A46 Coventry Junctions (Walsgrave)
Scheme number: TR010066

6.1 Environmental Statement
Chapter 9 – Geology and Soils

APFP Regulations 5(2)(a)

Planning Act 2008

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

Volume 6

July 2025

Deadline 4

Infrastructure Planning

Planning Act 2008

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

A46 Coventry Junctions (Walsgrave)
Development Consent Order 202[x]

ENVIRONMENTAL STATEMENT
Chapter 9 - Geology and Soils

Regulation Number	Regulation 5(2)(a)
Planning Inspectorate Scheme Reference	TR010066
Application Document Reference	TR010066/APP/6.1
Author	A46 Coventry Junctions (Walsgrave) Project Team, National Highways

Version	Date	Status of Version
Rev 0	November 2024	Application Issue
Rev 1	May 2025	Deadline 1
Rev 2	July 2025	Deadline 4

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9. Geology and soils

9.1. Introduction

9.1.1. This chapter presents the information required by the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) to be provided in the Environmental Statement (ES) to enable the identification and assessment of likely significant effects on geology and soils.

9.1.2. As part of the Environmental Impact Assessment (EIA) process, this chapter reports the potential significant effects for geology and soils 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.

9.1.3. The approach to this assessment follows the Environmental Scoping Report (National Highways, 2023) (**TR010066/APP/6.8**) and the Scoping Opinion (**TR010066/APP/6.9**) for the Scheme received from the Planning Inspectorate on behalf of the Secretary of State.

9.1.4. Mineral resources are covered in Environmental Statement (ES) Chapter 10 (Material Assets and Waste) (**TR010066/APP/6.1**). Hydrogeology, where not associated with land contamination, is covered in ES Chapter 13 (Road Drainage and the Water Environment) (**TR010066/APP/6.1**). For surface water and groundwater quality, this chapter only considers the effects from land contamination. Detailed assessment of the effects of the Scheme on water quality is provided in ES Chapter 13 (Road Drainage and the Water Environment) (**TR010066/APP/6.1**).

9.1.5. The assessment has been undertaken in accordance with the Design Manual for Roads and Bridges (DMRB), LA 109 Geology and soils (National Highways, 2019).

9.1.6. 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**). This chapter text is supported by the following:

- ES Figure 9.1: Study Area
- ES Figure 9.2: Potential Sources
- ES Figure 9.3: Controlled Water Receptors

- ES Appendix 9.1: Hierarchy of Screening Criteria for Generic Quantitative Risk Assessment
- ES Appendix 9.2: Soil Resource Plan and Agricultural Land Classification
- ES Appendix 9.3: Ground Investigation Report

9.2. Competent expert evidence

9.2.1. The competent expert is a contaminated land specialist (BSc, MSc, SoBRA Accredited Risk Assessor, Chartered Waste Manager, Member Royal Society Chemistry) with over 20 years of experience in environmental protection, contaminated land, risk assessment and EIA. They have experience of several large-scale National Highways Schemes including the A47 in Norfolk, A1 in Newcastle, M25 and the A63 in Hull.

9.2.2. The second competent expert is a Member of the Institution of Environmental Sciences with over 30 years of experience in contaminated land assessment, environmental planning and compliance.

9.2.3. The agricultural land sections and ES Appendix 9.2 (Soil Resource Plan and Agricultural Land Classification) (**TR010066/APP/6.3**) have been prepared by an Agricultural Land Classification Consultant and an EIA Consultant. The Agricultural Land Classification Consultant is qualified as a Master of Science in Agriculture, with over five years' experience in soil surveying. The EIA Consultant is qualified as a Master of Science in Environmental Assessment and Management and over five years' experience producing agricultural chapters for EIAs.

9.2.4. They have used their knowledge and professional judgement in identifying the likely significant effects associated with the Scheme and providing technical guidance through the assessment process.

9.3. Legislative and policy framework

Legislation

9.3.1. The main legislative framework for geology and soils (including contaminated land and soils as a national resource) includes the following regulations, presented in Table 9-1. These have been taken into account when assessing the potential effects on geology and soils.

Table 9-1: Summary of legislation relevant to the geology and soils assessment

Legislation or regulation	Summary	How this is addressed in the assessment
Environmental Protection Act 1990	Part IIA of this Act provides a framework for the definition, identification and remediation	A contaminated land risk assessment has been undertaken

Legislation or regulation	Summary	How this is addressed in the assessment
(as amended by the Environment Act 1995)	of contaminated land. Central to the assessment of potentially contaminated land is the concept of a Significant Pollutant Linkage, i.e. a significant connection between a source of contamination and a sensitive receptor via an appropriate environmental pathway. The Part IIA regime is underpinned by the core principles of the 'polluter pays' and that land must be suitable for use.	as part of this geology and soils chapter.
Environmental Protection (Duty of Care) Regulations 1991 (as amended)	These regulations impose a duty of care on persons who produce, store, carry, treat or dispose of controlled waste or, as a broker, has control of such waste. The duty requires such persons to ensure that there is no unauthorised or harmful deposit, treatment or disposal of the waste, to prevent the escape of the waste from their control or that of any other person, and on the transfer of the waste to ensure that the transfer is only to an authorised person or to a person for authorised transport purposes and that a written description of the waste is also transferred.	The Second Iteration Environmental Management Plan (EMP) would set out controls to ensure identified risks associated with contamination waste are appropriately managed and minimised during construction and to mitigate any identified limitations.
The Contaminated Land (England) (Amendment) Regulations 2012	This regulation amends the contaminated land (England) regulations 2006 to provide stronger protection of controlled waters. This is an extension of the existing regulations which is designed to prevent land from being contaminated and to tackle existing contamination.	A contaminated land risk assessment has been undertaken as part of this geology and soils assessment.
The Environmental Damage (Prevention and Remediation) (England) Regulations 2015 (as amended)	This regulation covers environmental liability with regard to the prevention and remedying of environmental damage. It specifies the types of damage to a protected species or natural habitat, a site of special scientific interest, water or land which constitute environmental damage. The regulation also deals with prevention of environmental damage, remediation of damage, and recovery of costs.	This Chapter assesses the effects of the Scheme on receptors such as biodiversity, SSSIs, water and land.
The Environmental Permitting (England and Wales) Regulations 2016 (as	The environmental permitting regime requires those carrying out activities that release emissions to land, air and water, or that involve certain waste types, to hold an	The Second Iteration EMP will include the environmental permitting requirements of the Principal Contractor.

Legislation or regulation	Summary	How this is addressed in the assessment
amended)	environmental permit.	
Water Resources Act 1991 (as amended), UK Government.	This Act sets out to regulate water resources, water quality and pollution, and flood defence. It sets out standards for controlled waters.	A controlled waters risk assessment has been undertaken and is presented in ES Appendix 9.3 (Ground Investigation Report) (**TR010066/APP/6.3**).
Water Act 2003 and Water Act 2014, UK Government	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.	A controlled waters risk assessment has been undertaken and is presented in ES Appendix 9.3 (Ground Investigation Report) (**TR010066/APP/6.3**).
Water Environment (Water Framework Directive) (England and Wales) Regulations 2017, UK Government	The 2017 regulations replace the Water Environment (Water Framework Directive) Regulations 2003, which transposed the Water Framework Directive (2000/60/EC) into UK law. The 2017 regulations provide a framework for managing the water environment in England and Wales by preventing its deterioration and improving its quality. The 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.	A controlled waters risk assessment has been undertaken and is presented in ES Appendix 9.3 (Ground Investigation Report) (**TR010066/APP/6.3**). Further information on water quality is provided in ES Appendix 13.3 (Water Quality Assessment) (**TR010066/APP/6.3**)

National Policy

National Networks National Policy Statement 2024

9.3.2. The National Networks National Policy Statement (NPS NN) (Department for Transport (2024)) 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 needs of the NPS NN. Compliance of the Scheme with the NPS NN is detailed within the NPS NN Accordance Tables (**TR010066/APP/7.2**).

9.3.3. The policies of relevance to geology, soils and contaminated land within the NPS NN and detail on how they have been addressed in the assessment are summarised in Table 9-2.

9.3.4. The requirements of the NPS NN and relevant policies detailed below in relation to assessing and mitigating the impacts of the Scheme on agricultural land, geological resources and potential land contamination have been taken account of in this assessment, through a combination of desk studies, sampling through ground investigations, and subsequent assessment, in order to identify the likely significant effects that the Secretary of State for Transport needs to give due regard to in decision-making.

Table 9-2: Summary of NPS NN planning policies of relevance to geology and soils.

NPS NN 2024 Paragraph Number	Summary	How this is addressed in the assessment
5.46	*"The applicant should consider the potential direct and indirect impacts on ecosystems including the impacts on habitats and protected species and the interactions between these, and provide environmental information proportionate to the likely impacts of the infrastructure on biodiversity and nature."*	There are no sites of geological conservation importance within the geology and soils study area for the Scheme. Ecological conservation sites are discussed in ES Chapter 8 (Biodiversity) (**TR010066/APP/6.1**).
5.47	*"The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests as well as consider how their proposal will deliver biodiversity net gain in line with the requirements in a Biodiversity Gain Statement…"*	There are no geological conservation sites within the geology and soils study area. Internationally, nationally and locally designated sites dependent on soils for their ecological designations have been scoped out of this assessment as none have been identified within the geology and soils study area.
5.154	*"Where necessary, land contamination and instability should be considered in respect of new development. Specifically, proposals should be appropriate for the location, including preventing unacceptable risks from land contamination or instability. If land instability and/or land contamination may be an issue, applicants should seek appropriate technical and environmental expert advice from a competent person to prepare and carry out the appropriate assessments. Applicants should consult*	This assessment uses Environment Agency (2023) Land Contamination Risk Management (LCRM) guidance to assess risks posed to human health and the environment.

NPS NN 2024 Paragraph Number	Summary	How this is addressed in the assessment
	with the Coal Authority, Environment Agency and Local Authority if necessary.'	
5.155	*"For developments on previously developed land, applicants should ensure and demonstrate that they have considered the risks posed by land contamination in accordance with the Land Contamination Risk Management guidance. A preliminary assessment of land contamination and/or ground instability should be carried out at the earliest possible stage before a detailed application for development consent is prepared."*	This assessment uses Environment Agency (2023) Land Contamination Risk Management (LCRM) guidance to assess risks posed to human health and the environment.
5.156	*"Applicants should ensure that any necessary investigations are undertaken, in accordance with Land Contamination Risk Management guidance, to ascertain the risk from contamination and identify sensitive receptors and that their sites are, and will, remain stable or can be made so as part of the development. The site needs to be assessed in the context of surrounding areas where subsidence, landslides and land compression could threaten the development during its anticipated life or damage neighbouring land or property. This could be in the form of a land stability or slope stability risk assessment report."*	This assessment uses Environment Agency (2023) Land Contamination Risk Management (LCRM) guidance to assess risks posed to human health and the environment.
5.189	*"Applicants should take into account the economic and other benefits of the best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification). Where significant development of agricultural land is demonstrated to be necessary, applicants should seek to use areas of poorer quality land in preference to that of a higher quality. Applicants should also identify any effects, and seek to minimise impacts, on soil health and protect and improve soils, taking into account any mitigation measures proposed. Soil is an important natural capital resource, providing many essential services such as storing carbon (also known as a carbon sink), reducing the risk of flooding, providing wildlife habitats and delivering global food supplies. Guidance on sustainable soil management can be found in Defra's Construction Code of Practice for the Sustainable Use of Soils on Construction Sites. As a first principle, developments should be on previously developed (brownfield) sites provided that it is not of high environmental value."*	The effects of the Scheme on agricultural land and BMV are reported in this Chapter and are informed by ES Appendix 9.2 (Soil Resource Plan and Agricultural Land Classification) (**TR010066/APP/6.3**).

National Planning Policy Framework

9.3.5. The National Planning Policy Framework (NPPF) (Department for Levelling Up, Housing and Communities 2023) sets out the Government's planning policy

framework for the whole of England, and how these are expected to be applied. It provides a framework within which locally prepared plans for housing and other developments can be produced. 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.

9.3.6. The below summarises the policy requirements from the NPPF relating to the Applicant's assessment and mitigation requirements for geology and soils and how these have been addressed in the assessment.

9.3.7. Section 15 sets out that planning policies should take into account ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining and any proposals for mitigation including land remediations. Ground conditions including land contamination and risks from natural hazards are included within the baseline section of this chapter. Mitigation for any land contamination and geological risks are included, where required, in the mitigation section of this chapter. The Environmental Management Plan will be provided as the First Iteration EMP (**TR010066/APP/6.5**) secured through the DCO.

9.3.8. Annex 2 of the NPPF states that a site investigation should be undertaken to provide a risk assessment of land potentially affected by contamination or ground stability as appropriate. A ground investigation has been undertaken and the findings are reported in the ES Appendix 9.3 (Ground Investigation Report) (**TR010066/APP/6.3**).

Safeguarding our Soils A Strategy for England (Department for Environment, Food and Rural Affairs (Defra), 2009)

9.3.9. This will be considered during the production of the Soil Handling Management Plan during the production of the Second Iteration EMP.

Local policy

9.3.10. In addition to national planning polices, the Scheme has taken into account the requirements of local planning policies in the assessment and management of geology, soils and land contamination as presented in Table 9-3.

Table 9-3: Summary of local planning policies of relevance to geology and soils.

Planning policy	Summary	How this is addressed in the assessment
Coventry City Council	Coventry City Council's Local Plan sets out a series of policies which will help the local authority promote sustainable	A controlled waters risk assessment has been

Planning policy	Summary	How this is addressed in the assessment
Local Development Plan (adopted December 2017)	development and help determine planning applications. Policy EM6: Redevelopment of Previously Developed Land includes the following guidance on contamination 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. • Prior to any potential development, consultation must be held with Severn Trent Water to ensure that the required wastewater infrastructure is in place in sufficient time. In line with the objectives of the Water Framework Directive, development must not affect the water bodies' ability to reach good status or its potential as set in the Humber and Severn River Basin Management Plans and should support, where possible, to improving the status class. • 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. • Developers are actively encouraged to engage with the Environment Agency and follow their guidance relating to contaminated land such as Environment Agency, Land Contamination Risk Management (LCRM), How to Manage the Risks from Land Contamination, October 2020. • The Environment Agency require the risk to groundwater of any significant contamination to be considered by a desk study, site investigation and subsequent conceptual model and risk assessment, where necessary leading to suitable remedial action and related method statement. This supports paragraphs 109-112 of the NPFF which states that where development is proposed on land that is known or suspected to be affected by contamination then the risks to human health and the wider environment should be assessed by the application for consideration by the LPA. • After carrying out the development and commencement of its use, the land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990. • Development proposals will need to comply with the Environment Agency publication Groundwater Protection: Policy and Practice' (GP3).	undertaken and is presented in ES Appendix 9.3 (Ground Investigation Report) (**TR010066/APP/6.3**). A Water Framework Directive (WFD) assessment has been undertaken and is presented in ES Appendix 13.2 (Water Framework Directive Compliance Assessment) (**TR010066/APP/6.3**). This assessment has been undertaken in accordance with the requirements of LCRM.
Rugby Borough Council Local Plan 2011-2031	Policy SDC1: Sustainable Design states that developers should consider the impact of environmental factors such as high noise areas, areas of low air quality and contaminated land to ensure such sensitive site achieve relevant statutory compliance/current best practice guidance and that a high	The local geology and contaminated land has been considered in this geology and soils chapter. The baseline is described in

Planning policy	Summary	How this is addressed in the assessment
(adopted June 2019)	level of sustainable design is achieved. Policy SDC7: Protection of the Water Environment and Water supply states that development will not be permitted where proposals may result in the release of pollution that has a negative impact on water quality.	Section 9.8 of this chapter, and Section 9.10 of this chapter describes embedded and essential mitigation measures.

National Highways policy

9.3.11. National Highways policies of particular relevance to the assessment of geology and soils include:

- National Highways Environment Strategy seeking to help protect, manage, and enhance the quality of the surrounding environment.
- National Highways Sustainable Development Strategy sets out National Highways' approach and priorities related to sustainable development including carbon management to achieve efficiency in raw material consumption and waste generation, responsible sourcing of resources and circular economy.

Technical guidance

9.3.12. Technical guidance and standards relevant to geology and soils that have been considered in the assessment are outlined below.

Land contamination: risk management. Environment Agency, July 2023

9.3.13. The Land Contamination Risk Management guidance details how to assess and manage risks from land contamination. The guidance covers the use of a tiered approach to risk assessment:

- Stage 1: Risk assessment
- Stage 2: Options appraisal
- Stage 3: Remediation and verification

9.3.14. The guidance applies to risks to human health, drinking water supplies, groundwater and surface water, soils ecosystems and property. A contaminated land risk assessment has been undertaken as part of this geology and soils assessment.

Contaminated Land Risk Assessment – A Guide to Good Practice C552 (CIRIA, 2001)

9.3.15. The C552 report examines risk assessment of contaminated land and the key elements of risk assessment practices and procedures. The guide describes the stages involved in identifying risks and assessing their significance. A contaminated land risk assessment has been undertaken as part of this geology and soils assessment.

Code of Practice for the Sustainable Use of Soils on Construction Sites, (Department for Environment, Food and Rural Affairs (Defra), 2009)

9.3.16. Comprises a code of practice for the sustainable use of soils on construction sites, to assist anyone involved in the construction industry to protect the soil resources with which they work. Outlines current guidance and legislation concerning the use of soil in construction projects, offering stage by stage guidance on the use, management and movement of soil on site. The Second Iteration EMP would include following management plans:

- Site Waste Management Plan (SWMP)
- Materials Management Plan (MMP)
- Soil Handling Management Plan (SHMP) - including a Soil Resource Plan and a Soil Handling Strategy.

Guide to assessing development proposals on agricultural land (Natural England, 2018)

9.3.17. This guide explains how local planning authorities can assess proposals to protect the best and most versatile (BMV) agricultural land from inappropriate and unsustainable development. The effects of the Scheme on the BMV are reported in this Chapter.

9.3.18. Agricultural Land Classification: protecting the best and most versatile agricultural land. (TIN049). Second edition (Natural England, 2012)

9.3.19. This note explains the Government Policy to protect agricultural land and the Agricultural Land Classification system and uses. The effects of the Scheme on agricultural land are reported in this Chapter and are informed by ES Appendix 9.2 (Soil Resource Plan and Agricultural Land Classification) (**TR010066/APP/6.3**).

9.4. Consultation

9.4.1. An Environmental Scoping Report was submitted to the Planning Inspectorate in June 2023 (**TR010066/APP/6.8**). A Scoping Opinion (**TR010066/APP/6.9**) was

received in response to the Environmental Scoping Report (2023). The Applicant's responses to the Scoping Opinion are contained in, ES Appendix 4.1 (Scoping Opinion Response) (**TR010066/APP/6.3**).

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

9.4.3. The Scoping comments from the Planning Inspectorate included requests to:

- Incorporate and assess the potential migration of contamination and ground gas through the introduction of new preferential pathways.
- Detail the measures taken to ensure that any potentially contaminative materials or working practices are to be controlled to prevent pollution incidents.
- Confirm how and when a geotechnical risk assessment will be undertaken.

9.4.4. The potential contaminated land risks are addressed through assessment of the ground investigation results (ES Appendix 9.3 (Ground Investigation Report) (**TR010066/APP/6.3**)) against standards from published guidance and regulations.

9.4.5. The Environmental Management Plan will be provided as the First Iteration EMP (**TR010066/APP/6.5**) for the DCO application. During the detailed design stage this will become the Second Iteration EMP. The EMP detail practices to control construction activities including the disturbance, handling and deposition of materials to minimise risk to the environment.

9.4.6. A geotechnical assessment has been completed in accordance with DMRB CD 622, Managing geotechnical risk (Highways England, 2020) and is reported in ES Appendix 9.3 (Ground Investigation Report) (**TR010066/APP/6.3**).

9.4.7. Comments pertaining to waste and reuse including those relating to the former landfills in the northern and southern extents of the Scheme have been included in this assessment. Further comment on the waste is contained within ES Chapter 10 (Material Assets and Waste) (**TR010066/APP/6.1**).

9.4.8. Further direct consultation for geology and soils has not been required during the assessment stage. Where required, ongoing engagement will be undertaken at the detailed design stage with the Environment Agency and the local authorities.

9.5. Assessment methodology

9.5.1. The following section describes the methodology used to determine the likely significant effects on geology and soils as a result of the Scheme.

9.5.2. The assessment has been undertaken in accordance with the methodology presented in LA 109 Geology and soils (Highways England, 2019).

9.5.3. The guidance provides a framework for assessing and managing the effects on geology and soils as a result of the Scheme during construction and operation. These include consideration of the:

- Effects on bedrock and superficial geology including geological designations and sensitive or valuable non-designated features.
- Effects on soil resources.
- Effects on agricultural land.
- Effects from contamination in soils on human health and surface water and groundwater.

9.5.4. As part of the scoping exercise, impacts to designated geological sites (both statutory and non-statutory) have been scoped out of this geology and soils assessment due to the absence of designated sites within the Scheme Order Limits. This was also the conclusion of the Planning Inspectorate, as reported in the Scoping Opinion (**TR010066/APP/6.9**) (3.5.4 in ES Appendix 4.1 (Scoping Opinion Response) (**TR010066/APP/6.3**)).

9.5.5. Additionally, the Scheme is not likely to introduce significant sources of contamination during construction or operation. This was also the conclusion of the Planning Inspectorate, as reported in the Scoping Opinion (**TR010066/APP/6.9**) (3.5.5 in ES Appendix 4.1 (Scoping Opinion Response) (**TR010066/APP/6.3**)).

9.5.6. Given the above, the assessment in this chapter will concentrate on contamination and the effects on human health, surface water and groundwater from historical and ongoing potential sources of contamination and impacts to agricultural land as a soil resource and BMV or prime land.

Assessment criteria

Sensitivity of receptors

9.5.7. Within DMRB LA 109, impacts on geology and soils are assessed by qualitative comparison, evaluating the value (sensitivity) of particular receptors impacted by the Scheme and assessment of the magnitude of that impact. The receptor

value, classes and the range of magnitude criteria are also set out in DMRB LA 109.

9.5.8. The assessment of the effects of contamination on the identified receptors has been informed by a ground investigation completed in 2023. Effects on groundwater during construction and operation of the proposed development are assessed in ES Chapter 13 (Road Drainage and the Water Environment) (**TR010066/APP/6.1**).

9.5.9. The criteria for assessing value of receptors and the magnitude of impact to these receptors is presented in Table 9-4 and Table 9-5 in accordance with DMRB LA 109 Geology and soils and DMRB LA 113 Road drainage and water environment (Highways England, 2020).

Table 9-4:Value (sensitivity) of receptor

Receptor value (sensitivity)	Description
Very high	Human health: • Very high sensitivity land use such as residential or allotments. Surface water: • Watercourse having a Water Framework Directive (WFD) classification shown in a River Basin Management Plan (RBMP) and $Q_{95} \geq 1.0m^3/s$. • Site protected/designated under European Community (EC) or UK legislation (Special Area of Conservation (SAC), Special Protection Area (SPA), Sites of Special Scientific Interest (SSSI), Ramsar site, salmonid water) • Species protected by EC legislation. Groundwater: • Principal aquifer providing a regionally important resource and/or supporting a site protected under EC and UK legislation. • Groundwater locally supports Groundwater dependent terrestrial ecosystems (GWDTE). • Source Protection Zone (SPZ) 1. Soils: • Soils directly supporting an EU designated site (e.g; SAC, SPA, Ramsar) and/or Agricultural Land Classification (ALC) grade 1 & 2 or Land Classification for Agriculture (LCA) grade 1 & 2.
High	Human health: • High sensitivity land use such as public open space. Surface water: • Watercourse having a WFD classification shown in a RBMP and Q_{95} $<1.0m^3/s$. Species protected under EC or UK legislation. Groundwater:

Receptor value (sensitivity)	Description
	• Principal aquifer providing locally important resource or supporting a river ecosystem. Groundwater supports a GWDTE. SPZ 2. Soils: • Soils directly supporting a UK designated site (e.g; SSSI) and/or ALC grade 3a, or LCA grade 3.1.
Medium	Human health: • Medium sensitivity land use such as commercial or industrial. Surface water: • Watercourses not having a WFD classification shown in a RBMP and Q_{95} >0.001m^3/s. Groundwater: • Aquifer providing water for agricultural or industrial use with limited connection to surface water. SPZ3. Soils: • Soils supporting non-statutory designated sites (e.g; Local Nature Reserves (LNR), Sites of Nature Conservation Importance (SNCIs), and/or ALC grade 3b or LCA grade 3.2.
Low	Human health: • Low sensitivity land use such as highways and rail. Surface water: • Watercourses not having a WFD classification shown in a RBMP and Q_{95} ≤0.001m^3/s. Groundwater: • Unproductive strata. Soils: • Soils supporting non-designated notable or priority habitats and/or ALC grade 4 & 5 or LCA grade 4.1 to 7.
Negligible	Human health: • Undeveloped surplus land/no sensitive land use proposed. Surface water: • Not applicable for this sensitivity. Groundwater: • Not applicable for this sensitivity. Soils: • Previously developed land formerly in 'hard uses' with little potential to return to agriculture.

Magnitude of impact

9.5.10. The magnitude of impact (change) is a predicted determination of the potential scale of change and deviation from baseline conditions as a result of the Scheme. The qualitative impact is determined according to the criteria provided in Table 9-5.

Table 9-5:Magnitude of impact (change)

Magnitude of impact (change)	Description
Major	Human health: • Significant contamination identified. Contamination levels significantly exceed background levels and relevant screening criteria (e.g. category 4 screening levels) with potential for significant harm to human health. Contamination heavily restricts future use of land. Surface water: • Loss or extensive change to a fishery. • Loss of regionally important public water supply. • Loss or extensive change to a designated nature conservation site. • Reduction in water body WFD classification. Groundwater: • Loss of regionally important water supply. • Reduction in water body WFD classification. Soils: • Physical removal or permanent sealing of >20 hectares (ha) of agricultural land.
Moderate	Human health: • Contaminant concentrations exceed background levels and are in line with limits of relevant screening criteria (e.g. category 4 screening levels). Significant contamination can be present. Control / remediation measures are required to reduce risks to human health / make land suitable for intended use. Surface water: • Degradation of regionally important public water supply or loss of major commercial/industrial/agricultural supplies. • Contribution to reduction in water body WFD classification. Groundwater: • Degradation of regionally important public water supply or loss of significant commercial/ industrial/ agricultural supplies. Soils: • Physical removal or permanent sealing of 1ha – 20ha of agricultural land; or permanent loss / reduction of one or more soil function(s) and restriction to

Magnitude of impact (change)	Description
	current or approved future use (e.g. through degradation, compaction, erosion of soil resource).
Minor	Human health: • Contaminant concentrations are below relevant screening criteria (e.g. category 4 screening levels). Significant contamination is unlikely with a low risk to human health. Best practice measures can be required to minimise risks to human health. Surface water: • Minor effects on water supplies. Groundwater: • Minor effects on an aquifer, GWDTEs and abstractions. Soils: • Temporary loss / reduction of one or more soil function(s) and restriction to current or approved future use (e.g. through degradation, compaction, erosion of soil resource.)
Negligible	Human health: • Contaminant concentrations substantially below levels outlined in relevant screening criteria (e.g. category 4 screening levels). No requirement for control measures to reduce risks to human health / make land suitable for intended use. Surface water: • No risk identified. Groundwater: • No measurable impact upon an aquifer and/or groundwater receptor. Soils: • No discernible loss / reduction of soil function(s) that restrict current or approved future use.

9.5.11. In assessing whether contaminants in soils or groundwater have potential to cause harm to health or controlled waters it is required that a contaminated land risk assessment is undertaken. This is a process by which the actual or potential risks posed by identified hazards to specific receptors are estimated. In the context of evaluation of contaminated land, hazards relate to sources, or potential sources of contamination capable of causing harm. The process of estimating risk from soil contamination is described in guidance documents set out in Land Contamination: Risk Management (LCRM) and related guidance documents. For the Scheme a quantitative risk assessment of the measured potential ground contaminants has been undertaken and is presented in the ES Appendix 9.3 (Ground Investigation Report) (**TR010066/APP/6.3**). The findings of the quantitative risk assessment have been used to inform the risk assessment in this Chapter.

9.5.12. Generic assessment criteria have been sourced from current published guidance protective of human health and controlled water. ES Appendix 9.1 (Hierarchy of Screening Criteria for Generic Quantitative Risk Assessment) (**TR010066/APP/6.3**) provides details on the source and application of these criteria.

Significance of effects

9.5.13. The significance of effects will be determined in accordance with Table 3.7 (presented as Table 9-6), Table 3.8.1 (presented as Table 9-7) and Section 3.9 of DMRB LA 104.

Table 9-6:Significance categories and typical descriptions

Significance category	Typical description
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

Table 9-7: Significance matrix

	Magnitude of impact (degree of change)					
		No change	**Negligible**	**Minor**	**Moderate**	**Major**
Environmental value (sensitivity)	**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	Slight or 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

9.5.14. Residual effects that are of moderate, large or very large significance will give rise to significant effects in accordance with Note 3 of the DMRB LA 104.

9.5.15. The significance of effects of the Scheme on receptors is reported in Section 9.11 of this chapter, Assessment of likely significant residual effects.

9.6. Assessment assumption and limitations

9.6.1. 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.

9.6.2. The Chapter is based on the current known ground conditions and knowledge of any potential contamination. The findings may be subject to change during Scheme development. Should any previously unidentified contamination or unforeseen ground conditions become evident the procedure set out in Requirement 8 of the draft DCO (**TR010066/APP/3.1**) will be followed ensuring that any remediation required will take place.

9.6.3. A ground investigation (GI) has been undertaken for the Scheme. Assumptions and limitations in relation to the GI can be found in ES Appendix 9.3 (Ground Investigation Report) (**TR010066/APP/6.3**)).

9.6.4. The GI information is representative of the soils within the Order Limits however it is limited to the locations investigated and there is the potential for unidentified contamination to be present outside of investigated locations. Laboratory analysis has been completed to relevant standards.

9.6.5. The Second Iteration EMP will set out controls to ensure identified risks associated with contamination are appropriately managed and minimised during construction and to mitigate any identified limitations. Additionally, this will set out appropriate measures for dealing with unidentified contamination. Mitigation measures within the Second Iteration of the EMP shall include best practice environmental management procedures and appropriate waste management.

9.6.6. An ALC survey has been undertaken for the Scheme. Assumptions and limitations in relation to the survey can be found in ES Appendix 9.2 (Soil Resource Plan and Agricultural Land Classification) (**TR010066/APP/6.3**)).

9.6.7. Due to stone content in the soils, some of the soil augers could not be taken to their full depth. In these cases, assumptions were drawn from nearby deeper

augers and/or comparable soil description pits. It is considered that there was still sufficient data to provide an accurate grading of the agricultural land.

9.6.8. A geotechnical assessment has been completed in accordance with DMRB CD 622, Managing geotechnical risk (Highways England 2020) and is reported in ES Appendix 9.3 (Ground Investigation Report) (**TR010066/APP/6.3**).

9.7. Study area

9.7.1. DMRB LA 109 paragraph 3.5 states the study area shall be identified on a project by project basis based on a series of criteria and using professional judgement. The study area has therefore been defined as:

- The study area for the contamination assessment considers all locations where physical works and ground disturbance would take place (the Order Limits).
- The study area also extends to 1km beyond the Order Limits in order to identify any past pollution incidents which may have affected geology and soils within the area
- The study area for sensitive off-site receptors that could be affected by the Scheme is detailed in Table 9-8 and is typically 250m to 1km based upon DMRB LA 109.
- In terms of agricultural land classification, the study area is land within the Order Limits.

9.7.2. The assessment of effects therefore considers an appropriate extent from the Order Limits including the satellite compound and temporary land take for the Scheme as further described in ES Chapter 2 (The Scheme) (**TR010066/APP/6.1**). The extent of the study area is shown on ES Figure 9.1 (Study Area) (**TR010066/APP/6.2**). The Scheme covers a land area of approximately 36.63ha.

9.8. Baseline conditions

9.8.1. The majority of the Scheme lies within or close to the existing A46 and connecting roads. Undeveloped agricultural land is located in the north of the study area with Coombe Pool to the east. A residential housing estate is located to the south-west of the Scheme. The existing A46 road infrastructure is the most prominent man-made feature present in the study area.

9.8.2. Previous reporting used in this assessment includes a Preliminary Environmental Information Report (PEIR) (National Highways, 2023) and Environmental Scoping Report (National Highways, 2023).

9.8.3. Reported baseline conditions in line with ES Appendix 9.3 (Ground Investigation Report) (**TR010066/APP/6.3**) have been used in this assessment.

9.8.4. Baseline conditions for the study area are summarised in Table 9-9 and on ES Figures 9.2 (Potential Sources) and ES Figure 9.3 (Controlled Water Receptors) (**TR010066/APP/6.2**).

Table 9-8: Baseline data

Aspect	Details
Geology	A basic summary of the geological sequence in the area of the Scheme is as follows, further details can be found in section 9.8 of this chapter. Details on the geology have been obtained from ES Appendix 9.3 (Ground Investigation Report) (**TR010066/APP/6.3**) and with reference to the British Geological Survey (BGS) published mapping and lexicon. Designated sites • No statutory or non-statutory designated sites such as UNESCO or SSSI have been designated for geological or geomorphological interest in the study area. Top soil • Topsoil was encountered in almost all exploratory holes. Generally described as a sand or clay with roots and rootlets. Made ground • Made ground – recorded to be present in the vicinity of, and under the existing roads and areas of infilled ground to the south of the existing Walsgrave Junction, adjacent to Hungerley Hall Farm and in isolated locations by field margins. The made ground is described as a sandy gravel of sandstone and concrete under the existing carriageway. In the vicinity of the farm and agricultural fields the made ground was recorded as a sandy gravelly clay or slightly clayey gravelly sand with brick fragments. Made ground in the former landfill to the south is a sandy gravel with metal filings and tire scraps at depth. Superficial geology • Alluvium – identified along the west and south site boundaries as soft to stiff sandy gravelly slightly silty clay and a slightly clayey gravelly sand. • River Terrace Deposits – recorded in two locations in the south and the north-west as sandy gravel. • Wolston Glacigenic Formation (parent of the Thrussington Till Member and Bosworth Clay Member) – typically found to the north of the site on both the east and west sides of the A46 carriageway as a firm to stiff, sandy, slightly gravelly clay, or as a clayey, slightly gravelly sand. • Baginton Sand and Gravel Formation – predominantly found in the north of Hungerley Hall Farm to the east and west of the A46 carriageway and described as sands and gravels, with lenses of silt and clay. Bedrock geology • Mercia Mudstone – underlies the entirety of the study area, described as a stiff to hard silty clay with occasional mudstone bands and a weathered thin to medium fine grained moderately strong to strong sandstone. Weathered mudstone was encountered during the GI and where this layer was penetrated a competent mudstone was noted.

Aspect	Details	
	Previous GI data located within the PSSR indicate that topsoil, made ground, alluvium, River Terrace Deposits, Bosworth Clay Member, Baginton Sand and Gravel, Thrussington Member and Mercia Mudstone (weathered) were identified within the Scheme extent.	
Sites of geological interest	Historical quarrying	One historical surface mineral working is located on site and two off-site within 250m, according to the Envirocheck (2023) report: • On-site – Coombe Woods, Coventry, Warwickshire. Located in the south. Commodity: sand and gravel. Operation ceased. • Off-site – Walsgrave Hill, Coventry, Warwickshire. 120m to east. Commodity sand and gravel. Operation ceased. • Off-site – Binley Gravel Pit, Coventry, Warwickshire. 70m west. Commodity: sand and gravel. Operation ceased.
	Designated geological sites	No statutory or non-statutory designated geological sites such as UNESCO or SSSI sites within 1km.
	BGS recorded mineral sites	Three BGS mines and quarry sites are located within the survey area. These are for Coombe Woods, Walsgrave Hill and Binley Gravel Pit.
Hydrogeology	The MAGIC mapping website indicates that the Scheme is not within or located within 1km to any groundwater SPZs. The closest SPZ is 3km to the west of the study area. The Environment Agency (2017) has designated aquifer properties of the strata as follows: • The alluvium, River Terrace Deposits and Baginton Sand and Gravel Formation are classified as Secondary A Aquifers (can support local water supplies, and may form an important source of base flow to rivers). • The Thrussington Member (Wolston Formation) and Bosworth Clay Member (Wolston Formation) are classified as a Secondary Undifferentiated (aquifer of minor value) and Unproductive stratum respectively (unable to provide usable water supplies). • The Mercia Mudstone is classified as a Secondary B aquifer (may store and yield limited amounts of groundwater). **Groundwater Vulnerability** Groundwater vulnerability varies across the study area. 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. **Water Framework Directive** The study area is located within the Warwickshire Avon – Secondary Mudrocks groundwater body (WBID GB40902G990900) and is part of the Avon Warwickshire - Secondary Mudrocks Operational Catchment and the Severn England GW Management Catchment. The groundwater body has 'Good' Chemical and Quantitative status (2019 cycle 3). The objective is to maintain 'Good' Quantitative status. The waterbody is protected under the Nitrates Directive and is a Drinking Water Protected Area. **Water Abstraction and Source Protection Zones** There are no SPZs within 2km of the Scheme.	

Aspect	Details
	There are two licensed groundwater abstractions within 2km of the Scheme with the closest 853m to the west abstracting from the Sherwood Sandstone Group. These are used for industrial and commercial purposes. No licensed abstractions have been identified to be directly down hydraulic gradient of the Scheme. Refer to ES Chapter 13 (Road Drainage and the Water Environment) (**TR010066/APP/6.1**), for more information.
Hydrology	**Surface water features** Coombe Pool, a man-made feature is located adjacent to the east of the Scheme, is designated as a SSSI as a standing open water and canals habitat. Smite Brook feeds into Coombe Pool at its north-eastern end. Water from Coombe Pool flows back into Smite Brook via a weir close to the existing Walsgrave Junction. Smite Brook passes west underneath the A46 through a culvert, and is a tributary to the River Sowe, which runs north to south on the western boundary extent of the study area. A surface water pond is located within the Order Limits approximately 100m from the A46 to the north. Two ponds are located east of the Order Limits, approximately 250m east. **Water Framework Directive** There are four surface water WFD water body catchments within the study area. The entire Scheme is located within three WFD water body catchments. The River Sowe water body catchment (confluence with Withy Brook to confluence with River Avon) (GB109054044540), Withy Brook water body catchment (source to confluence with the River Sowe) (GB109054044640) and Smite Brook water body catchment (source to confluence with the River Sowe) (GB109054044630). The WFD water bodies are not designated artificial or heavily modified for the three catchments which span the entire route option. Coombe Pool WFD water body catchment (GB30937926) located approximately 100m east of the Scheme is designated as heavily modified. The Coombe Pool WFD water body and River Sowe WFD water body both have a moderate ecological status and the Smite Brook WFD water body and Withy Brook WFD water body both have a poor ecological status. All four of the WFD water bodies are protected under the Nitrates Directive. **Surface Water Abstractions** There are no known abstractions within the study area. Refer to ES Chapter 13 (Road Drainage and the Water Environment) (**TR010066/APP/6.1**), for more information.
Landfill records	No active or recently active landfills have been identified within a 250m radius of the Scheme. An on-site historical landfill is located in the north of the study area (Walsgrave Hill Borrow Pit) with a further historical landfill located in the south of the study area (Coombe Fields), both within the Scheme and the study area. Refer to ES Figure 9.2 (Potential Sources) (**TR010066/APP/6.2**) Wastes accepted by the landfills, where known, include inert, commercial and industrial material. Off-site landfills to the south-west of the Scheme include Hawkes Tip, approximately 20m to the west and Coombe Abbey Park 100m to the south-west. A further landfill,

Aspect	Details
	Coombe Estate, is identified 165m to the west of the Scheme which received inert waste.
Current land use and man-made features	The A46, also known as Coventry Eastern Bypass, is a two-lane dual carriageway with central reserve which leads south to a three-arm roundabout. The south-east arm of the roundabout extends the A46 to the south-east and the western arm exits onto the B4082. Smite Brook is culverted where the B4082 crosses it. To the west of the B4082, another three-arm roundabout is present, the northern arm leads Clifford Bridge Road north towards Wyken. A bridge is located to the north which crosses the River Sowe. The southern arm leads onto Clifford Bridge Road towards Binley and the eastern arm leads towards Coombe Abbey Park. The principal land use within the Scheme area is agriculture to the north and east with urban areas to the west and south-west. The principal man-made features are the existing A46, B4082 and Clifford Bridge Road with associated bridges and roundabouts. The principal land uses surrounding the Scheme are: • urban residential to the west and south • Hungerley Hall Farm to the north of the existing Walsgrave Junction • Coombe Pool (ecological SSSI) to the east • agricultural to the north of the existing Walsgrave Junction Drainage channels are located within the draft Order Limits which ultimately connect to the River Sowe. Smite Brook runs east west across the Scheme from Coombe Pool with a section culverted beneath the A46. Coombe Pool is an artificial lake designated as a SSSI and is located directly east of the Scheme.
Agriculture	The current land use is predominantly arable (11 fields) but with two permanent grass fields that are grazed. Adjacent on the west of the southern part of the Scheme is urban development. Broadleaved woodland is present to the south and east, and improved grassland to the west. Agricultural land to the east of the A46 in the northern part of the study area is classified as a mixture of Grade 3a (good quality agricultural land) and Grade 3b (moderate quality agricultural land) land with a small parcel of Grade 2 (very good quality agricultural land) by a survey carried out in 1996 according to the MAFF 1988 ALC guidelines. Agricultural land to the west of the A46 is provisionally classified as Grade 2 and Grade 3. Further information on agricultural soils is provided below and in ES Appendix 9.2 (Soil Resource Plan and Agricultural Land Classification) (**TR010066/APP/6.3**).
Route history	The historical development of the area had been summarised from historical Ordnance Survey (OS) mapping contained within the Envirocheck report. The study area is dominated by agricultural fields in the earliest map from 1886 with Coombe Pool (labelled as The Pool) shown directly to the east. Hungerley Hall Farm is shown in its current position.

Aspect	Details
	In 1926, the current Clifford Bridge Road was previously named Binley Lane to the north and Sowe Lane to the south. On the 1955 map, this shows the change to the current name of Clifford Bridge Road (B4082). In 1955 gravel pits are shown at the southern extent of the Scheme. These are no longer presented in the 1980 map. 1991 shows the current A46 layout which trends generally north-south through the Scheme with the A4082 heading west from the roundabout. The A4082 became the current B4082 in 2001.
Potential contamination risks	No major environmental incidents have been recorded within the study area. A single significant incident is recorded 144m to the east at Coombe Pool Fishery where dead fish were found floating. No cause of the incident is given. The potential sources of contamination which may be present at or near the Scheme comprise: • former landfills • former and current scrap yard/metal recyclers and commercial premises • residual hydrocarbon contamination from any accidental releases of vehicle fuel or loads • agricultural chemicals and products applied to the agricultural land to the north and east • contaminated materials within imported fill material used for the existing road construction • residual contaminants from unspecified ground workings • unspecified tanks and below ground features These potential sources present theoretical risks to construction materials, ground conditions, site workers, site users, neighbouring agricultural land and adjacent surface waters including the River Sowe, Smite Brook and Coombe Pool.
Unexploded Ordnance (UXO) risk	The site comprises of medium risk and low risk areas of encountering UXO. The medium risk area is located to the north of the Scheme. Risk mitigation measures are recommended.

Conceptual Site Model

9.8.5. The desk-based information has been used to develop the Conceptual Site Model (CSM) which forms the basis to investigate potential contaminant linkages for the Scheme via a source-pathway-receptor model. For a source of contamination (or hazard) to present a risk to a receptor (such as construction workers or groundwater), there must be a viable exposure pathway.

9.8.6. This source-pathway-receptor model is considered best practice methodology to evaluate environmental risk arising from potential land contamination, according to Department of Environment, Food and Rural Affairs (DEFRA) and Environment Agency guidance documentation (Environment Agency, 2020).

9.8.7. This assessment utilises information from the 2023 GI reported in ES Appendix 9.3 (Ground Investigation Report) (**TR010066/APP/6.3**).

9.8.8. A risk evaluation has been undertaken by considering the source-pathway-receptor relationship in terms of both the probability (likelihood) that a source-pathway-receptor linkage will occur and the potential consequences of occurrence.

Potential Sources

9.8.9. In the context of this study, hazards relate to sources, or potential sources of contamination capable of causing harm. Table 9-9 lists the sources that have been identified within the study area based on the information presented in the baseline data analysed in the previous paragraphs and ES Appendix 9.3 (Ground Investigation Report) (**TR010066/APP/6.3**).

Table 9-9: Potential sources

Potential Source	Description
Source 1: Infilled land	Potential for infilled land for example from ground excavation and infilled ponds within the Scheme. Potential for hydrocarbons, metals, inorganics, asbestos
Source 2: Made ground	Made ground associated with the existing A46 carriageway and B4082
Source 3: Commercial/industrial land use	Potentially contaminated materials associated with former and current land uses including scrap yard, metal recyclers, commercial premises, unspecified tanks and agricultural land.
Source 4: Former landfills	Former landfills in south and north of the study area.
Source 5: Ground Gas	Hazardous ground-gas derived from organic rich deposits including peat.

Receptors

9.8.10. Receptors that could be adversely affected by a contaminant are listed in Table 9-10. These receptors have been identified through the baseline data analysed in the previous paragraphs within the Study area (250m to 1km as detailed in Table 9-10).

Table 9-10: Potential receptors

Potential Receptor	Description
Human Health (within 250m)	Construction/Maintenance workers – short term duration but potential for higher exposure – medium sensitivity Future site users – A46 and adjoining road users (motorised), pedestrians and cyclists – low sensitivity

Potential Receptor	Description
	Off-site receptors – users/occupiers of adjacent land areas; agricultural fields, paths, off-site residents/workers – high to very high sensitivity
Surface Water (within 250m)	The Scheme crosses the Smite Brook, a tributary of the River Sowe – high sensitivity Coombe Pool SSSI is located directly to the east of the Scheme – very high sensitivity Land drainage channels present in the locality – high sensitivity Ponds – high sensitivity
Groundwater (within 1km)	Secondary A Aquifers – Alluvium, River Terrace Deposits, Bagington Sand and Gravel Formation (sand and gravel) – high sensitivity Secondary B Aquifer – Mercia Mudstone (mudstone) – high sensitivity Secondary undifferentiated aquifer – Thrussington Member (Wolston Formation) (clay) – medium sensitivity Groundwater abstractions – the nearest groundwater abstraction is 853m north-west of the study area for industrial and commercial purposes. Given the distance to the abstraction this is not considered to pose a separate receptor with risks to be assessed via the described aquifers.
Agricultural land (within 250m)	Within the Order Limits land was provisionally classified as ALC grade 2 or 3. The recent ALC survey of the land affected by the scheme carried out according to MAFF 1988 ALC guidelines classified the agricultural land as a mix of grade 1 (excellent quality), subgrade 3a (good quality) and subgrade 3b (moderate quality) which would be respectively very high, high and medium sensitivity based on land quality.
Ecological (within 250m)	Flora and fauna (including livestock) – medium sensitivity ES Chapter 8 (Biodiversity) (**TR010066/APP/6.1**) assesses the impacts on these receptors in depth and are excluded from further discussion in this chapter.

Pathways

9.8.11. For a hazard to present a risk to a receptor they must be linked by an exposure pathway. Potential plausible pathways identified include:

- Direct contact with or ingestion of contaminated soils and dusts by humans.
- Inhalation of dusts (including asbestos fibres) by humans.
- Inhalation of ground gas/vapours by people.
- Migration of ground gas/vapours into buildings.
- Leaching/dissolution and migration of contaminants through permeable strata in the unsaturated zone towards the saturated zone.
- Migration of contaminants in the saturated zone towards surface water. Surface run-off towards surface waters, including via local drainage systems.
- Lateral migration of contaminants via groundwater flow.
- Migration of contaminants in the saturated zone towards surface water.
- Surface run-off towards surface waters, including via local drainage systems.

- Uptake by plant roots, ingestion/inhalation of contaminated soil/dust by animals.

9.8.12. The potential active contaminant linkages for the Scheme are summarised in Table 9-11.

Table 9-11: Potential active contaminant linkages

Source	Pathway	Receptor
Source 1: Infilled land - Potential small areas of infilled land (ponds, ground extraction etc). Source 2: Made ground - associated with the existing A46 carriageway and B4082 Source 3: Commercial/industrial land use Source 4: Former landfills in south and north of the scheme	Direct contact with soils/dusts Inhalation or ingestion of soils/dusts Inhalation of gas/vapours	Construction workers Future site users Off-site human health receptors Agriculture
	Leaching/dissolution of contaminants from made ground Migration of contaminants through permeable strata Migration of contaminants in saturated zone towards surface water	Surface water courses (Smite Brook, Coombe Pool, drainage channels and ponds)
	Leaching/dissolution of contaminants from made ground Migration of contaminants through permeable strata Migration to aquifers	Groundwater (Secondary aquifers)
Source 5: Ground Gas	Migration via permeable strata	Construction workers Future site users Off-site human receptors

Agricultural soils

9.8.13. The ALC system provides a framework for classifying land according to the extent to which its physical or chemical characteristics impose long-term limitations on agricultural use. The principal factors influencing agricultural production are climate, site (including relief) and soil. By assessing these factors, it is possible to assign land into one of five land classification grades, Grade 1 land being the highest quality and Grade 5 the lowest quality agricultural land. Grade 3 is sub-divided into Subgrades 3a and 3b, to identify good quality agricultural land from moderate quality agricultural land (ES Appendix 9.2 (Soil Resource Plan and Agricultural Land Classification) (**TR010066/APP/6.3**)) for further information on the ALC system).

9.8.14. ALC Grades 1, 2 and 3a are classified as BMV land. BMV agricultural land is a finite national resource and is given special consideration in national policy and guidance. The provisional ALC map (ES Appendix 9.2 (Soil Resource Plan and

Agricultural Land Classification) (**TR010066/APP/6.3**)) at 1:250,000 showed the land to be a mix of Grade 2 and Grade 3 quality.

9.8.15. An ALC survey was carried out within the Order Limits in October 2023 in accordance with the MAFF 1988 guidelines and the TIN049 guidance. The survey was based on observations at intersects of a 100m grid, giving a sampling density of at least one observation per hectare. During the survey soils were examined via a combination of 36 auger borings and three soil description pits to a maximum depth of 1.2m. The full results of the ALC survey including details on agricultural soils are provided in ES Appendix 9.2 (Soil Resource Plan and Agricultural Land Classification) (**TR010066/APP/6.3**).

9.8.16. The detailed field work carried out for the assessment indicated that the agricultural land quality within the Scheme footprint is a mixture of Grade 1, Subgrade 3a and Subgrade 3b as shown below in Table 9-12. The areas of Grade 1 and Subgrade 3a agricultural land are considered to be BMV agricultural land and make up 65% of the Order Limits.

Table 9-12: ALC grades within the study area

ALC Grade	Total (ha)	Total (%)
Grade 1 (excellent quality)	8.0	45
Grade 2 (very good quality)	-	-
Grade 3a (good quality)	3.5	20
Grade 3b (moderate quality)	6.1	35
Grade 4 (poor quality)	-	-
Grade 5 (very poor quality)	-	-
Total	**17.6**	**100**

Contamination baseline

Ground conditions

9.8.17. The 2023 GI encountered the following typical sequence of strata within the construction working areas (ES Appendix 9.3 (Ground Investigation Report) (**TR010066/APP/6.3**)):

- Topsoil (proven thickness of between 0.2m and 0.6m).
- Made ground encountered in six locations (proven thickness of between 0.4m and 3.5m).
- Alluvium identified in eight locations along the south and west boundaries with a reported thickness of between 2.0m and 2.95m.

- River Terrace Deposits recorded in two locations, one in the south and one in the north-west with a proven thickness of 0.4m and 2.3m.
- Wolston Glacigenic Formation recorded thicknesses of 0.4m to 13.35m typically found to the north of the site on both the east and west sides of the A46 carriageway.
- Baginton Sand and Gravel Formation predominantly found in the north of Hungerley Hall Farm to the east and west of the A46 carriageway with thicknesses of between 0.65m to 5.2m.
- Mercia Mudstone Group underlies the entire Scheme with a maximum thickness of 17.16m, base not proven.

9.8.18. Made ground was encountered in six exploratory holes within the Order Limits with a thickness recorded between 0.4m and 3.5m. The maximum thickness of made ground was recorded in the south of the Scheme within the existing carriageway. This is located in the footprint of the former landfill with the made ground recorded to comprise subangular to angular gravel of sandstone. Occasional metal filings and tyre scraps were recorded from 2.0m to 3.5m.

9.8.19. Areas outside of the footprint of the carriageway recorded limited made ground with cohesive made ground identified with thicknesses between 0.9m to 1.7m. The made ground was described as a sandy gravelly clay or a slightly clayey gravelly sand with a gravel of quartzite and brick fragments.

9.8.20. Topsoil with an average thickness of 0.4m was recorded in almost all exploratory holes and is generally described as a sandy gravelly clay with roots and rootlets or a slightly clayey slightly gravelly sand with frequent rootlets.

9.8.21. Alluvium deposits were found in eight exploratory hole locations in the south and west of the study area. The deposit is generally described as soft to stiff sandy gravelly slightly silty clay. Sand is fine to coarse, and gravel is subangular to rounded fine to coarse and typically consists of quartzite and chert.

9.8.22. In three locations the alluvium was recorded as a slightly clayey gravelly sand with a thickness of between 0.5m and 0.7m and underlain by cohesive alluvium.

9.8.23. Occasional firm slightly sandy, slightly gravelly peat was recorded in the alluvium.

9.8.24. River Terrace Deposits up to a thickness of 2.3m are present in two locations one in the south of the Scheme and one in north-west. The deposit is described as sandy gravel of quartz, sandstone and chert.

9.8.25. The Wolston Glacigenic Formation is the parent unit of the Thrussington Till member and Bosworth Clay and has been used to identify strata that comprise either of these units.

9.8.26. The Wolston Glacigenic Formation is typically found to the north of the site on both the east and west sides of the A46 carriageway. The stratum is described as a firm to very stiff sandy slightly gravelly clay. The thickness of the cohesive deposits within the Wolston Glacigenic Formation ranges from 0.4m to 8.1m, with the average thickness being 3.27m.

9.8.27. Granular deposits of the Wolston Glacigenic Formation are also recorded as clayey slightly gravely sand with the thickness ranging from 0.4m to 6.15m and an average thickness of 2.1m.

9.8.28. The Baginton Sand and Gravel Formation is generally described as loose to dense, slightly clayey gravelly sand. The formation is also described as loose to medium dense, clayey sandy gravel. thickness of granular material within the formation ranges between 0.4m and 4.8m, with an average thickness of 2.13m. The formation was predominantly found in the north of Hungerley Hall Farm to the east and west of the A46 carriageway. The formation also contains lenses of clay with a thickness range of 0.10m to 2.50m with an average thickness of 0.83m.

9.8.29. The Mercia Mudstone Group was encountered in all but one of the exploratory holes. The top of the formation was found to be Grade IV (fully weathered) Mercia Mudstone Group which was underlain by Grade III to Grade I (partially weathered to unweathered) Mercia Mudstone Group.

9.8.30. The weathered Mercia Mudstone Group is described as firm to stiff, slightly sandy gravelly clay. The Grade I to Grade III Mercia Mudstone Group is typically described as moderately weak to extremely weak mudstone. The thickness of the Mercia Mudstone was not proven.

9.8.31. Groundwater levels generally follow topographic variation across the study area, with lowest groundwater levels occurring adjacent to the River Sowe and Smite Brook. Groundwater levels are also highest in proximity to Hungerley Hall Farm to the west of Coombe Pool across a range of different aquifers. It is therefore assumed that there is a moderate level of continuity between aquifer units. This is also evidenced by groundwater level lows in proximity to the River Sowe and Smite Brook, which receive a component of baseflow from groundwater. Full details of the hydrogeological regime are presented in ES Chapter 13 (Road Drainage and the Water Environment) (**TR010066/APP/6.3**).

Human health

9.8.32. Chemical analysis results were compared with generic assessment criteria (GAC) protective of a commercial/industrial end use and a Public Open Space park (POS_{park}) in ES Appendix 9.3 (Ground Investigation Report)

(**TR010066/APP/6.3**). These are considered suitable assessment criteria to assess risks to future workers and site occupiers during the construction phase and subsequent future land use given the range of land use scenarios.

9.8.33. Concentrations exceeding the human health criteria for a commercial end use were recorded in a sample taken in the south of the Scheme within the footprint of a former landfill. The sample is described as comprising made ground of sand and gravel with metal filings and tyre scraps. No other visual or olfactory evidence of contamination were identified in this location. The recorded concentration was slightly elevated above the relevant criteria. Given the depth to the exceedance, 1.6mbgl to 2.3mbgl, and the presence of material above which does not exceed the criteria this location is not considered to pose an unacceptable risk to human health in its current location.

9.8.34. Concentrations exceeding the human health criteria for a POS_{park} end use were recorded in samples taken from depth in the footprint of the former landfill. The samples are described as made ground of sands and gravel with metal filings and tyre scraps noted from 2.0m below ground level (bgl). No other visual or olfactory evidence of contamination was identified. BH102 is located within the footprint of a former landfill. Given the depth to the exceedances and the presence of material above which does not exceed the criteria this location is not considered to pose an unacceptable risk to human health in its current location.

9.8.35. The remaining material is considered to present an acceptably low risk to human health given the absence of concentrations exceeding the relevant criteria.

9.8.36. Asbestos was detected in two of the 10 made ground soil samples recovered during the GI which were screened for the presence of asbestos. Chrysotile was recorded at a concentration of 0.695% at a depth of 1.6mbgl and as loose fibres, quantified with a concentration of <0.001% at 2.3mbgl both in the location of the former landfill. Given the depth to the identified asbestos in this location and lack of positive identification at all other locations tested, the risk from asbestos in soils is considered very low and is discounted from further assessment.

9.8.37. The results of the assessment identified overall potential risks to human health to be low from existing materials present within the construction boundary.

Controlled waters - leachability

9.8.38. Risks to groundwater from the Scheme have been assessed through comparing the chemical laboratory data against appropriate generic assessment criteria. The UK Drinking Water Standards (DWS) and World Health Organisation (WHO) guidelines for drinking water quality (2022) have been used for protection of the identified potentially sensitive aquifer receptors.

9.8.39. Risks to surface water from the Scheme have been assessed through comparing the chemical laboratory data against appropriate generic assessment criteria. The Water Framework Directive criteria has been used for protection of the identified potentially sensitive receptors: Smite Brook and Coombe Pool.

9.8.40. Slightly elevated leachable concentrations of ammoniacal nitrogen as N and NH_4 above the criteria were recorded in three samples. These exceedances were observed in natural strata (alluvium and Wolston Glaciogenic Formation) and made ground (top/subsoil with occasional brick fragments) and are likely to be as a result of agricultural activities. These concentrations are not considered to be derived from ground contamination related sources but maybe part of more general diffuse sources of agricultural impacts.

9.8.41. Limited concentrations of metals were observed to exceed the respective criteria with the exception of copper. The concentrations exceeding the criteria were generally within an order of magnitude of the criteria. The highest concentrations of metals, with the exception of copper and lead were identified in a band of peat. These concentrations are not considered to pose an unacceptable risk to controlled waters. The highest concentrations of leachable copper and lead were identified in natural material in agricultural locations and are likely to reflect natural levels.

9.8.42. Concentrations of polycyclic aromatic hydrocarbons (PAHs) were generally at the laboratory limit of detections with a single PAH concentration (fluoranthene) recorded above the criterion in a sample from the Baginton Sand and Gravel Formation. PAHs are not considered to pose an unacceptable risk to controlled waters.

9.8.43. Concentrations of total petroleum hydrocarbons were all below the relevant assessment criteria.

9.8.44. A single concentration of sulphate was recorded above the DWS criterion within a sample taken from a peat band. It is considered the source of this exceedance is due to the peat and is less than an order of magnitude above the criterion and therefore is not considered to pose an unacceptable risk.

9.8.45. Considering the following site-specific factors, and assuming the works are undertaken in an appropriate manner, with risks to controlled waters mitigated as detailed in the Second Iteration EMP , the potential for the identified exceedances to pose an unacceptable risk to controlled waters is considered Low:

- The raised concentrations (above laboratory limit of detection) are generally slightly elevated above the relevant criteria and within one order of magnitude of the criteria.

- No significant volumes of made ground have been identified outside of the landfill in the south where no significant works are proposed.
- Visual and olfactory evidence of contamination were not recorded, with the exception of samples recovered from the former landfill in the south of the Scheme.
- The majority of samples were from natural strata and are therefore likely to be reflective of natural background levels.

9.8.46. Mitigation measures shall include (but are not limited to) appropriate site management, for example, management of stockpiles of excavated soils, groundwater encountered in excavations and surface water drainage.

Controlled waters - groundwater

9.8.47. Concentrations of potential contaminants recorded in groundwater from samples obtained from 19 monitoring boreholes across the Scheme were generally below the assessment criteria. Where concentrations exceeded these criteria (metals, nitrate and sulphate), the exceedances were negligible and therefore do not pose an unacceptable risk to controlled waters.

9.8.48. Protection of controlled waters must be maintained throughout site works. Protection measures provided in the First Iteration EMP (**TR010066/APP/6.5**) may include but are not limited to:

- Appropriate environmental risk assessments.
- Suitable stockpile management (located on hardstanding, covered and bunded where applicable).
- Provision of suitable spill kits.
- Plant refuelling and storage of chemicals and fuels on drip trays away from watercourses, ditches and drains.
- Drain or ditch protection (sandbags, booms, boards etc).
- Management and appropriate disposal and or re-use of existing road construction materials.

Ground gas

9.8.49. Ground gas monitoring was undertaken at nine locations between May 2023 and August 2023 covering the Order Limits. Full details of the ground gas monitoring are contained within ES Appendix 9.3 (Ground Investigation Report) (**TR010066/APP/6.3**). Based on the results from the 2023 GI, no ground gas hazards have been identified within the Order Limits.

Future baseline

9.8.50. The future baseline scenario outlines the likely evolution of the current state of the environment without the Scheme. This allows for the identification of potential impacts of the Scheme against the baseline at both the commencement of construction and operation of the completed Scheme.

Construction year baseline (2026)

9.8.51. Potential changes to the identified baseline conditions for geology and soils, based on data in the Coventry City Council Local Plan (Coventry City Council, 2017) are limited to potential developments near the Scheme boundary and identifies a potential development site for 900 residential dwellings to the west of the A46. The Rugby Borough Council Local Plan 2011-2031 (2019) does not identify any planned developments within 500m of the Scheme.

9.8.52. This assessment does not consider there to be any material or significant changes to the baseline ground conditions identified in this future construction year baseline assessment. This is because no developments have been identified that would affect the baseline conditions for geology and soils.

Operational year baseline (2028)

9.8.53. The Coventry City Council adopted local plan and the Rugby Borough Council Local Plan are currently under review and therefore, potential development sites have not been fully assessed and should take into account the Scheme.

9.8.54. Given the locations of potential development sites, this assessment does not consider there to be any material or significant changes to the baseline ground conditions identified in this future operational year baseline assessment.

9.9. Potential impacts

9.9.1. The following sections identify the potential impacts on geology and soils that may occur as a consequence of the Scheme. The potential impacts are identified and assessed assuming no mitigation.

Construction

Contamination

9.9.2. Potential negative construction impacts in terms of contamination include the following:

- potential emission / pollution from construction activities

- potential to mobilise contaminants in soils and groundwater as a result of ground disturbance
- generation of dust
- alteration of potential for contaminants to mobilise (leach) from soils during construction
- increased potential for contaminants to enter surface water through drainage or surface run-off
- introduction of fuels, chemicals and fluids relating to construction activities
- increased potential for exposure to contaminants to human health receptors due to exposure of contaminated materials during construction
- creation of preferential pathways such as piles penetrating through strata or via service corridors for migration of potential contaminants to groundwater

Geology and soils

9.9.3. With regards to geology and soil resources the following construction activities have the potential to lead to negative impacts:

- creation of temporary access tracks and traffic diversions resulting in compaction or sealing of soils
- land-take both temporary and permanent
- impacts from proposed new / removed facilities such as severance of a path or habitat
- stripping and storage of soils, topsoil and materials leading to damage of these resources
- loss of agricultural land

9.9.4. Table 9-13 shows the approximate permanent and temporary land take associated with the Scheme, based on the preliminary design.

Table 9-13: Agricultural land take

ALC grade	Approximate permanent land take (ha)	Approximate temporary land take (ha)	Approximate total construction land take (ha)
Grade 1	7.8	0.2	8.0
Grade 3a	3.3	0.2	3.5
Grade 3b	4.5	1.6	6.1

9.9.5. Not all of the agricultural land lost though permanent land take would be covered in hardstanding. Although this land would be lost as an agricultural resource, the soil resources would still be used for landscaping as part of ES Figure 2.4 (Environmental Masterplan) (**TR010066/APP/6.2**). However, as none of this land

would be retained for commercial agriculture, it is all considered as lost agricultural land for the purpose of this assessment.

9.9.6. Compacted soil reduces water infiltration and can lead to increased rates of surface water run-off and associated soil erosion as well as reduced agricultural productivity. Poor reinstatement of any temporary land take would lead to a loss in agricultural land quality.

Operational

9.9.7. The loss of agricultural land occurs during the construction phase although it is acknowledged that some would be lost permanently to the Scheme. However, no additional loss of agricultural land is expected during the operational phase.

9.9.8. Therefore, it is anticipated that the Scheme, once constructed, would have limited future interaction with geology and soils.

Determination of magnitude of potential impact

9.9.9. The magnitude of potential impacts has been determined based on the baseline conditions identified and the above assessments and are presented in Table 9-14.

Table 9-14: Determination of the magnitude of potential impact

Receptor	Magnitude	Reasoning
Users/occupiers of A46 and B4082	Negligible adverse	Users of the existing A46/B4082 will be present during construction and during operation. Concentrations of contaminants and ground gases on the Scheme are at levels unlikely to cause risk to human health.
Users/occupiers of adjacent land areas; agricultural fields, paths	Negligible adverse	Human health receptors will be present in the areas close to the Scheme. Concentrations of contaminants and ground gases on the Scheme are at levels unlikely to cause risk to human health.
Off-site residential receptors	Negligible adverse	Residential properties within the study area. Concentrations of contaminants and ground gases on the Scheme are at levels unlikely to cause risk to human health.
Construction workers	Minor adverse	Construction workers will be present during the construction phase and potentially as maintenance workers during the operational phase. Potential for close contact with made ground materials. Concentrations of contaminants and ground gases on the Scheme are at levels unlikely to cause risk to human health.
Surface water Smite Brook, Coombe Pool and associated surface water features.	Negligible adverse	The most sensitive controlled water surface water receptors are Smite Brook and Coombe Pool. No potential risks have been identified from soils to controlled waters.

Receptor	Magnitude	Reasoning
		Potential for emissions or pollution from construction activities, potential for contaminants to enter surface water through drainage or surface run-off. Risks to controlled waters will be mitigated as detailed in the First Iteration EMP (**TR010066/APP/6.5**).
Groundwater	Negligible adverse	Secondary A, B and undifferentiated aquifers are present within the Scheme. Concentrations of contaminants in leachability samples and in groundwater do not pose an unacceptable risk to the aquifers. Potential for emissions or pollution from construction activities, potential for contaminants to enter groundwater through drainage or surface run-off. Risks to controlled waters will be mitigated as detailed in the First Iteration EMP (**TR010066/APP/6.5**).
Agricultural soils Permanent take	ALC grade 1: Very high sensitivity, moderate adverse ALC Grade 3a: High sensitivity, moderate adverse ALC Grade 3b: Medium sensitivity, moderate adverse	Stripping of soil across the Scheme footprint required for the permanent works (road, structures, drainage network, environmental bunds etc). Agricultural land would be removed from use or permanently sealed beneath new carriage ways which will be constructed as part of the Scheme. Permanent land take of between 1 - 20ha of ALC Grade 1. Permanent land take of between 1 - 20ha of ALC subgrade 3a. Permanent land take of between 1 - 20ha of ALC subgrade 3b.
Agricultural soils Temporary take	ALC Grade 1: Very high sensitivity, minor adverse ALC Grade 3a: High sensitivity, minor adverse ALC Grade 3b: Medium sensitivity, minor adverse	Stripping of soil across the Scheme footprint required for the temporary works (satellite construction compound, haul roads etc). Temporary land take resulting in the potential for reduction of soil functions due to degradation, compaction and erosion of soil resource during the construction period. Temporary land take of <1ha of ALC Grade 1 Temporary land take of <1ha of ALC subgrade 3a Temporary land take of 1-20ha of ALC subgrade 3b

9.10. Design, mitigation and enhancement measures

Design

9.10.1. 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 is reported in ES Chapter 2 (The Scheme) (**TR010066/APP/6.1**).

9.10.2. 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

9.10.3. Mitigation is included in the Register of Environmental Actions and Commitments (REAC) which forms Annex A of the First Iteration 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, Schedule 2 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

9.10.4. 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.

9.10.5. Best practice will include adherence to the following plans:

- Site Waste Management Plan (SWMP)
- Soil Handling Management Plan (SHMP)
- Traffic Management Plan (TMP)
- Materials Management Plan (MMP) (if required)

9.10.6. These plans will be produced in full as part of the Second Iteration EMP (Commitments GS3, G4 and MA6 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)). Accompanying the First Iteration EMP is an Outline Traffic Management Plan (OTMP) (**TR010066/APP/7.5**) and an Outline Site Waste Management Plan (OSWMP) (Appendix B.3 of the First Iteration EMP (**TR010066/APP/6.5**)). A summary of what these plans contain is provided below. How these plans will inform the mitigation required is presented in the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**).

9.10.7. The First Iteration EMP (**TR010066/APP/6.5**) sets out controls to ensure identified risks associated with contamination are appropriately managed and minimised through the SWMP, SHMP and MMP. Mitigation measures will include best practice environmental management procedures and appropriate waste management, which will be included within these documents, such as, but not limited to (Commitment GS1 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)):

- ensuring adequate space for storage of topsoil and subsoil which must be segregated during excavation
- protection of watercourses from entry of polluting matter
- stripping, storing and reinstating of soils using best practice measures to minimise the risk of degradation to soils
- controls for identification of unexpected contamination
- suppression of odour and dust using best practice measures

9.10.8. The most applicable mitigation for reducing impacts on agricultural soils on this Scheme is following methodologies set for soil handling in the SHMP (to be produced during the detailed design stage and to form part of the Second Iteration EMP) with further details provided below (Commitment GS3 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)).

9.10.9. Limited made ground and peat soils underlie the Scheme. Management of the associated potential risks of made ground and organic deposits would be undertaken, through the production of health and safety method statements by the Principal Contractor in accordance with good practice including (Commitment GS2 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)):

- monitoring of potential ground-gases and vapours in confined spaces during construction
- design of in-ground structures to appropriate concrete design class
- suitable personal protective equipment (PPE) and hygiene practices for construction and maintenance workers

9.10.10. To manage the impacts on soils from temporary and permanent land take measures in the SHMP, SWMP and MMP will be adhered to. Stripping and storage of topsoil shall be managed with regard to BS 3882:2015 utilising best practice (Commitment GS4 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)).

9.10.11. In order to mitigate impacts on temporary land take areas, a SHMP, incorporating guidance provided by the Construction Code of Practice for the

Sustainable Use of Soils on Construction Sites (Defra, 2009), will be produced to ensure the use of best practice measures for soil handling. The SHMP will ensure that soils in the areas subject to temporary land take are properly handled, stored and reinstated (Commitment GS3 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)).

9.10.12. There are no measures that can mitigate the permanent land take required and therefore the permanent loss of agricultural soils associated with the Scheme.

9.10.13. A MMP, if required, would be prepared where applicable to provide lines of evidence covering the use of clean site won materials within the Scheme. The MMP would be based on an adequate risk assessment concluding that the objectives of preventing harm to human health and pollution of the environment will be met if materials are used in the proposed manner (Commitment GS3 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)).

9.10.14. The SHMP and MMP, if required, shall outline areas of soil to be protected from earthworks and construction activities; the areas and types of topsoil and subsoil to be stripped, haul routes, stockpile locations; the methods for stripping, stockpiling, re-instated and ameliorating landscape soils and restoring temporary land take areas, and a cut and fill balance to ensure as much material as possible is re-used in the Scheme. Soil being disturbed by construction and earthworks activities will be stripped, including topsoil and subsoil, and stored separately (Commitment GS3 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)).

9.10.15. The satellite construction compound and working areas will include a clear demarcation (fence) of the construction area and prevent access onto adjacent areas of agricultural land that could result in further compaction or damage of soils. Construction vehicles will be confined to designated haul routes to reduce the amount of compaction of soil as stated in the OTMP (**TR010066/APP/7.5**) (Commitment GS5 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)).

9.10.16. Where there are excess soils generated, these will be saved and reused outside the Scheme where there are opportunities to do so and detailed in ES Chapter 10 (Material Assets and Waste) (**TR010066/APP/6.1**) (Commitment MA1 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)).

9.10.17. Where necessary for protection from earthworks and construction activities, agricultural soils will be stripped, stored and replaced to their baseline condition, as far as possible (Commitment GS4 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)).

9.10.18. Landfill materials if encountered will be disposed of off-site to a suitably licenced facility. Measures required for material reuse and disposal are detailed in ES Chapter 10 (Material Assets and Waste) (**TR010066/APP/6.1**).

Operation

9.10.19. The key principle considered to minimise effects on soils is to ensure that the footprint of the Scheme is reduced as much as practicable, without adversely affecting the design. The Scheme design has been developed to minimise the impact on surrounding land by reducing the Scheme footprint and temporary land take where practicable.

9.10.20. There are no measures that can mitigate the permanent land take required and therefore the permanent loss of agricultural soils associated with the Scheme.

9.10.21. The creation of potential preferential pathways will be avoided in the design of the Scheme.

9.10.22. Mitigation in relation to road drainage is included in ES Chapter 13 (Road Drainage and the Water Environment) (**TR010066/APP/6.1**).

Enhancements

9.10.23. No enhancement measures have been identified for geology and soils.

9.11. Assessment of likely significant effects

9.11.1. Residual effects once mitigation measures are taken into consideration, which have been identified based on GI data and the preceding sections are identified in Table 9-15. The methodology contained within DMRB LA 104 and DMRB LA 109 have been used to assign the receptor sensitivity, impact magnitude and significance of the effects (summarised in Section 9.5 and Table 9-7). The reasoning for the magnitude of impact assigned in presented in Table 9-14.

Table 9-15: Determination of the significance of residual effects

Description of impact	Sensitivity	Magnitude of impact	Significance	Reasoning
Construction				
Users/occupiers of A46 (human health): Direct contact with, inhalation or ingestion of contaminated soils, dusts and inhalation	Low	Negligible adverse	Neutral	Concentrations of contaminants and ground gases on the Scheme are at levels unlikely to cause risk to human health.

Description of impact	Sensitivity	Magnitude of impact	Significance	Reasoning
of ground gases/vapours.				
Users/occupiers of adjacent land areas; agricultural fields, paths (human health): Inhalation or ingestion of dusts and inhalation of ground gases/vapours.	High	Negligible adverse	Slight adverse	Concentrations of contaminants and ground gases on the Scheme are at levels unlikely to cause risk to human health.
Off-site residential receptors (human health): Inhalation or ingestion of dusts and inhalation of ground gases/vapours.	Very High	Negligible adverse	Slight adverse	Concentrations of contaminants and ground gases on the Scheme are at levels unlikely to cause risk to human health.
Construction (maintenance) workers (human health): Direct contact with, inhalation or ingestion of contaminated soils, dusts and inhalation of ground gases/vapours.	Medium	Minor adverse	Slight adverse	Concentrations of contaminants and ground gases on the Scheme are at levels unlikely to cause risk to human health.
Surface water – Smite Brook, Coombe Pool and associated surface water features (controlled water): Migration of contaminants in the saturated zone towards surface water. Surface run-off towards surface waters, including via local drainage systems.	Very high	Negligible adverse	Slight adverse	No potential risks have been identified from soils to controlled waters.
Groundwater (controlled water): Secondary A, B and undifferentiated Aquifers	High	Negligible adverse	Slight adverse	Concentrations of contaminants in leachability samples and in groundwater do not pose an unacceptable risk to the aquifers.

Description of impact	Sensitivity	Magnitude of impact	Significance	Reasoning
Agricultural soils Grade 1 Stripping of soil across the scheme footprint required for the permanent works (road, structures, drainage network, environmental bunds etc). Permanent land take of between 1 - 20ha	Very high	Moderate adverse	Large adverse	Stripping of soil across the Scheme footprint required for the permanent works (road, structures, drainage network, environmental bunds etc). Agricultural land would be removed from use or permanently sealed beneath new carriage ways which will be constructed as part of the Scheme.
Agricultural soils Grade 1 Stripping of soil across the scheme footprint required for the temporary works (satellite construction compound, haul roads). Temporary land take <1ha	Very high	Minor adverse	Moderate adverse	Stripping of soil across the Scheme footprint required for the temporary works (satellite construction compound, haul roads etc). Temporary land take resulting in the potential for reduction of soil functions due to degradation, compaction and erosion of soil resource during the construction period.
Agricultural soils Grade 3a Stripping of soil across the proposed scheme footprint required for the permanent works (road, structures, drainage network, environmental bunds etc). Permanent land take of between 1 - 20 ha.	High	Moderate adverse	Moderate adverse	Stripping of soil across the Scheme footprint required for the permanent works (road, structures, drainage network, environmental bunds etc). Agricultural land would be removed from use or permanently sealed beneath new carriage ways which will be constructed as part of the Scheme.
Agricultural soils Grade 3a Stripping of soil across the scheme footprint required for the temporary works (satellite construction compound, haul roads).Temporary land take <1ha	High	Minor adverse	Slight adverse	Stripping of soil across the Scheme footprint required for the temporary works (satellite construction compound, haul roads etc). Temporary land take resulting in the potential for reduction of soil functions due to degradation, compaction and erosion of soil resource during the construction period.
Agricultural soils Grade 3b	Medium	Moderate adverse	Moderate adverse	Stripping of soil across the Scheme footprint required for the

Description of impact	Sensitivity	Magnitude of impact	Significance	Reasoning
Stripping of soil across the scheme footprint required for the permanent works (road, structures, drainage network, environmental bunds etc). Permanent land take of between 1 – 20 ha				permanent works (road, structures, drainage network, environmental bunds etc). Agricultural land would be removed from use or permanently sealed beneath new carriage ways which will be constructed as part of the Scheme.
Agricultural soils Grade 3b Stripping of soil across the scheme footprint required for the temporary works (satellite construction compound, haul roads). Temporary land take 1-20ha	Medium	Minor adverse	Slight adverse	Stripping of soil across the Scheme footprint required for the temporary works (satellite construction compound, haul roads etc). Temporary land take resulting in the potential for reduction of soil functions due to degradation, compaction and erosion of soil resource during the construction period.
Operation				
Users of Scheme (human health): Direct contact with, inhalation or ingestion of contaminated soils, dusts and inhalation of ground gases/vapours.	Low	No change	Neutral	Concentrations of contaminants and ground gases on the Scheme are at levels unlikely to cause risk to human health. No additional impacts during operation.
Off-site receptors (human health): Inhalation or ingestion of dusts and inhalation of ground gases/vapours.	Very High	No change	Neutral	Concentrations of contaminants and ground gases on the Scheme are at levels unlikely to cause risk to human health. No additional impacts during operation.
Surface water – Smite Brook, Coombe Pool and associated surface water features (controlled water): Migration of contaminants in the saturated zone towards surface	Very high	No change	Neutral	No potential risks have been identified from soils to controlled waters. No additional impacts during operation.

Description of impact	Sensitivity	Magnitude of impact	Significance	Reasoning
water. Surface run-off towards surface waters, including via local drainage systems.				
Groundwater (controlled water) Secondary A, B and undifferentiated Aquifers	High	No change	Neutral	Concentrations of contaminants in leachability samples and in groundwater do not pose an unacceptable risk to the aquifers No additional impacts during operation.
Agricultural soils No additional loss of agricultural land is expected during the operational phase.	Very high to medium	No change	Neutral	No change to agricultural soils during operation.

Human health

9.11.2. Residual effects to human health from disturbance and mobilisation of contamination in geology and soils during construction have been identified as **Neutral** to **Slight adverse**. During operation effects are **Neutral**.

Controlled waters

9.11.3. Residual effects to controlled waters (surface water and groundwater) from disturbance and mobilisation of contamination in geology and soils during construction have been identified as **Slight adverse**. During operation effects are **Neutral**.

Agricultural soils

9.11.4. The proposed mitigation for agricultural soils outlined in Section 9.9 aims to maintain the quality of retained and excavated soils through best practice soil handling methods and techniques. The temporary land take areas would be restored to agriculture following the completion of the construction phase. The temporary loss of agricultural land during the construction phase is considered to be of moderate magnitude and large adverse significance for Grade 1 agricultural land and slight adverse significance for Grade 3b agricultural land.

9.11.5. Provided that the mitigation measures are effective and areas of temporary land take are restored back to their former condition, the long-term residual effects on agricultural soils would be limited to the permanent loss of agricultural land:

- The permanent loss of 7.8 hectares of Grade 1 agricultural land is considered to be of moderate magnitude and **large adverse** significance.
- The permanent loss of 3.3 hectares of Subgrade 3a agricultural land is considered to be of moderate magnitude and **moderate adverse** significance.
- The permanent loss of 4.5 hectares of Subgrade 3b agricultural land is considered to be of moderate magnitude and **moderate adverse** significance.

Summary

9.11.6. It is predicted that the Scheme is unlikely to give rise to any significant effects upon geology or soils during the operational phase.

9.12. Monitoring

9.12.1. No significant residual effects have been identified relating to contamination or geology and therefore physical monitoring through inground installations etc. is not considered necessary. No remediation due to contamination is required. Soils and other material assets will be handled according to the waste and materials asset requirements set out in the First Iteration EMP (**TR010066/APP/6.5**) and to be detailed in the Second Iteration EMP. The Second Iteration EMP will also set out the monitoring requirements secured by Requirement 4 of the draft DCO (**TR010066/APP/3.1**).

9.12.2. Soil stripping, handling and storage will be monitored/audited to ensure that it follows the procedures outlined in the SHMP. Following the reinstatement of the temporary land take, there would be a programme of monitoring of soil conditions to identify if there are soil problems which need to be remediated. This would include an assessment of the problem and design of a suitable remediation strategy such as subsoiling or drainage followed by crop establishment.

9.13. Conclusions

9.13.1. Only minor evidence of contamination from historical activities were recorded during the site investigation and no special remedial activities are recommended for the Scheme.

9.13.2. Minor impact from ground contamination was identified in the GI work and hence there is limited potential for construction activities to mobilise contaminants within the underlying soils or introduce contaminants which may potentially harm human health or environmental receptors such as Smite Brook and Coombe Pool. Potentially harmful construction activities will be identified, controlled and mitigated by measures set out in the First Iteration EMP (**TR010066/APP/6.5**)

and will be detailed in the Second Iteration EMP and via the detailed design of the Scheme.

9.13.3. The delivery of the Scheme results in the permanent and temporary land take of Grade 1 and Subgrade 3a agricultural land, which is considered to be BMV land, as well as some Subgrade 3b agricultural land which is considered non-BMV land.

9.13.4. A SHMP will be developed to help preserve land quality on the temporary land take areas and to make effective reuse of the soils taken from the areas of permanent land take. Provided that the mitigation and monitoring measures are effective and areas of temporary land take are restored back to their former condition, the long-term residual effects on agricultural soils would be limited to the permanent loss of agricultural land. The permanent loss of Grade 1 land is considered to be of large adverse significance, the permanent loss of Subgrade 3a and Subgrade 3b agricultural land is considered to be of moderate adverse significance of effect.

9.13.5. The operational phase of the Scheme results in a reduced potential for harm as the underlying soils are no longer exposed or disturbed effectively breaking potential pathways to receptors and presents no further impacts to agricultural soils.

Acronyms

Acronym	Meaning
ALC	Agricultural Land Classification
BMV	Best and Most Versatile
CLR	Contaminated Land Report
CSM	Conceptual Site Model
DWS	Drinking water standards
EMP	Environmental Management Plan
EPH	Extractable petroleum hydrocarbons
GAC	Generic assessment criteria
GI	Ground investigation
GIR	Ground investigation report
GWDTE	Groundwater dependent terrestrial ecosystems
LCA	Land Classification for Agriculture
MMP	Materials Management Plan
PAH	Polycyclic aromatic hydrocarbon
PEIR	Preliminary Environmental Information Report
PPE	Personal protective equipment
PSSR	Preliminary Sources Study Report
Q_{95}	The flow equaled or exceeded in a watercourse 95% of the time
RBMP	River Basin Management Plan
SHMP	Soil Handling Management Plan
SOM	Soil organic matter
SPZ	Source Protection Zone
SAC	Special Area of Conservation
SPA	Special Protection Area
SSSI	Sites of Special Scientific Interest
TPH	Total petroleum hydrocarbons
UXO	Unexploded ordnance
WFD	Water Framework Directive

Glossary

Term	Meaning
Agricultural Land Classification (ALC)	ALC is graded from 1 to 5. Best and Most Versatile (BMV) agricultural land is graded 1 to 3a.
Alluvial	Unconsolidated detrital material deposited by a river, stream or other body of running water as sediment in the bed of the stream or on its floodplain or delta.
Aquifer Designation	An Environment Agency definition reflecting the importance of aquifers as a resource and as supporting surface water flows. These are (most important to least important): Principal, Secondary A, Secondary B, Secondary Undifferentiated and Unproductive.

Term	Meaning
Bedrock (deposits)	Previously solid geology. The main mass of rocks forming the Earth that are present everywhere. Any deposits older than 2.6 million years.
Cohesive	Describing material that can hold together (e.g., clayey material).
Granular	Rocks or sediments comprising grains of approximately equal size.
Made ground	Artificial deposits.
Source Protection Zone (SPZ)	Zones defined by the Environment Agency to indicate those areas where groundwater supplies are at risk from potentially polluting activities and accidental releases of pollutants. Defined as Zone 1 (Inner Catchment) to Zone 3 (Total Catchment) and occasionally Zone 4 (Zone of special interest).
Superficial (deposits)	Previously drift geology or drift deposits. The youngest geological deposits formed during the most recent period of geological time, the Quaternary (2.6 million years ago to present),

References

AECOM. (2021). A46 Coventry Junctions Upgrade (Walsgrave Junction) Preliminary Sources Study Report. PCF Stage 2.

AECOM. (2020). A46 Coventry Junctions Upgrade (Walsgrave Junction) Environmental Scoping Report. PCF Stage 2

AECOM. (2022). A46 Coventry Junctions Upgrade (Walsgrave Junction) Environmental Assessment Report. PCF Stage 2

AECOM. (2021). A46 Coventry Junctions Upgrade (Walsgrave Junction) Ground Investigation Scope Report. PCF Stage 2

Alpha Associates. (2022). Detailed Unexploded Ordnance (UXO) Threat & Risk Assessment

British Standards. (2015). Specification for topsoil, BS 3882:2015.

CIRIA, (2001). Contaminated Land Risk Assessment – A Guide to Good Practice C552

CL:AIRE. (2010). The Soil Generic Assessment Criteria for Human Health Risk Assessment. CL:AIRE in association with AGS and EIC.

CL:AIRE. (2014). SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination. Final Project Report. CL:AIRE

Coventry City Council. (2017). Coventry City Council Local Plan 2011-2031. [online] Available at: https://www.coventry.gov.uk/planning-policy/coventry-local-plan-2011-2031 Accessed April 2024.

Defra. (2009). Construction Code of Practice for the Sustainable Use of Soils on Construction Sites.

DEFRA. (2014). SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document. DEFRA.

Defra. https://magic.defra.gov.uk/MagicMap.aspx (for provisional and any post 1988 Agricultural Land Classification). Accessed February 2024.

Department for Levelling Up, Housing and Communities (2023) National Planning Policy Framework

Department for Transport. (2024). National Networks National Policy Statement.

Environment Agency. (2001). Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention.

Environment Agency. (2008). Science Report SC050021/SR7. Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guideline Values. Environment Agency.

Environment Agency. (2009a). Science Report Final SC050021/SR2. Human Health Toxicological Assessment of Contaminants in Soil. Environment Agency. January 2009.

Environment Agency. (2009b). Science Report SC050021/SR3. Updated Technical Background to the CLEA Model. Environment Agency.

Environment Agency. (2009c). Science Report SC050021/SR4. CLEA Software (Version 1.05) Handbook, Environment Agency.

Environment Agency. (2009d). SC050021/Final Technical review 1. A Review of Body Weight and Height Data used within the Contaminated Land Exposure Assessment Model (CLEA). Environment Agency.

Environment Agency. (2009e). Science report: SC050021. Using Soil Guideline Values. / SGV Introduction. Environment Agency

Environment Agency. (2020). Land contamination: risk management. Environment Agency

Her Majesty's Government (UK). (1995) Environmental Protection Act 1990 (as amended by the Environment Act 1995).

Her Majesty's Government (UK). (2003) Environmental Protection (Duty of Care) Regulations 1991 (as amended 2003).

Her Majesty's Government (UK). (2015). The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.

Her Majesty's Government (UK). (2016). The Water Supply (Water Quality) Regulations 2016.

Her Majesty's Government (UK). (2017). Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.

Highways England. (2020). Design Manual for Roads and Bridges (DMRB) LA 104 Environmental assessment and monitoring (Revision 1).

Highways England. (2019). Design Manual for Roads and Bridges (DMRB) LA 109 Geology and Soils (and associated supporting guidance).

Highways England. (2020). Design Manual for Roads and Bridges (DMRB) LA 113 Road Drainage and the Water Environment (Revision 1).

LQM (2009). The LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment (2nd Edition). Land Quality Press, Nottingham. Nathanail, C.P., McCaffrey, C., Ashmore, M.H., Cheng, Y.Y., Gillett, A., R. & Scott, D.

LQM. (2015). The LQM/CIEH S4ULs for Human Health Risk Assessment. Land Quality Press, Nottingham. Nathanail, C.P., McCaffrey, C., Gillet, A.G., Ogden, R.C. and Nathanail, J.F. 2015.

MAFF. (1988). Agricultural Land Classification for England and Wales: Revised Guidelines and Criteria for Grading the Quality of Agricultural Land

Ministry of Housing, Communities & Local Government. (2019). National Planning Policy Framework.

National Highways (2018) Environmental Strategy [online] available at https://www.gov.uk/government/publications/highways-england-environment-strategy Accessed July 2024).

National Highways (2018) Sustainable Development Strategy and Action Plan [online] available at [Withdrawn] https://www.gov.uk/government/publications/highways-england-sustainable-development-strategy Accessed July 2024).

Natural England. (2012). Agricultural Land Classification: protecting the best and most versatile agricultural land. (TIN049). Second edition.

Natural England. (2018). Guide to assessing development proposals on agricultural land.

Octavius Infrastructure. (2023). Ground Investigation Report. A46 Coventry Junctions (Walsgrave). GDMS 42880.

Rugby Borough Council (2019). Rugby Borough Council Local Plan 2011- 2031. [online] Available at: https://www.rugby.gov.uk/w/local-plan-2011-2031 Accessed April 2024.

World Health Organisation. (2022). Guidelines for Drinking Water Quality. Fourth Edition (incorporating first and second addenda).