

**TAG Water Environment Impacts Worksheet for M4 Junction 17 Improvements OBC**

Description of study area/ summary of potential impacts	Key environmental resource	Features	Indicator of quality	Possible Measures	Assessment data availability	Scale	Rarity	Substitutability	Importance	
<b>Study area: 1km buffer around the alignment</b>										
Potential Impacts:										
<p>The increase in impermeable road area as a result of road widening could increase the polluted road runoff entering the watercourse (if the road runoff was routed to the watercourse) causing a deterioration in water quality</p> <p>The potential modification of an existing culvert (due to road widening) could disrupt the natural hydraulic and sediment transport processes within the watercourse.</p> <p>These impacts can likely be minimised through mitigation.</p> <p>At waterbody scale these impact would not be significant.</p>	<p>Rodbourne Brook WFD reported reach: Rodbourne Brook - source to conf R Avon (Brist) (GB109053027720)</p>	Water supply	Use of water supply (potable, industrial or agricultural)	Location and number of abstraction points	No abstraction licence information available at the time of reporting.					
			Volume of water abstracted	Indicator of quality not used in assessment.						
			Use of water (potable most important)							
			Chemical water quality	Existing chemical classification/status and objective under the WFD.	Existing chemical classification: Fail (2019) Chemical objective: Good (2015)	Regional	Commonplace	Replaceable	Medium	
				Likelihood of a change in classification arising (+ve or -ve)	No information available to indicate direction of change.					
		Transport and dilution of waste products	Presence of surface water discharge points	Location and number of discharge points	No discharge consents information available at the time of reporting					
			Volume of effluent discharged	Indicator of quality and measures not used in assessment.						
		Contribution of discharge to total river flow	Proportion of flow made up by effluent at different times of the year							
		Biodiversity	Biological water quality	Existing ecological classification/status and objective under the WFD	Existing classification: Moderate (2019) Objective: Good (2021)	Regional	Commonplace	Replaceable	Medium	
				Likelihood of a change in classification arising (+ve or -ve)	No information available to indicate direction of change.					
			Fisheries quality	EC Fishery designation (Salmonid, Cyprinid or undesignated)	Not considered in the water environment assessment, refer to Biodiversity assessment. Indicator of quality and measure not used in assessment.					
				Conservation value of river corridor	Results of River Habitat Survey	River Habitat Surveys have not been undertaken at the time of reporting. Indicator of quality and measure not used in assessment.				
		Presence of designations (e.g. SSSI, NNR, LNR, SINC)	Not considered in the water environment assessment, refer to Biodiversity assessment. Indicator of quality and measure not used in assessment.							
			Presence of protected species or BAP species	Presence of protected species or BAP species not considered in the water environment assessment, refer to Biodiversity assessment. Indicator of quality and measure not used in assessment.						
		Aesthetics	Contribution to landscape character and quality	Results of river landscape assessment	Contribution to landscape character and quality not considered in the water environment assessment, refer to landscape assessment. Feature not used in assessment.					
		Cultural heritage	Presence of historic features associated with river	Results of historic environmental assessment Presence of designations (e.g. SAMs, listed buildings)	Presence of historic features associated with river not considered in the water environment assessment, refer to Culture Heritage assessment. Feature not used in assessment.					
		Recreation	Riverside access	Presence of route and importance	Indicator of quality and measure not used in assessment					
			Use of the river for recreation	Presence of facilities and clubs for using the river environment	Indicator of quality and measure not used in assessment					
		Use for angling (number of clubs/membership)	Indicator of quality and measure not used in assessment							
Value to local economy (e.g. employment, relative property prices, cost of alternatives, etc)	Indicator of quality and measure not used in assessment									
Value to economy	Value of the uses of the river (e.g. commercial fishing, abstractions, discharges, navigation, leisure and riverside development land)									
Conveyance of flows and material	Presence of watercourses	Number and size of watercourse	Indicator of quality and measure used in floodplain resource so as to not duplicate scoring.							
		Existing flood risk	Indicator of quality and measure used in floodplain resource so as to not duplicate scoring.							
<p>The increase in impermeable road area as a result of road widening could increase the polluted road runoff entering the watercourse (if the road runoff was routed to the watercourse) causing a deterioration in water quality</p> <p>The potential modification of an existing culvert (due to road widening) could disrupt the natural hydraulic and sediment transport processes within the watercourse.</p> <p>These impacts can likely be minimised through mitigation.</p> <p>At waterbody scale these impact would not be significant.</p>	<p>Unnamed watercourse WFD reported reach: No Within the Rodbourne Brook - source to conf R Avon (Brist) (GB109053027720) waterbody</p>	Water supply	Use of water supply (potable, industrial or agricultural)	Location and number of abstraction points	No abstraction licence information available at the time of reporting.					
			Volume of water abstracted	Indicator of quality not used in assessment.						
			Use of water (potable most important)							
			Chemical water quality	Existing chemical classification/status and objective under the WFD.	Existing chemical classification: Fail (2019) Chemical objective: Good (2015)	Local	Commonplace	Replaceable	Medium	
				Likelihood of a change in classification arising (+ve or -ve)	No information available to indicate direction of change					
		Transport and dilution of waste products	Presence of surface water discharge points	Location and number of discharge points	No discharge consents information available at the time of reporting					
			Volume of effluent discharged	Indicator of quality and measures not used in assessment						
		Contribution of discharge to total river flow	Proportion of flow made up by effluent at different times of the year							
		Biodiversity	Biological water quality	Existing ecological classification/status and objective under the WFD	Existing classification: Good (2019) Objective: Good (2021)	Local	Commonplace	Replaceable	Medium	
				Likelihood of a change in classification arising (+ve or -ve)	No information available to indicate direction of change					
			Fisheries quality	EC Fishery designation (Salmonid, Cyprinid or undesignated)	Not considered in the water environment assessment, refer to Biodiversity assessment. Indicator of quality and measure not used in assessment					
				Conservation value of river corridor	Results of River Habitat Survey	River Habitat Surveys have not been undertaken at the time of reporting. Indicator of quality and measure not used in assessment				
		Presence of designations (e.g. SSSI, NNR, LNR, SINC)	Not considered in the water environment assessment, refer to Biodiversity assessment. Indicator of quality and measure not used in assessment							
			Presence of protected species or BAP species	Presence of protected species or BAP species not considered in the water environment assessment, refer to Biodiversity assessment. Indicator of quality and measure not used in assessment.						

<p>The increase in impermeable road area as a result of road widening could increase the polluted road runoff entering the watercourse (if the road runoff was routed to the watercourse) causing a deterioration in water quality</p> <p>This impact can likely be minimised through mitigation.</p> <p>At waterbody scale this impact would not be significant.</p>	<p>Unnamed watercourse WFD reported reach: No Within the Sutton Benger Bk - source to conf R Avon (Brist) (GB109053027700) WFD waterbody</p>	Aesthetics	Contribution to landscape character and quality	Results of river landscape assessment	Contribution to landscape character and quality not considered in the water environment assessment, refer to landscape assessment. Feature not used in assessment.				
		Cultural heritage	Presence of historic features associated with river	Results of historic environmental assessment Presence of designations (e.g. SAMs, listed buildings)	Presence of historic features associated with river not considered in the water environment assessment, refer to Culture Heritage assessment. Feature not used in assessment.				
		Recreation	Riverside access	Presence of route and importance	Indicator of quality and measure not used in assessment				
			Use of the river for recreation	Presence of facilities and clubs for using the river environment Use for angling (number of clubs/membership)	Indicator of quality and measure not used in assessment				
		Value to economy	Value of the uses of the river (e.g. commercial fishing, abstractions, discharges, navigation, leisure and riverside development land)	Value to local economy (e.g. employment, relative property prices, cost of alternatives, etc)	Indicator of quality and measure not used in assessment				
		Conveyance of flows and material	Presence of watercourses	Number and size of watercourse	Indicator of quality and measure used in floodplain resource so as to not duplicate scoring				
				Existing flood risk	Indicator of quality and measure used in floodplain resource so as to not duplicate scoring				
		Water supply	Use of water supply (potable, industrial or agricultural)	Location and number of abstraction points	No abstraction licence information available at the time of reporting.				
				Volume of water abstracted Use of water (potable most important)	Indicator of quality not used in assessment.				
		Chemical water quality	Existing chemical classification/status and objective under the WFD. Likelihood of a change in classification arising (+ve or -ve)	Existing chemical classification: Fail (2019) Chemical objective: Good (2015)		Local	Commonplace	Replaceable	Medium
				No information available to indicate direction of change					
		Transport and dilution of waste products	Presence of surface water discharge points Contribution of discharge to total river flow	Location and number of discharge points Volume of effluent discharged	No discharge consents information available at the time of reporting Indicator of quality and measures not used in assessment				
				Proportion of flow made up by effluent at different times of the year					
				Existing ecological classification/status and objective under the WFD Likelihood of a change in classification arising (+ve or -ve)	Existing classification: Good (2019) Objective: Good (2021) No information available to indicate direction of change	Local	Commonplace	Replaceable	Medium
		Fisheries quality	Conservation value of river corridor	EC Fishery designation (Salmonid, Cyprinid or undesignated)	Not considered in the water environment assessment, refer to Biodiversity assessment. Indicator of quality and measure not used in assessment				
Results of River Habitat Survey Presence of designations (e.g. SSSI, NNR, LNR, SINC)s	River Habitat Surveys have not been undertaken at the time of reporting. Indicator of quality and measure not used in assessment Not considered in the water environment assessment, refer to Biodiversity assessment. Indicator of quality and measure not used in assessment								
Presence of protected species or BAP species	Presence of protected species or BAP species not considered in the water environment assessment, refer to Biodiversity assessment. Indicator of quality and measure not used in assessment.								
Aesthetics	Contribution to landscape character and quality	Results of river landscape assessment	Contribution to landscape character and quality not considered in the water environment assessment, refer to landscape assessment. Feature not used in assessment.						
Cultural heritage	Presence of historic features associated with river	Results of historic environmental assessment Presence of designations (e.g. SAMs, listed buildings)	Presence of historic features associated with river not considered in the water environment assessment, refer to Culture Heritage assessment. Feature not used in assessment.						
Recreation	Riverside access	Presence of route and importance	Indicator of quality and measure not used in assessment						
	Use of the river for recreation	Presence of facilities and clubs for using the river environment Use for angling (number of clubs/membership)	Indicator of quality and measure not used in assessment						
Value to economy	Value of the uses of the river (e.g. commercial fishing, abstractions, discharges, navigation, leisure and riverside development land)	Value to local economy (e.g. employment, relative property prices, cost of alternatives, etc)	Indicator of quality and measure not used in assessment						
Conveyance of flows and material	Presence of watercourses	Number and size of watercourse	Indicator of quality and measure used in floodplain resource so as to not duplicate scoring						
		Existing flood risk	Indicator of quality and measure used in floodplain resource so as to not duplicate scoring						
Water supply	Use of water supply (potable, industrial or agricultural)	Location and number of abstraction points	No abstraction licence information available at the time of reporting.						
		Volume of water abstracted Use of water (potable most important)	Indicator of quality not used in assessment.						
Chemical water quality	Existing chemical classification/status and objective under the WFD. Likelihood of a change in classification arising (+ve or -ve)	Existing chemical classification: Fail (2019) Chemical objective: Good (2015)		Regional	Commonplace	Replaceable	Medium		
		No information available to indicate direction of change							
Transport and dilution of waste products	Presence of surface water discharge points Contribution of discharge to total river flow	Location and number of discharge points Volume of effluent discharged	No discharge consents information available at the time of reporting Indicator of quality and measures not used in assessment						
		Proportion of flow made up by effluent at different times of the year							
		Existing ecological classification/status and objective under the WFD Likelihood of a change in classification arising (+ve or -ve)	Existing classification: Good (2019) Objective: Good (2021) No information available to indicate direction of change	Regional	Commonplace	Replaceable	Medium		

			Fisheries quality	EC Fishery designation (Salmonid, Cyprinid or undesignated)	Not considered in the water environment assessment, refer to Biodiversity assessment. Indicator of quality and measure not used in assessment					
			Conservation value of river corridor	Results of River Habitat Survey	River Habitat Surveys have not been undertaken at the time of reporting. Indicator of quality and measure not used in assessment					
				Presence of designations (e.g. SSSI, NNR, LNR, SINC)	Not considered in the water environment assessment, refer to Biodiversity assessment. Indicator of quality and measure not used in assessment					
				Presence of protected species or BAP species	Presence of protected species or BAP species not considered in the water environment assessment, refer to Biodiversity assessment. Indicator of quality and measure not used in assessment.					
		Aesthetics	Contribution to landscape character and quality	Results of river landscape assessment	Contribution to landscape character and quality not considered in the water environment assessment, refer to landscape assessment. Feature not used in assessment.					
		Cultural heritage	Presence of historic features associated with river	Results of historic environmental assessment Presence of designations (e.g. SAMS, listed buildings)	Presence of historic features associated with river not considered in the water environment assessment, refer to Culture Heritage assessment. Feature not used in assessment.					
		Recreation	Riverside access	Presence of route and importance	Indicator of quality and measure not used in assessment					
				Use of the river for recreation	Presence of facilities and clubs for using the river environment	Indicator of quality and measure not used in assessment				
				Use for angling (number of clubs/membership)	Indicator of quality and measure not used in assessment					
		Value to economy	Value of the uses of the river (e.g. commercial fishing, abstractions, discharges, navigation, leisure and riverside development land)	Value to local economy (e.g. employment, relative property prices, cost of alternatives, etc)	Indicator of quality and measure not used in assessment					
		Conveyance of flows and material	Presence of watercourses	Number and size of watercourse	Indicator of quality and measure used in floodplain resource so as to not duplicate scoring					
					Existing flood risk	Indicator of quality and measure used in floodplain resource so as to not duplicate scoring				
<p>There is a potential increases in flood risk as a result of: The road widening potentially encroaching into Flood Zones 2 and 3. The potential increase in surface water runoff as a result of an increase in impermeable road area (caused by road widening). The potential modification to an existing culvert could result in flow constrictions and cause water to back during times of flooding and raise peak water levels.</p> <p>These impacts can likely be minimised through mitigation.</p>	Rodbourne Brook floodplain	Conveyance of flood flows	Presence of flood zones	Existing flood risk/flood return period	Flood Zones 2 and 3 are associated with the watercourse.	Local	Rare	Limited no substitution	High	
				Flood flow routes	Location / importance of flood flow routes	Unknown at the time of reporting. Indicator of quality not used in assessment.				
				Surface water flooding	Location of surface water flooding	Unknown at the time of reporting. Indicator of quality not used in assessment.				
			Biodiversity	Conservation value of river corridor	Results of River Habitat Survey	River Habitat Surveys have not been undertaken at the time of reporting.				
						Presence of designations (e.g. SSSI, NNR, LNR, SINC)	Presence of designations is not considered under the floodplain resource. Feature not used in assessment.			
			Presence of protected species or BAP species	Presence of protected species or BAP species not considered in the water environment assessment, refer to Biodiversity assessment. Feature not used in assessment.						
		Aesthetics	Contribution to landscape character and quality	Results of river landscape assessment	Contribution to landscape character and quality not considered in the water environment assessment, refer to landscape assessment. Feature not used in assessment.					
<p>The increase in impermeable road area as a result of road widening could increase the polluted road runoff entering the aquifer (if the road runoff was routed to ground) causing a deterioration in water quality</p> <p>This impact can likely be minimised through mitigation.</p> <p>At waterbody scale this impact would not be significant.</p>	Secondary A Bedrock Aquifer Located in the Malmesbury groundwater body (GB40402G990300)	Water supply	Use for water supply (potable, industrial or agricultural)	Location and number of abstraction points	No abstraction licence information available at the time of reporting.					
					Volume of water abstracted	Indicator of quality not used in assessment.				
					Use of water (potable most important)					
					Groundwater vulnerability	Location and grade of source protection zone	No Source Protection Zones. Measure not used in assessment.			
				Classification of aquifer vulnerability	Groundwater vulnerability classification: Minor Aquifer	Local	Rare	Limited no substitution	Medium	
				Classification/status and objective under WFD	Existing classification (overall water body): Good (2019) Objective (overall water body): Good (2015)	Regional	Rare	Limited no substitution	Medium	
			Transport and dilution of waste products	Presence of discharge points	Location and number of discharge points	No discharge consents information available at the time of reporting. Feature not used in assessment.				
						Location and number of discharge points				
			Value to the economy	Value of the uses of the groundwater (e.g. abstractions and discharges)	Value to local economy (e.g. employment, cost of alternatives, etc.)	No abstraction licence or discharge consent information available at the time of reporting. Feature not used in assessment.				
			Biodiversity	Conservation value of areas fed by groundwater	Results of River Habitat Survey	River Habitat Surveys have not been undertaken at the time of reporting. Feature not used in assessment				
		Presence of designations (e.g. SSSI, NNR, LNR, SINC)			Feature not used in assessment					
		Presence of protected species or BAP species			Presence of protected species or BAP species not considered in the water environment assessment, refer to Biodiversity assessment. Feature not used in assessment.					
	Conveyance of flood flows	Flow routes	Location and importance of flow routes	Unknown at the time of reporting. Feature not used in assessment.						
				Groundwater levels	Charges in levels and recharge					

#### Reference Sources

Design drawing - M4 Junction 17

Environmental datasets held on Defra's MAGIC website <https://magic.defra.gov.uk/home.htm>

Environment Agency - Catchment Data Explorer <http://environment.data.gov.uk/catchment-planning/>

British Geological Survey's Geology of Britain Viewer <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

**Summary Assessment Score (with mitigation)**

**Neutral**

**Qualitative Comments**

The M4 Junction 17 Improvements Scheme will result in an increase in impermeable road area. This could potentially impact the water quality of Rodbourne Brook, Sutton Benger Brook and two unnamed watercourses and/or the underlying aquifer's water quality (depending on when the increase in impermeable road area causes an increase in surface water runoff). Sustainable drainage measures that attenuate runoff volumes could be implemented to mitigate an increase in surface water flood risk or fluvial flow in a watercourse. These measures can also be designed to remove suspended solids, dissolved copper and dissolved zinc and they are also effective for spillage control. The exact choice of system is dependent on the physical environment of the Scheme and needs to consider the available soil permeability and topography.

There is the possibility that the road widening could encroach into Flood Zones 2 and 3. If this were the case then floodplain storage compensation would be required.

Also potential modifications to an existing culvert could potentially impact the hydromorphology of Rodbourne Brook and increase flood risk by causing flow constrictions at times of flooding. Potential impacts on hydromorphology could be mitigated by following environmentally sensitive design guidelines and potential for enhancements up and downstream where practical. Potential impacts on flood risk would need to be further assessed through a Flood Risk Assessment (FRA) and the culvert sized appropriately to ensure there is no increase in flood risk.

As there is a potential impact which is highly significant the overall assessment score for the operation of the M4 Junction 17 Improvements Scheme is large adverse. This has been determined with reference to sections 5.3.15 – 5.3.20 and 10.2 of TAG UNIT A3 - Environmental Impacts of Transport, Transport Analysis Guidance, as summarised below:

- Most adverse category. The scheme as a whole is assessed according to the most adverse assessment of the features affected i.e. if a single feature scores 'large adverse' and this is the highest individual assessment score for all features then the overall assessment score should be 'large adverse'.

However, applying water quality and flood risk mitigation will reduce the significance of effect to neutral.