M20 Junction 10a

TR010006

Environmental Statement

Chapter 14 Road Drainage and the Water Environment

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Revision A

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Environmental Statement

Chapter 14 Road Drainage and the Water Environment

Volume 6.1

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Content

14 Road Drainage and the Water Environment

14.1 Introduction

14.1.1 This topic addresses the potential effects of the construction and operation of the proposed Main and Alternative Schemes (as described in Chapter 2 The Proposed Scheme, Volume 6.1) on the water environment, namely surface water and groundwater, water resources and flood risk. This chapter describes the study area and key receptors, identifies the key impacts, and identifies how these will be mitigated during the construction and operation of the M20 junction 10a Scheme.

14.1.2 DMRB Volume 11, Section 3, Part 10 (HD 45/09)[1] provides guidance on the assessment of likely significance of effects on the water environment associated with highway schemes.

14.1.3 This chapter should read in conjunction with the Water Framework Directive (WFD) assessment (Appendix 14.1, Volume 6.3), the Flood Risk Assessment (FRA) (Appendix 14.2, Volume 6.3) and the Highways Agency Water Risk Assessment Tool (HAWRAT) assessment (Appendix 14.3, Volume 6.3).

14.2 Legislative and Policy Framework

14.2.1 This section summarises the main legislation and policies relevant to the water environment and the water attributes within the study area, to be taken into account in the proposed development. The assessment considers relevant European and national legislation as well as national, regional and local planning policy.

European and National Legislation and Policy

14.2.2 The main legislative framework of relevance to the water environment comprises:

- EC Directive on establishing a framework for Community action in the field of water policy (The Water Framework Directive) (2000/60/EC).
- Water Environment (Water Framework Directive) (England and Wales) Regulations 2003.
- EC Directive on the protection of groundwater against pollution caused by certain dangerous substances (the Groundwater Directive) (80/68/EEC).
- Groundwater protection: principles and practice (GP3) (EA, 2013a).

[1] DMRB, Volume 11, Section 3, Part 10 (HD 45/09): Road Drainage and the Water Environment, available at http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol11/section3/hd4509.pdf, accessed 28/4/2015.

- National Planning Policy Framework (CLG, 2012) and its associated Technical Guidance (CLG, 2014).
- Highways (Environmental Impact Assessment) Regulations 2007 (EIA Highways Regulations 2007).
- The Environmental Permitting (England and Wales) Regulations 2010.
- The Water Resources Act 1991.
- The Water Industry Act 1991 and Water Industry Act 1999.
- The Environment Act 1995.
- The Land Drainage Act 1991.
- Water Act 2003.
- Flood and Water Management Act 2010.
- National Policy Statement for National Networks 2014

14.2.3 The EU Water Framework Directive was transposed into law in England and Wales by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003. The WFD requires that environmental objectives be set for all surface waters and groundwaters in each European Union (EU) member state. The environmental objectives for the WFD will be delivered through the actions described in the River Basin Management Plans (RBMPs). The RBMPs are plans for improving the water environment and contain the main issues and actions needed within each river basin. The proposed Main and Alternative Schemes are within the South East River Basin District. The requirements of the WFD are described further in the WFD assessment (Appendix 14.1, Volume 6.3). A summary of the WFD assessment is provided in Section 14.8 below.

14.2.4 The National Policy Statement for National Networks sets out the need for, and Government's policies to deliver, development of nationally significant infrastructure projects (NSIPs) on the national road and rail networks in England. It provides planning guidance for promoters of nationally significant infrastructure projects on the road and rail networks, and the basis for the examination by the Examining Authority and decisions by the Secretary of State.

14.2.5 The National Planning Policy Framework (NPPF) was issued in March 2012. Sections of relevance to this assessment include:

- Chapter 10 "Meeting the challenge of climate change, flooding and coastal change", and the supporting technical guidance in relation to flood risk.
- Chapter 11 "Conserving and enhancing the natural environment".

14.2.6 The requirements of the NPPF, and the supporting technical guidance, are described further in the FRA (Appendix 14.2, Volume 6.3). A summary of the WFD assessment is provided in Section 14.8 below. The NPPF also indicates that the Floods and Water Management Act (FWMA) 2010 establishes a Sustainable Drainage Systems (SuDS) Approving Body in Unitary Authorities or

County Councils. This body must approve drainage systems in new developments and re-developments before construction begins.

14.2.7 The Water Act 2003 aims to improve water conservation, protect public health and the environment, and improve the service offered to consumers. The Act is in 3 parts relating to water resources, regulation of the water industry and other provisions.

14.2.8 The Environmental Permitting Regulations 2010 makes it an offence to knowingly pollute controlled waters, which comprise all groundwater and surface waters including ponds, streams and rivers. Works affecting a Main River require consent from the Environment Agency under the Environmental Permitting Regulations 2010, to ensure that any discharge does not adversely affect the water environment, fisheries or flood defence.

14.2.9 The WRA 1991 and the WRA 1991 (Amendment) (England and Wales) Regulations 2009, Section 93 provides for the establishment of water protection zones. The regulations are implemented under the Environment Agency's Policy and Practice for the Protection of Groundwater through the definition of Source Protection Zones (SPZs). Within the SPZs, the Environment Agency seeks to restrict certain potentially polluting activities, with the most onerous restrictions applied to SPZ1.

Local Policy

14.2.10 Ashford Borough Council (ABC) is currently preparing its Local Plan, up to 2030. The Local Plan will address housing, the economy, community infrastructure and environmental issues, such as adapting to climate change and ensuring high quality design. The Local Plan will be an important document that will make site allocations for different development uses and will set out criteria-based policies to facilitate planning decisions.

14.2.11 The Council's Core Strategy[2] was adopted in 2008 and includes the following policies of relevance to the water environment, which have been considered as part of this assessment:

POLICY CS19: Development and Flood Risk

Proposals for new development within the 100 year undefended river floodplain or the 200 year sea floodplain (plus an appropriate allowance for climate change) will not be permitted unless following a Flood Risk Assessment it can be demonstrated that:

a) it would not be at an unacceptable risk of flooding itself, and,

b) the development would not result in any increased risk of flooding elsewhere.

[2] Ashford Borough Council (2008) Local Development Framework Core Strategy, available online at http://www.ashford.gov.uk/download.cfm?doc=docm93jijm4n790.pdf&ver=6904, accessed 26/09/2014.

In exceptional circumstances, where the tests above cannot be met, essential transport or utility infrastructure, or other development on a brownfield site may be allowed if:

a) the development is designed to be compatible with potential flood conditions, and,

b) there are no alternative sites in a lower flood risk zone, and

c) the development would make a significant contribution to the overall sustainable development objectives of the LDF, such that the wider sustainability benefits of the development outweigh the flood risk and,

d) it can be demonstrated to the satisfaction of the Council and the Environment Agency that any residual flood risks are adequately mitigated to avoid an increased risk of flooding either on the site or elsewhere.

In addition, development that would harm the effectiveness of existing flood defences or prejudice their maintenance or management will not be permitted.

POLICY CS20: Sustainable Drainage

All development should include appropriate sustainable drainage systems (SUDS) for the disposal of surface water, in order to avoid any increase in flood risk or adverse impact on water quality.

For greenfield developments in that part of the Ashford Growth Area that drains to the River Stour, SUDS features shall be required so as to achieve a reduction in the pre-development runoff rate. On all other sites in the Borough, including those in the south-western part of the Growth Area that drains to the River Beult, developments should aim to achieve a reduction from the existing runoff rate but must at least, result in no net additional increase in runoff rates.

SUDS features should normally be provided on-site. In the Ashford Growth Area if this cannot be achieved, then more strategic forms of SUDS may be appropriate. In such circumstances, developers will need to contribute towards the costs of provision via Section 106 Agreements or the strategic tariff. In all cases, applicants will need to demonstrate that acceptable management arrangements are funded and in place so that these areas are well maintained in future.

SUDS should be sensitively designed and located to promote improved bio-diversity, an enhanced landscape and good quality spaces that improve public amenities in the area.

14.3 Method of Assessment

Study Area

14.3.1 The study area, which encompasses the site of the M20 junction 10a Main and Alternative Schemes, is located to the east of Ashford in Kent. Previous studies and assessments used a 1km buffer around the proposed scheme, which is considered to be a suitable study area. However, in order to align with the

South East RBMP[3], which was used as the primary source of baseline data for this assessment, adjacent downstream WFD waterbodies as defined in the RBMP, have also been considered. Similarly, for groundwater, the potential zone of impact during the construction and operation phases has been assessed on the underlying WFD groundwater body.

Significance Criteria

14.3.2 The value of controlled water, both surface waters and groundwater, has been assessed by taking into account the use and conservation importance of the waterbodies. Indicators of quality, scale, rarity and substitutability of the waterbodies are defined based on the guidance given within DMRB Volume 11, Section 3, Part 10 (HD 45/09)[4]. The importance of waterbodies, based on the indicators of quality, scale, rarity and substitutability, is set out in Table 14.1 below.

14.3.3 The value of water resources is partially defined by legislation[5] which protects all controlled waters in England and Wales. Consequently, all water bodies (surface and groundwater) are protected and a waterbody cannot have 'negligible' value.

Table 14.1 Sensitivity of water resources

Value	Criteria	Typical Examples
Very High	Attribute has high quality on regional, national or international scale	**Surface Water**: Site protected under EU wildlife legislation (SAC, SPA, Ramsar site); WFD High status. **Groundwater**: Groundwater vulnerability is classified as high; Principal aquifer providing a regionally important resource or supporting site protected under wildlife legislation; or SPZ1. **Flood Risk**: Receptor is at high risk from flooding (FZ3b); or floodplain or defence protecting more than 100 residential properties from flooding.
High	Attribute has high quality and rarity on local scale.	**Surface Water**: Site protected under UK wildlife legislation (SSSI); WFD status (or potential) is currently Good or has a target of Good. **Groundwater**: Groundwater vulnerability is classified as high; Principal aquifer providing locally important resource or supporting river ecosystem; SPZ2. **Flood Risk**: Receptor is at high risk from flooding (FZ3a); floodplain or defence protecting between 10 and 100 residential properties or industrial premises from flooding.
Medium	Attribute has a medium quality and rarity on local scale.	**Surface Water**: Site protected under Local wildlife legislation (SNCI, LNR), WFD status (or potential) is Moderate. **Groundwater**: Moderate classification of groundwater vulnerability; Secondary aquifer providing water for agricultural or industrial use

[3] EA (2009) River Basin Management Plan South East River Basin District, available online at https://www.gov.uk/government/collections/river-basin-management-plans, accessed 28/04/2015.

[4] DMRB, Volume 11, Section 3, Part 10 (HD 45/09): Road Drainage and the Water Environment, available at http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol11/section3/hd4509.pdf, accessed 28/4/2015.

[5] Principally the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 and the 2010 Environmental Permitting Regulations

Value	Criteria	Typical Examples
		with limited connection to surface water; SPZ3. **Flood Risk**: Receptor is at moderate risk from flooding (FZ2); floodplain or defence protecting 10 or fewer industrial properties from flooding.
Low	Attribute has a low quality and rarity on local scale.	**Surface Water**: WFD status (or potential) is Poor, or waterbody is not classified under the WFD. **Groundwater**: Secondary aquifer with poor water quality not providing baseflow to rivers; non-aquifer. **Flood Risk**: Receptor is at low risk from flooding (FZ1); floodplain with limited constraints and a low probability of flooding of residential and industrial properties.

14.3.4 The magnitude of an impact can vary, and it also takes into account the timescale over which the effect occurs. The effects are defined as temporary or permanent, and whether they are reversible or not. Typical criteria are set out in Table 14.2 below. The magnitude of all impacts, both beneficial as well as adverse, is noted in the assessment.

Table 14.2 Criteria for Determining the Magnitude of Impact

Magnitude	Criteria	Typical Example
Major adverse	Results in loss of attribute and/or quality and integrity of the attribute.	Surface Water: Failure of both soluble and sediment-bound pollutants in HAWRAT (Method A, Annex I) and compliance failure with EQS values (Method B) Calculated risk of pollution from a spillage >2% annually (Spillage Risk Assessment, Method D, Annex I) Loss or extensive change to a fishery Loss or extensive change to a designated Nature Conservation Site
		Groundwater: Loss of, or extensive change to, an aquifer Potential high risk of pollution to groundwater from routine runoff – risk score >250 (Groundwater Assessment, Method C, Annex I) Calculated risk of pollution from spillages >2% annually (Spillage Risk Assessment, Method D, Annex I) Loss of, or extensive change to, groundwater supported designated wetlands
		Flood Risk: Increase in peak flood level (1% annual probability) >100mm (Hydrological Assessment of Design Floods and Hydraulic Assessment, Methods E and F, Annex I)
Moderate Adverse	Results in effect on integrity of attribute, or loss of part of attribute.	Surface Water: Failure of both soluble and sediment-bound pollutants in HAWRAT (Method A, Annex I) but compliance with EQS values (Method B) Calculated risk of pollution from spillages >1% annually and <2% annually Partial loss in productivity of a fishery
		Groundwater: Partial loss or change to an aquifer Potential medium risk of pollution to groundwater from routine runoff – risk score 150-250 Calculated risk of pollution from spillages >1% annually and <2% annually Partial loss of the integrity of groundwater supported designated wetlands
		Flood Risk: Increase in peak flood level (1% annual probability) >50mm
Minor Adverse	Results in some measurable change in attributes quality or vulnerability.	Surface Water: Failure of either soluble or sediment-bound pollutants in HAWRAT Calculated risk of pollution from spillages >0.5% annually and <1% annually
		Groundwater: Potential low risk of pollution to groundwater from routine runoff – risk score <150 Calculated risk of pollution from spillages >0.5% annually and <1% annually Minor effects on groundwater supported wetlands
		Flood Risk: Increase in peak flood level (1% annual probability) >10mm
Negligible	Results in effect	The proposed scheme is unlikely to affect the integrity of the water environment

Magnitude	Criteria	Typical Example
	on attribute, but of insufficient magnitude to affect the use or integrity.	Surface Water: No risk identified by HAWRAT (Pass both soluble and sediment-bound pollutants) Risk of pollution from spillages <0.5%
		Groundwater: No measurable impact upon an aquifer and risk of pollution from spillages <0.5%
		Flood Risk: Negligible change in peak flood level (1% annual probability) <+/- 10mm
Minor Beneficial	Results in some beneficial effect on attribute or a reduced risk of negative effect occurring.	Surface Water: HAWRAT assessment of either soluble or sediment-bound 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)
		Groundwater: Calculated reduction in existing spillage risk by 50% or more to an aquifer (when existing spillage risk <1% annually)
		Flood Risk: Reduction in peak flood level (1% annual probability) >10mm
Moderate Beneficial	Results in moderate improvement of attribute quality.	Surface Water: HAWRAT assessment of both soluble and sediment-bound pollutants becomes Pass from an existing site where the baseline was a Fail condition Calculated reduction in existing spillage by 50% or more (when existing spillage risk >1% annually)
		Groundwater: Calculated reduction in existing spillage risk by 50% or more (when existing spillage risk is >1% annually)
		Flood Risk: Reduction in peak flood level (1% annual probability) >50mm
Major Beneficial	Results in major improvement of attribute quality.	Surface Water: Removal of existing polluting discharge, or removing the likelihood of polluting discharges occurring to a watercourse
		Groundwater: Removal of existing polluting discharge to an aquifer or removing the likelihood of polluting discharges occurring Recharge of an aquifer
		Flood Risk: Reduction in peak flood level (1% annual probability) >100mm

14.3.5 Using the combination of importance of the water body and the magnitude of impact, the effect of the development on each water feature has been allocated a level of significance as shown in Table 14.3 below.

Table 14.3 Significance of Effect categories

Value/ Sensitivity	Magnitude of Impact			
	Negligible	Minor	Moderate	Major
Very High	Neutral	Moderate or Large	Large or Very Large	Very Large
High	Neutral	Slight or Moderate	Moderate or Large	Large or Very Large
Medium	Neutral	Slight	Moderate	Large
Low	Neutral	Neutral	Slight	Slight or Moderate

14.3.6 Effects that are neutral or slight are considered to be not significant; effects that are moderate or above are considered to be significant. Insignificant effects, or effects of low significance, should not require mitigation. Mitigation measures for significant (or greater) effects have been determined in the assessment process. Any residual effects following mitigation are also identified.

14.3.7 Mitigation measures will be incorporated in the Outline Construction Environmental Management Plan (OCEMP) to protect water resources during construction. Mitigation measures include reference to current best practice guidance contained within Construction Industry Research and Information Association (CIRIA) guidance documents[6].

14.4 Consultation

14.4.1 Consultation with Statutory Environment Bodies (SEBs) was undertaken in 2010 as part of a broad consultation exercise with all relevant statutory consultees. A meeting was held with the Environment Agency on the 20 October 2010, to discuss flood modelling and nature conservation. Discussion included relocation of the junction to retain the Highfield Lane bridge crossing, rationale for the selection of visual assessment viewpoints, potential for long distance views from the edge of the North Downs, sensitivity of properties on Kingsford Street and the importance of the setting of St Marys Church.

14.4.2 A meeting was held on the 17th February 2015 with the Environment Agency and ABC, to give an update on the progress of the scheme and discuss the proposed methodology for the EIA, WFD compliance assessment and FRA.

[6] Environmental good practice on site (CIRIA, 3rd Edition, 2010), Control of water pollution from construction sites – guide to good practice (CIRIA, 2002) and Control of water pollution from linear construction projects (CIRIA, C648, 2006).

The Environment Agency's requirements for any proposed culvert extensions were discussed, to inform the design for carrying the junction 10a slip roads over the Aylesford Stream, although the preference for the use of clear span bridges was noted by both the Environment Agency and scheme designers. Should clear span bridges be used, it was noted that flood modelling would not be required. Access requirements to the Aylesford stream for maintenance were also discussed.

14.4.3 ABC's requirements for runoff attenuation, as described in the Sustainable Drainage Strategic Policy Document[7] were discussed. This requires attenuation to the 1-in-100 year (1% AEP) event plus a 30% allowance for climate change, with runoff to be restricted to 4 l/s/ha south of M20 and 2 l/s/ha north of M20.

14.4.4 The proposed scope of the Environmental Statement (ES) chapter and WFD compliance assessment were discussed, and new guidance on screening criteria for the WFD assessment was provided by the Environment Agency, which has been used to screen which aspects of the scheme could affect the WFD status of the waterbodies and therefore need to be assessed for WFD compliance.

14.4.5 Further meetings were held with the Environment Agency on the 2 September 2015 and the 21 March 2016, to discuss updates to the proposed drainage design and the ongoing environmental assessment work.

14.5 Assumptions and Limitations

14.5.1 Both the Main and Alternative Scheme assessments are based on available third party data combined with a visual site inspection. No detailed surveys were undertaken relating to water quality, although a drainage survey was carried out to establish the presence and function of pollution control devices and other existing drainage features.

14.6 Baseline Information

14.6.1 Figure 14.1, Volume 6.2 shows the location of waterbodies and European Designated Sites.

14.6.2 The South East RBMP[8] provides information on 4 WFD waterbodies within the study area that have the potential to be either directly or indirectly affected by the schemes. These are:

- The Aylesford Stream (GB107040019650), which flows under the M20 to the west of the new proposed junction 10a, which is a tributary of.

[7] Ashford Borough Council Local development Framework Sustainable Drainage SPD, available online at http://www.ashford.gov.uk/sustainable-drainage-spd, accessed 22/07/2015.

[8] EA (2009) River Basin Management Plan South East River Basin District, available online at https://www.gov.uk/government/collections/river-basin-management-plans, accessed 28/04/2015.

- The East Stour (GB107040019640), which is located approximately 2km to the southwest of the schemes, although it will be considered here as it is a downstream waterbody, which is a tributary of.
- The Great Stour between Ashford and Wye (GB107040019741), which lies approximately 5km to the north of the schemes, although it will be considered here as it is a downstream waterbody.
- The Kent Greensand Eastern (GB40701G501400) groundwater body, which underlies the whole of both schemes.

14.6.3 The Aylesford Stream is currently at Moderate overall status within the South East RBMP, with supporting elements at Moderate, Good or High status. The East Stour is currently at Poor status, as the Macrophytes and Phytobenthos Combined and Phosphate supporting elements are Poor. The Great Stour between Ashford and Wye is currently at Moderate status, as the Macrophytes and Phytobenthos Combined supporting element is Moderate. None of these waterbodies are designated as Artificial or Heavily Modified Water Bodies.

14.6.4 The Kent Greensand Eastern groundwater body is at Poor (quantitative and qualitative) status, due to resource balance and impacts on surface waters, and is noted to be at risk due to hazardous substances and other pollutants, nutrients and abstraction and other artificial flow pressures.

14.6.5 OS maps show a few ponds in the Aylesford Stream catchment, including 1 approximately 300m north of the proposed junction 10a and 2 at Hatch Park and Jacob's Plantation, 1.5km east of the proposed junction. In addition, a balancing pond (EXP1) just south of the M20 and west of Willesborough Garden Centre serves to attenuate highway runoff and possibly to reduce the risk of pollution to Aylesford Stream. An additional existing pond (EXP2) lies within junction 10, but would be unaffected by the Main or Alternative Schemes.

14.6.6 Downstream of the city of Canterbury, and more than 20km downstream from Ashford and the Aylesford Stream, the Great Stour flows through Stodmarsh SAC, SPA and Ramsar site. From there, the river flows into the tidal Lower Stour area where, approximately 40km downstream of Ashford and the Aylesford Stream, the River Stour flows through Thanet Coast and Sandwich Bay Ramsar and SPA sites, Thanet Coast SAC, and Sandwich Bay SAC, and into Pegwell Bay.

Stodmarsh Ramsar, SPA and SAC site

14.6.7 This is a 481ha site comprising inland, marine and coastal wetlands. It is important because it supports 6 British Red Data Book wetland invertebrates; 2 nationally rare plants and 5 nationally scarce species; and a diverse assemblage of rare wetland birds that use the site for breeding and wintering purposes.

14.6.8 The Stodmarsh sites are potentially vulnerable to significant changes in water supply and quality (including nutrient status, dissolved oxygen and other

contamination). However, significant changes in water supply or quality are highly unlikely to result from the proposed Main or Alternative Schemes, and there is therefore no potential for impacts to the site from the proposed Main or Alternative Schemes. This site will therefore not be considered further within this assessment.

Thanet Coast SAC, Sandwich Bay SAC, and Thanet Coast and Sandwich Bay SPA and Ramsar sites

14.6.9 This is a coastal site, consisting of a long rocky shore and adjoining estuary, reef with submerged or partially submerged sea caves, dune, maritime grassland, and saltmarsh and grazing marsh. These habitats support unusual communities including littoral algal flora, some of which are not known to be found anywhere else, and very specialised algal and lichen communities.

14.6.10 Water diversion and pollution from domestic waste, fertilisers, pesticides and other agricultural sources has led to eutrophication within the designated site, which is therefore considered to be potentially vulnerable to significant changes in water supply and quality (including nutrient status, dissolved oxygen and other contamination). However, significant changes in water supply or quality are highly unlikely to result from the proposed Main or Alternative Schemes, and there is therefore no potential for impacts to the site from the proposed Main or Alternative Schemes. These sites will therefore not be considered further within the assessment.

Licenced Abstractions

14.6.11 Six surface water abstraction points are located within 1km of the proposed Main and Alternative Schemes[9]. However, 4 of these abstractions are located upstream and are therefore unlikely to be affected by the Main or Alternative Schemes, and 1 appears to have been used for dust suppression at a construction site and is therefore unlikely to still be in use. There is an abstraction of groundwater for ‘general agricultural’ use at Sevington, which has been licensed since 1971. However, as this does provide a potable source of water it has not been considered to be a sensitive receptor for the purposes of this assessment, and therefore will not be considered further within this chapter.

Consents to Discharge

14.6.12 There are 3 consents to discharge within 500m of the Main and Alternative Schemes, 1 from the Tesco superstore to discharge site drainage into land, and 1 for the discharge of surface water drainage at Ashford Business Park.

[9] Envirocheck Report Datasheet, obtained 6th May 2015, Order Number: 67194272_1_1

Pollution incidents

14.6.13 The Envirocheck Report[8] lists 5 pollution incidents within the vicinity of the Main and Alternative Schemes. Three of these were road traffic accidents that resulted in the discharge of small quantities of diesel to a surface watercourse, 1 was caused by the sewage pumping station at Highfield Lane discharging to a watercourse and 1 was discharge of septic tank effluent from a construction site to Conningbrook Lake in Willesborough.

Existing Drainage

14.6.14 Runoff from the existing A2070 and some areas of the M20 drain unattenuated, without treatment or pollution control measures, into the Aylesford Stream via the existing outfalls detailed in Table 14.4 below.

Table 14.4 Existing outfalls and drainage features

Reference	Location	Size (mm)	Existing Drained Areas	Pollution control
Existing outfall 1	Headwall into Aylesford Stream approximately 50m east of the A2070.	750	Outfall /overflow from junction10 pond EXP2 (M20 and junction 10 roundabout). M20 and junction 10 slip roads (unattenuated).	None
Existing outfall 2	Adjacent to junction 10 westbound off-slip	450	Mainline between slips to be removed.	None
Existing outfall 3	Upstream end of Lacton Farm Culvert.	300	Mainline between Ch. 620 and Ch. 850.	None
Existing outfall 4	Downstream end of Lacton Farm Culvert.	300	Mainline between Ch. 620 and Ch. 850.	None
Existing outfall 5	Aylesford Stream adjacent to existing pond EXP1.	Ditch	Mainline from Ch. 850 to south of proposed junction 10a.	None
Existing outfall 6	Downstream of headwall of A2070 Aylesford Stream Culvert.	300	A2070.	None
Existing outfall 7	Upstream of headwall of A2070 Aylesford Stream Culvert.	250	A2070.	None
Existing outfall 8	Upstream of headwall of A2070 Aylesford Stream Culvert.	250	A2070 from junction 10.	None

Reference	Location	Size (mm)	Existing Drained Areas	Pollution control
Balancing pond EXP1	Adjacent to Aylesford Stream, west of the proposed junction 10a.		EXP1 drains catchment 5 (M20 main carriageway from Lacton Farm Culvert eastwards). Flow control is by a restricted diameter outlet pipe, with overflow weir.	None
Balancing pond EXP2	Within junction 10 (unaffected by the Scheme).		Runoff from catchment 1 is attenuated at the existing balancing pond (EXP2) within the footprint of junction 10; this would not be affected by the proposed Scheme.	Outlet penstock for spillage isolation.

14.6.15 South of the M20, the EXP1 balancing pond attenuates runoff from the M20. The flow from this pond is controlled by a pipe and an overflow weir and discharged to the Aylesford Stream via a ditch. The pond has well established vegetation, which suggests that it has not recently been maintained. It is possible that some of the runoff collected by the pond could infiltrate into the ground, as the pond does not appear to be lined.

14.6.16 Based on site visit observations carried out for the previous Scoping Report, none of the above outfalls were observed to have pollution control measures. However, the existing balancing pond EXP1 is equipped at the outlet with a penstock which would allow emergency isolation in case of a spillage. A review of the HADDMS priority assets register[10] did not identify any assets within the vicinity of the proposed Main and Alternative Schemes that have been identified as requiring action (maintenance, repair etc.).

Groundwater

14.6.17 The bedrock and superficial geology within the study area is described in Chapter 9 Geology and Soils, Volume 6.1.

14.6.18 Based on the BGS mapping[11], Sheet 289, Solid and Drift, the proposed junction 10a site is underlain predominantly by Lower Greensand deposits, overlain by Alluvium along the Aylesford Stream. Groundwater is often present within these geological formations and according to the Environment Agency's online maps there are areas of Secondary A aquifer in the superficial deposits. These support water supplies at a local rather than strategic scale, and in some cases may contribute to base flow to rivers.

14.6.19 There are also Principal and Secondary A aquifers in the deeper bedrock geology. These layers have high groundwater storage capacity due to high intergranular and / or fracture permeability and can therefore provide a high

[10] HADDMS, Highways England Drainage Data Management System, v5.4.0, available online at http://www.haddms.com/, accessed 28/04/2015.
[11] British Geological Survey, Sheet 289, Solid and Drift.

level of water storage. They may support water supply and / or river base flow on a strategic scale.

14.6.20 The Environment Agency's groundwater vulnerability mapping[12] shows Major Aquifer High and Minor Aquifer High to the north west of junction 10, with Major Aquifer Intermediate to the south of junction 10. Despite this, there are no SPZs within 1km of the Main or Alternative Schemes.

14.6.21 The South East RBMP[13] indicates that the site overlies the Kent Greensand Eastern (GB40701G501400) groundwater body. This is at Poor (quantitative and qualitative) WFD status, due to resource balance and impacts on surface waters, and is noted to be at risk due to the following pressures:

- Hazardous Substances and other pollutants; and,
- Nutrients; and Abstraction and other artificial flow pressures.

14.6.22 The Envirocheck report[14] notes 2 groundwater abstraction points within 1km of the site: 1 south of Sevington and 1 at Aylesford Green. The details of these abstractions (i.e. potable or other uses) are not known; however, as these abstractions are located more than 800m from the proposed Main and Alternative Schemes, they are unlikely to be affected.

14.6.23 The Environment Agency's website[15] indicates that a historic landfill site lies to the north of the A20: Mersham Quarry landfill. The landfill accepted inert, commercial and household waste until 1 December 1974.

Flood Risk

14.6.24 The Environment Agency's indicative flood mapping[9] shows that most of the Main and Alternative Schemes would be located in Flood Zone 1 – Low Probability. This zone comprises land assessed as having a less than 1-in-1000 annual probability of river or sea flooding (<0.1% AEP). The same map also indicates that parts of the proposed Main and Alternative Schemes lie within Flood Zone 2 – Medium Probability and Flood Zone 3a – High Probability, associated with the channel of the Aylesford Stream. Flood Zone 2 comprises land assessed as having between a 1-in-100 and 1-in-1000 annual probability of river flooding (1% - 0.1% AEP), or between a 1-in-200 and 1-in-1000 annual probability of sea flooding (0.5% – 0.1% AEP). Flood Zone 3 comprises land assessed as having a 1-in-100 or greater annual probability of river flooding (>1% AEP) or a 1-in-200 or greater annual probability of flooding from the sea (>0.5% AEP).

[12] What's in your backyard? Available online at http://apps.environment-agency.gov.uk/wiyby/default.aspx, accessed 28/04/2015.

[13] EA (2009) River Basin Management Plan South East River Basin District, available online at https://www.gov.uk/government/collections/river-basin-management-plans, accessed 28/04/2015.

[14] URS (2010) URS report M20 Junction 10a – Access to the South of Ashford 'Environmental Statement Screening and Scoping Report, December 2010. Doc Ref. 49326354/DBRP0004.

[15] What's in your backyard? Available online at http://apps.environment-agency.gov.uk/wiyby/default.aspx, accessed 28/04/2015.

14.6.25 It is believed that the existing EXP1 balancing pond, which attenuates runoff from the M20, is designed for a 1-in-5 year event, with no allowance for climate change in its storage volume, and that its allowable discharge rate to the Aylesford Stream from the balancing pond is 7 l/s/ha. The flood risk at the site is described further in the FRA (Appendix 14.2, Volume 6.3) and a summary is provided below in Section 14.8.

Aquatic Ecology

14.6.26 Aquatic ecology has been considered and the impact on such features has been assessed in Chapter 8 Nature Conservation, Volume 6.1. There are no known ecological or aquatic ecological protected areas in the study area that could be potentially affected by any changes to the water quality, volume or flow as a result of the Main or Alternative Schemes (refer to paragraphs 14.6.6 to 14.6.10 above for a discussion of the downstream designated conservation sites).

14.7 Mitigation and compensation measures

Construction

14.7.1 During construction, best practice for pollution prevention and water management would be implemented as part of the overall CEMP (see Appendix 17.1 Outline Construction Environmental Management Plan, Volume 6.3). Guidance on best practice in relation to pollution prevention and water management is set out in CIRIA's Environmental Good Practice on Site[16].

14.7.2 No pollution pathways would be created between the construction site and watercourses, as measures would be implemented to prevent surface water runoff containing suspended sediment reaching watercourses through overland flow in rainfall events.

14.7.3 The potential for impacts on surface water quality would be minimised by the following measures:

- Where possible, storage compounds (for the storage of construction materials or temporary stockpiling of excavated soils) would be located away from surface watercourses and drains.
- No materials would be stored or stockpiled within Flood Zones 2 or 3, only vehicle parking would be permitted within these areas. The site would subscribe to the Environment Agency's Flood Warning Service, enabling vehicles to be moved out of Flood Zones 2 and 3, in the event that flooding is predicted.
- Haul roads on the site and the approaches to the watercourse would be cleaned regularly in order to prevent the build-up of mud.

[16] Environmental good practice on site (third edition) (C692), Audus, Charles and Evans, December 2010.

- Before any discharge of water were to be made from the site, adequate provisions for preventing pollution would be made, such as by incorporating silt settlement techniques. The techniques employed would be chosen as appropriate for each specific site. Techniques may include settlement lagoons, use of straw bales for silt trapping and use of flocculants.
- Areas of bare soil would be kept to a minimum to reduce silty runoff.
- All pumped drainage from the construction works, including areas used for temporary storage of construction materials or excavated soils, would be passed through silt settlement treatment prior to discharge to surface watercourses or drains.
- All roads and hardstanding would be kept clean and tidy in order to prevent the build-up of oil and dirt that may be washed into a watercourse or drain during heavy rainfall.
- Where appropriate, watercourses would be shielded by bunds in order to prevent contamination from surface water runoff.
- The use of water sprays for reducing dust or washing construction areas would be carefully regulated in order to avoid washing substantial quantities of silt (etc.) into surface water drains. Where large quantities of gravel, mud or other such material required clearing, the area would be swept clean prior to any subsequent hosing down.

14.7.4 The potential for impacts to occur as a result of contamination of water by wet cement or concrete would be minimised by the following measures:

- Manholes and catchpits would be covered in order to prevent concrete / cement ingress.
- The placing of any wet concrete in or close to any watercourse would be controlled in order to minimise the risk of leakage of wet cement into the watercourse.
- Concreting at watercourse culvert sites would be closely supervised in order to prevent concrete contamination of the watercourses.
- The washing of any concrete mixing plant or ready-mix lorries would be carried out so as to prevent the resulting effluent from being allowed to flow into any watercourse or drain.

14.7.5 The potential for impacts to occur as a result of contamination of water by oil or other liquids would be minimised by the following measures:

- Storage compounds for fuels, oils or other liquid chemicals would be located away from surface water drains. They would have an impermeable base and impermeable bunds with a capacity of 110%, and would not drain directly into the surface water drains.
- Small plant such as pumps would be equipped with drip trays;
- Drums and barrels would be stored in a designated, bund-shielded safe area within the site compound.

- All drums and barrels would be properly labelled and fitted with flow-control taps.

14.7.6 The potential for impacts on surface and groundwater to occur as a result of contamination from accidental spillages would be minimised by the following measures:

- Emergency response procedures included in the OCEMP to handle any leakages or spillages of potentially contaminating substances.
- Spill kits would be located on sites near to watercourses and within the works compounds and staff would be trained in their use.

14.7.7 In addition, the following measures would be implemented, if required, to minimise potential impacts upon groundwater during earthworks:

- Groundwater would be pumped from excavations into lagoons/settlement tanks in order to enable sediment to drop out, and if necessary, sediment removal would be aided by the addition of flocculants, subject to the agreement of the Environment Agency. After sediment removal, water would be discharged to a watercourse subject to agreement with the Environment Agency.
- Subsoil would be exposed for a minimum length of time after topsoil strip. Cut-off trenches, where necessary, would be excavated in order to prevent massive surface water runoff into watercourses. Cut-off trenches would discharge into sediment lagoons, with discharge to watercourses subject to the prior consent of the Environment Agency.
- Topsoil/vegetation along watercourses would be retained in order to aid attenuation and sediment infiltration.
- Construction phase operations would be carried out in accordance with the Environment Agency's Policy and Practice for the Protection of Groundwater[17].
- Consideration would be given to Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention[18]. Piling operations would be subject to risk assessment and any measures to prevent pollution to the aquifer would be covered by piling method statements.

14.7.8 Monitoring of watercourses at risk from pollution would be carried out during the construction phase. This would comprise visual assessments for oil and silt, as well as watercourse monitoring using portable field indicator equipment, where necessary. Whilst construction operations are in progress, selected watercourses would be sampled at locations up and downstream of the works (and tested for suspended solids, pH changes and hydrocarbons).

[17] Groundwater protection: Principles and practice (GP3), Environment Agency, August 2013 Version 1.1 https://www.gov.uk/government/publications/groundwater-protection-principles-and-practice-gp3, accessed 20/03/2016

[18] Environment Agency National Groundwater & Contaminated Land Centre Report NC/99/73

Monitoring requirements would be discussed and agreed with the Environment Agency prior to construction.

14.7.9 An Outline Construction Environmental Management Plan (OCEMP) is set out in Appendix 17.1, Volume 6.3, which sets out a series of proposed measures and standards of work that would be applied by the contractors throughout the construction period. This would set out the requirements for a Handover Environmental Management Plan (HEMP). These documents would describe the requirements for mitigation and control measures during construction and operation.

Operation

14.7.10 The potential for impacts on flood risk as a result of the operation of the Main and Alternative Schemes would be minimised by the following measures:

- The proposed drainage design for the M20 junction 10a would use the existing mainline drainage system, incorporating revisions where required to include the new layout and meet the design criteria of no flooding for the 1-in-100 year event (1% AEP) 40% climate change allowance.
- The majority of the surface water runoff from the new highway would pass through the 3 proposed attenuation ponds before discharging at greenfield runoff rates to Aylesford Stream, although a small area of the 2 new slips to the west of junction 10a cannot be drained to Pond 1 due to site constraints. Retention of flows within the ponds would promote sediment removal and encourage biological treatment. In addition, penstocks would be installed upstream and downstream of each pond to allow isolation in case of a spillage within the catchment.

14.8 Predicted Road Drainage and the Water Environment Impacts

Water Framework Directive Assessment

14.8.1 As described above in Section 14.2, a WFD assessment has been carried out to support this ES chapter, which can be found in Appendix 14.1, Volume 6.3. The WFD assessment concluded that the Main and Alternative Schemes are unlikely to have any significant adverse effects on the WFD waterbodies present (as described above in Section 14.6) as the activities proposed meet the criteria for being 'low risk' or can be screened out of the assessment using the Environment Agency's risk screening thresholds for rivers[19]. Riparian vegetation management, partial demolition of the Lacton Farm Culvert headwall and the proposed new drainage system were identified as having the potential to impact on WFD compliance, but assessment has shown they would not affect the status of any of the waterbodies within the study area.

19 Protecting and improving the water environment Water Framework Directive compliance of physical works in rivers Screening step 1.3: WFD deterioration & risk to water body status objectives, Technical Guidance 488_10_SD06, issued 22/12/2014

14.8.2 The effects of the Main and Alternative Schemes on other European and Internationally designated sites have also been considered and it is concluded that sites designated under the Habitats and Birds Directives, and Ramsar sites would not be affected.

14.8.3 There is the potential for localised and temporary water quality impacts as a result of maintenance or construction works, although it is anticipated that these would be minimal and could be reduced with sensitive construction techniques and adherence to the CEMP that will be produced.

14.8.4 While mitigation measures in the form of adherence to the CEMP would not change any pollution pathways created between the construction site and watercourses, the risk of water quality deterioration would be minimal as a result of the mitigation measures. These measures could include, but not necessarily be limited to, minimising the amount of exposed ground and soil stockpiles, sheeting or seeding of any soil that does requires stockpiling, silt traps or settlement lagoons.

14.8.5 The WFD assessment concludes that impacts resulting from construction and operation of either the Main or Alternative Scheme are therefore unlikely to cause a permanent change in the ecological status or ecological potential of the water body and overall, both schemes are compliant with the requirements of the WFD.

Flood Risk Assessment

14.8.6 As described above in Section 14.2, an FRA has been carried out to support this ES chapter, which can be found in Appendix 14.2, Volume 6.3. The FRA demonstrated that parts of the site for both the Main and Alternative Schemes lie within Flood Zone 2 and 3 in terms of flooding from fluvial sources. The proposed structures on these parts of the site (clear span bridges, an animal pipe bridge and slip road embankments) would not constrict the flow of the Aylesford Stream, although modelling will be carried out during the detailed design phase to assess the effects on flood extents and depths due to the proposed location of the slip road embankments in Flood Zone 3 of the Aylesford Stream. Should the modelling demonstrate an adverse effect, there are several design options that could be considered, to ensure that the flood risk is mitigated. Any mitigation required would be provided within the Scheme boundary.

14.8.7 The site is considered to be at low risk from groundwater flooding, sewer flooding and reservoir flooding and is not considered to be at risk from tidal flooding. Part of the site is at risk from surface water flooding and the highest risk is found within the natural flood plain area of the Aylesford Stream to the south of the M20. The clear span bridge slip roads would be developed across small areas of ‘Low’ risk in these natural flood plain areas of the Aylesford Stream. Effects on surface water flooding from the location of the proposed slip road embankments would be assessed by flood modelling that would be carried out to inform the detailed design.

14.8.8 The Main and Alternative Schemes take into account the possible increased risk of surface runoff by the design of 3 new attenuation ponds. These ponds would store surface water runoff from the M20 junction 10a via a drainage network, with very little of this runoff entering the Aylesford Stream. In order for these attenuation basins to be efficient they must be maintained on a regular basis (that is deemed acceptable) by Highways England, to ensure that vegetation does not restrict the storage capacity. All drains on site should be regularly maintained to avoid any blockages.

14.8.9 During the construction phase, measures outlined within the CEMP would be implemented to protect the employees on site from any flood risk and to also lessen the risk of any surface runoff or interference with the nearby Aylesford Stream. In case of any high flow event in the Aylesford Stream, the site works and all employees must understand where to go for safety and where to store heavy machinery and potential hazardous materials.

14.8.10 Both the Main Scheme and the Alternative Scheme are considered 'Essential Infrastructure' and so, in accordance with the requirements of the NPPF, proposals for the redevelopment of the site are considered to be compliant with the 'Exception Test'.

HAWRAT assessment

14.8.11 This assessment of routine runoff has been undertaken using HAWRAT, as prescribed in Method A of the Design Manual for Roads and Bridges Volume 11, Section 3, Part 10, – Road Drainage and the Water Environment (DMRB HD45/09). The assessment of accidental spillage risk has been undertaken using Method D as prescribed in DMRB HD45/09.

14.8.12 The results of the Method A – Simple Assessment of Impacts from Routine Runoff to Surface Waters indicate that Environmental Quality Standards (EQS) would not be breached by routine runoff from either the Main or Alternative Schemes.

14.8.13 The results of the Method D assessment show that, without consideration of the drainage scheme, there would be no discharge with a serious spillage risk more frequent than the 1% and 0.5% AEP (1-in-100 year and 1-in-200 year return period) thresholds. The risk of an accidental spillage reaching the watercourse would be 0.00141 and the risk of a serious pollution incident (i.e. Category 1 or 2) resulting from this would be 0.00064, both of which are below the allowable risk factor of 0.01 (1%). The return period for the risk of a pollution incident, without existing pollution prevention measures is 1,574 years. With the existing pollution reduction measures the return period increases to 3,149 years and with the proposed pollution reduction measures this increases still further to 6,298 years.

14.8.14 Both the risk of spillage and the risk of a spillage causing a Category 1 or 2 pollution incident (considered to be a serious pollution incident) are therefore considered to be acceptable

Main Scheme - Construction

14.8.15 The risk of pollution to surrounding water bodies would be temporary and localised during the construction of the proposed Main Scheme. The implementation of mitigation measures presented in Section 14.7 above is considered sufficient to mitigate any potential adverse effects on surface water or groundwater quality.

14.8.16 If any dewatering works from excavations are needed, consent or written agreement under the Water Resources Act 1991 may be required. Advice would be sought from the Environment Agency before works commence. The application of Method Statements, agreed with the Environment Agency, would be sufficient to mitigate adverse effects on shallow groundwater levels or flow.

14.8.17 Any works in, under, over or within 8m of a Main River or ordinary watercourse require a Flood Risk Activity Permit / Land Drainage Consent under the Environmental Permitting Regulations / Land Drainage Act 1991. However, the requirements of this legislation will be disapplied for both the Main and Alternative Schemes, with protective provisions in favour of the EA included in the DCO. As part of the process of agreeing the protective provisions, the Environment Agency will be requested to advise on and agree to the final method statement for works within watercourses, including appropriate pollution control measures (based on PPG5 and other guidance on best practice in relation to pollution prevention and water management).

14.8.18 There may be a need to use sheet piling during construction to temporarily support excavations, which could result in temporary disruption to groundwater flows. However, this would be minimised by the proposed design, which keeps foundations close to the surface where possible. In addition, the contractor may be able to over-excavate in order to avoid the use of sheet piles altogether. This would therefore be a Negligible impact, which would be an effect of Neutral significance.

14.8.19 With the implementation of best practice, and the involvement of the Environment Agency in the consenting process, the proposed Main Scheme is expected to have only a Negligible impact on the Aylesford Stream, East Stour, Great Stour between Ashford and Wye, Kent Greensand Eastern, or minor ditches and ponds in the area. This would be an effect of Neutral significance. Table 14.5 provides a summary of the potential impacts and effects of the construction and operation of the Main and Alternative Schemes.

Main Scheme - Operation

14.8.20 The Main Scheme would increase the area of impermeable surfacing, thereby potentially increasing surface water runoff rates and the potential for pollution within the runoff. Pollution sources include vehicle emissions (including atmospheric deposition), vehicle part wear and vehicle leakages, catalytic converters, road surface erosion, and seasonal and regular maintenance practices. Possible contaminants include: particulate solids; hydrocarbons

(diesel, petroleum, lubricating oil leakages, and grease); heavy metals (especially copper and zinc but also cadmium, iron, lead and chromium in lesser amounts); oxides of nitrogen; sulphates; rubber; asbestos; tyre wear deposits including lead, zinc and hydrocarbons; and de-icer during cold weather.

14.8.21 However, the HAWRAT assessment included in Appendix 14.3, Volume 6.3 indicates that the risk of a spillage is very low and is considered to be acceptable. The proposed drainage design described above in paragraph 14.7.10 would include pollution prevention measures, which would reduce the risk of spillages reaching watercourses. In addition, the retention time of surface water runoff within attenuation ponds 1, 2 and 3, which would drain the proposed A2070 link road and A2070 / A2070 link road roundabout junction, would be up to 72 hours. This would allow for settlement of suspended sediment and biological treatment of any contaminants present within the runoff. Planting of reeds or other aquatic vegetation within the ponds would increase aeration of the runoff, thereby reducing the biochemical oxygen demand (BOD) (the measure of the oxygen required to degrade pollutants, which can deoxygenate watercourses) and the adverse impact on the Aylesford Stream.

14.8.22 The results of the HAWRAT assessment indicate that Environmental Quality Standards (EQS) would not be breached by routine runoff from either the Main or Alternative Schemes. The magnitude of the impact of the Main Scheme on the water quality of the Aylesford Stream and the 2 downstream waterbodies assessed here, namely the East Stour, and the Great Stour between Ashford and Wye, would therefore be Negligible. This would be an effect of Neutral significance.

14.8.23 However, there could be an impact on the attenuation ponds themselves during a pollution incident caused by, for example, a tanker spillage on the carriageways which discharge to the attenuation pond. However, the HAWRAT assessment included in Appendix 14.3, Volume 6.3 indicated that the risk of this occurring is very low. IN addition, the location of penstocks upstream of the ponds would allow for isolation within the drainage system in the event of a spillage, so this is considered to be a Minor Adverse impact. The attenuation ponds are a receptor of Low value, therefore this would be an effect of Neutral significance.

14.8.24 The potential flood risk from fluvial, surface water and groundwater sources is considered within the FRA (Appendix 14.2, Volume 6.3). The proposed drainage system represents an improvement on the current situation, which only attenuates surface water runoff to the 1-in-5 year storm event. The proposed new drainage system would maintain the existing attenuation pond EXP1, but this would be supplemented with an additional Pond 1 located outside of Flood Zone 3, which would outfall to the Aylesford Stream via EXP 1, attenuating to the 1-in-100 year event plus 40% allowance for climate change. A third attenuation Pond 3 would be located to the north-east of junction 10a, between the M20 and the A20. This would collect surface water runoff from the 2 new slips to the west of junction 10a, which cannot be

drained to Pond 1 due to site constraints. These constraints also mean that it is not possible to provide a betterment to the existing runoff rates from these areas, which would be limited to match the existing discharge rates. The new drainage design would therefore have an overall Minor Beneficial impact on flood risk. This would result in an effect of Slight or Moderate Beneficial significance.

14.8.25 According to the Groundwater Vulnerability map for the area, the majority of the site is positioned over a Major Aquifer (Highly Permeable). The Stage 2 Assessment Report (URS, 2010) indicates that in the study area groundwater is likely to be encountered at 1 – 2m below ground surface. Should any sheet piling be required as part of the Main Scheme, there is the potential for groundwater flows to be affected. However, at this stage in the design no sheet piles are proposed, and 'non-sheet' piles would not affect groundwater flows. There would therefore be a Negligible impact from this aspect of the Main Scheme. This would result in an effect of Neutral significance. Table 14.5 below provides a summary of the potential impacts and effects of the construction and operation of the Main and Alternative Schemes.

Alternative Scheme – Construction

14.8.26 Effects of the Alternative Scheme during construction would be as for the Main Scheme assessed above. There would be no additional effects from the Alternative Scheme and none of the effects identified above for the Main Scheme would be absent for the Alternative Scheme during construction. Table 14.5 provides a summary of the potential impacts and effects of the construction and operation of the Main and Alternative Schemes.

Alternative Scheme - Operation

14.8.27 Effects of the Alternative Scheme during operation would be as for the Main Scheme assessed above. There would be no additional effects from the Alternative Scheme and none of the effects identified above for the Main Scheme would be absent for the Alternative Scheme during operation. Table 14.5 provides a summary of the potential impacts and effects of the construction and operation of the Main and Alternative Schemes.

Table 14.5 Summary of Road Drainage and Water Environment Impacts for Main and Alternative Schemes

Receptor	Sensitivity	Potential effect	Mitigation	Magnitude of impact (with mitigation)	Significance of effect (with mitigation)
Construction					
Aylesford Stream, East Stour, Great Stour.	High	Suspended sediment in surface water runoff during construction.	Minimising the amount of exposed ground and soil stockpiles, silt traps or settlement lagoons, sheeting or seeding of soil stockpiles.	Negligible	Neutral
		Pollution from spillage during construction.	Compliance with EA PPGs. No routine discharges of any contaminated water to surface waters. OCEMP to include measures such as designated wheel and plant wash facilities, designated concrete and cement mix areas secondary containment for oil and fuel storage, and site security.	Negligible	Neutral
Existing attenuation pond.	Low	Suspended sediment in surface water runoff during construction.	Minimising the amount of exposed ground and soil stockpiles, silt traps or settlement lagoons, sheeting or seeding of soil stockpiles.	Negligible	Neutral
		Pollution from spillage during construction.	Compliance with EA PPGs. No routine discharges of any contaminated water to surface waters. OCEMP to include measures such as designated wheel and plant wash facilities, designated concrete and cement mix areas secondary containment for oil and fuel storage, and site security.	Minor Adverse	Neutral
Groundwater (Kent Greensand Eastern).	Medium	Pollution from spillage during construction.	Compliance with EA PPGs. No discharges of any contaminated water would be permitted to ground. OCEMP to include measures such as designated wheel and plant wash facilities, designated concrete and cement mix areas secondary	Negligible	Neutral

Receptor	Sensitivity	Potential effect	Mitigation	Magnitude of impact (with mitigation)	Significance of effect (with mitigation)
Construction					
			containment for oil and fuel storage, and site security.		
		Temporary disruption to groundwater flows due to sheet piles used during construction.	Design minimises the need for piling, by keeping foundations close to the surface where possible. Contractor may be able to over-excavate in order to avoid the use of sheet piles altogether.	Negligible	Neutral
Operation					
Areas susceptible to surface water flooding; FZ1.	Low	Increased surface water flood risk to and from the Scheme.	Runoff from new roads would be attenuated up to the 100 year plus 40% climate change storm event (where possible) at the agreed greenfield runoff rate of 4l/s/h. Relocation of pond EXP1 allows for an increase in attenuation capacity, which represents an improvement on the existing situation.	Minor Beneficial	Neutral
FZ2/3.	Medium / High	Increased fluvial flood risk to or from Scheme.		Minor Beneficial	Slight/Moderate Beneficial
Aylesford Stream, East Stour, Great Stour.	High	Pollution from contaminated runoff during operation.	Penstocks upstream and downstream of the ponds would allow isolation in the event of a spillage within the catchment.	Negligible	Neutral
Attenuation ponds 1, 2 and 3.	Low	Pollution from contaminated runoff during operation.	There is a low risk of a major spillage and penstocks upstream of the attenuation pond would allow isolation within the drainage system.	Minor Adverse	Neutral
Groundwater (Kent Greensand Eastern).	Medium	Pollution from contaminated runoff during operation.	All carriageways drain to the surface water drainage network, with no discharges to ground.	Negligible	Neutral
		Disruption to groundwater flows from piling.	No permanent sheet piles would be installed.	Negligible	Neutral

14.9 Conclusions

14.9.1 The risk of pollution to surrounding water bodies during the construction of the proposed Main and Alternative Schemes would be temporary and localised. The implementation of mitigation measures presented in Section 14.7 above is considered sufficient to mitigate any potential adverse effects on surface or groundwater during construction.

14.9.2 During the operation of the Main and Alternative Schemes, the proposed drainage design would enable any spillages on the carriageways to be isolated within the attenuation ponds, which would prevent adverse impacts on the surrounding watercourses. There may be some adverse impacts on the ponds themselves in the event of a spillage, but the risk of this is so low that this potential impact would not be significant.

14.9.3 Impacts on flood risk in the vicinity of the Main and Alternative Schemes would be beneficial, as the relocation of pond EXP1 allows for an increase in attenuation capacity, which represents an improvement on the existing situation. Runoff from new roads would be attenuated up to the 1-in-100 year plus 40% climate change storm event, where possible, with the exception of the 2 new slips to the west of junction 10a, where site constraints prevent this, at the agreed greenfield runoff rate of 4l/s/h.