality element status anticipated
519438	HEWRAT routine runoff assessment passes for all surface water tests. Negligible effect anticipated when balanced against embedded mitigation. No measurable change in quality element anticipated. Additional mitigation not required.					None	Negligible effect anticipated when Scheme component effects are considered in combination. No measurable change in quality element anticipated. Additional mitigation not required.	N/A	Negligible effect anticipated when Scheme component effects are considered in combination. No measurable change in quality element anticipated. Additional mitigation not required.	Compliant - no deterioration in quality element status anticipated
RBMP Programme of measures (PoM)						None	Element is insensitive to impact. No measurable change to quality element.	N/A	Element is insensitive to impact. No measurable change to quality element.	Compliant - no deterioration in quality element status anticipated

Mechanism of impact	Description	Element impacted				
		Biological	Physio chemical	Specific pollutants	Hydromorphological	Chemical
Direct loss or alterations to open channel	Any direct loss of watercourse or ditch. This could be from new culverts, culvert extensions, bridges reduced vegetation coverage or installation of hard bed or bank protection which will have a significant impact on the receptor.	✓			✓	
Habitat severance	Disconnection of habitats within the water body due to activities such as weirs, steep hydraulic gradients, or culverts.	✓				
Shading	Loss of light from the channel which is not associated with direct loss of habitat.	✓				
Changes in surface water runoff	Changes in the quantity and quality in the receiving watercourses due to any alterations to the impermeable area and drainage system.	✓	✓	✓	✓	✓
Changes in flood mechanisms within the surface water bodies	Changes in water quality in the receiving water courses due to increased runoff, and pollutants from routine runoff and spillages.	✓	✓	✓	✓	✓
Creation of new habitats	Any additional habitat creation as part of the Scheme. For example, enhancements of water courses or creation of new ditch length.	✓				

Project Name: M5 Junction 10 Improvements Scheme

RAYG traffic light decision matrix for assessing magnitude of effects on surface water quality element status class

Type of effect	Impact of scheme element on WFD element i.e. in individual cells	Impact on WFD element i.e. at end of row	Impact on WFD water body i.e. the combined effect on the water body as a result of all the effect on WFD elements	Examples	Outcome
Moderate Beneficial	Impacts when taken on their own have the potential to lead to significant improvement.	Impacts in combination with others have the potential to lead to the improvement in the class of a WFD element.	Impacts in combination with others have the potential to lead to the improvement in the WFD status of the water body.	Creation of significant areas of riparian habitats (for example, within a river diversion) which enhance the value of the water body. Removal of hard bank protection. Removal of barriers to fish species. Major improvement to groundwater quality or improved quality of GWDTE due to groundwater contributions.	Increase in status class for that water body.
Minor / localised beneficial	Impacts when taken on their own have the potential to lead to a minor localised or temporary improvement.	Impacts in combination with others have the potential to lead to a minor localised improvement of the WFD element.	Impacts in combination with others have the potential to lead to a minor localised or temporary improvement that does not affect the overall WFD status of the water body.	Minor habitat creation measures such as creation of marginal berms up/downstream of a structure. Minor improvement to groundwater quality or improved quality of GWDTE due to groundwater contributions.	Localised improvement, no change in status of WFD water body.
Green (no effect)	No measurable change to any quality elements.	No measurable change to any quality elements.	No measurable change to any quality elements.	Clear span bridge which causes no significant light shading. Changes to flow with no likely impact in macroinvertebrate community/contamination in areas with highly tolerant invertebrate community (e.g. Average Score Per Taxon <4). Minor, temporary encroachment into the channel Improvement in the existing surface water quality through improvement to existing drainage systems. Minor, temporary changes to groundwater levels	No change
Yellow – Localised/ temporary adverse effect	Impacts when taken on their own have the potential to lead to a minor localised or impact.	Impacts in combination with others have the potential to lead to a minor localised or temporary impact on the WFD elements. Consideration will be given to habitat creation measures.	Impacts in combination with others have the potential to lead to a minor localised or temporary impact on the WFD elements. Consideration will be given to habitat creation measures.	Loss of macrophytes/phytobenthos due to shading from a bridge or other structure.. Temporary loss of invertebrates/macrophytes etc. during channel re-alignment Estimated loss in diversity of invertebrates for e.g. <100m of water body (due to habitat loss, changes to flow etc.). Localised loss of fish habitat/numbers of fish. Reduction in water quality with negligible knock on effects to biological elements Localised changes to groundwater levels or quality with no impact to GWDTE or protected water bodies.	No change in status of WFD water body when balanced against mitigation embedded in the scheme.
Amber – adverse widespread or prolonged effect	Impacts when taken on their own have the potential to lead to a widespread or prolonged impact. Consideration will be given to habitat creation measures.	Impacts in combination with others have the potential to have an adverse impact on the WFD element. Additional mitigation will be applied.	Impacts in combination with others have the potential to have an adverse impact on the WFD water body. The current WFD risk category will be taken into account when assessing these combined impacts. Consideration will be given to habitat creation measures.	Loss of macrophytes/phytobenthos for a significant length of water due to shading from a long (e.g. >200m) culvert or other similar structure. Likely significant drop in invertebrate diversity over e.g. >300m of water body (due to habitat loss /siltation or combination of various impacts etc.). Obstruction to upstream migration of fish to spawning grounds in a salmonid river therefore affecting fish in the whole of the WFD water body. Reduction in water quality with potential to cause knock on effects to biological elements. Adverse changes to GWDTE or baseflow contributions to protected surface water bodies.	Adverse effect but risk of status change needs to be considered with any additional mitigation, and taking into account the level of confidence.
Red – adverse impact on an individual quality element and/or overall status of water body	Impacts when taken on their own have the potential to lead to a widespread or prolonged impact even with mitigation in place.	Impacts in combination with others have the potential to have an adverse impact on the WFD element and change its class. Consideration will be given to habitat creation measures.	Impacts in combination with others have the potential to have an adverse impact on the WFD water body and change its status. The current WFD risk category will be taken into account when assessing these combined impacts. Consideration will be given to habitat creation measures.	Loss or extensive change to a fishery Significant loss of hydromorphological diversity likely to impact the water body scale such as channelisation of a natural watercourse using hard engineering for a significant length. Creation of barriers which will inhibit migration and movement of fish within the system. Significant decline in water quality resulting in knock on effects to biological elements at the water body scale. Loss of or extensive change to GWDTE or baseflow contributions to protected surface water bodies. Any significant change in groundwater quality reducing WFD status.	Decrease in status of WFD water body when balanced against additional mitigation. Outcome is considered to be certain.

Environment Statement SMR (water resources and flood risk)	
Relative EIA Receptor Value	**EIA Receptor value criteria**
Major or Moderate Benefit	In addition to below, Contribution to improvement in water body WFD classification. Removal of existing polluting discharge, or removing the likelihood of polluting discharges occurring to a watercourse. Improvement in water body WFD classification.
Moderate or Minor Benefit	HEWRAT assessment of either acute soluble or chronic-sediment related pollutants becomes pass from an existing site where the baseline was a fail condition. Calculated reduction in existing spillage risk by 50% or more (when existing spillage risk is <1% annually).
Negligible	No risk identified by HEWRAT (pass both acute-soluble and chronic-sediment related pollutants). Risk of pollution from spillages <0.5%.
Minor Adverse	Failure of either acute soluble or chronic sediment related pollutants in HEWRAT. Calculated risk of pollution from spillages ≥0.5% annually and < 1% annually. Minor effects on water supplies.
Moderate Adverse	Failure of both acute-soluble and chronic-sediment related pollutants in HEWRAT but compliance with EQS values. Calculated risk of pollution from spillages ≥1% annually and <2 % annually. Partial loss in productivity of a fishery. Degradation of regionally important public water supply or loss of major commercial/industrial/agricultural supplies. Contribution to reduction in water body WFD classification.
Major Adverse	Failure of both acute-soluble and chronic-sediment related pollutants in HEWRAT and compliance failure with EQS values. Calculated risk of pollution from a spillage ≥2% annually (spillage assessment). Loss or extensive change to a fishery. Loss of regionally important public water supply. Loss or extensive change to a designated nature conservation site. Reduction in water body WFD classification.