A46 Coventry Junctions (Walsgrave)
Scheme number: TR010066

6.1 Environmental Statement
Chapter 13 – Road Drainage and the Water Environment

APFP Regulations 5(2)(a)

Planning Act 2008

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

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

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ENVIRONMENTAL STATEMENT
Chapter 13 - Road Drainage and the Water Environment

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13. Road drainage and the water environment

13.1. Introduction

13.1.1. This Chapter presents the information required by the Infrastructure Planning (Environmental Impact Assessment (EIA)) Regulations 2017 (as amended) to be provided in the Environmental Statement (ES) to enable the identification and assessment of likely significant effects on Road drainage and water environment.

13.1.2. As part of the EIA process, this Chapter reports the potential significant effects for road and drainage and the water environment as a result of the Scheme. This assessment includes a review of the existing baseline conditions, consideration of the potential impacts and identification of proportionate mitigation and enhancement.

13.1.3. The approach to this assessment follows the Environmental Scoping Report (**TR010066/APP/6.8**) and has been prepared in accordance with the Planning Inspectorate's Scoping Opinion (**TR010066/APP/6.9**), produced on behalf of the Secretary of State. ES Appendix 4.1 (Scoping Opinion Response) (**TR010066/APP/6.3**) contains further information on how each of the matters raised in the Scoping Opinion have been addressed.

13.1.4. The assessment has been undertaken in accordance with the Design Manual for Roads and Bridges (DMRB) LA 113 Road drainage and the water environment (RDWE) (Highways England, 2020b).

13.1.5. ES Chapter 2 (The Scheme) (**TR010066/APP/6.1**) contains a detailed description of the Scheme. The drawings referenced in this Chapter can be found in the ES Figures (**TR010066/APP/6.2**), and the technical appendices referred to in this Chapter are presented in the ES Appendices (**TR010066/APP/6.3**).

13.1.6. This Chapter text is supported by the following ES Figures (**TR010066/APP/6.2**), which provide illustrative information:

- ES Figure 13.1: Surface Water Features, Licensed Abstractions, Consented Discharges and Fluvial Flood Risk
- ES Figure 13.2: WFD Surface Waterbody Catchments
- ES Figure 13.3: Pluvial Flood Risk
- ES Figure 13.4: Aquifer and Environmental Designations
- ES Figure 13.5: WFD Groundwater Bodies
- ES Figure 13.6: Groundwater Abstractions and Source Protection Zones

- ES Figure 13.7: Susceptibility to Groundwater Flooding

13.1.7. This Chapter text is supported by and the following ES appendices (**TR010066/APP/6.3**):

- ES Appendix 13.1 Flood Risk Assessment
- ES Appendix 13.2 Water Framework Directive Compliance Assessment
- ES Appendix 13.3 Water Quality Assessment
- ES Appendix 13.4 Groundwater Assessment
- ES Appendix 13.5 Hydromorphological Assessment
- ES Appendix 13.6 Drainage Strategy Report

13.2. Competent expert evidence

13.2.1. The surface water and flood risk discipline lead (BSc, MSc, C.WEM, CEnv), has over 19 years of consultancy experience throughout which time they have prepared Water Environment ES chapters. Recent EIA experience includes leading the water environment ES chapter for Drax BECCS from inception through DCO examination and the preparation of the Cory Carbon Capture Scheme water environment ES. Other recent Nationally Significant Infrastructure Projects (NSIPs) include Protos Carbon Capture, A1 in the North and A1 Birtley to Coalhouse.

13.2.2. The groundwater discipline lead (BSc, PhD, CSci, CGeol, FGS) has over 30 years of experience in all aspects of groundwater resource development, management and protection, with significant experience in EIA and the provision of technical support on major infrastructure projects. Examples of ES experience include the West Suffolk Hospital redevelopment, Dartford Park, London Development, M3 J9 – 14 Smart Motorway Programme and A63 Castle Street, Hull dual carriageway improvement scheme. They have also acted as groundwater technical lead supporting the contractor on the delivery of schemes such as the A303 Sparkford to Ilchester dualling and the M25 J25 and 28, and M2 J5 motorway junction upgrades.

13.2.3. Both competent experts have used their EIA knowledge, experience of DMRB and road infrastructure projects and professional judgment in identifying the likely significant impacts associated with the Scheme and providing technical guidance through the assessment process.

13.3. Legislative and policy framework

Legislation

13.3.1. The national legislation and regulatory framework applicable in this assessment for road drainage and the water environment are summarised in Table 13-1.

13.3.2. It should be noted that the details presented in this section are not intended to provide a full consideration of the relevant documents and their application to the Scheme.

Table 13-1 Summary of legislation relevant to the road drainage and water environment assessment

Legislation	Summary	How this has been addressed within the assessment
The Groundwater (WFD) (England) Direction 2016	The Groundwater Direction instructs the Environment Agency on obligations to protect groundwater. The Groundwater (WFD) (England) Direction 2016 revokes and replaces the Groundwater (WFD) (England) Direction 2014.	This direction has been considered for water quality within section 13.8 of this ES Chapter and within ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**).
The Environment Act 2021	This act makes provisions about targets, plans and policies for improving the natural environment. It outlines how the government will reduce waste, make better use of resources, and improve management of water resources in a changing climate. It sets four targets: • The levels of total nitrogen, total phosphorous and sediment entering freshwaters in, and coastal waters around, England from agricultural land • The levels of total phosphorous discharged into freshwaters from relevant discharges from sewerage systems of sewage undertakers • The length of waters polluted by arsenic, cadmium, copper, lead, nickel and zinc from abandoned metal mines • The amount of potable water supplied by water undertakers	None of the four targets within the Act apply to the Scheme. However, this legislation has been considered for the assessment of water quality within this Chapter and ES Appendix 13.3 (Water Quality Assessment) (**TR010066/APP/6.3**).
The Environmental Protection Act 1990	The Environmental Protection Act 1990 sets out the structure and authority of waste management and emissions control in England, Wales, and Scotland. It aims to protect the environment with controls that mitigate increases in air pollution, carbon emissions, and harmful waste disposal practices. Relevant provisions of the Environmental Protection Act 1990 include: • Reduce air pollution, carbon emissions, and harmful waste disposal	This act has been considered for water quality within this Chapter and ES Appendix 13.2 (Water Framework Directive Compliance Assessment), ES Appendix 13.3 (Water Quality Assessment), and ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**).

Legislation	Summary	How this has been addressed within the assessment
	• Protect the environment by outlining the obligations of individuals and businesses • Establish enforcement processes and penalties for non-compliance	
Flood and Water Management Act 2010 and Commencement Orders	The key areas covered by this Act are the roles and responsibilities for flood and coastal erosion risk management and improving reservoir safety.	This has been considered within this Chapter and the ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**).
Water Act 2003 and Water Act 2014	These Acts aim to improve water conservation, protect public health and the environment, and improve the service offered to consumers. The basis of the Act is three parts relating to water resources, regulation of the water industry and other provisions.	This Chapter and ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**) have considered this legislation. The impact assessment in section 13.11 considers where construction and operation activities may require water abstraction and impoundment licenses.
Water Resources Act 1991	This Act sets out to regulate water resources, water quality and pollution, and flood defence. It sets out standards for Controlled Waters.	This has been considered for water quality within ES Appendix 13.3 (Water Quality Assessment) (**TR010066/APP/6.3**) and water resources and quality in this Chapter and Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**).
The Land Drainage Act 1991 and 1994	This act requires that a watercourse be maintained by its owner in such a condition that the free flow of water is not impeded. The 1994 Act amends it in relation to the functions of internal drainage boards (IDBs) and local authorities.	This legislation has been considered for the assessment of water quality and flow within ordinary watercourses and relating to consents within the impact assessment in section 13.11 of this Chapter.
Climate Change Act 2008	The Climate Change Act (CCA) 2008 sets out the UK's approach to reducing emissions and preparing for the impacts of climate change. It sets legally binding goals to reduce carbon dioxide and other greenhouse gas emissions and obliges the government to develop policies to deliver on these. Amongst other measures, the CCA requires the UK Government to undertake a five yearly assessment of climate change risks to the UK.	The CCA 2008 has been considered within this Chapter and the ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**) to apply future climate change allowances to assess future flood risk.
The Reservoirs Act 1975	The Reservoirs Act 1975 provides the legal framework for ensuring reservoir safety.	This has been considered within this Chapter and the ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**) with

Legislation	Summary	How this has been addressed within the assessment
		regards to Coombe Pool[1] as a reservoir.
Highways Act 1980	The Highways Act 1980 deals with the management and operation of the road network in England and Wales including the drainage of highways into environmental waters and sewers. National Highways has a right to discharge runoff from highways into inland and tidal waters, or groundwaters (for example, controlled waters as defined under the WRA), subject to the requirement not to pollute controlled waters.	This has been considered for water quality within this Chapter, ES Appendix 13.3 (Water Quality Assessment) and ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**).
Salmon and Freshwater Fisheries Act 1975	The Salmon and Freshwater Fisheries Act 1975 is a UK law that aims to protect salmon and trout from commercial poaching, migration routes, and vandalism. It also aims to ensure correct licensing and water authority approval.	This has been considered for water quality within this Chapter and ES Appendix 13.3 (Water Quality Assessment) (**TR010066/APP/6.3**).
Water Environment (WFD) (England and Wales) Regulations 2017	The Water Environment (WFD) (England and Wales) Regulations 2017 (hereafter referred to as the 'WFD Regulations 2017') replace the Water Environment (WFD) Regulations 2003, which transposed the WFD (2000/60/EC) into law in England and Wales. The WFD 2017 regulations provide a framework for managing the water environment in England and Wales by preventing its deterioration and improving its quality. The WFD 2017 Regulations require all surface waters and groundwaters within defined river basin districts to reach at least Good status and define how this should be achieved through the establishment of environmental objectives and ecological targets. New schemes must not cause deterioration of the water environment or prevent the future attainment of Good status.	The WFD Regulations 2017 have been considered within ES Appendix 13.2 (Water Framework Directive Compliance Assessment) (**TR010066/APP/6.3**) for surfaces water bodies and this Chapter for groundwater bodies.
The Environmental Permitting (England and Wales) (Amendment) Regulations 2023	The Environmental Permitting Regulations (EPR) provide a consolidated system of environmental permitting in England and Wales and transpose provisions of fifteen EU Directives which impose obligations requiring delivery through permits or which are capable of being delivered through permits. It covers Environment Agency permits for flood risk (on Main River), WFD regulations and certain discharges to watercourses. The EPR protect groundwater and surface waters from pollution by controlling the inputs of potentially harmful and polluting substances.	These Regulations have been considered for permitting requirements within section 13.8 of this Chapter and within ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**).
The Water Resources Act 1991 (Amendment)	This Act sets out the responsibilities of the Environment Agency of England and Wales in relation to water pollution, resource	These Regulations have been considered for water quality within the impact assessment in

[1] Coombe is also spelt as Combe in some databases. For consistency, hereafter the spelling of Coombe will be used.

Legislation	Summary	How this has been addressed within the assessment
(England and Wales) Regulations 2009	management, flood defence, fisheries, and in some areas, navigation. The Act regulates discharges to controlled waters, namely rivers, estuaries, coastal waters, lakes and groundwaters.	section 13.11 of this Chapter, ES Appendix 13.3 (Water Quality Assessment) and ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**).
Environmental Damage (Prevention and Remediation) (England) Regulations 2015	The Environmental Damage (Prevention and Remediation) (England) Regulations 2015 apply in England and in specified marine waters and the seabed. They specify the types of damage to a protected species or natural habitat, a site of special scientific interest, water or land which constitute “environmental damage” for the purposes of the regulations and the types of activity causing environmental damage to which the regulations apply. The Regulations also specify the authorities whose function it is to enforce the regulations. Environmental damage to groundwater means any damage to a body of groundwater such that its conductivity, level or concentration of pollutants changes sufficiently to lower its status for the purposes of Directive 2000/60/EC and in relation to pollutants, for the purposes of Directive 2006/118/EC of the European Parliament and of the Council on the protection of groundwater against pollution and deterioration, whether or not the body of groundwater is in fact reclassified as being of lower status.	These Regulations have been considered for water quality within this Chapter, ES Appendix 13.3 (Water Quality Assessment) and ES Appendix (13.4 Groundwater Assessment) (**TR010066/APP/6.3**).
The Control of Pollution Regulation 1996	This regulation outlines the procedure for applications and appeals for consents under the Water Resources Act 1991. The regulations cover topics such as: • Time limits for appeals • Action taken upon receiving an appeal notice • Written representations • Hearings • Notification of determination • Consents for discharges • Pollution control registers	These Regulations have been considered for water quality within this Chapter and ES Appendix 13.3 (Water Quality Assessment) (**TR010066/APP/6.3**).
The Urban Waste Water Treatment (England and Wales) Regulations 1994	These regulations are designed to protect the environment from the negative effects of untreated urban waste water. The regulations require: • the establishment of systems to collect wastewater from urban ‘agglomerations’ (towns and cities) • the secondary treatment of collected wastewater	These Regulations have been considered for water quality within this Chapter and ES Appendix 13.3 (Water Quality Assessment) (**TR010066/APP/6.3**).

Legislation	Summary	How this has been addressed within the assessment
	• the identification of sensitive areas (for example, areas susceptible to eutrophication) • more stringent treatment of wastewater discharged to sensitive areas	
The Eels (England and Wales) Regulations 2009	The Eels (England and Wales) Regulations 2009, give the Environment Agency and Natural Resources Wales the authority to implement measures to help recover European eel stocks in freshwater and estuarine waters in England and Wales.	These regulations are applicable to this Scheme due to its close proximity to a number of watercourses. This has been considered for habitat quality within this Chapter and ES Appendix 13.2 (Water Framework Directive Compliance Assessment) (**TR010066/APP/6.3**).
25 Year Environment Plan	This initiative aims to improve the natural environment over the next 25 years. The plans goals, relevant to this Scheme include: • Clean air and water • Reduced environmental hazards	This has been considered for water quality and flood risk within this Chapter and ES Appendix 13.1 (Flood Risk Assessment), ES Appendix 13.3 (Water Quality Assessment) and Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**).

National Policy

National Networks National Policy Statement 2024

13.3.3. The National Networks National Policy Statement (NPS NN) sets out the policy which the Scheme should comply with. It is also the basis for informing a judgement on the impacts of a Scheme, for example whether the Scheme is consistent with the requirements of the NPS NN. Compliance of the Scheme with the NPS NN is detailed within the NPS NN Accordance Tables (**TR010066/APP/7.2**).

13.3.4. The requirements of the NPS NN in relation to assessing and mitigating the impacts of the Scheme on road drainage and the water environment and how they have been addressed in the assessment are summarised in Table 13-2.

Table 13-2 Summary of NPS NN 2024 policy relevant to the road drainage and water environment assessment

NPS NN 2024 Paragraph Number	Summary	How has this policy been addressed within the assessment
5.131	The NPS NN states: *"Applications for projects in the following locations should be accompanied by a Flood Risk Assessment:*	ES Appendix 13.1 (Flood Risk Assessment)

NPS NN 2024 Paragraph Number	Summary	How has this policy been addressed within the assessment
	• *applications in Flood Zones 2 and 3, which represent a medium and high probability of river and sea flooding* • *applications in Flood Zone 1 which represent a low probability of river and sea flooding involving sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in the future; or land that may be subject to other sources of where its development would introduce a more vulnerable use.*	(**TR010066/APP/6.3**) has been produced.
5.132	The NPS NN states: *"The Flood Risk Assessment should identify and assess the risks of all forms of flooding and coastal erosion to and from the project and demonstrate how these flood risks will be managed, taking climate change into account."*	ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**) considers all forms of flooding and demonstrates how these will be managed taking into account climate change.
5.133	The NPS NN states: *"In preparing a Flood Risk Assessment (FRA) the applicant should:* • *consider the risk of all forms of flooding arising from the project (including in adjacent parts of the United Kingdom). In addition to the risk of flooding to the project, demonstrate how these risks will be managed and where relevant mitigation will be implemented so that the development remains safe throughout its lifetime* • *take the impacts of climate change into account, clearly stating the development lifetime over which the assessment has been made* • *consider the vulnerability of those using the infrastructure including arrangements for safe access and exit* • *include the assessment of the remaining (known as 'residual') risk after risk reduction measures have been considered and demonstrate that this is acceptable for the particular project* • *consider if there is a need to remain operational during a worst-case flood event over the development's lifetime* • *provide the evidence for the Secretary of State to apply the Sequential Test and Exception Test as appropriate"*	ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**) addresses the risk of all forms of flooding taking the impacts of climate change into account, and provides the application of Sequential and Exception Tests.
5.134	The NPS NN states: *"Applicants for projects which may be affected by, or may add to, flood risk should seek sufficiently early pre-application discussions, before the official pre-application stage of the NSIP process with the Environment Agency, and, where relevant, other flood risk management bodies such as lead local flood authorities, Internal Drainage Boards, sewerage undertakers and local highway authorities.*	Details of pre-application discussions with the Environment Agency and the Lead Local Flood Authorities (LLFA) are set out in Section 5 of ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**)

NPS NN 2024 Paragraph Number	Summary	How has this policy been addressed within the assessment
	Such discussions can be used to identify the likelihood and possible extent and nature of the flood risk, to help scope the Flood Risk Assessment, and identify the information that will be required by the Secretary of State to reach a decision on the application once it has been submitted and examined. If the Environment Agency has concerns about the proposal on flood risk grounds, the applicant should discuss these concerns with the Environment Agency and look to agree ways in which the proposal might be amended, or additional information provided, which would satisfy the Environment Agency's concerns, before the application for development consent is submitted."	
5.135	The NPS NN states: *"For local flood risk (surface water, groundwater and ordinary watercourse flooding), local flood risk management strategies and surface water management plans provide useful sources of information for consideration in Flood Risk Assessments. Surface water flood issues need to be understood and then account of these issues can be taken, for example, flow routes should be clearly identified and managed."*	ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**) addresses the risk of all forms of flooding taking the impacts of climate change into account.
5.136	The NPS NN states: *"Proposals should prioritise the use of Sustainable Drainage Systems unless there is clear evidence that this would be inappropriate. A drainage strategy should also be produced and submitted as part of the Flood Risk Assessment."*	ES Appendix 13.6 (Drainage Strategy Report) (**TR010066/APP/6.3**) has been developed for the Scheme and aims to reduce the impact of pluvial flood risk through the use of SuDS.
5.137	The NPS NN states: *"The term Sustainable Drainage Systems is taken to cover the whole range of sustainable approaches to surface water drainage management including:* • *source control measures including rainwater recycling and drainage* • *use of Sustainable Drainage Systems Management Trains to improve water quality* • *infiltration devices to allow water to soak into the ground, that can include individual soakaways and communal facilities* • *filter strips and swales, which are vegetated features that hold and drain water downhill mimicking natural drainage patterns* • *filter drains and porous pavements to allow rainwater and run-off to infiltrate into permeable material below ground and provide storage if needed* • *basins and ponds to hold excess water after rain and controlled discharge that avoids flooding* • *flood routes to carry and direct excess water through developments to minimise the impact of severe rainfall flooding."*	ES Appendix 13.6 (Drainage Strategy Report) (**TR010066/APP/6.3**) has been developed for the Scheme and aims to reduce the impact of pluvial flood risk through the use of SuDS.

NPS NN 2024 Paragraph Number	Summary	How has this policy been addressed within the assessment
5.138	The NPS NN states: *"To satisfactorily manage flood risk and the impact of the natural water cycle on people, property and ecosystems, good design and infrastructure may need to be secured using requirements or planning obligations. This may include the use of Sustainable Drainage Systems, but could also include vegetation to help slow runoff, hold back peak flows and make landscapes more able to absorb the impact of severe weather events."*	ES Appendix 13.6 (Drainage Strategy Report) (**TR010066/APP/6.3**) details the measures proposed to be used to reduce flood risk.
5.139	The NPS NN states: *"Site layout and surface water drainage systems should cope with events the exceed the design capacity of the system, so that excess water can be safely stored on or conveyed from the site without adverse impacts."*	ES Appendix 13.6 (Drainage Strategy Report) (**TR010066/APP/6.3**) details the measures proposed to store and convey water from the site.
5.140	The NPS NN states: *"The surface water drainage arrangements for any project should be such that the volumes and peak flow rates of surface water leaving the site are no greater than the rates prior to the proposed project unless specific off-site arrangements are made and result in the same net effect."*	ES Appendix 13.6 (Drainage Strategy Report) (**TR010066/APP/6.3**) summarises the volumes and flow rates for the Scheme.
5.141	The NPS NN states: *"If there are no viable Sustainable Drainage Systems options available, it may be necessary to provide surface water storage and infiltration to limit and reduce both the peak rate of discharge from the site and the total volume discharged from the site. There may be circumstances where it is appropriate for infiltration attenuation storage to be provided outside of the project site, if necessary, through the use of a planning obligation."*	ES Appendix 13.6 (Drainage Strategy Report) (**TR010066/APP/6.3**) details the measures proposed to store and convey water from the site.
5.142	The NPS NN states: *"The sequential approach should be applied to the layout and design of the project. Vulnerable uses should be located in parts of the site with lower probability and residual risk of flooding. Applicants should seek opportunities to use open space for multiple purposes such as amenity, wildlife habitat and flood storage uses. Opportunities can be taken forward to lower flood risk by improving flow routes, flood storage capacity and using Sustainable Drainage Systems."*	ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**) addresses the risk of all forms of flooding taking the impacts of climate change into account. ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**) provides the application of Sequential and Exception Tests.
5.143	The NPS NN states: *"Where flood risk is a factor in determining an application for development consent, the Secretary of State should be satisfied that, where relevant:* • *the application is supported by an appropriate Flood Risk Assessment* • *the Sequential Test has been satisfactorily applied as part of the site selection and, if required, the Exception Test."*	ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**) provides the application of Sequential and Exception Tests.
5.144	The NPS NN states: *"The Secretary of State should not consent development in flood risk areas (including flood zones 2 and 3 and locations at risk of flooding*	ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**) provides

NPS NN 2024 Paragraph Number	Summary	How has this policy been addressed within the assessment
	from local watercourses, surface water, groundwater or reservoirs) accounting for the predicted impacts of climate change unless they are satisfied that the sequential test requirements have been met. In addition, the Secretary of State should not consent development in Flood Zone 3 unless they are satisfied that both the Sequential and Exception Test requirements have been met."	the application of Sequential and Exception Tests.
5.145	The NPS NN states: *"When determining an application, the Secretary of State should be satisfied that flood risk will not be increased elsewhere and only consider development appropriate in areas at risk of flooding where (informed by a Flood Risk Assessment, following the Sequential Test and, if required, the Exception Test), it can be demonstrated that:* • *within the site, the most vulnerable development is located in areas of lowest flood risk unless there are overriding reasons to prefer a different location* • *development is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed, including by emergency planning; and priority is given to the use of Sustainable Drainage Systems."*	ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**) provides the application of Sequential and Exception Tests.
5.146	The NPS NN states: *"In addition, any project that is classified as 'essential infrastructure' and proposed to be located in Flood Zone 3a or b should be designed and constructed to remain operational and safe for users in times of flood; and any project in Flood Zone 3b should result in no net loss of floodplain storage and not impede water flows."*	ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**) provides a description of the flood risk and measures to be taken.
5.147	The NPS NN states: *"If the Environment Agency continues to have concerns and objects to the grant of development consent on the grounds of flood risk, the Secretary of State can grant consent, but would need to be satisfied before deciding whether or not do so that all reasonable steps have been taken by the applicant and the Environment Agency to try and resolve the concerns."*	ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**) details the consultation undertaken with the Environment Agency.
5.148	The NPS NN states: *"The Secretary of State should expect that reasonable steps have been taken to avoid, limit and reduce the risk of flooding to the proposed infrastructure and others. However, the nature of linear infrastructure means that there will be cases where:* • *upgrades are made to existing infrastructure in an area at risk of flooding* • *infrastructure in a flood risk area being replaced* • *infrastructure is being provided to serve a flood risk area* • *infrastructure is being provided connecting two points that are not in flood risk areas, but where*	ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**) provides a description of the flood risk and measures to be taken.

NPS NN 2024 Paragraph Number	Summary	How has this policy been addressed within the assessment
	the most viable route between the two passes through such an area."	
5.149	The NPS NN states: *"The design of linear infrastructure and the use of embankments in particular, may mean that linear infrastructure can reduce the risk of flooding for the surrounding area while also offering opportunities to enhance biodiversity. It should be demonstrated that there is no increase in flood risk elsewhere. In such cases the Secretary of State should take account of any positive benefit to placing linear infrastructure in a flood-risk area."*	ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**) has been prepared to assess the flood risk arising from the Scheme.
5.150	The NPS NN states: *"Where linear infrastructure has been proposed in a flood risk area, the Secretary of State should expect reasonable mitigation measures to have been made, to ensure that infrastructure remains functional in the event of predicted flooding."*	ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**) has been prepared to assess the flood risk arising from the Scheme.
5.151	The NPS NN states: *"For construction works that have drainage implications approval for the project's drainage system will form part of any development consent issued by the Secretary of State. The Secretary of State will therefore need to be satisfied that the proposed drainage system complies with Technical Standards published by Ministers. In addition, any Development Consent Order, or associated planning obligations, will need to make provision for the adoption and maintenance of any Sustainable Drainage Systems, including necessary access rights to property. Sustainable Drainage Systems should deliver multifunctional benefits and help to achieve biodiversity net gain. The Secretary of State should be satisfied that the most appropriate body is being given responsibility for maintaining any Sustainable Drainage Systems, taking into account the nature and security of the infrastructure on the proposed site. The responsible body could include, for example, the applicant, the landowner, the relevant local authority and the relevant Sustainable Drainage Systems Approval Body or another body such as the Internal Drainage Board. Where infiltration type Sustainable Drainage Systems are proposed, pre-applications with the Environment Agency are recommended to ensure they do not cause pollution to surface and groundwater quality and applicants should consider the role of Sustainable Drainage Systems management trains to control and treat run-off."*	ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**) has been prepared to assess the flood risk arising from the Scheme. ES Appendix 13.6 (Drainage Strategy Report) (**TR010066/APP/6.3**) details the measures proposed to store and convey water from the site.
5.159	The NPS NN states: *"Applicants have a range of options available to mitigate and minimise risks of land and groundwater contamination:* • *these options should include sustainable remediation, sustainable remediation can provide the opportunity to manage unacceptable risks to human health and*	ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**) has been prepared to assess the impacts to groundwater quality arising from the Scheme.

NPS NN 2024 Paragraph Number	Summary	How has this policy been addressed within the assessment
	the environment, it can help to ensure that the benefit of doing the remediation is greater than its impact • *in accordance with the Environmental Improvement Plan, disposal of soils to landfill should be minimised"*	
5.252	The NPS NN states: *"Infrastructure development can have adverse effects on the water environment, including groundwater, inland surface water, transitional waters and coastal waters. During the construction and operation, it can lead to increased demand for water, involve discharges to water and cause adverse ecological effects resulting from physical modifications to the water environment. There may also be an increased risk of spills and leaks of pollutants to the water environment. These effects could lead to adverse impacts on health or on species and habitats, and could, in particular, result in surface waters, groundwaters or protected areas failing to meet environmental objectives established under the Water Framework Directive Regulations."*	ES Appendix 13.3 (Water Quality Assessment) (**TR010066/APP/6.3**) and ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**) have been prepared to assess the impacts to surface water and groundwater quality arising from the Scheme.
5.253	The NPS NN states: *"The planning system should contribute to and enhance the natural and local environment by, amongst other things, preventing both new and existing development from contributing to, or being put at unacceptable risk from, or being adversely affected by, water pollution. The government has issued guidance on water supply, wastewater and water quality considerations in the planning system. Where applicable, an application for a Development Consent Order has have regard to the water body objectives of the River Basin Management Plan where the project is located and avoid or mitigate deterioration of water bodies in the area."*	ES Appendix 13.3 (Water Quality Assessment) (**TR010066/APP/6.3**) and ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**) have been prepared to assess the impacts to surface water and groundwater quality arising from the Scheme.
5.254	The NPS NN states: *"Applicants should make early contact with the relevant regulators, including the Environment Agency, for abstraction licensing or water quality activity or groundwater activity permits, and with relevant water undertakers. Where development is likely to have adverse effects on the water environment, the applicant should undertake an assessment of the existing status and impacts of the proposed project on water quality, water resources and physical characteristics of the water environment as part of the Environmental Statement or equivalent. The assessment should also include how this might change due to the impact of climate change on rainfall patterns and consequently water availability across the water environment."*	ES Appendix 13.3 (Water Quality Assessment) (**TR010066/APP/6.3**) and ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**) have been prepared to assess the impacts to surface water and groundwater quality arising from the Scheme.
5.258	The NPS NN states: *"Any assessment for both the construction and operational phases of the development should describe:*	ES Appendix 13.3 (Water Quality Assessment) (**TR010066/APP/6.3**) and ES Appendix 13.4 (Groundwater

NPS NN 2024 Paragraph Number	Summary	How has this policy been addressed within the assessment
	• *the existing quality of waters affected by the proposed project, and how climate change will impact on this* • *existing water resources affected by the proposed project, the impacts of the proposed project on water resources, and how climate change will impact on this* • *existing physical characteristics of the water environment (including quantity and dynamics of flow) affected by the proposed project, and any impact of physical modifications to these characteristics* • *any impacts of the proposed project on water bodies or protected areas under the Water Framework Directive Regulations and source protection zones around potable groundwater abstractions; and how climate change will impact on this* • *any cumulative effects"*	Assessment) (**TR010066/APP/6.3**) have been prepared to assess the impacts to surface water and groundwater quality arising from the Scheme.
5.259	The NPS NN states: *"The assessment should also identify protected areas and other water usages within the vicinity of any discharge, such as bathing waters, abstractions and fisheries at risk from proposed works and the permits/consents required. It should also identify opportunities, such as those included in the relevant local nature recovery strategy or catchment plan to improve water quality, for example, through nature-based approaches or solutions."*	ES Appendix 13.3 (Water Quality Assessment) (**TR010066/APP/6.3**) and ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**) have been prepared to assess the impacts to surface water and groundwater quality arising from the Scheme.
5.263	The NPS NN states: *"The project should identify opportunities and secure measures to protect and improve water quality and resources through green and blue infrastructure and sustainable drainage. This will help to achieve Environment Improvement Plan objectives and potentially provide greater capacity to support infrastructure needs."*	ES Appendix 13.3 (Water Quality Assessment) (**TR010066/APP/6.3**) and ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**) has been prepared to assess the impacts to surface water and groundwater quality arising from the Scheme.
5.267	With regards to water quality, the Secretary of State should be satisfied that the proposal considers the River Basin Management Plans (Environment Agency, 2022a) and the requirements of the WFD (WFD) (including Article 4.7) and its daughter directives. This includes requirements on priority substances and groundwater.	ES Appendix 13.2 (Water Framework Directive Compliance Assessment) (**TR010066/APP/6.3**) has been prepared to address this policy, and section 13.8 of this Chapter.

National Planning Policy Framework (NPPF) (2023)

13.3.5. The National Planning Policy Framework (NPPF) (December 2023) sets out the Government's planning policy framework for the whole of England, including the Government's expectation for content and quality of planning applications and

local plan policy. The overall strategic aims of the NPS NN and NPPF are consistent. The NPPF may be an important and relevant matter but does not form the basis for a decision on an NSIP.

13.3.6. The NPPF applies to this Scheme under Chapter 14 Meeting the challenge of climate change, flooding and coastal change and the supporting Planning Practice Guidance (PPG), in relation to flood risk. Paragraph 173 states that where the development is located in areas which are vulnerable to flooding, relevant Flood Risk Assessments and mitigation must be implemented to ensure the risks can be managed.

13.3.7. The NPPF has considered the risk of flooding within this ES Chapter and ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**).

National Planning Practice Guidance (NPPG) (2023)

13.3.8. Accompanying the NPPF, the NPPG was first published in 2014, and most recently updated in 2023 when updates were made to the Planning Practice Guidance for flood risk. This advises on how Local Planning Authorities can ensure the protection of water quality, the delivery of adequate water infrastructure and take account of the risks associated with flooding in the planning application process.

13.3.9. The NPPF has considered the risk of flooding and impact to water quality within this ES Chapter, ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**) and ES Appendix 13.3 (Water Quality Assessment) (**TR010066/APP/6.3**).

Local Policies

13.3.10. Local policy relevant to the assessment of the road drainage and water environment assessment are provided in Table 13-3.

13.3.11. It should be noted that the details presented in this section are not intended to provide a full consideration of the relevant documents and their application to the Scheme.

13.3.12. The Scheme lies within two LLFAs: Coventry City Council and Warwickshire County Council. LLFAs are county councils and unitary authorities. They lead in managing local flood risks (i.e. risks of flooding from surface water, ground water and Ordinary (smaller) watercourses).

Table 13-3 Local policy relevant to the road drainage and water environment assessment

Legislation or regulation	Summary	How this has been considered in the assessment
Coventry Local Plan (2011-2031) (Adopted 2017)	The following policies relevant to flood risk and water quality of surface waters and groundwaters described within the local plan are listed below:	
	Policy DS4 (part A): General Masterplan Principles. Where appropriate incorporate innovative and creative approaches to energy generation, the provision of utilities and information technology, mitigation of pollutants, management of surface water and flood risk and waste management solutions.	This has been considered for water quality and flood risk within this ES chapter, ES Appendix 13.1 (Flood Risk assessment) (**TR010066/APP/6.3**) and ES Appendix 13.3 (Water Quality Assessment) (**TR010066/APP/6.3**).
	Policy GE1: Green Infrastructure. Flood risk management and improving surface water quality.	This has been considered for water quality and flood risk within this ES chapter, ES Appendix 13.1 (Flood risk Assessment) (**TR010066/APP/6.3**) and ES Appendix 13.3 (Water Quality Assessment) (**TR010066/APP/6.3**).
	Policy GE3: Biodiversity, Geological, Landscape and Archaeological Conservation. Sites of Special Scientific Interest (SSSIs), Local Nature Reserves (LNRs), Ancient Woodlands, Local Wildlife and Geological Sites will be protected and enhanced. Negative impacts on existing biodiversity will be avoided and legally protected species will be preserved.	This has been considered for water quality within this ES chapter, ES Appendix 13.3 (Water Quality Assessment) (**TR010066/APP/6.3**) and ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**).
	Policy EM1: Planning for Climate Change Adaptation. Proposed developments to minimise vulnerability to flood risk by locating development in areas of low flood risk where feasible and include mitigation measures within the proposed development. Proposed developments must aim to seek opportunities to make space for water and develop new blue infrastructure to accommodate climate change.	This has been considered for flood risk within this ES chapter and ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**).
	Policy EM2: Building Standards. This requires proposed developments to acknowledge the need for conserving water and minimising flood risk including flood resilient construction.	This has been considered for flood risk within this ES chapter and ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**).
	Policy EM4: Flood Risk Management. All major developments must be assessed in respect of the level of flood risk from all sources. Opportunities to reduce flood risk	This has been considered for flood risk within this ES chapter and ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**).

Legislation or regulation	Summary	How this has been considered in the assessment
	in the surrounding area must be taken, including creating additional flood storage. For sites in Flood Zone 3a, development should not impede flow routes, reduce floodplain storage, or consume flood storage in a 'flood cell' within a defended area without appropriate compensatory floodplain storage elsewhere. Development should ensure that it would not prevent the water bodies' ability to reach good status and should support, where feasible, improving the status class.	
	Policy EM5: Sustainable Drainage Systems (SuDS). All development must apply SuDS and should ensure that surface water runoff is managed as close to its source as possible. All development should carry out infiltration tests and a ground water risk assessment, including seasonal groundwater monitoring, to demonstrate whether infiltration is possible, and that ground water would not be polluted to Environment Agency and LLFA requirements.	This has been considered for water quality within this ES chapter and ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**).
	Policy EM6: Redevelopment of Previously Developed Land. Development will be permitted where proposals do not have a negative impact on water quality, either directly through pollution of surface or ground water or indirectly through the treatment of wastewater by whatever means. Developers and operators must provide adequate information when submitting their proposals so that the potential impact on groundwater resources and quality can be adequately assessed. Development will not be permitted within a groundwater Source Protection Zone 1 which would physically disturb an aquifer.	This has been considered for water quality within this ES chapter, ES Appendix 13.3 (Water Quality Assessment) and ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**).
Rugby Borough Council Local Plan (2011-2031) (Rugby Borough Council, 2019)	**Policy SDC5 (Part A): Flood Risk Management.** A Sequential Test is required to identify the most appropriate location where practicable, to steer new development to areas with the lowest probability of flooding. Developments must not increase flood risk elsewhere as a result of the Scheme. Developments must incorporate the appropriate flood mitigation measures.	This has been considered for flood risk within this ES chapter and ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**).
	Policy SDC6: Sustainable Drainage. This encourages the use of sustainable drainage techniques to reduce the potential	This has been considered for water quality and flood risk within this ES chapter, ES Appendix 13.1 (Flood

Legislation or regulation	Summary	How this has been considered in the assessment
	impact of flood risk and improve water quality. The developer will carry out infiltration tests where practicable and a groundwater risk assessment to ensure that groundwater will not be polluted.	Risk Assessment), ES Appendix 13.3 (Water Quality Assessment) and ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**).
	Policy SDC7: Protection of the Water Environment and Water Supply. Ensures the proposed development is in accordance with the WFD Objectives and does not adversely affect the water bodies. Development will not be carried out where the sensitivity of the groundwater environment, or the risk posed by the type of development, is deemed to pose an unacceptable risk of pollution of the underlying aquifer.	This has been considered for water quality within this ES chapter, ES Appendix 13.2 (WFD Compliance Assessment) and ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**).
Rugby Borough Council Climate Change and Sustainable Design and Construction Supplementary Planning Document (Rugby Borough Council, 2023)	**Policy SDC5: Flood Risk and Resilience Measures.** A sequential approach to flood risk is followed to ensure that development is located in the areas of lowest flood risk. This means favouring applications in Flood Zones 1 (low probability of flooding), rather than in Flood Zones 2 and 3 (medium and high probabilities of flooding respectively). On a larger scale, natural flood measures could be utilised to reduce flood risk. This can include restoration of floodplains - which can slow water flow and provide attenuation and catchment woodland – to hold some rainwater and allow evaporation, as well as soil infiltration.	This has been considered for flood risk within this ES chapter and ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**).
	SDC6 Sustainable drainage. The use of SuDS can be used to manage surface water runoff on-site and also alleviate flood pressure elsewhere. Policy SDC6 of the local plan sets out the requirements for providing SuDS as part of developments.	This has been considered for flood risk within this ES chapter and ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**).
Coventry Strategic Flood Risk Assessment (Coventry City Council, 2015)	The Coventry Strategic Flood Risk Assessment (SFRA) sets out the local flood risks within the area and the findings from the SFRA provides a baseline flood risk to proposed developments within the local area.	The local assessments and management plans have all been considered within ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**) in relation to flood risk. Elements of this local guidance have been assessed against flood risk within ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**) and summarised within this Chapter.
Coventry Local Flood Risk Management Strategy (Coventry City Council, 2022)	The Coventry Local Flood Risk Management Strategy (LFRMS) is a strategy plan set out by Coventry City Council that reduces and manages local flood risk for the betterment of the local area.	

Legislation or regulation	Summary	How this has been considered in the assessment
Coventry Preliminary Flood Risk Assessment (Coventry City Council, 2017)	The Coventry Preliminary Flood Risk Assessment (PFRA) is a high-level assessment that identifies local sources of flood risk. The assessment also includes guidance on future flood risk.	
Coventry Surface Water Management Plan (Coventry City Council, 2023)	The Coventry Surface Water Management Plan (SWMP) provides a comprehensive understanding of flood risk from surface water. It also examines the impact of current and future developments on flood risk and drainage provisions, supplementing the planning of mitigation measures.	
Warwickshire SFRA (Warwickshire County Council, 2013)	The assessment aims to provide: • an assessment of the impact of all potential sources of flooding in accordance with NPPF, including an assessment of any future impacts associated with climate change and sea level rise • enable planning policies to be identified specific to local flooding issues provide recommendations of suitable mitigation measures including the objectives of SuDS sufficient information to inform each of the Local Planning Authorities (LPAs) within the study area of acceptable flood risk in relation to emergency planning capability	

13.4. Consultation

13.4.1. An Environmental Scoping Report (**TR010066/APP/6.8**). was submitted to the Planning Inspectorate in June 2023. A Scoping Opinion (**TR010066/APP/6.9**) was received in response to the Environmental Scoping Report from the Planning Inspectorate on behalf of the Secretary of State. The Applicant's responses to the Scoping Opinion (**TR010066/APP/6.9**) are contained in the Scoping Opinion Response, ES Appendix 4.1 (**TR010066/APP/6.3**).

13.4.2. Responses in relation to the statutory consultation undertaken are presented in the Consultation Report (**TR010066/APP/5.1**). Details of how the Applicant has undertaken further engagement with statutory consultees is set out in the Consultation Report (**TR010066/APP/5.1**) and Consultation Report Annexes (**TR010066/APP/5.2**).

13.4.3. For the purposes of this assessment, ongoing engagement has been undertaken with the Environment Agency, Coventry City Council and Warwickshire County Council:

- Ongoing engagement with the LLFA, Warwickshire County Council in August 2023, noted that there were no major concerns with the Scheme regarding flood risk, water quality and impacts to surface water and groundwater receptors.
- The Environment Agency were contacted for engagement regarding the assessment of potential indirect impacts to watercourses, designated sites, priority habitats and fish. The Environment Agency commented that if a culvert was being extended as part of the Scheme, then watercourse enhancements (under biodiversity net gain) may need to be considered as best practice. As a result of this, enhancements from the Scheme have been considered to the WFD status of identified WFD water bodies within ES Appendix 13.2 (WFD assessment).
- Ongoing engagement with the LLFA, Coventry City Council, was undertaken in February 2024. The overview of the Scheme was presented including an overview of fluvial and surface water flood risk. Further information regarding the ongoing engagement with Coventry City Council can be found in ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**).
- Further engagement was made with Coventry City Council in May 2024 regarding flood risk. The engagement discussed the requirements of DMRB and the flood model which was reviewed.
- Further ongoing engagement was undertaken in July 2024 with the Environment Agency. The consultation concluded that the Environment Agency had no issues or concerns and agreed with the approach to flood risk proposed. The baseline model has been reviewed twice by the Environment Agency, resulting in minor changes to the model.

13.4.4. Engagement with the above bodies is ongoing. The ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**) has been issued for comment to the Environment Agency, Coventry City Council and Warwickshire County Council ahead of the DCO submission.

13.5. Assessment methodology

13.5.1. The methodology described in this Report follows the guidance provided within DMRB LA 113 for assessing the significance of effects of the Scheme on the water environment. The procedures and the appropriate methods that have been used when assessing the potential impacts from road schemes on the water environment are described in the DMRB LA 113.

13.5.2. To meet the requirements of the assessment methodology, the following methods have been adopted:

- A Flood Risk Assessment (ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**)) has been undertaken in accordance with the requirements of the NPS NN and the NPPF and the climate change

allowances (Environment Agency, 2022b). A detailed hydrological and hydraulic assessment has been undertaken as part of this assessment.

- A WFD Compliance Assessment (ES Appendix 13.2 (Water Framework Directive Compliance Assessment) (**TR010066/APP/6.3**)) for surface water as described in section 3.50 of DMRB LA 113 has been completed for the identified WFD surface water bodies. This identifies how the Scheme has the potential to impact each of the water bodies' ecological and chemical elements and whether or not it could lead to non-compliance of the WFD.
- A Highways England Water Risk Assessment Tool (HEWRAT) assessment has been completed. This utilised updated drainage information and Annual Average Daily Traffic (AADT) data to establish potential impacts of pollutants in routine highway runoff and impacts from spillages from the Scheme on the receiving watercourses. This informed the requirement for mitigation measures to adequately reduce the risk. As discharges did not fail the HEWRAT assessment for annual average concentrations of soluble pollutants, a detailed assessment using the UKTAG Rivers and Lakes Metal Bioavailability Assessment Tool (M-BAT) is not required. This is detailed in the ES Appendix 13.3 (Water Quality Assessment) (**TR010066/APP/6.3**). However, note the HEWRAT also provides assessment for the impact for other contaminants, such as sediment bound pollutants (total copper, zinc, cadmium, pyrene, fluoranthene, anthracene, phenanthrene and total Polyaromatic hydrocarbons (PAH) and identifies whether accumulation of sediments will occur.
- A Groundwater Assessment (ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**)) has been undertaken to provide a robust hydrogeological conceptual model and assess risks to groundwater receptors. The groundwater assessment incorporates the groundwater level and flow, GWDTE and groundwater quality and routine runoff assessments (as defined by DMRB LA113). For the groundwater quality and routine runoff assessment, a simple assessment was first undertaken using the HEWRAT for groundwater, and this was followed by further detailed assessments in line with guidance provided in the SuDS Manual (Woods Ballard *et al*, 2015) A water features survey (WFS) was also conducted in January 2024 to establish surface water and groundwater features that could potentially be impacted by the Scheme. This is reported on in ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**)).
- A Hydromorphological Assessment (ES Appendix 13.5 (Hydromorphological Assessment) (**TR010066/APP/6.3**)) has been undertaken in accordance with Appendix E of DMRB LA 113. A simple assessment, supplemented by a site survey, identifies the natural river processes that would have operated before any development had affected the river or catchment and determines whether the degree of hydromorphological change is acceptable.
- A Drainage Strategy Report (ES Appendix 13.6 (Drainage Strategy Report) (**TR010066/APP/6.3**)) describes the proposed drainage design and outlines mitigation measures to mitigate potential adverse impacts on the water environment.

Assessment criteria

13.5.3. The assessment identifies the water features within the study area (and any downstream water bodies) and determines the importance (value) of the features as set out in DMRB LA 113.

Value of receptor

13.5.4. The conservation value of water resources is in part defined by legislation which protects all controlled waters in England and Wales and, in effect protects all water bodies (surface water or groundwater). Therefore, there cannot be any water feature which has negligible value. The value of controlled waters is defined by considering the use and conservation importance of the water body.

13.5.5. The criteria used in this assessment to determine the value and importance of each water feature and its attributes are set out in Table 13-4 and are based on the definitions provided in Table 3.70 in DMRB LA 113.

Table 13-4 Criteria for estimating the importance of water environment attributes (adapted from Highways England, 2020b)

Value	Criteria	Typical example
Very high	Nationally significant attribute of high importance	Surface water: Watercourse having a WFD classification shown in a RBMP and Q_{95} ≥ 1.0m^3/s. Site protected / designated under EC or UK legislation (Special Area of Conservation (SAC), Special Protection Area (SPA), SSSI, Ramsar site, salmonid water) / Species protected by EC legislation Ecology and Nature Conservation. The watercourse is free from any modification or human influence and is in natural equilibrium exhibiting a range of morphological features. Groundwater: Principal aquifer providing a regionally important resource and / or supporting a site protected under EC and UK legislation Ecology and Nature Conservation. Groundwater locally supports GWDTE. SPZ1. Flood risk: Essential infrastructure or highly vulnerable development.
High	Locally significant attribute of high importance	Surface water: Watercourse having a WFD classification shown in a river basin management plan (RBMP) and Q_{95} <1.0m^3/s. Species protected under EC or UK legislation Ecology and Nature Conservation. The watercourse shows very limited signs of modification or other human influence on morphology. Groundwater: Principal aquifer providing locally important resource or supporting a river ecosystem. Groundwater supports a GWDTE. SPZ2. Flood risk: More vulnerable development.
Medium	Of moderate quality and rarity	Surface water: Watercourses not having a WFD classification shown in a RBMP and Q_{95} >0.001m^3/s. Limited range of morphological diversity and features, the watercourse shows signs of modification changed by channel modification or other human pressures.

Value	Criteria	Typical example
		Groundwater: Aquifer providing water for agricultural or industrial use with limited connection to surface water. SPZ3. Flood risk: Less vulnerable development.
Low	Lower quality	Surface water: Watercourses not having a WFD classification shown in a RBMP and Q_{95} ≤0.001m^3/s. No morphological diversity, the watercourse is highly modified changed by channel modification or other human pressures. Groundwater: Unproductive strata. Flood risk: Water compatible development.

Magnitude of impact

13.5.6. Definitions for estimating the magnitude of impact including typical examples are given in Table 13-5 and are based on values set out in DMRB LA 113.

Table 13-5 Estimating the magnitude of an impact on an attribute*

Magnitude	Criteria	Example
Major adverse	Results in loss of attribute and / or quality and integrity of attribute	Surface water Failure of both acute-soluble and chronic-sediment related pollutants in HEWRAT and compliance failure with environmental quality standard (EQS) values. Calculated risk of pollution from a spillage ≥2% annually (spillage assessment). Loss of regionally important public water supply. Loss or extensive change to a designated nature conservation site. Reduction in water body WFD classification. Extensive change to or replacement of natural bed and bank with artificial interventions. Groundwater Loss of, or extensive change to an aquifer. Loss of regionally important water supply. Potential high risk of pollution to groundwater from routine runoff - risk score >250 (Groundwater quality and runoff assessment). Calculated risk of pollution from spillages ≥2% annually (Spillage assessment). Loss of, or extensive change to GWDTE or baseflow contribution to protected surface water bodies. Reduction in water body WFD classification. Loss or significant damage to major structures through subsidence or similar effects. Flood risk Increase in peak flood level (> 100mm).
Moderate adverse	Results in effect on integrity of attribute, or loss of part of attribute	Surface water 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. Degradation of regionally important public water supply or loss of major commercial / industrial / agricultural supplies. Contribution to reduction in water body WFD classification. Considerable change to or replacement of natural bed and bank with artificial interventions. Groundwater

Magnitude	Criteria	Example
		Partial loss or change to an aquifer. Degradation of regionally important public water supply or loss of significant commercial / industrial / agricultural supplies. 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 GWDTE. Contribution to reduction in water body WFD classification. Damage to major structures through subsidence or similar effects or loss of minor structures. Flood risk Increase in peak flood level (> 50mm).
Minor adverse	Results in some measurable change in attribute's quality or vulnerability	Surface water 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. Slight change from the baseline of channel bed and banks though changes to or replacement of natural bed and bank with artificial intervention. 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 an aquifer, GWDTEs, abstractions and structures. Flood risk Increase in peak flood level (> 10mm).
Negligible	Results in effect on attribute, but of insufficient magnitude to affect the use or integrity	The proposed project is unlikely to affect the integrity of the water environment. Surface water No risk identified by HEWRAT (pass both acute-soluble and chronic-sediment related pollutants). Risk of pollution from spillages <0.5%. No change from the baseline of channel bed and banks. Groundwater No measurable impact upon an aquifer and / or groundwater receptors and risk of pollution from spillages <0.5%. Flood risk Negligible change to peak flood level (≤ + / - 10mm).
Minor beneficial	Results in some beneficial effect on attribute or a reduced risk of negative effect occurring	Surface water 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). Slight change from the baseline of channel bed and banks through changes to or replacement of artificial bed and bank with natural interventions. Groundwater Calculated reduction in existing spillage risk by 50% or more to an aquifer (when existing spillage risk <1% annually). Reduction of groundwater hazards to existing structures. Reductions in waterlogging and groundwater flooding.

Magnitude	Criteria	Example
		Flood risk Creation of flood storage and decrease in peak flood level (> 10mm).
Moderate beneficial	Results in moderate improvement of attribute quality	Surface water HEWRAT assessment of both acute-soluble and chronic-sediment related 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). Contribution to improvement in water body WFD classification. Considerable change to or replacement of artificial bed and bank with natural interventions to include a range of morphological features. Groundwater Calculated reduction in existing spillage risk by 50% or more (when existing spillage risk is >1% annually). Contribution to improvement in water body WFD classification. Improvement in water body catchment abstraction management strategy (CAMS) (or equivalent) classification. Support to significant improvements in damaged GWDTE. Flood risk Creation of flood storage and decrease in peak flood level (> 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. Improvement in water body WFD classification. Extensive change to or replacement of artificial bed and bank with natural interventions to include a range of morphological features. Groundwater Removal of existing polluting discharge to an aquifer or removing the likelihood of polluting discharges occurring. Recharge of an aquifer. Improvement in water body WFD classification. Flood risk Creation of flood storage and decrease in peak flood level (> 100mm).
No change		No loss or alteration of characteristics, features or elements; no observable impact in either direction.

*adapted from DMRB LA 113

Significance

13.5.7. The overall significance of effect was determined using the significance matrix in DMRB LA 104 Environmental assessment and monitoring (Highways England, 2020a), significance definitions and examples provided in Table 13-6, and using professional judgement to consider site specific factors that may be of relevance. Effects can be beneficial or adverse. Effects that are moderate, large, or very large, are considered significant effects. Effects that are slight or neutral are not significant.

Table 13-6 Significance categories and typical descriptions

Significance	Examples
Very large	Effects at this level are material in the decision-making process.
Large	Effects at this level are likely to be material in the decision-making process.
Moderate	Effects at this level can be considered to be material decision-making factors.
Slight	Effects at this level are not material in the decision-making process.
Neutral	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

Significance matrix

13.5.8. The overall significance of effect is determined using the significance matrix in DMRB LA 104 (Table 13-7) and the significance definitions and examples provided in Table 4.3 of ES Chapter 4 (Environmental Assessment Methodology) (**TR010066/APP/6.1**). Effects can be beneficial or adverse. Effects that are moderate, large, or very large, are considered significant effects. Effects that are slight or neutral are not significant.

Table 13-7 Significance matrix

		Magnitude of impact				
		No change	**Negligible**	**Minor**	**Moderate**	**Major**
Environmental value	**Very High**	Neutral	Slight	Moderate or large	Large or very large	Very large
	High	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
	Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
	Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
	Negligible	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

13.6. Assessment assumption and limitations

13.6.1. The assessment has been based on the Scheme description presented in ES Chapter 2 (The Scheme) (**TR010066/APP/6.1**) and the design presented on the Works Plans (**TR010066/APP/2.3**) assuming a reasonable worst-case basis afforded by the limits of deviation (see Section 2.5 of ES Chapter 2 (The Scheme) (**TR010066/APP/6.1**)). It is assumed that in the instance of any changes to the design within the vertical and horizontal limits of deviation, mitigation measures would still be provided and would function as described in

this Chapter and as such there would be no change to the assessment of significant effects.

13.6.2. This ES Chapter has been prepared using publicly available information with references to reports and the Drainage Data Management System (DDMS), (National Highways, 2024). The assessment is a desk-based study, supplemented by the WFS, a site walkover to characterise selected surface water and groundwater features. It is also informed by the findings of ground investigations and an ongoing groundwater monitoring programme. Due to access issues during the surface water walkover survey, watercourses could not be followed downstream at certain points. Therefore, watercourses were assumed to have similar characteristics through the length of the study area, this was supported through a desk based assessment.

13.6.3. The design does not include altering the Smite Brook channel or culverts beneath the A46 and the B4082. A temporary culvert within an unnamed ordinary watercourse is required to provide access to the temporary storage of materials. It is assumed that no other access over watercourses or any in-channel works will be required as part of the Scheme.

13.6.4. The construction of key structures may require excavation into the superficial deposits and bedrock. Further investigations will be required during detailed design to ascertain the hydraulic properties of these to understand potential impacts on the water environment, particularly with respect to dewatering requirements and subsequent impacts of construction. Further details of construction methods will also be required to assess the associated groundwater control (i.e. dewatering) requirements.

13.6.5. ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**) is based on information and data available at present. Whilst the ES Appendix 9.3 (Ground Investigation Report) (**TR010066/APP/6.3**) has provided comprehensive data relating to the geology and hydrogeology within the Order Limits, data is limited outside of this. The data collected may therefore not necessarily fully represent the regional hydrogeological conditions, particularly with respect to hydraulic gradients and direction of groundwater flow.

13.7. Study area

13.7.1. The study area encompasses groundwater and surface water features that could potentially be affected by the Scheme. The study area is based on professional judgement and reflects the Scheme and the surrounding environment. This ensures that surface water (including flood risk, WFD and water quality) effects are sufficiently identified within a 1km boundary surrounding the Order Limits as pollutants are expected to disperse and to have been diluted beyond a 1km

radius. The study area boundary has been extended to 2km to encompass areas of particular significance to groundwater such as GWDTE, and focussing on the main features of the Scheme that have the potential to impact groundwater in the local area. The study area is shown in ES Figure 13.1 (Surface Water Features, Licensed Abstractions, Consented Discharges and Fluvial Flood Risk) and ES Figure 13.4 (Aquifer and Environmental Designations) (**TR010066/APP/6.2**).

13.8. Baseline conditions

Sources of information

13.8.1. Relevant studies that have previously been undertaken by National Highways for the area of the Scheme are:

- A46 Coventry Junctions (Walsgrave) Environmental Scoping Report (**TR010066/APP/6.8**)
- A46 Coventry Junctions (Walsgrave) Preliminary Environmental Information Report (PEIR) (National Highways, 2023)

13.8.2. The key sources of information used to determine the baseline water environment and flood risk conditions are:

- Environment Agency online Flood Map for Planning (Environment Agency, 2024a)
- Environment Agency online Long-Term Flood Risk map (Environment Agency, 2024b)
- Environment Agency online Catchment Data Explorer (Environment Agency, 2024c)
- Environment Agency water quality archive (Environment Agency, 2024d)
- Environment Agency water discharge consents database (Environment Agency, 2024e)
- Environment Agency historic flood map (Environment Agency, 2024f)
- DDMS (National Highways, 2024)
- Ordnance Survey (OS) Mapping (Ordnance Survey, 2024a)
- Ordnance Survey Open Rivers (Ordnance Survey, 2024b)
- Environment Agency's LiDAR Composite Digital Terrain Model (Environment Agency, 2022c)
- Department for Environment, Food and Rural Affairs (DEFRA) MAGIC online Mapping (DEFRA, 2024)
- British Geological Survey (BGS) Geology of Britain Viewer (British Geological Society, 2024)

- Natural England Designated Sites (Natural England, 2024)
- Envirocheck Report (Landmark Information Group Limited, 2023)
- Flood Estimation Handbook (FEH) Web Service (UK Centre for Ecology & Hydrology, 2024)
- Current aerial photography (Google Earth, 2024)

Surface water

Surface water features

13.8.3. The Scheme is located within close proximity to two designated main rivers within the study area. There are no main rivers within the Order Limits (ES Figure 13.1 (Surface Water Features, Licensed Abstractions, Consented Discharges and Fluvial Flood Risk) (**TR010066/APP/6.2**)):

- The River Sowe is located to the west of the Scheme Order Limits, flowing southwards 100m to the west of the Scheme at its closest point within the study area.
- Withy Brook is a tributary of the River Sowe, flowing south crossing beneath the existing A46, within the study area approximately 300m north of the Scheme Order Limits, before its confluence with the River Sowe.

13.8.4. OS mapping shows the Scheme is located in close proximity to multiple ordinary watercourses within the study area, which include field drains and six ordinary watercourses identified below and in ES Figure 13.1 (Surface Water Features, Licensed Abstractions, Consented Discharges and Fluvial Flood Risk) (**TR010066/APP/6.2**):

- Smite Brook flows from the north-east joining with Coombe Pool and discharging to the west of Coombe Pool. Coombe Pool then discharges excess flow into Smite Brook to the west of Coombe Pool, 100m south-east of the existing Walsgrave Junction. At this location, Birchley Beck converges with Smite Brook. Smite Brook is then culverted beneath the A46, 50m south of the existing Walsgrave Junction, before flowing westwards beneath the B4082 via a culvert, before its confluence with the River Sowe.
- Birchley Beck, originates from the south-east outside the study area. Birchley Beck is formed from a number of small watercourses, which confluence within Birchley Wood. Birchley Beck flows west, to the south of Coombe Pool receiving discharges from the reservoir via sluice gates and spillways. The brook then confluences with an unnamed tributary before its confluence with Smite Brook, to the east of the A46.
- The unnamed tributary of Birchley Beck originates from the south, outside the study area, flowing north before it is culverted beneath Brinklow Road. After flowing beneath Brinklow Road, it flows north before its confluence with Birchley Beck

- An unnamed ordinary watercourse, located within the study area, approximately 1km north of the existing A46 Walsgrave Junction, flows west beneath the existing A46 via pipework to the River Sowe (ES Figure 13.1 (Surface Water Features, Licensed Abstractions, Consented Discharges and Fluvial Flood Risk) (**TR010066/APP/6.2**)).
- Approximately 700m north of the existing A46 Walsgrave Junction, an unnamed ordinary watercourse flows in a westerly direction to the River Sowe. This watercourse is contained to the west of the existing A46, where it originates. On the opposite side of the A46 carriageway to this, a watercourse flows in a westerly direction and connects to the existing drainage system, east of the A46.

13.8.5. Coombe Pool is a reservoir situated approximately 100m east of the existing Walsgrave Junction. It is located within the grade II* Registered Park and Garden and is designated as a Site of Special Scientific Interest (SSSI) (ES Figure 13.4 (Aquifer and Environmental Designations) (**TR010066/APP/6.2**)) identified by MAGIC maps. The reservoir (as part of Coombe Abbey Park) is owned and managed by Coventry City Council in accordance with requirements of the Reservoir Act 1975.

13.8.6. There are three ponds located within the study area, which are hydraulically connected to watercourses during extreme flood events as they lie within Flood Zones 2 and 3 (see ES Figure 13.1 (Surface Water Features, Licensed Abstractions, Consented Discharges and Fluvial Flood Risk) (**TR010066/APP/6.2**)). Two ponds are located in the south-west of the study area, one within and one close to Stoke Floods Local Nature Reserve (LNR) (see ES Figure 13.4 (Aquifer and Environmental Designations) (**TR010066/APP/6.2**)). The third is located in the north of the study area. In addition to this there are 11 ponds within the study area which are hydraulically disconnected from watercourses and the Scheme.

13.8.7. The nearest Environment Agency gauging station to the Scheme is located approximately 13.5km downstream of the Scheme, along the River Sowe at Stoneleigh. The gauged Q95 (the flow that is exceeded 95% of the time) is 1.2m^3/s. Areal scaling of the Q95 flows at this gauging station was undertaken to estimate the Q95 flows for Smite Brook, River Sowe and Withy Brook at the Scheme and was calculated to be 0.2m^3/s, 0.6m^3/s and 0.1m^3/s respectively.

13.8.8. The Environment Agency water quality archive notes there is a routine water quality monitoring point within the Order Limits on Smite Brook at the B4082 culvert. In addition to this, there are three locations within the study area that are sampled as part of the Environment Agency's routine monitoring regime:

- River Sowe - Hungerley Hall Farm, located 300m north-west of the existing Walsgrave Junction

- Coombe Pool, located 100m east of the existing Walsgrave Junction
- Withy Brook - High Bridge, located 1.5km north of the existing Walsgrave Junction

13.8.9. The Scheme Order Limits and study area do not lie within an IDB area.

Groundwater

Geology

13.8.10. The bedrock and superficial geology within the study area is described in ES Chapter 9 (Geology and Soils) (**TR010066/APP/6.1**) and ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**)**.** In summary, the geology underlying the study area comprises glacial till of the Wolston Glacigenic Formation, subdivided into the Thrussington Till Member and Bosworth Clay Member, the Baginton Sand and Gravel Formation with silt and clay lenses and bedrock of the Mercia Mudstone Group (referred to in the remainder of this Chapter as the Mercia Mudstone). Alluvium, comprising clay, silt and sand and gravel are associated with the River Sowe and Smite Brook. River Terrace Deposits, comprising sandy gravels are present in two locations one in the south of the Scheme and one in north-west.

13.8.11. Much of the study area has a cover of superficial deposits. However, the Mercia Mudstone outcrops in the central part of the Scheme, in proximity to the existing Walsgrave Junction. The extent of the superficial deposits is shown in Figure 13.4 (Aquifer and Environmental Designations) (**TR010066/APP/6.2**).

13.8.12. The Helsby Sandstone Formation of the Sherwood Sandstone Group underlies the Mercia Mudstone at a depth of approximately 50m below ground level beneath the Scheme, outcropping approximately 1km to the west of the study area.

Aquifer designations

13.8.13. Aquifer designations are presented in ES Figure 13.4 (Aquifer and Environmental Designations) (**TR010066/APP/6.2**).

13.8.14. The Helsby Sandstone Formation is classed as a Principal Aquifer. Principal aquifers are strata that have high intergranular and/or fracture permeability, and as such usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.

13.8.15. Superficial deposits, including Alluvium, River Terrace Deposits and the Baginton Sand and Gravel Formation are classed as Secondary A aquifers, which are described as formations that provide locally important water resources and may support baseflow to rivers.

13.8.16. The Mercia Mudstone is classified as a Secondary B aquifer, defined as mainly lower permeability layers that may store and yield limited amounts of groundwater through characteristics such as cracks, openings and eroded layers.

13.8.17. The Thrussington Till Member of the Wolston Glacigenic Formation is classified as a Secondary (undifferentiated) aquifer. Secondary (undifferentiated) aquifers are aquifers where it is not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type.

13.8.18. The Bosworth Clay Member of the Wolston Glacigenic Formation is classified as unproductive strata. These have negligible significance for water supply or baseflow to rivers, lakes, and wetlands due to their low permeability. They naturally offer protection to any aquifers that may be present beneath them.

Aquifer properties

13.8.19. The properties of an aquifer define its capacity to store, release and transmit groundwater.

13.8.20. The permeability of the alluvial clays, silts and sands within the study area will vary, with cleaner sand and gravel horizons having the highest permeability. The river terrace deposits, primarily comprising sandy gravels, are likely to have a high permeability. Lower permeability deposits up to 10m thick confine the Baginton Sand and Gravel Formation in the south and central portions of the Scheme, proximal to the River Sowe and Smite Brook.

13.8.21. The Wolston Glacigenic Formation is generally impermeable within the study area but does contain sandy lenses, which may act as perched aquifers. This formation is up to 9m thick and confines the Baginton Sand and Gravel Formation in the northern portion of the Scheme.

13.8.22. The Baginton Sand and Gravel Formation is the predominant superficial aquifer within the Scheme. It is between 2m and 5m thick, highly permeable, confined where overlain by low permeability deposits and unconfined in the central portion of the Scheme, north of the existing Walsgrave Junction and at Hungerley Hall Farm, where it is present at surface. The unit is potentially sub-artesian in areas where it is overlain by other less permeable superficial deposits.

13.8.23. The Mercia Mudstone bedrock underlies the entire Scheme and is relatively impermeable, although there is potential for limited groundwater flow through fractures in the uppermost, weathered horizons. The Mercia Mudstone outcrops in the central portion of the Scheme and therefore potentially restricts lateral groundwater flow between superficial aquifers. It also confines the underlying

Helsby Sandstone Formation, which is present approximately 50m below ground level.

13.8.24. Further details of aquifer properties are included in ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**).

Groundwater levels and flows

13.8.25. Groundwater level monitoring was carried out as part of the 2023 ground investigation and continued for a period of 12 months to capture seasonal variations. The investigation findings summarised below with further detail provided in ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**).

13.8.26. Groundwater strikes recorded during the ground investigation were primarily in the Wolston Glacigenic Formation and the underlying Mercia Mudstone. Several strikes were also noted in the alluvium and Baginton Sand and Gravel Formation.

13.8.27. Maximum seasonal groundwater levels during the monitoring period were shallow, ranging from ground level to 4m below ground level.

13.8.28. Groundwater levels generally reflect topography. Groundwater levels are highest in the unconfined Baginton Sand and Gravel Formation associated with the high ground at Hungerley Hall Farm where recharge is assumed to occur. They are lowest in the alluvium along the courses of Smite Brook to the south and the River Sowe to the west, which are both likely to receive baseflow from the superficial deposits.

13.8.29. Groundwater level data also indicates a component of groundwater flow towards the north-east within the Baginton Sand and Gravel Formation where it is largely hydraulically isolated from other superficial deposits by the Mercia Mudstone. It is also considered likely that there is north-easterly groundwater flow within the Baginton Sand and Gravel Formation south of the Smite Brook.

Groundwater quality

13.8.30. Groundwater quality and soil sampling were carried out as part of the 2023 ground investigation. Risks to groundwater from the Scheme have been assessed by comparing chemical laboratory data against appropriate generic assessment criteria.

13.8.31. A total of 19 groundwater samples were analysed for metals, inorganics, polycyclic aromatic hydrocarbons and total petroleum hydrocarbons, phenols, volatile organic compounds and semi-volatile organic carbons. Several groundwater samples exceeded the screening limits for metals, nitrate and

sulphate at relatively low levels. The assessment of risk to controlled waters in ES Appendix 9.3 (Ground Investigation Report) (**TR010066/APP/6.3**) concluded that there is no unacceptable risk to controlled waters. The assessment findings are presented in ES Chapter 9 (Geology and Soils) (**TR010066/APP/6.1**). A baseline risk assessment for key road drainage pollutants is included in ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**).

Groundwater vulnerability

13.8.32. The bedrock and superficial aquifers have a combined groundwater vulnerability classification of medium-high risk. There are also areas of medium risk in the north-east of the study area.

Surface water features supplied by groundwater

13.8.33. Designated sites that are potentially hydraulically linked to the study area are included in this assessment and illustrated in ES Figure 13.4 (Aquifer and Environmental Designations) (**TR010066/APP/6.2**).

13.8.34. The River Sowe flows south and then west along the Scheme's western extent of the Order Limits.

13.8.35. Coombe Pool discharges over a weir to Smite Brook immediately to the east of the Scheme. Smite Brook is culverted beneath the existing A46 carriageway and flows west before it is culverted beneath the B4082 before discharging to the River Sowe.

13.8.36. Groundwater level monitoring in the superficial deposits indicates flow towards the River Sowe and Smite Brook, suggesting that both receive baseflow.

13.8.37. There are two SSSI within 2km of the Scheme.

13.8.38. Coombe Pool SSSI is designated for its ornithological importance and is located directly east of the Scheme. It is not considered to be groundwater dependent.

13.8.39. Herald Way Marsh biological SSSI is located 1.5km south of the Scheme. A review of the GWDTE dataset (Environment Agency, 2024g) identified Herald Way Marsh SSSI as a GWDTE.

13.8.40. As there is a potential hydraulic connection between Herald Way Marsh SSSI and the study area, it has been considered in the Groundwater Dependent Terrestrial Ecosystems assessment (ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**)) and was identified as high importance.

Water Framework Directive

13.8.41. Within the study area, there are three WFD surface water body catchments from catchment data explorer, these are identified in Table 13-8.

Table 13-8 WFD surface water body catchments within the study area

Water body	Description/quality		
WFD water body name	Withy Brook – Source to confluence with River Sowe	Sowe – Confluence with Withy Brook to confluence with River Avon	Smite Brook – Source to confluence with River Sowe
Water body ID	GB109054044640	GB109054044540	GB109054044630
River basin district name	Severn	Severn	Severn
Water body type	Surface water (river)	Surface water (river)	Surface water (river)
Hydromorphological designation	Not designated artificial or heavily modified	Not designated artificial or heavily modified	Not designated artificial or heavily modified
Overall water body status (2022)	Poor	Moderate	Poor
Ecological status (2022)	Poor	Moderate	Poor
Chemical status (2022)	Does not require assessment	Does not require assessment	Does not require assessment
Hydromorphology status of water body (2022)	Supports Good	Supports Good	Supports Good
Reasons for not achieving Good (RNAG) overall status (RBMP Cycle 3)	RNAG include poor nutrient management.	The RNAG include poor livestock management, poor nutrient management and sewage discharge (intermittent).	The RNAG includes poor livestock management.

13.8.42. Within the study area, which aligns with the WFD Compliance Assessments Zone of Influence, there are two further WFD surface water body catchments (Table 13-9).

Table 13-9 WFD surface water body catchments within the study area

WFD Surface water body	Description/quality	
WFD water body name	Coombe Pool	Sowe – Confluence with Breach Brook to confluence with Withy Brook
Water body ID	GB30937926	GB109054044660
River basin district	Severn	Severn

WFD Surface water body	Description/quality	
Water body type	Lake	River
Hydromorphological designation	Heavily modified	Not designated artificial or heavily modified
Overall water body status (2022)	Moderate	Poor
Ecological status (2022)	Moderate	Poor
Chemical status (2022)	Does not require assessment	Does not require assessment
Hydromorphology status of water body (2022)	Supports Good	Supports Good
RNAG overall status (RBMP Cycle 3)	The RNAG includes poor livestock management, sewage discharge (continuous) and urban development.	The RNAG includes urban development, poor livestock management and groundwater abstraction.

13.8.43. WFD groundwater bodies are shown in ES Figure 13.4 (Aquifer and Environmental Designations) (**TR010066/APP/6.2**). The Scheme and most of the study area are located within the Warwickshire Avon – Secondary Mudrocks (GB40901G300700) groundwater body, although a small part of the study area lies within the Warwickshire Avon - PT Sandstone Warwick/Avon Confined (GB40901G300700) groundwater body. Groundwater body details are summarised in Table 13-10.

13.8.44. The Warwickshire Avon – PT Sandstone Warwick/Avon Confined groundwater body is overlain by a significant thickness of the low permeability Mercia Mudstone within the Scheme Order Limits and much of the study area, only outcropping west of the River Sowe. As it is considered unlikely that there is any measurable hydraulic connection between groundwater underlying the Scheme and this groundwater body, it is scoped out of further assessment.

Table 13-10 WFD groundwater body catchments within the study area

WFD Groundwater body	Description/quality	
WFD Water body name	Warwickshire Avon - PT Sandstone Warwick/Avon Confined	Warwickshire Avon – Secondary Mudrocks
Water body ID	GB40901G300700	GB40902G990900
Operational catchment	Avon Warwickshire - Permo-Triassic Sandstone Warwick and Avon Confined Operational Catchment	Avon Warwickshire - Secondary Mudrocks Operational Catchment
Management catchment	Severn England GW Management Catchment	Severn England GW Management Catchment
River basin district	Severn	Severn
Type	Groundwater body	Groundwater body

WFD Groundwater body	Description/quality	
Overall classification (Cycle 3 – 2019)	Poor	Good
Current quantitative (Cycle 3 – 2019)	Poor	Good
Quantitative objective	Poor (by 2015; disproportionately expensive)	Good (by 2015)
Current chemical quality (Cycle 3 – 2019)	Good	Good
Chemical objective	Good (by 2015)	Good (by 2015)
Protected area	Nitrates Directive and Drinking Water Protected Area	Nitrates Directive and Drinking Water Protected Area

Licenced abstractions

13.8.45. The Environment Agency indicated are three licensed surface water abstractions shown in ES Figure 13.1 (Surface Water Features, Licensed Abstractions, Consented Discharges and Fluvial Flood Risk) (**TR010066/APP/6.2**), one is located approximately 300m north-east of Old Lodge Farm, within the study area. The other two licensed surface water abstractions are located approximately 200m and 400m east of the study area, respectively.

13.8.46. There is one active licensed abstraction borehole in the Sherwood Sandstone at Bodmin Road Wyken (18/54/11/0141) 850m north-west of the Order Limits, within the 1km study area (ES Figure 13.6 (Groundwater Abstractions and Source Protection Zones) (**TR010066/APP/6.2**)). It is operated by Aluminium Surface Engineering for industrial and commercial purposes and has a pump intake at approximately 63m below ground level. As the Sherwood Sandstone is likely to be hydraulically isolated from the Scheme, this abstraction is not considered further in the assessment.

13.8.47. Brinklow Quarry boreholes are to the south-east of the Scheme and greater than 2km from any proposed structures. This licensed abstraction is not located directly down hydraulic gradient of the Scheme and therefore not considered further in the assessment.

13.8.48. Requests were submitted to Coventry City Council and Warwickshire County Council for details of unlicensed abstractions. Both local authorities responded that this information was not available. No unlicensed abstractions were identified during the WFS.

Consented discharges

13.8.49. There is one consented surface water discharge located approximately 900m south-east of the Scheme Order Limits within the study area (ES Figure 13.1 (Surface Water Features, Licensed Abstractions, Consented Discharges and Fluvial Flood Risk) (**TR010066/APP/6.2**)). The discharge is for Old Lodge and Roseycombe Farm to discharge sewage and trade waste to a freshwater river. There are a further two consented surface water discharges located just outside the study area (ES Figure 13.1 (Surface Water Features, Licensed Abstractions, Consented Discharges and Fluvial Flood Risk) (**TR010066/APP/6.2**)). One located to the south-west of the Scheme is for sewage discharge of a domestic property on Copsewood Golf Club. The second is located south of the Scheme and is for discharge from a Severn Trent Water pumping station.

13.8.50. There are no consented discharges to groundwater within the study area.

13.8.51. Requests were submitted to Coventry City Council and Warwickshire County Council for details of unconsented discharges. Both local authorities responded that this information was not available.

Flood risk

13.8.52. The risk of flooding within the study area together with the risk to and from the Scheme has been assessed and discussed in detail in ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**)) in accordance with the NPS NN, the NPPF and its associated PPG for flood risk and coastal change. The Flood Risk Assessment includes future climate change predictions within its analysis.

Fluvial flood risk

13.8.53. The Scheme is not influenced by tidal variations and therefore tidal flooding has been scoped out of this assessment, as agreed with the Planning Inspectorate in the Scoping Opinion (**TR010066/APP/6.9**). See 3.9.2 in ES Appendix 4.1 (Scoping Opinion Response) (**TR010066/APP/6.3**).

13.8.54. The Environment Agency's Flood Map for Planning shows that the majority of the Scheme and study area is located within Flood Zone 1 (ES Figure 13.1 (Surface Water Features, Licensed Abstractions, Consented Discharges and Fluvial Flood Risk) (**TR010066/APP/6.2**)). Land immediately surrounding the River Sowe, Smite Brook, Withy Brook, Birchley Beck, and its unnamed tributary primarily lie within Flood Zones 2 and 3 (ES Figure 13.1 (Surface Water Features, Licensed Abstractions, Consented Discharges and Fluvial Flood Risk) (**TR010066/APP/6.2**)).

13.8.55. Sections of the study area to the south of the existing Walsgrave Junction and along the B4082 lie within Flood Zones 2 and 3. In addition to this, Flood Zone 2 associated with Birchley Beck and its unnamed tributary, encroach the study area along Brinklow Road. Flood Zone 2 is also located approximately 300m north of the Scheme associated with the Withy Brook.

13.8.56. The Environment Agency's flood zones are defined below. The Environment Agency split Flood Zone 3 into two further zones, which refer to the probability of river or sea flooding:

- Flood Zone 1. This zone comprises of land with less than 1 in 1000 annual probability of river or sea flooding in any one year (0.1%).
- Flood Zone 2. This zone comprises of land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1%-0.1%) or between 1 in 200 and 1 in 1000 annual probability flooding from the sea (0.5%-0.1%) in any one year.
- Flood Zone 3a. This zone comprises of land assessed as having a 1 in 100 year or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
- Flood Zone 3b. The Functional Floodplain. This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise:
- land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively
    - land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding)

13.8.57. A Scheme specific hydraulic model has been developed to refine the understanding of the baseline and post development conditions. This demonstrates that the existing highway is not at flood risk during the 1% event. Although there are areas at flood risk adjacent to the Scheme, these are broadly in line with those shown in the Environment Agency's Flood Map for Planning as described above. Further information is provided within ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**)).

Pluvial flood risk

13.8.58. The Environment Agency's Long Term Flood Risk map indicates the majority of the Scheme is at very low risk of flooding from pluvial sources (surface water). This indicates the majority of the Scheme has a chance of flooding of less than 0.1% each year. However, ES Figure 13.3 (WFD Surface Waterbody

Catchments) (**TR010066/APP/6.2**) shows high and medium risks of surface water flooding along parts of the B4082 and the A46, on the northbound carriageway from the existing Walsgrave Junction. ES Figure 13-3 (Pluvial Flood Risk) (**TR010066/APP/6.2**) also shows medium risks of surface water flooding along the B4082.

13.8.59. Outside the Scheme, within the study area, areas at medium risk of surface water flooding are predominantly located within floodplains of Smite Brook, Birchley Beck and the River Sowe.

13.8.60. The pluvial flood zones are classified by the Environment Agency as:

- low – each year, the area has between 1 in 1000 (0.1%) and 1 in 100 (1%) chance of flooding in any given year
- medium – each year, the area between 1 in 100 (1%) and 1 in 30 (3.3%) chance of pluvial flooding in any given year
- high – each year, the area has greater than 1 in 30 (3.3%) chance of pluvial flooding in any given year

13.8.61. DDMS identified three flood hotspots driven by nine flood events between 2016 and 2022. The most severe being a medium flooding event (rated 7 on the flood severity index). DDMS indicates these events are caused by defective gullies/drainage or blocked/overgrown channels.

Groundwater flood risk

13.8.62. Due to potentially high groundwater levels within the study area, the Scheme is at risk from groundwater flooding. Both Warwickshire County Council (2013) and Coventry City Council (Coventry City Council, 2015) SFRAs have been taken into consideration during analysis of the baseline flood risk from groundwater as outlined in the Environmental Scoping Report (**TR010066/APP/6.8**). The SFRAs indicate the susceptibility to groundwater flooding is between 25% and 75%.

13.8.63. ES Figure 13-7 (Susceptibility to Groundwater Flooding) (**TR010066/APP/6.2**) indicates that much of the Scheme either has the potential for groundwater flooding to occur at surface or the potential for groundwater flooding of property situated below ground level. Within the study area, permeable superficial deposits associated with the River Sowe and Smite Brook have potential to cause groundwater flooding to occur at surface, including where Smite Brook crosses the Scheme beneath the B4082 and A46 via culverts.

Reservoir flood risk

13.8.64. Coombe Pool is designated as a high-risk reservoir and is owned and maintained by Coventry City Council. It is the responsibility of Coventry City

Council to maintain the asset to a high standard to prevent the unlikely event of reservoir breach to occur.

13.8.65. The best available information on the potential flood risk associated with a failure of Coombe Pool is available from the Environment Agency's reservoir flood maps. The Environment Agency have not been able to provide further site-specific modelling or mapping for consideration in this assessment due to national security considerations. These maps are derived from the Environment Agency Reservoir Flood Mapping (RFM) hydraulic modelling, which was completed in 2020. The maps show where water may go in the unlikely event of a reservoir failure. The publicly available maps predict two flooding scenarios:

- Dry Day scenario – Flooding that would occur if the reservoir failed when river levels are at a 'normal' level.
- Wet Day scenario – Flooding that would occur if the reservoir failed when rivers are experiencing an extreme natural flood (0.1% AEP).

13.8.66. The dry-day flood extents largely resemble the predicted 1% AEP plus 32% climate change fluvial flood extents modelled for this assessment albeit with increased predicted extent along Smite Brook and its tributaries. The wet-day extents show significantly increased floodplain coverage including a section of the A46 adjacent to the Coombe Pool spillway.

Sewers

13.8.67. The Scheme borders the eastern edge of the City of Coventry albeit within a predominantly rural area to the east of the city. To the east of the Scheme lies the Warwickshire administrative boundary. The only drainage infrastructure in the surrounding area is associated with the existing A46 carriageway and the B4082 leading to the existing Walsgrave Junction. Only the areas west of the Scheme are contained within an urbanised area of Coventry. Information via DDMS shows the drainage network of the existing A46 carriageway is isolated from the local networks.

13.8.68. The Warwickshire County Council SFRA reports no instances of sewer flooding in the area. However, the Coventry City Council SFRA indicates there have been two instances of sewer flooding within the CV3 2 postcode area, where the Scheme is located, although the locations where these occurred are not known.

Designated water dependent conservation sites

13.8.69. Surface water and groundwater dependent designated conservation sites within the study area are presented in ES Figure 13.4 (Aquifer and Environmental Designations) (**TR010066/APP/6.2**) and include:

- Coombe Pool SSSI (1014505) is located 100m east of the Order Limits. Coombe Pool is designated for its herons, other breeding waterfowl and wintering wildfowl.
- Coastal and Floodplain Grazing Marshes within the Priority Habitat Inventory located approximately 350m west of the Order Limits.
- Herald Way Marsh SSSI / LNR is located approximately 1.5km south south-west of the Order Limits and designated for its range of wetland habitats and assemblages of invertebrates. It is likely to be in hydraulic continuity with the superficial aquifers and is therefore considered as a GWDTE in this assessment.

Aquatic ecology

13.8.70. Potential impacts on the water environment due to the Scheme can inadvertently impact the aquatic ecology of the study area. Potential impacts on such features have been assessed and are detailed in ES Chapter 8 (Biodiversity) (**TR010066/APP/6.1**) and the features are summarised below:

- The presence of otters was identified during surveys undertaken in 2022 and 2023. Three otter couches were identified on the northern banks of Coombe Pool, one couch was identified on Smite Brook and one couch was identified on the River Sowe. Numerous feeding remains were also identified on the northern banks of Coombe Pool.
- Aggregations of breeding birds - Grey Heron, Ardea cinerea.
- Aggregations of non-breeding birds - Shoveler, Anas clypeata.
- Assemblages of breeding birds - Lowland open waters and their margins.

Recreation

13.8.71. The western half of Coombe Pool, closest to the Scheme, is reserved for angling and is a premier coarse fishery. Bird watching is also undertaken along the banks of Coombe Pool.

13.8.72. The River Sowe is used for recreation and angling.

Historical flood events

13.8.73. Warwickshire County Council, joint with Rugby Borough Council, SFRA (URS Infrastructure & Environment UK Limited, 2013) and the historic flooding map (Environment Agency, 2024f) indicates there have been no recorded historical flood events within the Order Limits or the study area. However, the Coventry City Council SFRA (Coventry City Council, 2015) indicates that there have been a number of flood incidents outside the Order Limits, within the study area since 1990. Two to five incidents occurred at one location south of the Order Limits,

adjacent to the existing A46 carriageway. The majority of the other incidents in the study area are associated with the River Sowe.

Events impacting the water environment

13.8.74. The Envirocheck report (Landmark Information Group Limited, 2023) reported seven pollution incidents to controlled waters within the study area. Six of the pollution incidents were described as minor with one described a significant incident due to an unknown pollutant located at Coombe Pool Fishery. The other six, minor incidents relate to oils (two) sewage (two) and miscellaneous (two) within the Sowe catchment.

Climate change

13.8.75. The Met Office UK climate averages (Met Office, 2024) for Coventry indicate that:

- average monthly maximum temperatures range from 7.24 to 21.51°C and average monthly minimum temperatures range from 1.75 to 12.64 °C in the climate period 1991-2020. The average annual maximum temperature for the region is 14.17°C and average annual minimum temperature for the region is 6.62°C for the climate period 1991-2020.
- total annual sunshine in the region is 1507.22 hours in the climate period 1991-2020.
- total annual rainfall in the region is 698.30mm and there are 123.33 days of rainfall annually in the climate period 1991-2020.

13.8.76. In accordance with the climate change allowance (Environment Agency, 2022b), the Scheme is classed as ‘essential infrastructure’ and partly lies within Flood Zone 3b. Therefore, in terms of changes in peak river flows, the higher central climate change allowance applies for the 2080s (as the Scheme has a design life of 100 years). In the Avon Warwickshire Rivers Management Catchment, the higher central allowance is 32% for the 2080s (2070 to 2115). The anticipated changes in peak rainfall intensity in the catchment for the 2070s (2061 to 2125) is between 25% and 40%, for the central and upper end allowances respectively, for the 1% annual exceedance rainfall event.

13.8.77. Climate change predictions suggest that future annual groundwater recharge (effective recharge) volumes are broadly stable, although the period when groundwater recharge occurs is likely to become shorter. The consequence of the anticipated shortening of the groundwater recharge season is that there will be a greater variability of groundwater levels and greater drought vulnerability (Environment Agency, 2019).

Sensitivity of receptors

13.8.78. Surface water receptors or features that have been identified as potentially being affected by construction and / or operation of the Scheme are shown in ES Figure 13.1 (Surface Water Features, Licensed Abstractions, Consented Discharges and Fluvial Flood Risk) (**TR010066/APP/6.2**). Groundwater receptors or features that have been identified as potentially being affected by construction and / or operation of the Scheme are shown in ES Figure 13.5 (WFD Groundwater Bodies) (**TR010066/APP/6.2**). The sensitivity or importance of these features in terms of their attributes is summarised in Table 13-11 in accordance with the DMRB LA 113 guidance. Water features that are considered to be hydraulically isolated from the Scheme have not been included in this assessment. This includes the scoping out of Avon – ClaycotonYelvertoft Bk to conf R Sowe for this reason which was agreed by the Planning Inspectorate within the Scoping Opinion (**TR010066/APP/6.9**). See 3.9.1 in Appendix 4.1 (Scoping Opinion Response) (**TR010066/APP/6.3**).

Table 13-11 Summary of the Sensitivity of Receptors

Feature	Attribute	Importance	Reason for assigned value
Coombe Pool (WBID: GB30937926) Hydraulically connected ponds	Recreation	High	Recreational use is predominantly angling and bird watching.
	Water supply and quality	High	WFD chemical classification fail. No known abstractions
	Dilution and removal of waste products	Medium	Large, heavily modified water body. The reservoir is 32 ha in size. Smite Brook discharges into Coombe Pool.
	Value to economy	Medium	No known licensed or unlicensed abstractions within the study area. Used in a number of recreational activities while also forming part of Coombe Abbey Park and the Coombe Abbey Hotel.
	Biodiversity	Very high	Combe Pool is a SSSI, Otters present within the Order Limits
River Sowe and its tributaries (within Sowe – conf Withy Bk to conf R Avon WFD waterbody) (GB109054044540)	Water supply and quality	High	WFD chemical classification fail. No known abstractions
	Dilution and removal of waste products	Low	No known consented discharges within the study area Q95 flow = 0.58m3/s
	Recreation	Medium	Used for angling
	Value to economy	Low	No known licensed or unlicensed abstractions within the study area. Low economical value
	Conveyance of flow	High	Q95 flow = 0.58m3/s
	Biodiversity	Very high	Priority Habitat Inventory - Coastal and Floodplain Grazing Marsh. Otters present along the River Sowe.

Feature	Attribute	Importance	Reason for assigned value
Smite Brook and its tributaries, including Birchley Beck, (within Smite Bk – source to conf R Sowe WFD waterbody) (GB109054044630)	Water supply and quality	Medium	WFD chemical classification fail. No active licenced abstraction within the study area
	Dilution and removal of waste products	Low	No known consented discharges within the study area Q95 flow = 0.20m3/s
	Recreation	Low	No known recreational use.
	Value to economy	Low	One active licenced abstraction for agricultural use for Old Lodge Farm located along a tributary of Smite Brook. No known economical value.
	Conveyance of flow	Medium	Not designated artificial or heavily modified Q95 flow = 0.20m3/s
	Biodiversity	Very high	Otters have been confirmed to use the linear watercourse corridor of Smite Brook. Birchley Beck enters within Coombe Pool SSSI
Withy Brook and its tributaries (within Withy Bk – source to conf R Sowe WFD waterbody) (GB109054044640)	Water supply and quality	High	WFD classification. No known abstractions within the study area
	Dilution and removal of waste products	Low	No known consented discharges within the study area Q95 flow = 0.13m3/s
	Recreation	Low	No known recreational use
	Conveyance of flow	Medium	Not designated artificial or heavily modified Q95 flow = 0.13m3/s
	Value to economy	Low	No known licensed or unlicensed abstractions within the study area. No known economical value
	Biodiversity	Low	Unknown fish quality, no designated sites.
River Sowe floodplain	Conveyance of flow	Very High	Floodplain includes the B4082 and A46, which are classified as essential infrastructure.
Smite Brook floodplain	Conveyance of flow	Very High	Floodplain includes the B4082 and A46, which are classified as essential infrastructure.
Withy Brook floodplain	Conveyance of flow	Very High	Floodplain includes the A46, which is classified as essential infrastructure.
Warwickshire Avon – Secondary Mudrocks WFD groundwater body (Mercia Mudstone) and overlying secondary superficial aquifers	Water supply/quality	High	Secondary aquifers have the potential to support local water supplies. WFD groundwater body has Good status.
	Soakaway	Low	No consented discharges. There may be some existing road drainage infiltrating to ground.
	Vulnerability	High	Groundwater vulnerability classification of medium - high, meaning that there is

Feature	Attribute	Importance	Reason for assigned value
			only limited protection against pollutants being transmitted to groundwater.
	Economic value	Low	No local abstractions from superficial deposits or Mercia Mudstone directly downgradient of the Scheme.
	Conveyance of flow	High	Superficial aquifers support baseflow to surface water bodies (River Sowe and Smite Brook).
	Biodiversity	High	Superficial aquifers support Herald Way Marsh SSSI – assessed to have High importance (ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**)).

Future baseline

Surface water

13.8.79. The future baseline conditions for water quality could alter due to changes in land use. Measures to improve watercourses in line with legislative objectives may result in an improvement away from baseline water quality over time. Climate change may lead to a change in both low and high flows in watercourses, leading to subsequent changes in dilution capacity. Given the onset of climate change driven weather events changes in hydromorphology may include localised lateral adjustment where unconfined, channel incision where watercourses comprise of a steep gradient and other natural processes.

Flood risk

13.8.80. Over the anticipated lifetime of the Scheme changes to the baseline as a consequence of climate change would likely occur, including a likely increase in the frequency and magnitude of flood events. Future baseline accounting for climate change has been assessed in line with the latest Environment Agency guidance for increases in fluvial flows and rainfall intensity which can be found in ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**).

Groundwater

13.8.81. Over the anticipated lifetime of the Scheme baseline conditions for groundwater resources and receptors could be altered. Predictions suggest that future annual groundwater recharge (effective recharge) volumes are broadly although the period when groundwater recharge occurs is likely to become shorter., resulting in prolonged drought periods and a greater groundwater level variability. This may lead to a reduction in baseflow to watercourses and GWDTEs in the medium to long term. Based on currently available information, changes to the groundwater regime brought about by climate change are unlikely to cause a significant change in baseline groundwater quality.

13.9. Potential impacts

13.9.1. This section considers the potential impacts upon surface water (which include flood risk, WFD and water quality) and groundwater receptors, during construction and operation of the Scheme prior to the implementation of mitigation measures.

13.9.2. Where the effect of the Scheme on a receptor would result in potential impact, this has been assessed below. For groundwater, the potential impacts have been identified through a simple hydrogeological assessment of construction and operational activities following a source – pathway – receptor approach as provided in ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**).

Construction

Surface water

13.9.3. Construction activities increase the risk of a pollution incident from accidental spillages or leakage of fuels, oils, chemicals, wastewater, concrete or cement admixtures used. Such accidental spillages are likely to impact upon surface water features such as Coombe Pool, the River Sowe, Smite Brook, Withy Brook and tributaries. This has the potential to have a negative impact upon downstream aquatic environments, recreation, water supply, water quality and recreation.

13.9.4. Construction works taking place within, adjacent, over, or close to surface water features, including the fluvial floodplain, as detailed in in ES Appendix 13.5 (Hydromorphological Assessment) (**TR010066/APP/6.3**), would have the greatest potential to impact upon the surface water environment. There will be a requirement to work within a watercourse or floodplain, in order to complete the construction of two new outfalls (one to the new highways drainage ditch along the western side of the B4082 and one from the northern pond into the existing ditch identified as Watercourse 2) and a temporary culvert of a ditch (identified as watercourse 2) to enable access into the satellite compound area. Works also involve the modification of the A46 southbound embankment (including adding a clay layer) and the severance, realignment and partial infilling of two ephemeral watercourses (identified as watercourses 1 and 3). The placement of construction materials, washing of plant and vehicles, and cleaning areas of hardstanding, for example, increases the potential for mobilisation of sediment and contaminants from surface water runoff to watercourses. These activities could adversely impact upon the water quality, recreational users, value to the economy and the aquatic ecology aspects of surface water features including Coombe Pool, River Sowe and Smite Brook and their tributaries. Due to Withy Brook being located upstream it is not anticipated to be affected by this impact. Additionally, the three identified watercourses are ephemeral with limited

biodiversity or habitat to note, and due to this the impact on the habitat is identified as being small scale (as noted in ES Chapter 8 (Biodiversity) (**TR010066/APP/6.1**).

13.9.5. There is potential to impact upon WFD status, habitat and ecology of the local environment during construction of:

- proposed highway drainage and outfalls to watercourses 1, 2 and 3
- severing and infilling of 150m of an ordinary watercourse (identified as watercourse 1), west of the A46
- severing, infilling and realignment of 125m of ordinary watercourse (identified as watercourse 3), east of the A46, diverting flow into the A46 drainage system
- temporary culvert (during construction only) is proposed on an ephemeral tributary of the River Sowe (identified as watercourse 2).
- ponds and basins required for runoff attenuation and water quality mitigation, respectively

13.9.6. During construction, there will be a requirement to work within, adjacent, over or close to water bodies, watercourses, or the fluvial floodplain. The construction includes the implementation of two proposed outfalls, a temporary culvert, embankment modification and the severance and partial infilling of watercourses 1 and 3. These construction works may cause an increase in the risk of fluvial flooding to the Scheme due to temporary obstruction or changes in the flows within the channels or floodplain. This has the potential to place construction workers and equipment at risk of flooding. Additionally, this could adversely impact upon flood-sensitive receptors such as the River Sowe and its tributaries, Coombe Pool and Smite Brook. Due to the location of works, it is considered there would be no impact to the River Sowe or Withy Brook floodplains. Hydraulic modelling was undertaken as part of the Flood Risk Assessment (ES Appendix 13.1 (**TR010066/APP/6.3**) which confirmed that the Scheme Order Limits, including construction compounds, are not at risk of flooding other than the southern highway embankment adjacent to Coombe Pool. In addition to this, with consideration to the location of material stockpiles and the nature of the construction works, localised flooding is not anticipated to affect the Scheme and nearby receptors. The risk to workers results from fluvial flooding and reservoir failure of Coombe Pool and overflows from the convergence of Smite Brook and its tributaries prior to the A46 culvert.

13.9.7. During construction, increases in new hardstanding areas, including the construction compounds and additional road, has the potential to increase the volume and flow rate of runoff. This could result in the overloading of the temporary drainage system, increasing localised flooding to the Scheme.

Additionally, this could adversely impact upon downstream aquatic environments, the value to economy, and the water quality and supply of surface water features such as the River Sowe, Smite Brook, Withy Brook and their tributaries and floodplains.

13.9.8. Alteration of ground elevations and construction of above ground structures will act as a barrier to surface water flow pathways. This could cause localised flooding to the Scheme and nearby receptors due to changes in surface water flood flow pathways. Indirectly, overloading of the temporary drainage system could adversely impact on surface water features including the River Sowe, Smite Brook, Withy Brook and their tributaries and floodplains. This, in turn, may have a negative impact on down gradient flood-sensitive receptors, aquatic environments, value to economy, water quality (mobilisation of sediment and pollutants) and recreational users.

Groundwater

13.9.9. Construction activities with the potential to impact groundwater have been considered in Sections 3 and 4 of ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**). Those identified as having the potential to impact on groundwater receptors within the study area are described below.

13.9.10. Drainage of construction areas where topsoil has been removed may result in surface water contaminated by construction materials discharging to groundwater. Contamination may arise as a result of accidental spillages and leakages, for example during refuelling activities, or from suspended solids in runoff from stockpiled areas. The contamination risk increases in areas where the groundwater vulnerability is high, for example where construction areas directly overlie the Baginton Sand and Gravel Formation Secondary A aquifer, to the north of the existing Walsgrave Junction.

13.9.11. Similarly, excavations for drainage basins, ponds, cuttings, service trenches, and reinforced soil wall foundations have the potential to increase the vulnerability of underlying aquifers. In addition to increasing the risk of aquifer contamination from leakages and accidental spillages, excavation activities may generate groundwater turbidity, particularly if excavation is undertaken during periods of heavy rainfall. This has the potential to impact the superficial deposits, underlying Mercia Mudstone and indirect receptors River Sowe and Smite Brook in terms in terms of water quality, vulnerability and economic value. The likely significance of effects to soakaway and economic value are considered neutral due to the lack of known consented discharges or licensed abstractions in the study area. Whilst there is also the potential for biodiversity impacts to the Herald Way Marsh SSSI where the Baginton Sand and Gravel Formation is present beneath the Scheme as it has the potential to act as a pathway for

contaminants, excavations for the B4082 cutting and ponds are hydraulically isolated from the southern extents of the Scheme, where the SSSI is located, by Smite Brook and the less permeable Mercia Mudstone Group.

13.9.12. Groundwater may also become contaminated through direct contact with construction materials where it is intercepted by excavations for drainage basins, ponds, cuttings, service trenches, and reinforced soil wall foundations. It is anticipated that where shallow groundwater is intercepted dewatering may be required.

13.9.13. Dewatering activities associated with temporary excavations that extend below the water table may divert groundwater flow and potentially reduce baseflow to Smite Brook and the River Sowe. In particular, dewatering associated with the B4082 cutting, which intercepts permeable horizons of the Baginton Sand and Gravel Formation, presents a potential risk to groundwater levels and resource.

13.9.14. Below ground temporary and permanent structures that extend below the water table also have the potential to divert groundwater flow to receptors. They may also increase the risk of groundwater flooding up-gradient by acting as a groundwater dam, particularly where groundwater levels are close to surface.

13.9.15. Dewatering discharges may contain suspended solids or be contaminated if the excavation is in contaminated ground. Without appropriate treatment, the discharges have the potential to contaminate the receiving waterbody i.e. superficial aquifers via infiltration galleries or the River Sowe or Smite Brook. Any infiltrations directly to ground to the south of Smite Brook have the potential to contaminate groundwater and subsequently the Herald Way Marsh SSSI through permeable horizons.

13.9.16. Piles associated with the variable message sign gantry are likely to intercept more than one aquifer units. There is potential for contamination of groundwater within the superficial aquifers through smearing of contaminants from surface, generation of turbidity, creation of pathways for the migration of groundwater between aquifer units or by direct contact with construction materials. The new overbridge structure is located up-hydraulic gradient of the River Sowe and therefore any potential contamination of the aquifer in this area may also result in contamination of the river.

13.9.17. These below ground activities have the potential to impact the superficial deposits and underlying Mercia Mudstone, as well as indirect receptors River Sowe, Smite Brook and Herald Way Marsh SSSI in terms of water supply, economic value and conveyance of flow, and water quality, soakaway function, vulnerability and biodiversity. Due to the lack of known consented discharges or

licensed abstractions, the significance of effect on conveyance of flow and soakaway function is neutral.

13.9.18. Alteration of ground profiles, for example embankments, and creation of additional hardstanding areas, for example for access roads and construction compounds during the construction period has the potential to reduce the potential area of effective recharge to the superficial deposits and Mercia Mudstone aquifers, resulting in potential impacts to water supply and quality, soakaway function, groundwater vulnerability and economic value. This may also reduce groundwater flow to receptors resulting in an impact to conveyance of flow and reduction in baseflow to the indirect receptors River Sowe and Smite Brook. This is unlikely to affect biodiversity and the Herald Way Marsh SSSI as this is situated to the south of Smite Brook in an area where there is limited hydraulic connection to the rest of the Scheme and limited construction nearby (see ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**)).

Operational

Surface water

13.9.19. There is a risk of pollution to surface water features resulting from accidental spillage or pollution incidents. This risk would be exacerbated by the increase in the volume of traffic. The potential water quality impacts of accidental spillages on surface water bodies were assessed using HEWRAT spillage assessment, as described in Appendix D of DMRB LA 113. The assessment (as detailed in ES Appendix 13.3 (Water Quality Assessment) (**TR010066/APP/6.3**)) indicates that the annual risk of pollution incidents less than the annual acceptable threshold of 0.5%. All catchment areas passed the accidental spillages assessment and therefore it is considered there is no risk to the receptors.

13.9.20. The Scheme would result in an increase in the highway drainage area, coupled with the associated increase in traffic volumes would result in an increase in pollutant loads in highway runoff. This could result in a long-term increase in diffuse pollution. An assessment of pollution impacts from routine runoff to surface waters was undertaken using HEWRAT. This assessment establishes potential impacts of pollutants (including sediment) in routine highway runoff for the Scheme upon surrounding water bodies and the requirement for mitigation measures to adequately reduce the risk. The assessment shows that there is a negligible impact following dilution in the channel for both soluble and sediment-bound pollutants for four of the six drainage catchments. Catchments 5 and 6 failed the HEWRT assessment, due to this the increase in diffuse pollution has the potential to adversely impact upon water quality, recreational users, value to the economy and aquatic ecology of surface water features, including the River Sowe and its tributaries.

13.9.21. The WFD ecological quality elements that could be impacted from accidental spillage or increases in pollutant loads in highway runoff include:

- physicochemical quality elements (ammonia, dissolved oxygen, pH, phosphate and temperature)
- biological quality elements (invertebrates and macrophytes and phytobenthos)
- hydromorphological quality elements (hydrological regime and morphological conditions) evaluated within ES Appendix 13.5 (Hydromorphological Assessment) (**TR010066/APP/6.3**).

13.9.22. The Scheme, through the creation of the new carriageway, slip roads, and hardstanding areas, would result in an increase in impermeable area. If not mitigated, the works would increase the peak flow rate of runoff as well as the volume from the carriageway. There is already an existing flood risk issue identified by DDMS due to defective gullies/drainage or blocked/overgrown channels. This could result in increased localised flooding to the Scheme and to others downstream and may exacerbate an existing flood risk issue. Additionally, this would adversely impact upon downstream aquatic environments such as the River Sowe and its tributaries, Smite Brook and their floodplains.

13.9.23. Increases in hardstanding and alterations to ground elevations due to re-profiling may also have an impact upon fluvial flood risk for example in terms of floodplain storage capacity. This has the potential to increase flood risk to the Scheme and to others. This could result in increased or redirected flooding close to the Scheme with potential increased flood risk to the Scheme and to Coombe Pool as reservoir flood risk, the River Sowe, Smite Brook and their tributaries and floodplains. Indirectly, this could potentially affect downstream aquatic environments.

13.9.24. The construction of two new outfalls, discharging runoff from catchment 5 to a tributary of the River Sowe (identified as watercourse 2) and from catchment 6 to a ditch which connects to a tributary of the River Sowe (identified as watercourse 1), has the potential to cause river erosion. The outfall structure itself, if not set back into the riverbank, could create localised turbulent flows which could lead to erosion of the bed and bank. In turn this can impact on channel stability, structural damage and an increase sediment in downstream reaches leading to degradation of the watercourse habitat. Degradation of the watercourse habitat and supporting ecological features, adversely impacts the following WFD ecological and hydromorphological elements of the River Sowe and its tributaries. The location of the new and existing outfalls can be found in Annex A of ES Appendix 13.3 (Water Quality Assessment) (**TR010066/APP/6.3**).

13.9.25. The location of the Scheme will require severing and infilling of 150m of an ordinary watercourse, west of the A46 and the severing, infilling and realignment of 125m of ordinary watercourse, east of the A46. This has the potential to result in the loss, or deterioration of channel and riparian habitat, and reduce the hydromorphological complexity of tributaries of the River Sowe. However, as the areas of ordinary watercourses that will be infilled and redirected are ephemeral in nature with limited biodiversity or habitat, it is considered there would be no operational impacts.

Groundwater

13.9.26. Operational activities with the potential to impact groundwater levels and flows are considered in Sections 3 and 4 of ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**).

13.9.27. The existing and proposed road drainage design incorporates unlined road drainage in the form of filter drains and unlined drainage ditches. Discharges from unlined road drainage has the potential to contaminate groundwater, particularly if there is a limited thickness of unsaturated zone. Where groundwater levels are close to surface, unlined road drainage can also act as a groundwater drain, locally controlling groundwater levels. This may be the case in the northern extents of the Scheme.

13.9.28. Potential impacts from road drainage are considered in the groundwater quality and routine runoff assessment presented in Sections 3 and 4 of ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**). These were undertaken in accordance with the assessment methods set out in DMRB LA 113, The assessment identified a medium risk to water quality of the receiving superficial aquifer, and therefore impacts in terms of soakaway function, vulnerability and economic value. Such water quality impacts also apply to indirect groundwater receptors such as River Sowe and Smite Brook, due to shallow groundwater levels. The significance of effects on soakaway function and economic value were considered neutral due to the lack of known consented discharges and licensed abstractions. Cuttings that extend below the water table have the potential to result in permanent interception of groundwater, resulting in groundwater seepages through the cutting face and a long-term reduction in groundwater availability for down-gradient receptors such as the River Sowe and Smite Brook, therefore impacting water supply, economic value and conveyance of flow. The significance of effects on economic value are neutral due to the lack of known licensed abstractions however.

13.9.29. Below-ground structures and piles that extend below the water table have the potential to create a barrier to groundwater flow, especially within superficial aquifers that have limited spatial extents. This may result in groundwater

mounding up-gradient of the structure and redirection of groundwater away from receptors down-gradient. If groundwater levels are shallow, groundwater mounding may increase the risk of flooding. The drainage basins have also been identified as having the potential to cause groundwater mounding and redirection of groundwater flows downgradient, potentially affecting baseflow to the River Sowe and Smite Brook. These below-ground structures therefore have impacts to water supply, economic value and conveyance of flow. The significance of effects to economic value are neutral due to the lack of known licensed abstractions however. No structures have been identified in areas that may result in a reduction of flow to the Herald Marsh Way SSSI (see ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**), and as such there is no impact to biodiversity.

13.9.30. Alteration of ground profiles, for example embankments, and creation of additional hardstanding areas, for example for access roads have the potential to reduce the potential area of effective recharge to the superficial deposits and Mercia Mudstone aquifers, resulting in potential impacts to water supply and quality, soakaway function, groundwater vulnerability and economic value. This may also reduce groundwater flow to downgradient receptors such as River Sowe and Smite Brook, therefore resulting in impacts to conveyance of flow. This is unlikely to affect biodiversity and the Herald Way Marsh SSSI, however, as this is situated to the south of Smite Brook in an area where there is limited hydraulic connection to the rest of the Scheme and limited construction nearby (see ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**)).

13.10. Design, mitigation and enhancement measures

Design

13.10.1. The development of the Scheme design has been an iterative process. The environment team has worked in close collaboration with the infrastructure design team to avoid or reduce environmental impacts through the Scheme design. This is referred to as embedded (or design) mitigation. The principles of the design and mitigation hierarchy outlined in DMRB LA 104 Environmental Assessment and Monitoring have been followed. The first principle being to avoid potential adverse effects, if at all feasible, before seeking to minimise or mitigate for any unavoidable impacts. Embedded mitigation for the Scheme are reported in ES Chapter 2 (The Scheme) (**TR010066/APP/6.1**).

13.10.2. Scheme design principles adopted to avoid or prevent adverse environmental effects are set out within the Scheme Design Report (**TR010066/APP/7.4**). This includes general principles and specific commitments that will inform the detailed design of the scheme. ES Chapter 3 (Assessment of Alternatives)

(**TR010066/APP/6.1**) details the design alternatives that have been considered, including the environmental factors which have influenced the decision-making.

Mitigation

13.10.3. Mitigation is included in the Register of Environmental Actions and Commitments (REAC) contained within Appendix A of the First Iteration Environmental Management Plan (EMP) (**TR010066/APP/6.5**). The First Iteration EMP will be developed into the Second Iteration EMP for implementation during construction which is secured by Requirement 4 of the draft DCO (**TR010066/APP/3.1**) (Commitment G1 of the REAC (Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)). Further information on the First Iteration EMP is provided within Section 4.8 of ES Chapter 4 (Environmental Assessment Methodology) (**TR010066/APP/6.1**).

Construction

13.10.4. This section summarises the mitigation required during the construction of the Scheme. Unless stated, all mitigation is considered to be embedded as it follows best practice measures and/or is required to achieve compliance with legislation.

13.10.5. During construction, best practice methods for pollution prevention and water management would be implemented as part of the First and Second Iteration EMP (Commitments RD1, RD2, RD4 and RD12 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)). Guidance on best practice in relation to pollution prevention and water management is set out in CIRIA guidelines (C648 & C811) (Murnane *et al*., 2006) (Kwan *et al*., 2023).

Surface water

13.10.6. The design and construction of above ground structures would aim to minimise potential adverse impacts on surface water features and flood risk. Specific mitigation measures are described below.

13.10.7. Contamination of water receptors from accidental spillages would be minimised by the following measures (Commitment RD1 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)):

- Appropriate storage of fuels, chemicals and construction materials, including bunding of storage tanks, use of silt capture systems and covering stockpiles.
- Refuelling would only occur in designated areas.
- Spill kits would be located in the construction works compounds and construction areas, particularly those near to watercourses. Staff would be trained in their use.

- Site compounds should all have closed drainage systems with appropriate management of foul drainage.
- Emergency response procedures would be included in the Second Iteration EMP to appropriately manage any leakages or spillages of potentially contaminating materials.

13.10.8. Potential pollution pathways between construction works compounds, materials storage and construction areas and ordinary watercourses would be avoided (Commitment RD1 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)).

13.10.9. Measures would be implemented to prevent surface water runoff containing suspended sediment or other potential contaminants reaching watercourses through overland flow during rainfall events. This would include implementing an appropriate treatment train to remove sediment and other contaminants as well as attenuating runoff. This would be specified as part of a temporary works drainage strategy within the Second Iteration EMP (Commitment RD1 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)).

13.10.10. Proposed construction activities include two new outfalls one of which is to an existing watercourse and one to a new proposed highway drainage ditch temporary culverting, partial infilling and severance of two watercourses. Necessary land drainage consents to be sought from the Lead Local Flood Authorities (Coventry City Council and Warwickshire County Council) where disapplication sought pursuant to the draft DCO (**TR010066/APP/3/1**) has not been granted, prior to construction. (Commitment RD7 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)).

13.10.11. The temporary culvert and permanent new outfalls would adhere to C786 – Culvert, Screen and Outfall Manual guidelines (Commitment RD2 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)). The proposed design would include erosion protection measures and be designed to minimise effects on the hydromorphology and ensure no loss of habitat or biodiversity. ES Appendix 13.2 (Water Framework Directive Compliance Assessment) (**TR010066/APP/6.3**) identifies these measures to ensure that there is a negligible risk to WFD waterbody. The WFD compliance assessment indicates that any impacts are likely to be temporary and highly localised due to the design and construction mitigation noted above.

13.10.12. Due to their ephemeral nature and limited biodiversity or habitat, the in-channel works proposed on watercourse 1, 2 and 3 are expected to have a minimal impact on morphology and quality of flow to the River Sowe and will not impact upon flood risk. Works within the ditches will only take place where partial infilling is to occur. SuDS would be implemented as part of the temporary works

drainage strategy during construction (Commitment RD3 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)). This would capture sediment runoff and mitigate the hydromorphological impacts to the watercourse. This measure in line with Guidance for Pollution Prevention 5 (GPP 5): Works and maintenance in or near water (NetRegs, 2018) should ensure sediment from the removal of the A46 southbound embankment is not discharged directly to nearby watercourses.

13.10.13. Potential risks associated with a temporary increase in the area of hardstanding and alteration of ground levels would be managed by the implementation of a temporary works drainage strategy within the Second Iteration EMP. This would implement SuDS principles where appropriate, to attenuate runoff to existing rates and provide water treatment (Commitment RD3 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)).

13.10.14. To manage the effectiveness of the proposed mitigation measures, water quality monitoring would be undertaken throughout the construction phase (Commitments RD1, RD11 and RD13 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)).

13.10.15. The risk of localised flooding as a result of the construction of the Scheme and nearby receptors have been identified as a potential impact to construction workers, equipment and the Scheme. Therefore, it is recommended that contractors subscribe to the Environment Agency Flood Warning service to obtain real time information on flooding, which would inform the proposed construction and emergency procedures. The Second Iteration EMP should ensure that workers are not in the floodplain when flooding is forecast or during / following significant rainfall events. Furthermore, liaison should be undertaken with Coventry City Council who own and maintain the reservoir and with Warwickshire County Council as the LLFA for the area. In addition to this, a flood emergency response plan should also be developed as part of the temporary works drainage strategy, which is part of the water monitoring and management plan, to manage the flood risk impacts during construction and to ensure construction workers are not exposed to increased levels (Commitment RD3 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)). This would also be noted in the Second Iteration EMP which is secured under Requirement 4 of Schedule 2 of the draft DCO (**TR010066/APP/3.1**).

Groundwater

13.10.16. Contamination of water receptors from accidental spillages would be minimised by the following measures (Commitment RD3 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)):

- Appropriate storage of fuels, chemicals and construction materials, including bunding of storage tanks, use of silt capture systems and covering stockpiles.
- Refuelling would only occur in designated areas.
- Spill kits would be located in the construction works compounds and construction areas. Staff would be trained in their use.
- Site compounds should all have closed drainage systems with appropriate management of foul drainage.
- Emergency response procedures would be included in the Second Iteration EMP which is secured under Requirement 4 of Schedule 2 of the draft DCO (**TR010066/APP/3.1**) to appropriately manage any leakages or spillages of potentially contaminating materials.

13.10.17. Temporary dewatering activities may require a transfer or full abstraction licence, while dewatering discharges to the environment may require an environmental permit. All necessary licence and permits would be obtained prior to temporary dewatering commencing and any conditions complied with whilst the licence and permit are in place in line with the Consents and Agreements Position Statement (**TR010066/APP/3.3**) (Commitment RD4 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)). Further investigations are likely to be needed to satisfy Environment Agency requirements before any licence or permit is granted.

13.10.18. Discharges that do not comply with an environmental permit would be collected and disposed of off-site at an appropriately licensed facility (Commitment RD4 of the REAC, Appendix A of First Iteration EMP (**TR010066/APP/6.5**)).

13.10.19. A water monitoring and management plan would be developed to complement the existing baseline water level and water quality monitoring dataset. The water level and water quality monitoring would provide a potential early warning of potential groundwater impacts arising from construction activities, for example pollution incidents. It would also provide data to confirm that a perceived impact has not occurred, for example ground settlement due to temporary dewatering. The water monitoring plan would be included in the Second Iteration EMP which is secured under Requirement 4 of Schedule 2 of the draft DCO (**TR010066/APP/3.1**) (Commitment RD3 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)).

13.10.20. The design and construction of temporary and permanent below ground structures and piles would minimise the potential for groundwater impacts on groundwater levels, flows and quality by adopting the following mitigation measures:

- The design of below ground structures and piles would be selected to minimise disturbance to groundwater flows (Commitments 5, 6 and 8 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)). This in turn would minimise the potential risk of groundwater flooding up-gradient of the structure or piles and minimise potential loss of water supply to down-gradient groundwater receptors.
- Excavation and piling methods would also be selected to minimise the generation of suspended solids and turbidity. Piling materials would be selected to avoid groundwater contamination by direct contact (Commitment RD5 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)).
- The piling method would be selected to avoid the creation of preferential pathways between aquifer units and potential down-drag of contaminated ground (Commitment RD5 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)).
- A piling risk assessment would be undertaken prior to construction commencing, which takes into account relevant Environment Agency guidance on the minimisation of pilling pollution risk being adhered to (Environment Agency, 2001; 2017; and Westcott *et al.,* 2001) (Commitment RD5 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)).

13.10.21. Demolition activities would be designed to minimise impacts on groundwater quality. The Second Iteration EMP which is secured under Requirement 4 of Schedule 2 of the draft DCO (**TR010066/APP/3.1**) would include measures to minimise turbidity generation and contamination by demolition materials. The Second Iteration EMP would also include emergency response procedures in the event of a pollution incident (Commitment RD1 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)).

13.10.22. Inspections, audits, monitoring, and control measure effectiveness would be assessed and reported on throughout the construction programme to ensure best practice is being followed and all regulatory requirements complied with. Implemented mitigation strategies would be reviewed and, if necessary, updated regularly (Commitments RD2, RD3, RD4, RD5, RD6, RD7, RD8, RD9, RD11, RD12 and RD13 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)).

Operation

13.10.23. This section provides further details on the mitigation required for road drainage and the water environment for the implementation of the Scheme. Unless stated all mitigation is considered to be embedded.

Surface water

13.10.24. The Drainage Strategy Report (ES Appendix 13.6 (**TR010066/APP/6.3**)) proposes all road drainage will drain by surface water outfalls discharging to the River Sowe and Smite Brook. The proposed highway drainage will discharge to six locations, utilising two new outfalls on tributaries of the River Sowe. The location of the outfalls can be found in Annex A of the ES Appendix 13.3 (Water Quality Assessment) (**TR010066/APP/6.3**).

13.10.25. Where catchments 5 and 6 failed the HEWRAT assessment without mitigation, further HEWRAT assessments were undertaken to identify mitigation requirements, see ES Appendix 13.3 (Water Quality Assessment) (**TR010066/APP/6.3**). Following this additional assessment, the two outfalls which discharge from catchments 5 and 6 passed the HEWRAT assessment with the inclusion of ponds as essential mitigation. There is an intention in the proposed drainage design to provide a vegetated detention basin on catchment 3 to attenuate runoff (Commitment RD10 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)). As this is not required water quality mitigation, it would provide a betterment through further biodiversity and water quality enhancements. The provision of filter drains is to be considered further during detailed design, due to the potential risk to groundwater (Commitment RD9 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)). Should filter drains remain in the design, it is considered these will result in a betterment, providing further suspended sediment and dissolved zinc removal benefits, as they are not required for mitigation.

13.10.26. A drainage strategy (ES Appendix 13.6 (**TR010066/APP/6.3**)) has been developed for the Scheme that aims to reduce the impact of pluvial flood risk through the use of SuDS. The drainage is designed to attenuate new drainage systems to the greenfield runoff rate, up to a 1 in 100-year rainfall event including a 20% climate change allowance, with a sensitivity test undertaken with a 40% allowance (Commitment RD10 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)). For existing drainage systems that are modified as part of the Scheme, there must be no increase in existing runoff rate; these standards are in accordance with DMRB CG501. This will ensure there is no increase in surface water runoff peak flow rate resulting from the Scheme. In addition to this, the existing flood risk issue identified on DDMS, will be mitigated through the current drainage design and ground levels in the locations will be raised where they currently form a low point.

13.10.27. A kerb and gully system is proposed along the B4082 to channel runoff from the Scheme. A more rural approach, without a kerb, is proposed for the rest of the Scheme. The proposed drainage of road runoff will mitigate the impacts of surface water flooding along the highway.

13.10.28. The proposed detention basin and ponds within the drainage design will be planted with suitable local species to provide further water quality and biodiversity enhancements (Commitment RD10 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)). Vegetated detention basin and ponds would also reduce nitrate and phosphate concentrations through biological uptake. The above-mentioned measures will also mitigate impacts to WFD physicochemical, biological, and specific pollutant quality elements of the River Sowe and Smite Brook. Due to this, the Scheme is compliant with the objectives of the WFD, and the WFD Compliance assessment concludes there is no significant risk to any WFD water bodies, as reported in ES Appendix 13.2 (WFD Compliance Assessment) (**TR010066/APP/6.3**). Details of the drainage design can be found in (ES Appendix 13.6 (Drainage Strategy Report) (**TR010066/APP/6.3**)).

13.10.29. The majority of the Scheme lies within Flood Zone 1; however, where areas lie within Flood Zones 2 and 3, a Flood Risk Assessment (ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**)) has been prepared to assess the flood risk arising from the Scheme. Scheme specific hydraulic modelling has been undertaken, as detailed in the Flood Risk Assessment (ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**)) to determine the fluvial flood risk post development. This model demonstrates that there is no flooding of the carriageway during the 1 in 100 year plus 32% climate change event. The Scheme also does not result in adverse changes in flood risk offsite. This is achieved through:

- The embankment adjacent to the A46 southbound carriageway at Coombe Pool is maintained at a level of at least 74.0mAOD, approximately (the 1 in 100 year plus 32% climate change plus 0.6m freeboard). This is set out in in the Flood Risk Assessment (ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**) and ensures no flooding of the carriageway itself and ensures the Scheme adheres to DMRB LA 113 guidance for projects on motorways. Annex F of the Flood Risk Assessment indicates the bund ranges from 73.923 to 82.224mAOD.
- The proposed A46 southbound embankment will be graded to the existing slope or steeper and ensures no net gain in material below the design level. Therefore, there is no requirement for compensatory flood storage.
- The minimum carriageway levels for the section adjacent to Coombe Pool are maintained, this will ensure there is no change to the reservoir flood risk, in the event of failure of the dam (a residual risk scenario).

13.10.30. The Flood Risk Assessment and hydraulic model can be referred to within ES Appendix 13.1 (Flood Risk Assessment) (**TR010066/APP/6.3**) to assess the impact of pluvial, fluvial, reservoir and groundwater flood risk.

13.10.31. Outfalls would be designed to ensure the outfall structure is set back from the channel bank and bed to minimise the impact on flow and sediment conveyance. The proposed outfall design to include erosion protection measures. Adherence to C786 – Culvert, Screen and Outfall Manual guidelines (Commitment RD11 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)).

Groundwater

13.10.32. A Drainage Strategy Report (ES Appendix 13.6 (**TR010066/APP/6.3**) has been developed that minimises potential impacts on groundwater. All new drains within the Order Limits will be lined where the unsaturated zone beneath the drain is likely to be less than 1m. This is essential mitigation.

13.10.33. Consultation with the Environment Agency will be undertaken with respect to existing filter drains, for example at the northern extent of the Order Limits, which may be receiving groundwater and locally controlling groundwater levels (Commitment RD9 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)). Consultation with the Environment Agency will also be undertaken with respect to the two existing unlined ditches outside the order limits that discharge to the River Sowe. The ditches receive treated water from the road drainage (Commitment RD10 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)).

13.10.34. The design of below ground structures and piles would be selected to minimise disturbance to groundwater flows (Commitment RD8 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)). This in turn would minimise the potential risk of groundwater flooding up-gradient of the structure or piles and minimise potential loss of water supply to down-gradient groundwater receptors. This is essential mitigation.

13.10.35. Should the design of below ground structures, including the drainage ponds, require permanent drainage to prevent potential water supply disruption of groundwater flooding, the design would take into consideration the Environment Agency's regulatory position statement for passive dewatering (Environment Agency, 2020).

13.10.36. The drainage design would ensure that shallow groundwater discharging to filter drains, for example along the toe of cuttings, is returned to the environment in the same catchment so that there is no loss in groundwater resource in the catchment.

Enhancements

13.10.37. There is an intention in the proposed drainage design to provide a vegetated detention basin on catchment 3 to attenuate runoff (Commitment RD10 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)). As this is not required water quality mitigation, it would provide a betterment through further biodiversity and water quality enhancements. The provision of filter drains is to be considered further during detailed design, due to the potential risk to groundwater. Should filter drains remain in the design, it is considered these will result in a betterment, providing further suspended sediment and dissolved zinc removal benefits, as they are not required for mitigation.

13.11. Assessment of likely significant effects

13.11.1. Potential effects on surface water and groundwater receptors during construction and operation are summarised in Table 13-12 and Table 13-13 respectively, together with residual effects after mitigation.

13.11.2. The mitigation measures described in Table 13-12 and Table 13-13, are discussed in Section 13.10 and are summarised below.

13.11.3. The potential effects upon surface water receptors is based on the outcome of the following assessments:

- Flood Risk Assessment (ES Appendix 13.1 (**TR010066/APP/6.3**))
- WFD Compliance Assessment (ES Appendix 13.2 (**TR010066/APP/6.3**))
- Water Quality Assessment (ES Appendix 13.3 (**TR010066/APP/6.3**))
- Hydromorphological Assessment (ES Appendix 13.5 (**TR010066/APP/6.3**)).

13.11.4. Potential effects on groundwater receptors take into consideration the findings of the Groundwater Assessment (ES Appendix 13.4 (**TR010066/APP/6.3**).

13.11.5. Where the significance may be neutral or slight in the significance matrix, for the purpose of this assessment, the worst case scenario has been chosen, unless evidence to state otherwise has been provided in section 13.10 to report a single significance category. Where the significance may be slight to moderate, evidence has been provided in section 13.10 support the reporting of a single significance category.

13.11.6. Potential effects on the WFD status of the affected groundwater bodies is also considered in this section and is based on the assessments noted above. A summary of the surface water WFD assessment is provided.

Construction

Surface water

13.11.7. Accidental leakage and spillage have been identified as a potential impact as a result of the Scheme. This has been identified as having a temporary negligible impact on Coombe Pool (attributes of low to very high importance), River Sowe and its tributaries (attributes of low to very high importance), Smite Brook and its tributaries (attributes of low to very high importance), Withy Brook and its tributaries (attributes of low to very high importance). With mitigation considered this results in a **slight adverse significant effect**.

13.11.8. Works within, adjacent, over or close to water bodies, watercourses, ponds or the fluvial floodplain have been identified as a potential impact to surface water quality as a result of the Scheme. This has been identified as having a negligible impact on Coombe Pool (attributes of low to very high importance), River Sowe and its tributaries (attributes of low to very high importance), Smite Brook and its tributaries (attributes of low to very high importance). With mitigation considered this results in a **slight adverse significant effect**.

13.11.9. Works within, adjacent, over or close to water bodies, watercourses, ponds or the fluvial floodplain have been identified as a potential impact to flood risk as a result of the Scheme. This has been identified as having a negligible impact on Coombe Pool (attributes of low to very high importance), River Sowe and its tributaries (attributes of low to very high importance), Smite Brook, its tributaries and its floodplains (attributes of low to very high importance). With mitigation considered this results in a **slight adverse significant effect**.

13.11.10. Alteration of ground elevations and overland flow pathways and construction of above ground structures have been identified as a potential impact to flood risk as a result of the Scheme. This has been identified as having a negligible impact on River Sowe, its tributaries and its floodplains (attributes of low to very high importance),Smite Brook, its tributaries and its floodplains (attributes of low to very high importance) and Withy Brook floodplain (attributes of very high importance). With mitigation considered this results in a **slight adverse significant effect**.

13.11.11. Drainage of additional hardstanding areas have been identified as a potential impact to surface water quality as a result of the Scheme. This has been identified as having a negligible impact on River Sowe, its tributaries and its floodplains (attributes of low to very high importance), Smite Brook, its tributaries and its floodplains (attributes of low to very high importance) and Withy Brook, its tributaries and floodplain (attributes of low to very high

importance). With mitigation considered this results in a **slight adverse significant effect**.

Groundwater

13.11.12. Drainage from site compounds and construction areas, accidental leaks and spillages have been identified as a potential impact as a result of the Scheme. This has been identified as having a negligible impact on Superficial deposits, Mercia Mudstone and indirect receptors (attributes of low to high importance). With mitigation considered this results in a **neutral** (soakaways and economic value) **to slight adverse** (Water supply/quality, vulnerability and biodiversity) **significant effect**.

13.11.13. Excavation and construction of temporary and permanent below ground structures and piles below the water table and construction of embankments have been identified as a potential impact as a result of the Scheme. This has been identified as having a negligible impact on Superficial deposits, Mercia Mudstone and indirect receptors (attributes of low to high importance). With mitigation considered this results in a **neutral** (soakaways and economic value) **to slight adverse** (Water supply/quality, vulnerability and biodiversity) **significant effect**.

13.11.14. Alteration of ground profiles, for example embankments, and creation of additional hardstanding areas, for example for access roads and construction compounds have been identified as a potential impact as a result of the Scheme. This has been identified as having a negligible impact on Superficial deposits, Mercia Mudstone and indirect receptors (attributes of low to high importance). With mitigation considered this results in a **neutral** (soakaways and economic value) **to slight adverse** (Water supply/quality, vulnerability and biodiversity) **significant effect**.

Table 13-12 Potential residual effects on groundwater and surface water receptors during construction of the Scheme

Construction activity	Potential impacts on receptors	Feature	Relevant attributes	Importance (value)	Mitigation	Magnitude of impact after mitigation	Significance of effect after mitigation (residual effect)
Surface water							
Accidental leakage or spillages.	Pollution of surface water bodies due to accidental spillage or leakage of fuel and oils, or due to placement of construction materials, washing of plant, cleaning areas of hardstanding etc. (suspended solids and dissolved contaminants). Deterioration of downstream aquatic environments	Coombe Pool (no direct impact)	Water supply and quality	Low	Construction design and Second Iteration EMP. Second Iteration EMP (pollution prevention measures in the construction drainage design, emergency response procedures and provision of spill kits). Adhere to CIRIA guidelines on control of water pollution on linear construction sites (C648) and environmental best practice on site (C741) Monitoring plan must include water quality monitoring prior to and during construction (to be agreed with the Environment Agency).	Negligible	Slight adverse
			Value to economy	Medium		Negligible	Slight adverse
			Biodiversity	Very high		Negligible	Slight adverse
		River Sowe and its tributaries	Water supply and quality	Low		Negligible	Slight adverse
			Value to economy	Low		Negligible	Slight adverse
			Biodiversity	Very High		Negligible	Slight Adverse
		Smite Brook and its tributaries	Water supply and quality	Low		Negligible	Slight adverse
			Value to economy	Low		Negligible	Slight adverse
			Biodiversity	Very high		Negligible	Slight Adverse
		Withy Brook and its tributaries	Water supply and quality	Low		Negligible	Slight adverse
			Value to economy	Low		Negligible	Slight adverse
			Biodiversity	Low		Negligible	Slight adverse
Works within, adjacent, over or close to water bodies, watercourses,	Pollution of surface water bodies due to placement of construction materials, washing of	Coombe Pool	Water supply and quality	Low	Construction design and mitigation measures implemented as part of the	Negligible	Slight adverse
			Value to economy	Medium		Negligible	Slight adverse

Construction activity	Potential impacts on receptors	Feature	Relevant attributes	Importance (value)	Mitigation	Magnitude of impact after mitigation	Significance of effect after mitigation (residual effect)
ponds or the fluvial floodplain	plant, cleaning areas of hardstanding etc. (suspended solids and dissolved contaminants). Deterioration of downstream aquatic environments.		Biodiversity	Very high	Second Iteration EMP including SuDS. Adhere to CIRIA guidelines on control of water pollution on linear construction sites (C648) and environmental best practice on site (C741) Monitoring plan to include water quality sampling prior to, during and after construction (to be discussed with the Environment Agency).	Negligible	Slight Adverse
		River Sowe and its tributaries	Water supply and quality	Low		Negligible	Slight adverse
			Value to economy	Low		Negligible	Slight adverse
			Biodiversity	Very High		Negligible	Slight Adverse
		Smite Brook and its tributaries	Water supply and quality	Low		Negligible	Slight adverse
			Value to economy	Low		Negligible	Slight adverse
			Biodiversity	Very high		Negligible	Slight Adverse
Works within, adjacent, over or close to water bodies, watercourses, ponds or the fluvial floodplain	Increased localised flooding to the Scheme. Increased or redirected flood risk to other and risk to flood-sensitive receptors near to overloaded system and downstream.	Coombe Pool	Water supply and quality	Low	Construction design and mitigation measures implemented as part of the Second Iteration EMP. Including temporary drainage strategy employing SuDS where appropriate. Necessary land drainage consents to be sought from the Lead Local Flood Authorities (Coventry City Council and Warwickshire County Council) where disapplication sought pursuant to the draft DCO (**TR010066/APP/3/1**) has not	Negligible	Slight adverse
			Value to economy	Medium		Negligible	Slight adverse
			Biodiversity	Very high		Negligible	Slight Adverse
		River Sowe and its tributaries	Water supply and quality	Low		Negligible	Slight adverse
			Value to economy	Low		Negligible	Slight adverse
			Conveyance of flow	High		Negligible	Slight Adverse
			Biodiversity	Very High		Negligible	Slight Adverse
		Smite Brook and	Water supply and quality	Low		Negligible	Slight adverse
			Value to economy	Low		Negligible	Slight adverse

Construction activity	Potential impacts on receptors	Feature	Relevant attributes	Importance (value)	Mitigation	Magnitude of impact after mitigation	Significance of effect after mitigation (residual effect)
		its tributaries	Conveyance of flow	High	been granted, prior to construction.	Negligible	Slight Adverse
			Biodiversity	Very high		Negligible	Slight Adverse
		Smite Brook floodplain	Conveyance of flow	Very High		Negligible	Slight Adverse
Alteration of ground elevations and overland flow pathways and construction of above ground structures acting as a barrier to flow.	Changes in surface water flow pathways resulting in overloading of drainage systems and surface watercourses. Increased or redirected flood risk to other and risk to flood-sensitive receptors near to overloaded system and downstream. Deterioration of downstream aquatic environments.	River Sowe and its tributaries	Water supply and quality	Low	Construction design and mitigation measures implemented as part of the Second Iteration EMP. Including temporary drainage strategy employing SuDS where appropriate. Adhere to CIRIA guidelines on control of water pollution on linear construction sites (C648) and environmental best practice on site (C741).	Negligible	Slight adverse
			Value to economy	Low		Negligible	Slight adverse
			Conveyance of flow	High		Negligible	Slight Adverse
			Biodiversity	Very High		Negligible	Slight Adverse
		Smite Brook and its tributaries	Water supply and quality	Low		Negligible	Slight adverse
			Value to economy	Low		Negligible	Slight adverse
			Conveyance of flow	High		Negligible	Slight Adverse
			Biodiversity	Very high		Negligible	Slight Adverse
		River Sowe floodplain	Conveyance of flow	Very High		Negligible	Slight Adverse
		Smite Brook floodplain	Conveyance of flow	Very High		Negligible	Slight Adverse

Construction activity	Potential impacts on receptors	Feature	Relevant attributes	Importance (value)	Mitigation	Magnitude of impact after mitigation	Significance of effect after mitigation (residual effect)
		Withy Brook floodplain	Conveyance of flow	Very High		Negligible	Slight Adverse
Drainage of additional hardstanding areas (construction compound areas etc)	Increase in the rate and volume of surface water runoff to water features and increased localised flooding to the Scheme. Deterioration of downstream aquatic environments.	River Sowe and its tributaries	Water supply and quality	Low	Construction design and mitigation measures implemented as part of the Second Iteration EMP. Including temporary drainage strategy employing SuDS where appropriate. Adhere to CIRIA guidelines on control of water pollution on linear construction sites (C648) and environmental best practice on site (C741). Necessary land drainage consents to be sought from the Lead Local Flood Authorities (Coventry City Council and Warwickshire County Council) where disapplication sought pursuant to the draft DCO (**TR010066/APP/3/1**) has not been granted, prior to construction.	Negligible	Slight adverse
			Value to economy	Low		Negligible	Slight adverse
			Conveyance of flow	High		Negligible	Slight Adverse
			Biodiversity	Very High		Negligible	Slight Adverse
		Smite Brook and its tributaries	Water supply and quality	Low		Negligible	Slight adverse
			Value to economy	Low		Negligible	Slight adverse
			Conveyance of flow	High		Negligible	Slight Adverse
			Biodiversity	Very high		Negligible	Slight Adverse
		Withy Brook and its tributaries	Water supply and quality	Low		Negligible	Slight adverse
			Value to economy	Low		Negligible	Slight adverse
			Conveyance of flow	High		Negligible	Slight Adverse
			Biodiversity	Low		Negligible	Slight adverse
		River Sowe floodplain	Conveyance of flow	Very High		Negligible	Slight Adverse

Construction activity	Potential impacts on receptors	Feature	Relevant attributes	Importance (value)	Mitigation	Magnitude of impact after mitigation	Significance of effect after mitigation (residual effect)
		Smite Brook floodplain	Conveyance of flow	Very High		Negligible	Slight Adverse
		Withy Brook floodplain	Conveyance of flow	Very High		Negligible	Slight Adverse
Groundwater							
Drainage from site compounds and construction areas, accidental leaks and spillages	Runoff contaminated by fuels, chemicals and construction materials may result in groundwater contamination, including turbidity. Removal of topsoil and excavations into the unsaturated zone increases the vulnerability of underlying aquifers to potential contamination. Groundwater may act as a pathway to surface water receptors	<u>Direct receptors</u>: Superficial deposits, Mercia Mudstone <u>Indirect receptors:</u> River Sowe Smite Brook Herald Way Marsh GWDTE	Water supply/ quality	High	Mitigation measures implemented as part of the Second Iteration EMP, for example pollution prevention measures, temporary drainage design, emergency response procedures. Closed drainage systems and hardstanding for site compounds. Inclusion of water monitoring plan in the Second Iteration EMP	Negligible	Slight Adverse
			Soakaway	Low		Negligible	Neutral
			Vulnerability	High		Negligible	Slight Adverse
			Economic value	Low		Negligible	Neutral
			Biodiversity	High		Negligible	Slight Adverse

Construction activity	Potential impacts on receptors	Feature	Relevant attributes	Importance (value)	Mitigation	Magnitude of impact after mitigation	Significance of effect after mitigation (residual effect)
Excavation and construction of temporary and permanent below ground structures and piles below the water table. Construction of embankments	Structures and piles may divert groundwater flow from down-gradient receptors and increase the risk of groundwater flooding up-gradient where groundwater levels are close to surface. Temporary and permanent embankments may compress underlying superficial deposits, reducing their permeability and potentially groundwater flow.	Direct Receptor: Superficial deposits Mercia Mudstone Indirect Receptors: River Sowe Smite Brook Herald Way Marsh GWDTE	Water supply/ quality	High	Design of temporary and permanent structures and piles so that they do not act as groundwater dams. Compliance with regulatory requirements for temporary dewatering and associated water discharges. A transfer or full abstraction licence and discharge environmental permit may be required. Treatment of temporary discharges to remove suspended solids and other potential contaminants. Non-compliant discharges to be disposed of off-site. Adopt best practice methods to minimise contamination	Negligible	Slight Adverse
			Soakaway	Low		Negligible	Neutral
			Vulnerability	High		Negligible	Slight Adverse
			Economic value	Low		Negligible	Neutral
			Conveyance of flow	High		Negligible	Slight Adverse

Construction activity	Potential impacts on receptors	Feature	Relevant attributes	Importance (value)	Mitigation	Magnitude of impact after mitigation	Significance of effect after mitigation (residual effect)
	Temporary excavation dewatering may divert groundwater flow from down-gradient receptors. Removal of topsoil and excavations into the unsaturated zone increases the vulnerability of underlying aquifers Groundwater may become contaminated through direct contact with construction materials and down drag of contaminants. Excavation and piling create pathways between aquifer units Generation of turbidity in groundwater during excavation activities. Groundwater may act as a pathway to surface water receptors		Biodiversity	High	pathways and generation of suspended solids. Preparation of piling risk assessment and implementation of mitigation measures including appropriate selection of piling method. Inclusion of water monitoring plan in the Second Iteration EMP	Negligible	Slight Adverse

Construction activity	Potential impacts on receptors	Feature	Relevant attributes	Importance (value)	Mitigation	Magnitude of impact after mitigation	Significance of effect after mitigation (residual effect)
Alteration of ground profiles, for example embankments, and creation of additional hardstanding areas, for example for access roads and construction compounds.	Additional hardstanding reduces potential area of effective recharge to aquifers and may reduce groundwater flow to receptors.	Direct Receptors: Superficial Deposits Mercia Mudstone Indirect Receptors: River Sowe Smite Brook	Water supply/ quality	High	Temporary drainage design to ensure that runoff from areas of hardstanding is returned to the same catchment. Inclusion of groundwater monitoring plan in the Second Iteration EMP.	Negligible	Slight Adverse
			Soakaway	Low		Negligible	Neutral
			Vulnerability	High		Negligible	Slight Adverse
			Economic value	Low		Negligible	Neutral
			Conveyance of flow	High		Negligible	Slight Adverse

Operation

Surface water

13.11.15. Increase in pollutants from routine road runoff have been identified as a potential impact as a result of the Scheme. This has been identified as having a negligible impact on River Sowe and its tributaries (attributes of low to very high importance). With mitigation considered this results in a **slight adverse significant effect.**

13.11.16. Drainage of additional areas of hardstanding and alteration of ground elevations due to re-profiling have been identified as a potential impact as a result of the Scheme. This has been identified as having a negligible impact on River Sowe, its tributaries and its floodplains (attributes of low to very high importance) and Smite Brook, its tributaries and its floodplains (attributes of low to very high importance). With mitigation considered this results in a **slight adverse** (River Sowe its tributaries and floodplain and features of Smite Brook its tributaries and floodplain) **to slight beneficial** (features of Smite Brook) **significant effect.**

13.11.17. Discharge from proposed outfalls have been identified as a potential impact as a result of the Scheme. This has been identified as having a negligible impact on River Sowe and its tributaries (attributes of low to very high importance) and Smite Brook and its tributaries (attributes of low to very high importance). With mitigation considered this results in **a slight adverse** (River Sowe its tributaries and floodplain and features of Smite Brook its tributaries and floodplain) **to slight beneficial** (features of Smite Brook) **significant effect.**

Groundwater

13.11.18. Routine road drainage and accidental spillages have been identified as a potential impact as a result of the Scheme. This has been identified as having a negligible impact on Superficial deposits, Mercia Mudstone and indirect receptors (attributes of low to high importance). With mitigation considered this results in a **neutral** (soakaways and economic value) **to slight adverse** (Water supply/quality, vulnerability and biodiversity) **significant effect.**

13.11.19. Permanent cuttings that extend below the water table have been identified as a potential impact as a result of the Scheme. This has been identified as having a negligible impact on Superficial deposits, Mercia Mudstone and indirect receptors (attributes of low to high importance). With mitigation considered this results in a **neutral** (soakaways and economic value) **to slight adverse** (Water supply/quality, vulnerability and biodiversity) **significant effect**.

13.11.20. Permanent placement of below-ground structures, including drainage basins, and piles that extend below the water table have been identified as a potential impact as a result of the Scheme. This has been identified as having a negligible impact on Superficial deposits, Mercia Mudstone and indirect receptors (attributes of low to high importance). With mitigation considered this results in a **neutral** (soakaways and economic value) **to slight adverse** (Water supply/quality, vulnerability and biodiversity) **significant effect.**

13.11.21. Increased area of hardstanding and embankments have been identified as a potential impact as a result of the Scheme. This has been identified as having a negligible impact on Superficial deposits, Mercia Mudstone and indirect receptors (attributes of low to high importance). With mitigation considered this results in a **neutral** (soakaways and economic value) **to slight adverse** (Water supply/quality, vulnerability and biodiversity) **significant effect.**

Table 13-13 Potential residual effects on groundwater and surface water receptors during operation of the Scheme

Operational activity	Potential impacts on receptors	Feature	Relevant attributes	Importance (value)	Mitigation	Magnitude of impact after mitigation	Significance of effect after mitigation (residual effect)
Surface water							
Increase in pollutants from routine road runoff	Pollution of surface water features, including an increase in sediment load. Deterioration of downstream aquatic environments.	River Sowe and its tributaries	Water supply and quality	Low	Mitigation in the form of ponds required for catchments 5 and 6 which are tributaries of the River Sowe.	Negligible	Slight Adverse
			Value to economy	Low		Negligible	Slight Adverse
			Biodiversity	Very High		Negligible	Slight Adverse
Drainage of additional areas of hardstanding and alteration of ground elevations due to re-profiling	Increase in the rate and volume of surface water runoff to water bodies and watercourses and increased localised flooding to the Scheme. Increased or redirected flood risk to others and risk to flood-sensitive receptors near to overloaded system and downstream. Deterioration of downstream aquatic environments	River Sowe and its tributaries	Water supply and quality	Low	Proposed drainage designed to attenuate 1 in 100-year event including 20% climate change allowance, to greenfield runoff rate, with a sensitivity test undertaken with a 40% allowance. Two ponds and one vegetated detention basin to be provided for attenuation. A vegetated detention basin which discharges to Smite Brook will provide a water quality betterment	Negligible	Slight Adverse
			Value to economy	Low		Negligible	Slight Adverse
			Conveyance of flow	High		Negligible	Slight Adverse
			Biodiversity	Very High		Negligible	Slight Adverse
		Smite Brook and its tributaries	Water supply and quality	Low		Negligible	Slight Beneficial
			Value to economy	Low		Negligible	Slight Beneficial
			Conveyance of flow	High		Negligible	Slight Adverse
			Biodiversity	Very high		Negligible	Slight Beneficial
		River Sowe floodplain	Conveyance of flow	Very High		Negligible	Slight Adverse

Operational activity	Potential impacts on receptors	Feature	Relevant attributes	Importance (value)	Mitigation	Magnitude of impact after mitigation	Significance of effect after mitigation (residual effect)
		Smite Brook floodplain	Conveyance of flow	Very High		Negligible	Slight Adverse
Discharge from proposed outfalls	Potential risk of erosion impacting on channel stability, causing structural damage and an increase sediment in downstream reaches. Deterioration of downstream aquatic environment of indirect receptors.	River Sowe and its tributaries	Water supply and quality	Low	Surface water runoff will be attenuated to greenfield rates at source. Proposed outfall design to include erosion protection measures. Adherence to C786 – Culvert, Screen and Outfall Manual guidelines. Two ponds and one vegetated detention basin to be provided for attenuation. A vegetated detention basin which discharges to Smite Brook will provide a water quality betterment	Negligible	Slight Adverse
			Value to economy	Low		Negligible	Slight Adverse
			Conveyance of flow	High		Negligible	Slight Adverse
			Biodiversity	Very High		Negligible	Slight Adverse
		Smite Brook and its tributaries	Water supply and quality	Low		Negligible	Slight Beneficial
			Value to economy	Low		Negligible	Slight Beneficial
			Conveyance of flow	High		Negligible	Slight Adverse
			Biodiversity	Very high		Negligible	Slight Beneficial
Groundwater							
Routine road drainage and accidental spillages	Routine road drainage may result in contamination of receiving aquifer. Accidental spillages collected by road drainage may result in contamination of receiving aquifer	Direct Receptors: Superficial Deposits	Water quality	High	All new drains within the order limits will be lined where the unsaturated zone beneath the drain is likely to be less than 1m. Environment Agency to be consulted with respect to unlined drainage ditches outside the order limits	Negligible	Slight Adverse
			Soakaway	Low		Negligible	Neutral
			Vulnerability	High		Negligible	Slight Adverse
			Economic value	Low		Negligible	Neutral
		Indirect Receptors: River Sowe	Biodiversity	High		Negligible	Slight Adverse

Operational activity	Potential impacts on receptors	Feature	Relevant attributes	Importance (value)	Mitigation	Magnitude of impact after mitigation	Significance of effect after mitigation (residual effect)
		Smite Brook			receiving treated road drainage. Environment Agency to be consulted with respect to existing filter drains within order limits where groundwater levels are less than 1m below the drain.		
Permanent cuttings that extend below the water table	Permanent interception of groundwater locally controlling groundwater levels and permanently diverting flow from receptors.	Direct Receptors: Superficial Deposits Indirect Receptors: River Sowe Smite Brook	Water supply	High	Adherence to conditions specified in the Environment Agency's regulatory position statement on passive dewatering. Drainage design to ensure that cutting drainage is returned to the environment in the same catchment.	Negligible	Slight Adverse
			Economic value	Low		Negligible	Neutral
			Conveyance of flow	High		Negligible	Slight Adverse
Permanent placement of below-ground structures, including drainage basins, and piles that extend below the water table.	Structures and piles may divert groundwater flow from down-gradient receptors and increase the risk of groundwater flooding up-gradient where groundwater levels are close to surface.	Direct Receptors: Superficial Deposits Indirect Receptors: River Sowe Smite Brook	Water supply	High	Design of permanent structures and piles that extend below the water table so that they do not act as groundwater dams and impede flow. Consider pile spacing and the inclusion of subsurface passive drainage if necessary.	Negligible	Slight Adverse
			Economic value	Low		Negligible	Neutral
			Conveyance of flow	High		Negligible	Slight Adverse

Operational activity	Potential impacts on receptors	Feature	Relevant attributes	Importance (value)	Mitigation	Magnitude of impact after mitigation	Significance of effect after mitigation (residual effect)
Increased area of hardstanding. Embankments	Additional hardstanding reduces potential area of effective recharge to aquifers and may reduce groundwater flow to receptors. Embankments may compress underlying superficial deposits, reducing their permeability and potentially groundwater flow.	Direct Receptors: Superficial Deposits Mercia Mudstone Indirect Receptors: River Sowe Smite Brook	Water supply/ quality	High	Drainage design to ensure that routine runoff is returned to the same catchment. Inclusion of groundwater monitoring plan for early operation in the Second Iteration EMP to demonstrate no adverse impact.	Negligible	Slight Adverse
			Soakaway	Low		Negligible	Neutral
			Vulnerability	High		Negligible	Slight Adverse
			Economic value	Low		Negligible	Neutral
			Conveyance of flow	High		Negligible	Slight Adverse

Summary

13.11.22. For both construction and operational activities across the Scheme the magnitude of impacts after mitigation are negligible and the significance of effects after mitigation (residual effects) are slight adverse to slight beneficial. Subsequently, no significant effects to surface water and groundwater bodies are anticipated to be posed by the Scheme.

Water Framework Directive assessment

13.11.23. This section outlines the assessment of potential construction and operation related impacts on each of the WFD water bodies' quantity and quality elements. It assessed whether these impacts could lead to non-compliance of the WFD and the ability of the relevant WFD water bodies to meet their current objectives.

Surface water

13.11.24. The Scheme has the potential to affect five WFD water bodies which surround the Scheme. Due to this, an assessment of the compliance of the proposed scheme with the objectives of the WFD was undertaken for surface water.

13.11.25. Contaminants from runoff or accidental spillage represent the largest potential risk for degradation of the identified receptors. Mitigation during the construction phase would be managed through the implementation of the Second Iteration EMP which will include best practice measures to limit the risk of pollutants entering surface water features. A HEWRAT assessment was undertaken to assess potential water quality impacts during the operation phase. The results identified that all catchment areas pass the routine runoff assessment, two of which required mitigation. All catchment areas passed the accidental spillages assessment without the need for mitigation included in the design.

13.11.26. Works within the channel involved partial infilling, the construction of a temporary culvert and construction of two new outfalls have the potential to impact the hydromorphology of the watercourse and downstream receptors. However, the temporary culvert would be designed to minimise effects on hydromorphology and ensure there is no loss of habitat or biodiversity. This would ensure there is a negligible risk to WFD receptors of the River Sowe.

13.11.27. Scheme activities do not propose heavy modification of WFD water bodies. Due to this, it is considered the Scheme will not impact upon any of the Coombe Pool mitigation measures, as identified by the Environment Agency and referred to as environmental improvements, following mitigation. The

Environment Agency will work towards implementing the environmental improvement mitigation measures on Coombe Pool as part of a separate process. Based on the nature of the proposed activities and potential range of mitigation measures that may be applicable to this water body, it is not anticipated that the Scheme will prevent the attainment of good ecological potential.

13.11.28. This WFD compliance assessment indicates any impacts are likely to be temporary and highly localised due to the construction approach along with the design and mitigation in place for the operational phase of the Scheme. Due to this, the Scheme is compliant with the objectives of the WFD, and it is concluded there is no significant risk to any WFD water bodies.

13.11.29. The surface water WFD assessment concluded that the Scheme is compliant with the objectives of the WFD and there is no significant risk to the WFD surface water bodies scoped into the assessment. Contaminants from runoff, partial infilling of tributaries or accidental spillage represent the largest potential for degradation of the other receptors.

Groundwater

13.11.30. The Scheme and surrounding study area is primarily within the Warwickshire Avon – Secondary Mudrocks (GB40902G990900) groundwater body as shown in ES Figure 13.5 (WFD Groundwater Bodies) (**TR010066/APP/6.2**). The Warwickshire Avon PT Sandstone Warwick/Avon Confined (GB40901G300700) groundwater body is also present in the study area, less than 1km north-west of the Scheme at its nearest point.

13.11.31. The Warwickshire Avon – Secondary Mudrocks groundwater body covers a significant area (2,689km2). It comprises the Mercia Mudstone, which is a Secondary B aquifer that can only yield limited amounts of groundwater. Within the study area, the Mercia Mudstone is largely overlain by superficial deposits, although is present at surface immediately to the north of the existing Walsgrave Junction. The superficial deposits comprise Secondary A and Secondary (undifferentiated) aquifers that are capable of supporting water on a local scale and baseflow to rivers. Where permeable superficial deposits directly overlie the Mercia Mudstone, they are likely to be in hydraulic continuity.

13.11.32. The impact assessment considers the combined risks to the Warwickshire Avon – Secondary Mudrocks and overlying superficial deposits as a conservative approach. Details of potential impacts to the groundwater body superficial aquifers prior to mitigation are provided in Section 3 of ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**).

13.11.33. The Warwickshire Avon PT Sandstone Warwick/Avon Confined groundwater body comprises the Sherwood Sandstone, which is a principal aquifer. The groundwater body is mostly confined with its outcrop area limited to 40km^2. Within the majority of the study area, including within the Scheme Order Limits, the Warwickshire Avon – PT Sandstone Warwick/Avon Confined groundwater body is overlain by a significant thickness of low permeability Mercia Mudstone. It is present at surface to the west of the River Sowe, but as the river intercepts groundwater flow, it is considered likely that the degree of hydraulic connection between the Scheme and the groundwater body is minimal. The Warwickshire Avon – PT Sandstone Warwick/Avon Confined groundwater body is therefore scoped out of the WFD assessment.

13.11.34. Table 13-14 indicates that the construction and operation of the Scheme will not cause deterioration in the status of Warwickshire Avon – Secondary Mudrocks groundwater body, nor will it impact upon the ability of the water bodies to achieve its objectives and standards under the WFD.

Table 13-14 Summary of groundwater WFD water body assessment

Water body name ID	WFD aspect	WFD sub-aspects	Impacts on status or ability to meet target
Warwickshire Avon – Secondary Mudrocks	Quantitative	Quantitative saline intrusion	Scheme elements do not encroach on areas of saline water. Therefore, there is no potential for saline intrusion.
		Quantitative water balance	No construction related impacts due to best practice mitigation outlined in construction method statements, risk assessments and the Second Iteration EMP, and obtaining all relevant licences and permits. Negligible operational impacts due to mitigation included in Scheme design. Therefore, no impact to quantitative water balance test.
		Quantitative GWDTEs test	No quantitative construction or operational impacts on GWDTEs identified, therefore no impact on the quantitative GWDTE test. See Section 4 of ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**).
		Quantitative dependent surface water body status	No construction related impacts due to best practice mitigation outlined in construction method

Water body name ID	WFD aspect	WFD sub-aspects	Impacts on status or ability to meet target
			statements, risk assessments and the Second Iteration EMP, and obtaining all relevant licences and permits. Negligible operational impacts due to mitigation included in Scheme design. Subsequently no impact to quantitative dependent surface water body status.
	Chemical	Chemical drinking water protected area	No construction related impacts due to best practice mitigation outlined in construction method statements, risk assessments and the Second Iteration EMP, and obtaining all relevant licences and permits. Negligible operational impact due to mitigation included in Scheme design. Subsequently no impact to chemical drinking water protected area.
		General chemical test	No construction related impacts due to best practice mitigation outlined in construction method statements, risk assessments and the Second Iteration EMP, and obtaining all relevant licences and permits. Negligible operational impacts due to mitigation included in Scheme design. Subsequently no impact to general chemical test.
		Chemical GWDTEs test	No construction related impacts due to best practice mitigation outlined in construction method statements, risk assessments and the Second Iteration EMP, and obtaining all relevant licences and permits. Negligible operational impacts due to mitigation included in Scheme design. Subsequently no impact to Chemical GWDTE test.

Water body name ID	WFD aspect	WFD sub-aspects	Impacts on status or ability to meet target
			See Section 4 of ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**).
		Chemical dependent surface water body status	No construction related impacts due to best practice mitigation outlined in construction method statements, risk assessments and the Second Iteration EMP, and obtaining all relevant licences and permits. Negligible operational impacts due to mitigation included in Scheme design. Subsequently no impact to quantitative dependent surface water body status.
		Chemical saline intrusion	Proposed scheme elements do not encroach on areas of saline water. Therefore, there is no potential for saline intrusion.

13.12. Monitoring

13.12.1. Receptors are at risk of potential adverse impacts due to construction activities. Therefore, it is recommended that surface water quality monitoring and groundwater level and quality monitoring are undertaken prior to and during the construction phase. The water monitoring plan should be included in the Second Iteration EMP which is secured under Requirement 4 of Schedule 2 of the draft DCO (**TR010066/APP/3.1**) and be agreed with the Environment Agency.

13.12.2. Monitoring requirements may additionally be included as conditions of licences and permits.

13.12.3. Surface water quality monitoring would comprise visual assessments for oil and silt, as well as water quality monitoring for a range of parameters that include suspended solids, pH changes and hydrocarbons. Whilst construction works are in progress, selected watercourses would be sampled at locations up and downstream of the works including the installation of continuous turbidity or total suspended solids monitor probes.

13.12.4. Groundwater monitoring would include water level monitoring in existing boreholes until they are required to be abandoned and backfilled due to construction activities. Water quality monitoring for selected parameters, including suspended solids, would be complemented by wellhead analysis.

13.12.5. Inspections and audits, along with general monitoring and reporting of effectiveness of control measures to be carried out throughout the construction programme, would also be incorporated into the Second Iteration EMP. The mitigation strategies implemented will be reviewed regularly to best suit the practices being undertaken on site.

13.13. Summary

13.13.1. This assessment has considered the effects of the Scheme upon the surface water and groundwater environment as well as the potential vulnerability of the Scheme to the surface water and groundwater environment.

13.13.2. A baseline assessment utilising a desktop review and a water feature survey has been carried out to identify important water feature receptors that may be affected by the Scheme.

13.13.3. The construction, operation and use of the Scheme is expected to increase the risk of contaminant runoff into watercourses if not mitigated. As well as this, the Scheme is expected to increase the risk of flooding to the Scheme and nearby receptors. these risks have been assessed throughout this Chapter and their applicable appendices to assess these risks both prior to and following mitigation. Following the analysis of this Chapter and attached appendices it is considered that the Scheme will only bring about slight adverse impacts to the surface water environment which was identified as a worst-case scenario.

13.13.4. Groundwater quality and routine runoff assessments were completed in ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**) to assess the risks of impacts upon groundwater quality from unlined road drainage. The detailed assessment identified that road runoff poses a potential risk to groundwater receptors in terms of water quality. The use of filter drains, and unlined drainage ditches, will therefore require further reassessment at the detailed design stage and consultation with the Environment Agency to confirm the risk due to the presence of shallow groundwater across the Scheme.

13.13.5. The simple GWDTE assessment, undertaken in ES Appendix 13.4 (Groundwater Assessment) (**TR010066/APP/6.3**), considered potential hydraulic links between the Scheme and a designated site, Herald Way Marsh SSSI, to the south. The assessment concluded negligible risk to the site in terms of groundwater quality and quantity due to significant distance from construction and operational activities, and embedded mitigation in the form of lined drains south of the Smite Brook culvert.

13.13.6. Therefore, the Scheme is not expected to give rise to significant adverse (moderate or greater) residual effects during the construction or operational

phases with the adoption of mitigation discussed in Section 13.9 and will comply with local, regional, and national policies. The outcome of this assessment is based on the mitigation measures described in this chapter which shall be managed through the implementation of the Second Iteration EMP which is secured under Requirement 4 of Schedule 2 of the draft DCO (**TR010066/APP/3.1**).

Acronyms

Acronym	Meaning
AADT	Annual average daily traffic
ARG UK	Amphibian and Reptile Group
AQMA	Air quality management area
bgl	Below Ground Level
BGS	British Geological Survey
CAMS	Catchment Abstraction Management Strategy
cm/s	Centimetre Per Second
CIRIA	Construction Industry Research and Information Association
oC	Degree Celsius
DEFRA	Department of Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges
DWS	Drinking Water Standards
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPR	Environmental Permitting Regulations
EQS	Environmental Quality Standards
ES	Environmental Statement
ESR	Environmental Scoping Report
EU	European Union
FRA	Flood Risk Assessment
>	Greater Than
GIR	Ground investigation report
GWDTE	Groundwater Dependent Terrestrial Ecosystems
GP3	2013 Groundwater Protection: Principles and Practice
ha	Hectare
HADDMS	Highways Agency Drainage Data Management System
HEWRAT	National Highways Water Risk Assessment Tool
IDB	Internal Drainage Board
km	Kilometre
LLFA	Lead Local Flood Authority
<	Less Than
LNR	Local Nature Reserve
mm	Millimetre
m	Metre
mg/l	Milligram Per Litre
m3/s	Cubic Metres Per Second
NGR	National Grid Reference
NPPF	National Planning Policy Framework
NPSNN	National Policy Statement for National Networks
NVZ	Nitrate Vulnerable Zone
PSD	Particle Size Distribution

Acronym	Meaning
%	Percent
PPG	Planning Practice Guidance
PBDE	Polybrominated Diphenyl Ethers
PSSR	Preliminary Sources Study Report
Q95	Flow Equalled or Exceeded in a Watercourse 95% of the Time
RBMP	River Basin Management Plan
SAC	Special Area of Conservation
SFRA	Strategic Flood Risk Assessment
SPA	Special Protection Area
SPZ	Source Protection Zone
SSSI	Sites of Special Scientific Interest
SuDS	Sustainable Drainage Systems
ug/l	Microgram Per Litre
VHT	Variable Head Test
WFD	Water Framework Directive
WRA	Water Resources Act

Glossary

Glossary term	Definition
Above Ordnance Datum (AoD)	Above the mean sea level at Newlyn in Cornwall calculated between 1915 and 1921, taken as a reference point for the height data on Ordnance Survey maps.
Alluvial/alluvium deposits	Natural materials deposited by rivers, found both within and adjacent to rivers.
Annual Exceedance Probability (AEP)	Annual Exceedance Probability e.g. 1% AEP is equivalent to 1% (1 in 100) probability of flooding occurring in any one year (or, on average, once in every 100 years).
Application	This refers to the application for permission to construct the project. An application consists of a series of documents and plans which are submitted to the regulators, who are asked to determine whether a project should be consented or not.
Baseflow Index	The proportion of the flow in a watercourse made up of groundwater and discharges. Base flow sustains the watercourse in dry weather.
Baseline	A description of the current state of the environment without implementation of the project
Borehole	A hole bored into the ground, usually as part of investigations, typically to test the depth and quality of soil, rock and groundwater. A borehole can also be used to dewater the ground.
Catchment	A drainage/basin area within which precipitation drains into a river system and eventually into the sea.
Consenting process	The regulated process of obtaining permission from a statutory authority, against a set of principles and legislation, to carry out the works of a particular development within a specific area of land.
Culvert	A tunnel (pipe or box shaped) that carries a stream or open drain under a road.
Designation/Designated	Area of land which has been given a special status due to its particular characteristic or purpose. Normally there are restrictions on activities and developments that might affect a designated or protected area. Local authorities and other statutory authorities such as Environment Agency can designate an area of land providing that it is a matter of public interest.
Discharge	The volume of flow passing a point in a given time period.
Discharge consent	A consent or permit to discharge effluent that could harm the environment.
Effect	Term used to express the consequence of an impact (expressed as the 'significance of effect').
Enhancement	A measure that is over and above what is required to mitigate the adverse effects of a project.
Environmental Quality Standard (EQS)	The maximum permissible concentration of a potentially hazardous chemical. The Environmental Quality Standard is used to assess the risk to the health of aquatic flora and fauna.
Floodplain	A floodplain is flat, or nearly flat, land adjacent to a stream or river, stretching from the banks of its channel to the base of the enclosing valley walls and (under natural conditions) experiences periods of flooding.

Glossary term	Definition
Fluvial flooding	Flooding resulting from water levels exceeding the bank level of a Main River
Greenfield	Undeveloped parcel of land
Highways England Water Risk Assessment Tool (HEWRAT)	A tool which determines whether the catchments in which National Highways operate are particularly exposed to water risk, as well as to better understand the nature of risk in specific catchments.
Hydrogeology	The nature, distribution and movement of groundwater in soils and rocks, including in aquifers.
Hydrology	The scientific study of the movement, distribution, and quality of water on Earth and other planets, including the water cycle, water resources and environmental watershed sustainability
Hydromorphology	The scientific study of the form and function of rivers and the interaction between streams and the landscape around them.
Lead Local Flood Authority (LLFA)	Local Authority responsible for taking the lead on local flood risk management. The duties of LLFAs are set out in the Floods and Water Management Act
Local Plan	A statutory development plan prepared by the local planning authority in consultation with the local community. It sets out the vision and framework for the future development of the local area with detailed policies to address needs and opportunities in relation to housing, the economy, community facilities and infrastructure, as well as environmental protection
Main River	A watercourse shown as such on the Main River Map, and for which the Environment Agency has responsibilities and powers. N.B. Main River designation is not an indication of size, although it is often the case that they are larger than Ordinary Watercourses.
Ordinary watercourse	All watercourses that are not designated Main River, and which are the responsibility of Local Authorities or, where they exist, Internal Drainage Boards. Note that Ordinary Watercourse does not imply a “small” river, although it is often the case that Ordinary Watercourses are smaller than Main Rivers.
Outfall	Point of discharge into a waterbody.
Q_{95}	The flow rate of the watercourse that is exceeded for 95% of the time.
Reach	A length of river along which the channel controls are sufficiently uniform to allow a fairly consistent morphological structure to be maintained.
Residual risk	A measure of the outstanding flood risks and uncertainties that have not been explicitly quantified and/or accounted for as part of the design process.
Riparian zone	The corridor of land which runs along the banks of a river channel. If vegetated, it is known as the vegetated riparian zone.
River Basin Management Plan	A regional plan that sets out how organisations, stakeholders and communities will work together to improve the water environment and fulfil the requirements of the Water Framework Directive.
Routine runoff	The normal runoff from roads including any contaminants washed off the surface in rainfall events which can result in either acute or chronic
Runoff	The movement of water above and below the surface.

Glossary term	Definition
Sediment	Organic and inorganic material that has precipitated from water to accumulate on the floor of a water body, watercourse or trap.
Sewer flooding	Flooding caused by a blockage or overflowing in a sewer or urban drainage system.
Source Protection Zone	Areas defined by the Environment Agency that show the risk from contamination/pollution to groundwater that is extracted for drinking water.
Strategic Flood Risk Assessment (SFRA)	Strategic Flood Risk Assessment – considers local flood risk and informs the planning process information on the future risk over a wide spatial area.
Surface water flooding	Flooding as a result of surface water runoff as a result of high intensity rainfall when water is ponding or flowing over the ground surface before it enters the underground drainage network or watercourse, or cannot enter it because the network is full to capacity, thus causing what is known as surface water or pluvial flooding.
Surface water runoff	Rainwater (including snow and other precipitation) which is on the surface of the ground (whether or not it is moving), and has not entered a watercourse, drainage system or public sewer.
Sustainable Drainage System (SuDS)	Sustainable Drainage Systems - Methods of management practices and control structures that are designed to drain surface water in a more sustainable manner than some conventional techniques

References

British Geological Society, 2024. BGS Geology Viewer. [Online]. Available at: https://www.bgs.ac.uk/map-viewers/bgs-geology-viewer/ Accessed: 6 April 2024

Coventry City Council (2017). Coventry City Council Local Plan. [Online]. Available at: final_local_plan_december_2017 (coventry.gov.uk). Accessed: 6 April 2024

Coventry City Council, 2015. Strategic Flood Risk Assessment. [Online]. Available at: https://www.coventry.gov.uk/downloads/file/19112/coventry-sfra-final-report-2015 Accessed: 6 April 2024

Coventry City Council, 2017. Coventry Preliminary Flood Risk Assessment. [Online]. Available at: https://www.coventry.gov.uk/water-management-flooding/preliminary-flood-risk-assessment Accessed: 6 April 2024

Coventry City Council, 2022. Coventry Local Flood Risk Management Strategy. [Online]. Available at: https://www.coventry.gov.uk/downloads/file/19379/coventry_local_flood_risk_management_strategy#:~:text=The%20Local%20Flood%20Risk%20Management,Management%20Plan%20for%20Coventry%20City Accessed: 6 April 2024

Coventry City Council, 2023. Coventry Surface Water Management Plan. [Online]. Available at: https://www.coventry.gov.uk/water-management-flooding/surface-water-management-plan Accessed: 6 April 2024

DEFRA, 2024. MAGIC online Mapping. [Online]. Available at: https://magic.defra.gov.uk/magicmap.aspx Accessed: 6 April 2024.

Environment Agency, 2001. Piling and penetrative ground improvement methods on land affected by contamination: Guidance on pollution prevention. National Groundwater and Contaminated Land Centre report NC/99/73. Environment Agency: Bristol.

Environment Agency, 2017. Groundwater protection. [Online]. Available at: https://www.gov.uk/government/collections/groundwater-protection#documents Accessed: 6 April 2024

Environment Agency, 2019. National groundwater recharge assessment under climate change, project summary SC160018. [Online]. Available at: https://www.gov.uk/government/publications/national-groundwater-recharge-assessment-under-climate-change Accessed April 2024

Environment Agency, 2020. Passive dewatering: regulatory position statement. [Online]. Available at: https://www.gov.uk/government/publications/passive-dewatering-regulatory-position-statement/passive-dewatering-regulatory-position-

statement#:~:text=Contents&text=Passive%20dewatering%20is%20when%20groundwater,the%20environment%20or%20groundwater%20table Accessed: 6 April 2024

Environment Agency, 2022a. River basin management plans: updated 2022. [Online]. Available at: https://www.gov.uk/guidance/river-basin-management-plans-updated-2022 Accessed: 6 April 2024

Environment Agency, 2022b. Flood risk assessments: climate change allowances. [Online]. Available at: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances Accessed: 6 April 2024

Environment Agency, 2022c. LIDAR Composite Digital Terrain Model (DTM) - 1m. [Online]. Available at: https://environment.data.gov.uk/dataset/13787b9a-26a4-4775-8523-806d13af58fc Accessed: 6 April 2024

Environment Agency, 2024a. Flood Map for Planning. [Online]. Available at: https://flood-map-for-planning.service.gov.uk/flood-zone-results?polygon=[[438320,279400],[438207,279264],[438426,279127],[438558,279306],[438320,279400]]&center=[438382,279263]&location=cv3%25202ae Accessed: 6 April 2024

Environment Agency, 2024b. Long Term Flood Risk. [Online]. Available at: https://check-long-term-flood-risk.service.gov.uk/map Accessed: 6 April 2024

Environment Agency, 2024c. Catchment Data Explorer. [Online]. Available at: https://environment.data.gov.uk/catchment-planning Accessed: 6 April 2024

Environment Agency, 2024d. Water Quality Archive. [Online]. Available at: https://environment.data.gov.uk/water-quality/view/download/new Accessed: 6 April 2024

Environment Agency, 2024e. Consented Discharges to Controlled Waters with Conditions. [Online]. Available at: https://www.data.gov.uk/dataset/55b8eaa8-60df-48a8-929a-060891b7a109/consented-discharges-to-controlled-waters-with-conditions Accessed: 6 April 2024

Environment Agency, 2024f. Historic Flood Map. [Online]. Available at: https://www.data.gov.uk/dataset/76292bec-7d8b-43e8-9c98-02734fd89c81/historic-flood-map Accessed: 6 April 2024

Environment Agency, 2024g. Groundwater Dependent Terrestrial Ecosystems (England only). [Online]. Available at: Groundwater Dependent Terrestrial Ecosystems (England only) - data.gov.uk Accessed: 6 April 2024

Google Earth, 2024.Google Earth. [Online]. Available at: https://earth.google.com/web/@52.40737339,-

1.42512664,74.25873822a,6326.23859748d,35y,0.00000002h,2.31016828t,0r/data=OgMKATA Accessed: 6 April 2024

Her Majesty's Government, 1975a. Reservoirs Act 1975. [Online]. Available at: https://www.legislation.gov.uk/ukpga/1975/23 Accessed: 6 April 2024.

Her Majesty's Government, 1975b. Salmon and Freshwater Fisheries Act 1975. [Online]. Available at: https://www.legislation.gov.uk/ukpga/1975/51 Accessed: 2 September 2024

Her Majesty's Government, 1980. Highways Act 1980. [Online]. Available at: https://www.legislation.gov.uk/ukpga/1980/66 Accessed: 6 April 2024

Her Majesty's Government, 1991a. Water Resources Act 1991. [Online]. Available at: https://www.legislation.gov.uk/ukpga/1991/57 Accessed 6 April 2024

Her Majesty's Government, 1991b. Land Drainage Act 1991. [Online]. Available at: https://www.legislation.gov.uk/ukpga/1991/59/pdfs/ukpga_19910059_en.pdf Accessed: 6 January 2024

Her Majesty's Government, 1994a. Land Drainage Act 1994. [Online]. Available at: https://www.legislation.gov.uk/ukpga/1994/25/contents Accessed: 6 April 2024.

Her Majesty's Government, 1994b. The Urban Waste Water Treatment (England and Wales) Regulations 1994. [Online]. Available at: https://www.legislation.gov.uk/uksi/1994/2841/contents Accessed: 2 September 2024

Her Majesty's Government, 1996. The Control of Pollution Regulation 1996. [Online]. Available at: https://www.legislation.gov.uk/uksi/1996/2971/contents/made Accessed: 2 September 2024

Her Majesty's Government, 2003a. Water Act 2003. [Online]. Available at: https://www.legislation.gov.uk/ukpga/2003/37 Accessed 6 April 2024

Her Majesty's Government, 2003b. The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003. [Online]. Available at: https://www.legislation.gov.uk/uksi/2003/3242/contents/made Accessed: 6 April 2024

Her Majesty's Government, 2008. Climate Change Act 2008. [Online]. Available at: https://www.legislation.gov.uk/ukpga/2008/27/contents Accessed: 6 April 2024

Her Majesty's Government, 2009a. The Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009. [Online]. Available at: https://www.legislation.gov.uk/uksi/2009/3104/contents Accessed: 2 September 2024

Her Majesty's Government, 2009b. The Eels (England and Wales) Regulations 2009. [Online]. Available at: https://www.legislation.gov.uk/uksi/2009/3344/contents Accessed: 2 September 2024

Her Majesty's Government, 2010. Flood and Water Management Act 2010. [Online]. Available at: https://www.legislation.gov.uk/ukpga/2010/29/contents Accessed: 6 April 2024

Her Majesty's Government, 2014. Water Act 2014. [Online]. Available at: https://www.legislation.gov.uk/ukpga/2014/21/contents Accessed: 6 April 2024

Her Majesty's Government, 2015. The Environmental Damage (Prevention and Remediation) (England) Regulations 2015. [Online]. Available at: https://www.legislation.gov.uk/uksi/2015/810/contents Accessed: 6 April 2024.

Her Majesty's Government, 2016. The Groundwater (Water Framework Directive) (England) Direction 2016. [Online]. Available at: https://www.gov.uk/government/publications/the-groundwater-water-framework-directive-england-direction-2016 Accessed: 6 April 2024

Her Majesty's Government, 2017. The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. [Online]. Available at: https://www.legislation.gov.uk/uksi/2017/407/contents/made Accessed: 6 April 2024

Her Majesty's Government, 2018. 25 Year Environment Plan. [Online]. Available at: https://assets.publishing.service.gov.uk/media/5ab3a67840f0b65bb584297e/25-year-environment-plan.pdf Accessed: 2 September 2024

Her Majesty's Government, 2021. Environment Act 2021. [Online]. Available at: https://www.legislation.gov.uk/ukpga/2021/30/contents Accessed: 6 April 2024

Highways England, 2020a. DMRB LA 104 Road Drainage and the Water Environment. [Online]. Available at: https://www.standardsforhighways.co.uk/search/0f6e0b6a-d08e-4673-8691-cab564d4a60a Accessed: 6 April 2024

Highways England, 2020b. DMRB LA 113 Road Drainage and the Water Environment. [Online]. Available at: https://www.standardsforhighways.co.uk/search/d6388f5f-2694-4986-ac46-b17b62c21727 Accessed: 6 April 2024

His Majesty's Government, 2023a. The Environmental Permitting (England and Wales) (Amendment) (England) Regulations 2023. [Online]. Available at: https://www.legislation.gov.uk/uksi/2023/651/contents/made Accessed 29 April 2024

His Majesty's Government, 2024. National Policy Statement for National Networks. [Online]. Available at: https://www.gov.uk/government/publications/national-networks-national-policy-statement Accessed: 6 April 2024

Kwan, J, Dickinson, C, MacLeod, C., 2023. Environmental good practice on site guide (fifth edition) (C811)

Landmark Information Group Limited, 2023. Envirocheck report.

Met Office, 2024. UK Climate Averages. [Online]. Available at: https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/gcqfjn5xn Accessed: 6 April 2024

Ministry of Housing, Communities and Local Government, 2023a. National Planning Policy Framework. [Online]. Available at: https://assets.publishing.service.gov.uk/media/669a25e9a3c2a28abb50d2b4/NPPF_December_2023.pdf Accessed: 6 April 2024

Ministry of Housing, Communities and Local Government, 2023b Planning Practice Guidance. [Online]. Available at: https://www.gov.uk/government/collections/planning-practice-guidance Accessed: 6 April 2024

Murnane, E, Heap, A, Swain, A., 2006. Control of water pollution from linear construction projects. Technical guidance (C648). [Online]. Available at: https://www.ciria.org/CIRIA/CIRIA/Item_Detail.aspx?iProductCode=C648&Category=BOOK Accessed: 6 April 2024

National Highways, 2020. PCF Stage 2 A46 Coventry Junctions Upgrade (Walsgrave) Environmental Scoping Report.

National Highways, 2023. A46 Coventry Junctions (Walsgrave) Preliminary Environmental Information Report

National Highways, 2024. HADDMS. [Online]. Available at: https://www.haddms.com/ Accessed: 6 April 2024

Natural England, 2024. Natural England Designated Sites. [Online]. Available at: https://designatedsites.naturalengland.org.uk/ Accessed: 6 April 2024

NetRegs, 2018. GPP 5: Works and maintenance in or near water. [Online]. Available at: https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/gpp-5-works-and-maintenance-in-or-near-water/ Accessed: 6 April 2024

Ordnance Survey, 2024a. [Online]. Available at: https://osdatahub.os.uk/downloads/open Accessed: 6 April 2024

Ordnance Survey, 2024b. Open Rivers. [Online]. Available at: https://www.ordnancesurvey.co.uk/products/os-open-rivers Accessed: 6 April 2024

Rugby Borough Council, 2019. Rugby Borough Council Local Plan (2011-2031). [Online]. Available at: https://www.rugby.gov.uk/documents/20124/6585161/FINAL_LOCAL_PLAN_21.06.19.pdf/b896f4cc-f4b5-c8a9-5602-6fcc0df00427?t=1702377142359 Accessed: 6 April 2024

Rugby Borough Council, 2023. Climate Change and Sustainable Design and Construction Supplementary Planning Document. [Online]. Available at: https://www.rugby.gov.uk/documents/20124/6987732/Climate_Change_and_Sustainable_Design_and_Construction_Supplementary_Planning_Document__February_2023_.pdf/605b9da2-02e0-9d0d-e762-19d61e715bdc?t=1702379922113 Accessed 2 September 2024

UK Centre for Ecology & Hydrology, 2024. Flood Estimation Handbook Web Service. [Online]. Available at: https://fehweb.ceh.ac.uk/ Accessed 6 April 2024.

URS Infrastructure & Environment UK Limited, 2013. Stratford-on-Avon DC, Warwickshire CC, North Warwickshire BC & Rugby BC Level 1 SFRA Report. [Online]. Available at: https://api.warwickshire.gov.uk/documents/WCCC-680-21 Accessed: 6 April 2024

Warwickshire County Council, 2013. Warwickshire Strategic Flood Risk Assessment. [Online]. Available at: https://www.warwickshire.gov.uk/directory-record/2159/strategic-flood-risk-assessment Accessed: 6 February 2024

Westcott, F. J., Lean, C. M. B. and Cunningham, M. L., 2001. Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention. NGWCLC Report NC/99/73. [Online]. Available at: https://webarchive.nationalarchives.gov.uk/ukgwa/20140329082415/http://cdn.environment-agency.gov.uk/scho0501bitt-e-e.pdf Accessed: 6 April 2024

Woods Ballard, B, Wilson, S, Udale-Clarke, H, Illman, S, Scott, T, Ashley, R, Kellagher, R, 2015. The SuDS Manual, CIRIA C753