

The Lighthouse Green Fuels Order

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Contents

Abbreviations	4
21 Geology and Soils	6
21.1 Introduction.....	6
Overview.....	6
21.2 Legislation and planning policy context.....	7
Overview.....	7
Policy, legislation and guidance	7
21.3 Assessment methodology and significance criteria	13
Study area	13
Baseline methodology	13
Consultation.....	14
Determining receptor value/sensitivity, magnitude and significance of effect	26
Receptor sensitivity	26
Magnitude of impact on receptors	27
Significant effects	29
Limitations of the Assessment.....	30
21.4 Baseline conditions.....	30
Historical uses	31
Geology	31
Made ground	32
Superficial deposits	32
Bedrock	32
Hydrogeology	33
Hydrology	34
Mining, ground workings and natural cavities	35
Geological designated sites	36
Ecological designations	36
Landfills and waste management.....	36
Unexploded ordnance (UXO)	37
Other potential contamination sources.....	37
Land contamination	37
Sources of land contamination	37
Receptors	40
Pathways	40

21.5	Future baseline	41
21.6	Development design and impact avoidance.....	41
	Construction	42
	Operation.....	44
	Decommissioning	45
21.7	Likely impact and effects of the Proposed Development.....	45
	Overview.....	45
	Construction	47
	Operation.....	47
21.8	Mitigation and enhancement measures	53
21.9	Residual effects and conclusions.....	53
21.10	Summary of significant effects	55
References		56

Tables

Table 21.1	Summary of key legislation, policy, and guidance.....	7
Table 21.2	Consultation summary table	15
Table 21.3	Receptor value and sensitivity	26
Table 21.4	Magnitude of impact on receptors.....	28
Table 21.5	Assessment matrix.....	30
Table 21.6	Ground model summary within Main Site based on previous ground investigation records	33
Table 21.7	Summary of potential sources of contamination	38
Table 21.8	Summary of receptors and sensitivity	40
Table 21.9	Summary of potential contaminant pathways	41
Table 21.10	Summary of effects - construction.....	48
Table 21.11	Summary of effects - operation.....	51
Table 21.12	Summary of residual effects	53

Abbreviations

Abbreviation	In full
ACM	Asbestos containing material
bgl	Below ground level
BGS	British Geological Survey
BMV	Best and most versatile
BSI	British Standards Institution
BTEX	Benzene, toluene, ethylbenzene and xylenes
CAR 2012	The Control of Asbestos Regulations 2012
CDM	Construction (Design and Management)
CEMP	Construction Environmental Management Plan
CIRIA	Construction Industry Research and Information Association
CL:AIRE	Contaminated Land: Applications in Real Environments
COSHH	Control of Substances Hazardous to Health
CSM	Conceptual Site Model
DCO	Development Consent Order
Defra	Department for Environment, Food and Rural Affairs
DEMP	Decommissioning Environmental Management Plan
DMRB	Design Manual for Roads and Bridges
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking water standards
EA	Environment Agency
EIA	Environmental Impact Assessment
EQS	Environmental Quality Standard
ES	Environmental Statement
GCR	Geological Conservation Review
GQRA	Generic Quantitative Risk Assessment
GWDE	Groundwater dependent terrestrial ecosystem
LCRM	Land Contamination Risk Management
LNR	Local Nature Reserve
MMP	Materials Management Plan
NHBC	National House Building Council
NNR	National Nature Reserve

NPPF	National Planning Policy Framework
NPS	National Policy Statement
fCEMP	Framework Construction Environmental Management Plan
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PCL	Potential contaminant linkage
PEIR	Preliminary Environmental Information Report
PFAS	Per- and polyfluoroalkyl substances
PPE	Personal protective equipment
RCBC	Redcar and Cleveland Borough Council
RBMP	River Basin Management Plan
RIGS	Regionally Important Geological Site
SPA	Special Protection Area
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
STBC	Stockton-on-Tees Borough Council
SVOC	Semi-volatile organic compound
TBT	Tributyl tin
TPH	Total petroleum hydrocarbons
UNESCO	United Nations Educational, Scientific and Cultural Organization
UXO	Unexploded ordnance
VOC	Volatile organic compound
WFD	Water Framework Directive
WWII	Second World War

21 Geology and Soils

21.1 Introduction

Overview

21.1.1 This chapter of the Environmental Statement (ES) provides an assessment of the potential likely significant effects in relation to Geology and Soils from the construction, operation and maintenance of the Proposed Development.

21.1.2 Geology and Soils aspects considered within this chapter are:

- Risks to human health, surface water quality and groundwater quality arising from the Proposed Development's interaction with existing land contamination during construction and operation; and
- Risks from accumulation of hazardous ground gas within confined spaces during construction and operation.

21.1.3 This chapter should be read in conjunction with **Chapter 4: The Proposed Development (ES Volume I, Application Document Ref. 6.1)**, which describes the development parameters against which the effects considered in this chapter have been assessed, **Chapter 5: Construction Programme and Management (ES Volume I, Application Document Ref. 6.1)** which describes the construction phase of the Proposed Development, and **Chapter 2: Assessment Methodology (ES Volume I, Application Document Ref. 6.1)** which describes the approach to the Environmental Impact Assessment (EIA).

21.1.4 This chapter should also be read in conjunction with the following chapters:

- **Chapter 11: Freshwater and Marine Ecology (ES Volume I, Application Document Ref. 6.1);**
- **Chapter 12: Water Environment and Flood Risk (ES Volume I, Application Document Ref. 6.1); and**
- **Chapter 16: Materials Assets and Waste (ES Volume I, Application Document Ref. 6.1).**

21.1.5 This chapter is supported by **Appendix 21A: Ground Conditions – Phase 1 Preliminary Risk Assessment Report (ES Volume III, Application Document Ref. 6.3)** and the following figures:

- **Figure 21.1: Site Location and Study Area (ES Volume II, Application Document Ref. 6.2);**
- **Figure 21.2: Site Layout (ES Volume II, Application Document Ref. 6.2);**

- **Figure 21.3: Superficial Geology (ES Volume II, Application Document Ref. 6.2);**
- **Figure 21.4: Bedrock Geology (ES Volume II, Application Document Ref. 6.2); and**
- **Figure 21.5: Historic and Authorised Landfill Sites (ES Volume II, Application Document Ref. 6.2).**

21.2 Legislation and planning policy context

Overview

- 21.2.1 This section outlines the relevant legislation, planning policy and guidance which underpins the assessment methodology for Geology and Soils and have informed the scope of the assessment.

Policy, legislation and guidance

Table 21.1 Summary of key legislation, policy, and guidance

Legislation/Policy/Guidance	Relevance to assessment
Legislation	
Environmental Protection Act 1990 [Ref 1]	This is the key regulatory regime relating to historical land contamination. Part 2A of the Environmental Protection Act 1990 describes a regulatory role for local authorities and provides local authorities with the power to inspect land to identify land which is contaminated within the meaning of the Part 2A definition, to establish liability and to ensure its remediation. In England and Wales the Part 2A regime consists of three main legislative/statutory elements, these are Part 2A itself, the Statutory Guidance and the Regulations.
The Contaminated Land (England) Regulations 2006 [Ref 2]	Regulation 3 provides a definition of what constitutes 'contaminated land' and sets out the responsibilities of the local authority and the Environment Agency (EA) in the identification and management of contaminated land. Contaminated land assessment works associated with Part A are to be conducted in accordance with these regulations.
The Water Environment (Water Framework Directive (WFD)) (England and Wales) Regulations 2017 [Ref 3]	The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017, transpose into English and Welsh law the Water Framework Directive 2000/60/EC and contain provisions to protect rivers, lakes, estuaries, coastal waters and groundwater. These regulations provide for protection of all types of water bodies and include environmental objectives and compliance parameters to be assessed. These requirements underpin the impact assessment for the water environment.

Legislation/Policy/Guidance	Relevance to assessment
The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 [Ref 4]	Provides legislative context for the protection of organisms within the surface water bodies of England and Wales.
The Environmental Damage (Prevention and Remediation) (England) Regulations 2015 [Ref 5]	These Regulations aim to prevent serious environmental effects or ensure that remediation is carried out. The emphasis is on encouraging operators to put in place appropriate pollution prevention measures and where appropriate agreed voluntary remedial action. The Regulations specifically define three types of environmental damage: biodiversity damage to European Union protected species and habitats and Sites of Special Scientific Interest (SSSI); water damage; and land damage.
The Environmental Permitting (England and Wales) Regulations 2016 [Ref 6]	These regulations streamline the legislative system for industrial and waste installations into a single permitting structure for those activities which have the potential to cause harm to human health or the environment. The regulations require every regulated facility (as defined) to be operated under the authority of an environmental permit. They provide, among other things, for: the discharge of functions by the regulator in relation to permits, procedure for environmental permitting, enforcement notices and other enforcement measures and powers of the regulator.
The Control of Substance Hazardous to Health Regulations 2002 (COSHH) [Ref 7]	Under the COSHH regulations employers are required to control substances that are hazardous to health. It outlines a precautionary approach to risk management with control strategies aiming to reduce exposure as much as possible.
The Control of Asbestos Regulations 2012 (CAR 2012) [Ref 8]	Legislation to set out the duties to manage risks from asbestos/asbestos containing materials (ACM) in existing non-domestic premises and during any work activity involving asbestos. Duty holders must make sure anyone who carries out any work in non-domestic premises and any occupants of the premises are not exposed to asbestos from ACM that may be present.
The Construction (Design & Management) Regulations 2015 (CDM) [Ref 9]	Legislation to ensure health and safety issues are properly considered during a project's development so that the risk of harm to those who have to build, use and maintain the development is reduced. CDM regulations apply to all building and construction work, including new build, demolition, refurbishment, extensions, conversions, repair and maintenance.
Policy	
Overarching National Policy Statement (NPS) for Energy (EN-1), 2025 (published 2026) [Ref 11]	Section 5.4 outlines the requirement for biodiversity and geological conservation. It is stated that where the development site is subject to EIA the applicant should ensure that the ES clearly sets out any effects on

Legislation/Policy/Guidance	Relevance to assessment
	internationally, nationally and locally designated sites of ecological or geological conservation importance.
NPS for Renewable Energy Infrastructure (EN-3), 2025 (published 2026) [Ref 33]	Provides the primary policy for decisions by the Secretary of State on applications they receive for national significant renewable energy infrastructure and to establish the specific criteria by which applications for development consent for such schemes are to be assessed.
The National Planning Policy Framework (2026) (NPPF) [Ref 10]	The NPPF is a document that sets out the Government's planning policies for England and how they are expected to be applied. The NPPF states that the purpose of the planning system is to contribute to the achievement of sustainable development. The NPPF includes specific chapters which relate to the assessment of Geology and Soils as follows: Chapter 12: Making effective use of land The NPPF states that the planning policies and decisions should promote an effective use of land in meeting the need for homes and other uses, while safeguarding and improving the environment and ensuring safe and healthy living conditions. Chapter 19: Conserving and enhancing the natural environment The NPPF states that the objective of planning policies should be to influence the design and location of development to. This should include limiting the scale and extent of development within Protected Landscapes (e.g. designated sites and area of importance for their landscape, geodiversity or biodiversity), avoiding the use of higher quality agricultural land where land of poorer quality is available and avoiding and minimising harm to designated sites of importance for nature. It should also seek to prevent new and existing development from contributing to or being put at unacceptable risk from soil or water pollution or land instability. Planning decisions should lead to the remediation and mitigation of despoiled, degraded, derelict contaminated and unstable land, where appropriate. Guidance relating to ground conditions and pollution is provided in policies P2 and P3 (Chapter 17) which are quoted below. P2: Ground Conditions <i>"1. Sites proposed for development should be suitable for their proposed use taking into account: a) Ground conditions, including any risks arising from land instability or contamination (whether due to natural hazards or current and former activities such as mining or fuel storage); and b) The extent to which any such risks can be mitigated, and the potential impacts on the natural environment arising from remediation.</i>

Legislation/Policy/Guidance	Relevance to assessment
	<i>2. Where land is remediated it should, as a minimum, not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990.</i> <i>3. Adequate site assessment information, prepared by a competent person, should be available to inform these considerations.</i> <i>4. Where a site is affected by contamination or land stability issue, responsibility for securing a safe development rests with the developer and/or landowner.</i> P3: Living conditions and pollution <i>"1. Development proposals should be appropriate for their location, taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, whether these effects are on or off-site; and whether this is as a result of the development itself or the product or preexisting conditions in its vicinity. In assessing the potential effects of pollution, consideration should be given to the potential sensitivity of the site, and its intended occupiers and users, as well as that of the environment and population in the surrounding area (including where certain groups could be vulnerable to its effects, such as children and older people).</i> <i>2. Within this context development proposals should: a) Provide healthy living conditions for occupiers and users in terms of adequate access to light and avoiding exposure to levels of air, noise, artificial light or other sources of pollution which could have an unacceptable adverse effect on health and the quality of life. Where necessary suitable mitigation measures should be incorporated to secure acceptable living conditions; b) Not give rise to, or contribute to, an unacceptable level of access to daylight and sunlight for neighbouring residents and occupiers, or unacceptable levels of air, noise, artificial light, water, soil or other forms of pollution on or beyond the site. Adverse impacts of this nature should be avoided where possible, opportunities should be taken to reduce pollution affecting the wider area; f) Assess and mitigate impacts where the development could have an unacceptable adverse effect on water quality, especially in relation to sensitive water bodies such as chalk streams.</i> Chapter 11: Facilitating the sustainable use of minerals <i>The objective of the policies is "to ensure there is a sufficient supply of minerals, which are essential to provide the infrastructure, buildings, green energy and goods that the country needs; while restricting peat, coal and onshore oil and gas extraction for environment reasons."</i>
Stockton-on-Tees Borough Council (STBC) – Local Plan [c]	The Local Plan sets out the Council's policies and proposals to guide planning decisions and establishes the framework for the sustainable economic growth and development of the Borough.

Legislation/Policy/Guidance	Relevance to assessment
	Policy ENV5 - Preserve, Protect and Enhance Ecological Networks, Biodiversity and Geodiversity states that: The Council will protect and enhance the biodiversity and geological resources within the Borough. Sites designated for nature or geological conservation will be protected and, where appropriate enhanced. Policy ENV7 – Ground, Air, Water, Noise and Light Pollution states that: All development proposals that may cause groundwater, surface water, air (including odour), noise or light pollution either individually or cumulatively will be required to incorporate measures as appropriate to prevent or reduce their pollution so as not to cause unacceptable impacts on the living conditions of all existing and potential future occupants of land and buildings, the character and appearance of the surrounding area and the environment.
Redcar and Cleveland Borough Council (RCBC) – Local Plan	The Local Plan sets out the Council's policies and proposals to guide planning decisions and establishes the framework for the sustainable economic growth development of the Borough. Policy SD4 General Development Principles states that: development will be permitted where it will avoid locations that would put the environment or human health at unacceptable risk and development proposals will be expected to minimise pollution and respect or enhance geological features Policy N4 – Biodiversity and Geological Conservation states that: The Council will protect and enhance the borough's biodiversity and geological resources. Designated sites will be protected and, where appropriate enhanced.
Guidance	
EA, Land Contamination Risk Management (LCRM) guidance [Ref 13]	Provides guidance on how to assess and manage the risks from land contamination.
Department for Environment, Food and Rural Affairs (Defra), Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance (2012) [Ref 14]	Guidance which provides a means of dealing with unacceptable risks posed by land contamination and assessing if land should be considered as meeting the Part 2A definition of contaminated land.
Ministry of Housing Communities and Local Government and Department for Levelling Up, Housing and Communities, Natural Environment Guidance (updated 2019) [Ref 15]	Guidance that explains key issues in implementing policy to protect and enhance the natural environment, including local requirements.

Legislation/Policy/Guidance	Relevance to assessment
EA and National House Building Council (NHBC) (2008) Guidance for the safe development of housing on land affected by contamination, EA R&D publication 66 [Ref 16]	Guidance to assess how best to construct housing on land affected by contamination. Although published by the NHBC, the guidance provided is relevant to many types of development.
Construction Industry Research and Information Association (CIRIA) C552 (2001) Contaminated Land Risk Assessment: A guide to good practice [Ref 17]	Provides guidance on the examination and risk assessment of contaminated land and provides an explanation of the key elements of risk assessment practices and procedures.
CIRIA C532 (2001) Control of Water Pollution from Construction Sites [Ref 18]	Provides guidance on environmental good practice for the control of water pollution arising from construction activities. The document focuses on the potential sources of water pollution from within construction sites and the effective methods of preventing its occurrence.
British Standards Institution (BSI) BS 10175:2026 Investigation of Potentially Contaminated Sites – Code of Practice [Ref 19]	Provides recommendations for investigation of potentially contaminated land or land with naturally elevated concentrations of potentially harmful materials.
EA (2023) Groundwater Protection [Ref 20]	Contains position statements which provide information about the EA's approach to managing and protecting groundwater.
BSI BS 5930 (2015 +A1:2020) The Code of Practice for Site Investigations [Ref 21]	Provides guidelines for conducting ground investigation.
Design Manuals for Road and Bridges (DMRB) 109 (Geology and Soils) [Ref 22]	A manual that covers the requirements that shall be applied to the assessment, reporting and management of environmental effects on geology and soils from the delivery of highways projects. Although the Proposed Development is not a highways project, this guidance is used in the absence of any other guidance specific to the topic of Geology and Soils.
Contaminated Land: Applications in Real Environments (CL:AIRE) Piling and penetrative ground improvement methods on land affected by contamination: guidance on pollution prevention [Ref 35]	Provides guidance on assessing risks associated with, and preventing pollution from, piling and penetrative ground improvement methods, with a specific focus on their use on land affected by contamination.

21.3 Assessment methodology and significance criteria

Study area

21.3.1 For the purposes of determining the local baseline conditions with respect to Geology and Soils, the study area includes the Proposed Development boundary, plus the following buffers:

- 50m from the boundary of the Proposed Development is adopted for identifying sources of contamination posing a risk to human health receptors. Given there is no direct citing of a recommended buffer in industry guidance for the assessment of human health in relation to contaminated land, the 50m buffer used is on the basis of professional judgement and its acceptance on other previous schemes; and
- A 250m buffer is used for the assessment of potential sources of contamination posing a risk to sensitive controlled waters (groundwater and surface water), which is consistent with safe development on contaminated land guidance EA R&D publication 66 [Ref 16] when considering the impacts of contamination on sensitive environmental receptors.

21.3.2 The Study Area is presented in **Figure 21.1: Site Location and Study Area (ES Volume II, Application Document Ref. 6.2)**.

Baseline methodology

21.3.3 The baseline conditions have been informed by the **Ground Conditions – Phase 1 Preliminary Risk Assessment Report (Appendix 21A, ES Volume III, Application Document Ref. 6.3)**. This is primarily based on information in relation to geology and ground conditions within the study area using the following sources of information:

- Historical mapping and environmental data included as part of a professional Groundsure Insights Report (included in **Appendix 21A: Ground Conditions – Phase 1 Preliminary Risk Assessment Report (ES Volume III, Application Document Ref. 6.3)**);
- British Geological Survey (BGS) 1:50,000 geological map series Sheet 33 [Ref 23] and Sheet 34 [Ref 24];
- BGS 1:10,000 geological map series Sheet NZ52SW [Ref 25], Sheet NZ52SE [Ref 26], Sheet NZ52NW [Ref 27] and Sheet NZ42SE [Ref 28];
- BGS GeoIndex for digital geological mapping and historical borehole records [Ref 29];
- BGS online lexicon of named rock units [Ref 30];

- Zetica unexploded ordnance (UXO) desk study/risk assessment (included in **Appendix 21A: Ground Conditions – Phase 1 Preliminary Risk Assessment Report (ES Volume III, Application Document Ref. 6.3)** [Ref 31];
 - Available historical ground conditions reports related to the Proposed Development Site (listed in **Appendix 21A: Ground Conditions – Phase 1 Preliminary Risk Assessment Report (ES Volume III, Application Document Ref. 6.3)**;
 - Google Earth Pro aerial images; and
 - South Bank Quarry (2020) EIA Report [Ref 34].
- 21.3.4 Baseline data collection is predominantly desk-based. No development specific intrusive ground investigation data was available at the time of preparing this ES. A phase of intrusive ground investigations will be undertaken after submission of the DCO application, secured by Requirement in the DCO (see Section 21.3.13).
- 21.3.5 The **Appendix 21A: Ground Conditions – Phase 1 Preliminary Risk Assessment Report (ES Volume III, Application Document Ref. 6.3)** includes a review of historical and current land uses for the Proposed Development Site to assess the potential for ground contamination; a review of the environmental setting to assess the sensitivity of the surrounding area to contamination/pollution and a qualitative environmental risk assessment to produce a preliminary conceptual site model (CSM) summarising potential pollutant linkages associated with the Proposed Development. This assessment has been undertaken in accordance with the EA LCRM guidance [Ref 13].

Consultation

- The consultation undertaken with statutory consultees to inform this chapter, including a summary of comments, relevant to Geology and Soils raised is summarised in Table 21.2.
- 21.3.6 . This consultation included scoping consultation, statutory consultation following publication of PEIR and further targeted consultation.
- 21.3.7 The following meetings were held in the development of this ES Chapter to discuss consultation responses in more detail:
- 28 November 2025 – Meeting with STBC Planning and Environmental Health teams.
 - 20 April 2026 – Meeting with EA's area Water Quality, Water Resources and Groundwater teams.

Table 21.2 Consultation summary table

Stakeholder	Date	Summary of consultee comment	Summary of response
Planning Inspectorate (PINS)	November 2025 Scoping Opinion	The scoping report proposes to scope out connection corridors from the assessment. The Inspectorate considered information on the connection corridors should be included in the ES, including identification and evaluation of impacts, and environmental management and engineering methods set out and secured.	The assessment presented in this chapter has been updated to include the whole Proposed Development Site including the connection corridors.
		The scoping report indicates that there is potential for aggressive ground conditions to affect structures in the operation phase, and this will be assessed during future intrusive works and mitigated through implementation of good design. The Inspectorate does not agree to scope this matter out at this stage, accordingly the ES should include an assessment of this risk during operation.	The assessment presented in this chapter includes consideration of aggressive ground conditions. The presence of aggressive ground conditions (for example sulphates and acidic conditions in soil/groundwater) will be assessed from data collected during pre-construction ground investigation and used to inform appropriate design of buried concrete and below ground utilities.
		This chapter does not mention the decommissioning phase. The ES should consider the potential likely significant effects during decommissioning of the proposed development.	The potential impacts associated with decommissioning activities are likely to be similar to or less than those for construction activities, as the activities are expected to be broadly similar but without the works on the quay and infrastructure. This is discussed in Section 21.6.4.
STBC	November 2025 Scoping Opinion	The scope of the area concerned includes areas which are categorised as high risk within the Stockton Contaminated Land Strategy. These present potential significant risks from contaminated land affecting controlled waters and sensitive areas under Schedule 2. Contaminated land should be scoped into the EIA. The assessment should cover: – Desk top study identifying potential sources, pathways and receptors and CSM	A desk-based Geoenvironmental Preliminary Risk Assessment has been produced (Appendix 21A: Ground Conditions – Phase 1 Preliminary Risk Assessment Report, ES Volume III, Appendix Document Ref. 6.3) in accordance with LCRM and includes a preliminary CSM. This includes a review of information obtained from STBC regarding contamination on sites adjacent to the Proposed Development.

Stakeholder	Date	Summary of consultee comment	Summary of response
		- Detailed ground investigation and risk assessment for soil, groundwater and ground gas. The investigation should include delineating plume or plumes of free-phase materials (mainly toluene) across the Vertellus and ConocoPhillips sites - Proposed remediation and mitigation measures - Consideration of cumulative impacts with other developments in the area This should be undertaken on a staged basis in accordance with LCRM (2023) and each report submitted and approved by the local authority before progressing to the next stage.	A phase of intrusive ground investigation is being planned and will be undertaken post consent to investigate the presence of soil, groundwater and ground gas contamination. The data from this ground investigation would inform refinement of risk assessments and the design of a remediation strategy reported via the discharge of an appropriate Development Consent Order (DCO) requirement prior to construction. The impact of offsite contamination sources on the Proposed Development will be assessed as part of the ground investigation within the site. It is not intended to undertake ground investigation on neighbouring sites. Cumulative impacts with other developments in the area are considered in Chapter 22: Cumulative and Combined Effects (ES Volume I, Application Document Ref. 6.1).
EA	November 2025 Scoping Opinion	Geological classifications are correct and the relevant potential contaminant pathways considered. The risks to controlled waters from contaminated land should be considered at the appropriate stage. Further ground investigation and risk assessment is required to assess the impact of contamination on controlled waters and other receptors, and remediation undertaken where required, following framework in LCRM. Risks to groundwater from the proposed site usage should be considered at the appropriate stage. For example, risks associated with storage and/or transportation of potentially hazardous materials below ground level. Tanks and pipeline should be suitably	A desk-based geoenvironmental Preliminary Risk Assessment has been produced (Appendix 21A: Ground Conditions – Phase 1 Preliminary Risk Assessment Report (ES Volume III, Application Document Ref. 6.3)) in accordance with LCRM and includes a preliminary CSM which considers risk to controlled water and other receptors. A phase of intrusive ground investigation is being planned and will be undertaken post-DCO submission to investigate the presence of soil, groundwater and ground gas contamination. The data from this ground investigation would inform refinement of risk assessments and the design of a remediation strategy and piling risk assessment

Stakeholder	Date	Summary of consultee comment	Summary of response
		designed, constructed and pollution measures/mitigation installed where required to minimise groundwater risk. A piling risk assessment should be undertaken to ensure that piling activities do not pose a risk to groundwater.	reported via the discharge of an appropriate DCO requirement prior to construction. Appropriate mitigation measures will be incorporated into the Proposed Development design to minimise risks to groundwater from storage/transport of chemicals. Measures are be outlined in Framework Construction Environmental Management Plan (fCEMP).
Mining Remediation Authority	December 2025 Scoping Opinion	The coal mining data we hold against the works proposed has been reviewed and can confirm that based on the information provided the project site does not lie within the defined coalfield. On this basis we have no detailed comments to make on this proposal. As the site identified is not within areas of past or present coal mining and lies outside of the defined coalfield there is no requirements to consult with us further.	The Applicant notes these comments.
EA	January 2026 Preliminary Environmental Information Report (PEIR) Statutory Consultation	General comments The development site consists of land previously used for heavy industry, which is likely to affect groundwater. The Sherwood Sandstone principal aquifer underlies the main site. As principal aquifers provide significant quantities of water for people and may also sustain rivers, lakes and wetlands, an assessment of the impacts of the development on groundwater should be undertaken. Particular consideration should be given to the identification of appropriate remediation measures to minimise the risks posed by the development to groundwater. We recommend that developers should follow the risk management framework in the EA/CL:AIRE piling guidance especially when dealing with land affected by contamination and/or if the proposed piles extend to the	A desk-based geoenvironmental Preliminary Risk Assessment has been produced (Appendix 21A: Ground Conditions – Phase 1 Preliminary Risk Assessment Report, ES Volume III, Application Document Ref. 6.3) in accordance with LCRM and includes a preliminary CSM which considers risk to controlled waters and other receptors. A phase of intrusive ground investigation is being planned and will be undertaken post-DCO submission to investigate the presence of soil, groundwater and ground gas contamination. The data from this ground investigation would inform refinement of risk assessments and the design of a remediation strategy reported via the discharge of an appropriate DCO requirement prior to construction. The requirement for a piling risk

Stakeholder	Date	Summary of consultee comment	Summary of response
		Chalk within the saturated zone in Source Protection Zone 1 for public waters supply. We recommend that developers should: • follow the risk management framework provided in Land Contamination: Risk Management, when dealing with land affected by contamination; • consider using the National Quality Mark Scheme for Land Contamination Management which involves the use of competent persons to ensure that land contamination risks are appropriately managed; and • refer to the contaminated land pages on gov.uk for more information.	assessment is identified in this chapter, this will be undertaken in accordance with the EA/CL:AIRE piling guidance (Ref 35). All assessments undertaken will follow the risk management framework provided in LCRM and will be undertaken by competent persons. The developer will consider use of the National Quality Mark Scheme.
		It is noted that in Table 7-1 of Chapter 12 (Water Environment) that the sensitivity of the Sherwood Sandstone Principal Aquifer is classified as Very High. We agree with this assessment. However, in later chapters, notably Chapter 21 (Geology and Soils), a different scale is used for sensitivity, with 'high' representing the highest sensitivity, rather than 'Very High'. As such, the Sherwood Sandstone is classified as 'High' sensitivity in chapter 21. This inconsistently should be addressed to ensure the same receptors are assessed using comparable scales.	The receptor sensitivity classifications used in this chapter have been amended to align with those used in Chapter 12: Water Environment (ES Volume I, Application Document Ref. 6.1).
		Chapter 21 (Geology and Soils) As mentioned in section 3.5 (Limitations of the assessment), a scheme specific ground investigation has not been undertaken. At an appropriate time, we would welcome consultation on the scope and extent of the ground investigation, particularly with respect to investigation of land quality and risk assessment of controlled waters. Table 6-1 (Summary of effects – construction) and Table 6-2 (Summary of effects – operation) states that the	Proposed scope for intrusive geoenvironmental ground investigations can be shared with the EA. It is noted that ground investigation results will not be available for the ES and will be reported separately to address anticipated post-DCO consent conditions related to contaminated land. The sensitivity categories for receptors and the assessment matrix presented in this chapter have been revised and the significance of effects for all

Stakeholder	Date	Summary of consultee comment	Summary of response
		magnitude of impact would be negligible to the Sherwood Sandstone Principal Aquifer. However, the significance of the effect would be Minor. Based on Table 3-4 (Assessment matrix), it is not possible for the significance of the effect to be negligible for a high sensitivity receptor. Therefore, we do not consider a 'minor' effect on the principal aquifer during either construction or operation to be acceptable. As such, the assessment matrix should be adjusted to allow for 'negligible' effect for high sensitivity receptors, and a reassessment of the effects on the Sherwood Sandstone undertaken. If the effect is considered minor, further mitigation should be proposed to reduce the effect on the principal aquifer. The Sherwood Sandstone principal aquifer is a regionally important resource. Therefore, we cannot accept deterioration to principal aquifers due to WFD requirements. Additionally, in the absence of site-specific ground investigation and confirmed development plans, it is difficult to accurately assign magnitude of impact and an appropriate level of residual risk. Reconsideration should be given to the magnitude of impact and residual risk.	receptors reassessed. Where site-specific data to assess magnitude of impact is not available, "reasonable worst-case" conditions have been assumed for the assessment.
		The interaction between groundwater within the bedrock and superficial deposits and the River Tees has not been demonstrated within the PEIR. However, it is referenced in the appended Geoenvironmental Preliminary Risk Assessment (Chapter 21: Appendix 21A). We consider the receptor sensitivity of the more permeable superficial deposits to be medium rather than low. This is due to the potential for superficial groundwater to contribute to base flow of the River Tees. Clarification is required on whether the interaction	The sensitivity categories for receptors and the assessment matrix presented in this chapter has been revised following Statutory Consultation and the significance of effects for all receptors have been reassessed. Where site-specific data to assess magnitude of impact is not available, "reasonable worst-case" conditions have been assumed for the assessment.

Stakeholder	Date	Summary of consultee comment	Summary of response
		between groundwater within the bedrock, and superficial geological units with the River Tees has been considered in assigning the various receptor sensitivities. Table 6-1 does not consider the effects from piling during the construction phase. Consideration should therefore be given to the potential impacts of piling. A piling risk assessment must be undertaken to ensure that piling activities do not pose a risk to shallow or deep groundwater and mitigation put in place to mitigate pollution risks.	This chapter has been updated to include a clearer demonstration of interaction between groundwater and River Tees. Potential contaminant pathways via piling are considered in the assessment. The assessment table has been updated to make the consideration of effects from piling clearer. Requirement for a foundation works risk assessment to be produced is identified in the ES.
		With respect to Section 7 (Mitigation and Enhancement Measures), we acknowledge the proposed ground investigation, risk assessments, and remediation strategy. However, the requirement for soil remediation along with active groundwater remediation and long-term monitoring should not be discounted. We also acknowledge the intent to undertake sediment quality and water quality sampling from the River Tees, and the preparation and implementation of a groundwater and land quality monitoring plan. We would welcome consultation in the scope and extent of groundwater and land quality monitoring.	Potential requirements for both soil and groundwater remediation and long-term monitoring have not been discounted at this stage. Where site-specific data to assess magnitude of impact is not available, "reasonable worst-case" conditions have been assumed for the assessment. Appropriate remediation methods and monitoring requirements will be specified and implemented based on ground investigation and risk assessment results and development design; and will be reported separately to address anticipated DCO Requirements related to contaminated land. Proposals for monitoring will be shared for discussion with Statutory Consultees as they are developed.
		Chapter 23 (Summary of Significant Effects) In light of our previous comments, and given the current absence of ground investigation data, we cannot at this stage confirm full confidence in the assessment of significant geological effects relating to geology, hydrogeology, and contaminated land. We would welcome consideration of our earlier comments and further engagement,	As described in comment responses above the significance of effects has been reassessed and is based on "reasonable worst-case" conditions where site specific data is not available. Proposed scope for intrusive geoenvironmental ground investigations will be shared with Environment Agency. Ground investigation results and

Stakeholder	Date	Summary of consultee comment	Summary of response
		particularly in relation to ground investigation, controlled waters risk assessment, and the piling risk assessment.	subsequent risk assessments will be reported separately to address anticipated post-DCO consent requirements related to contaminated land. The requirement for a piling risk assessment to be produced is identified in the ES.
Natural England	January 2026 PEIR Statutory Consultation	The Teesmouth and Cleveland Coast Designated Sites have not been listed as a receptors for potential impacts from geology and soil contaminants. The Tees water body is stated in Table 4-2 as a receptor, but this does not take into account the wider ecological receptors connected to designated sites that rely on the watercourse. The contaminants pathway should be updated accordingly.	The assessment of potential impacts to the River Tees considers its sensitivity as both a transitional waterbody and as an ecologically designated site. The list of receptors in Table 21.8 and assessment of impacts represented in Section 21.7 has been amended to make this clearer.
		The conclusions on the impacts from soil and geology contaminants does not take into account impacts on the adjacent designated site.	
STBC	January 2026 PEIR Statutory Consultation	No intrusive ground investigation has yet been undertaken, and a site investigation is recommended, followed by a Generic Quantitative Risk Assessment and an updated conceptual site model. A remediation strategy must then be agreed with the Local Planning Authority prior to construction. A piling risk assessment must be undertaken to prevent preferential pathways to aquifers prior to undertaking the works. Subject to these requirements being secured, I have no objection in principle to the proposed development. I recommend the following conditions be applied: Contaminated Land Risk Assessment No part of the authorised development may commence until a scheme for managing the risks associated with land contamination has been submitted to and approved in writing by the relevant planning authority. The scheme	The Applicant notes these comments. A phase of intrusive ground investigation is being planned and will be undertaken after submission of the DCO application to investigate the presence of soil, groundwater and ground gas contamination. The data from this ground investigation would inform refinement of risk assessments and the design of a remediation strategy and piling risk assessment reported via the discharge of the relevant DCO requirement prior to construction. The development of the risk assessments and remediation strategy will be undertaken in accordance with LCRM guidance.

Stakeholder	Date	Summary of consultee comment	Summary of response
		must include the following components, each of which shall be submitted to and approved by the authority before proceeding to the next stage: (a) A site investigation scheme, based on the Desk Top Study (PEIR Chapter 21 and Appendix 21A, dated 2 December 2025), to provide information for a detailed assessment of the risk to all receptors that may be affected, including those off site. (b) The results of the site investigation and detailed risk assessment referred to in (a) and based on these, an options appraisal and remediation strategy giving full details of the remediation measures required and how they are to be undertaken. (c) A verification plan providing details of the data that will be collected to demonstrate that the works set out in the remediation strategy in (b) are complete and identifying any requirements for longer-term monitoring of pollutant linkages, maintenance and arrangements for contingency action. This must be undertaken in accordance with the Environment Agency's "Land Contamination Risk Management" Guidance (2023). Any changes to these components require the express written consent of the Local Planning Authority. The scheme shall be implemented as approved.	
		Due to the risk of piling activities creating new contaminant migration pathways to land and to the deeper aquifers, a piling risk assessment shall be undertaken in accordance with 'Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention (2001)'.	The requirement to produce a piling risk assessment is set out in the ES. The piling risk assessment will be informed by the development design and data obtained from the proposed intrusive ground investigation. the piling risk assessment will be reported via the discharge of an appropriate DCO requirement prior to construction.

Stakeholder	Date	Summary of consultee comment	Summary of response
		Reason: To ensure the risks to controlled waters are adequately addressed. The site is underlain by the Sherwood Sandstone Principal Aquifer which is a sensitive receptor that could be affected by any land contamination that may be present at the site. The environmental setting of the development site is therefore considered sensitive with regards to the risk that any land contamination that may be present at the site may pose to controlled waters receptors.	
EA	May 2026 Targeted Engagement Response	Insufficient information on proposed method(s) to replace the Process Wastewater Pipeline including removal and replacement of the pipeline within the Sembcorp No.2 Tunnel. Insufficient information on proposed open cut and trenchless techniques (e.g. in respect of CO ₂ connection and additional electrical connection).	Further detail on pipeline removal and replacement within the Sembcorp No.2 Tunnel and proposed open cut and trenchless techniques will be developed during subsequent stages of detailed design.
		The proposed development changes show that the proposed DCO boundary includes part of a currently regulated facility (SABIC Northern Aromatic). Please can we advise that their permit is currently going through the surrender process and their application is being considered. We would highlight that the permit surrender process only requires the operator to demonstrate no deterioration in baseline conditions and does not require them to address historic land contamination issues pre permit.	The Applicant notes these comments. A desk-based geoenvironmental Preliminary Risk Assessment has been produced (Appendix 21A: Ground Conditions – Phase 1 Preliminary Risk Assessment Report (ES Volume III, Application Document Ref. 6.3)) in accordance with LCRM which considered potential historic land contamination sources and includes a preliminary CSM. A phase of intrusive ground investigation is being planned and will be undertaken after submission of the DCO Application to investigate the presence of contamination to inform refinement of risk assessments and the design of a remediation strategy.
		We would expect the risk from reusing existing pipework/ utility infrastructure to be considered	Where existing pipelines/utility corridors are to be reused they will be subject to surveys and, where

Stakeholder	Date	Summary of consultee comment	Summary of response
		particularly, but not limited to, where they are transporting substances which could be contaminative. We would expect some commentary on the integrity of existing pipework and/or utility infrastructure.	necessary, testing to assess their integrity during subsequent stages of detailed design and construction as outlined in Chapter 5: Construction Programme and Management (ES Volume I, Application Document Ref. 6.1) .
		The risk to all controlled water receptors relevant to the proposed DCO development should be considered. This includes groundwater bodies within superficial deposits and bedrock units underlying the site and surface water bodies relevant to the DCO site boundary.	The Applicant notes these comments. A desk-based geoenvironmental Preliminary Risk Assessment has been produced (Appendix 21A: Ground Conditions – Phase 1 Preliminary Risk Assessment Report (ES Volume III, Application Document Ref. 6.3)) in accordance with LCRM and risks to all identified potential controlled water receptors has been considered.
		At an appropriate time, we would welcome consultation on the scope and extent of the ground investigation, particularly with respect to investigation of the impact to controlled waters from land contamination and subsequent risk assessment of controlled waters. Please could we highlight that in relation to slag made ground deposits, appropriate characterisation of the nature and chemical properties of these deposits should be undertaken.	Proposed scope for intrusive geoenvironmental ground investigations will be shared with the EA. It is noted that ground investigation results will be reported separately to address anticipated post-DCO consent requirements related to contaminated land. The ground investigation will include appropriate testing to allow characterisation of slag made ground deposits to be undertaken.
		The proposed development area comprises made ground deposits consisting of slag deposits. Please be advised that excavation and re use of slag deposits would be considered a permitted waste activity (Deposit for Recovery)/Groundwater Activity. We would advise that the applicant seeks pre application permit advice on these aspects.	The Applicant notes these comments. A detailed earthworks design would be developed once ground investigation is completed to identify proposed soils intended for reuse and disposal. If reuse of slag deposits is proposed then this would be undertaken in accordance with an appropriate environmental permit.
		We would highlight that the proposed development is located within an area where emerging contaminants in the form of PFOS/PFOA compounds may be present	Per- and polyfluoroalkyl substances (PFAS) compounds have been identified as a potential contaminant of concern in the geoenvironmental

Stakeholder	Date	Summary of consultee comment	Summary of response
		within soils and groundwaters and we would recommend that the applicant considers this aspect.	Preliminary Risk Assessment (Appendix 21A: Ground Conditions – Phase 1 Preliminary Risk Assessment Report, ES Volume III, Application Document Ref. 6.3). The presence of PFAS compounds in soil and groundwater within the site will be assessed as part of the proposed intrusive ground investigation.
		Please could we highlight that INEOS Nitriles UK Limited's (INEOS) Seal Sands and BASF plc are operators which are also included within the proposed redline DCO boundary. Please could we advise that their permits are currently going through the surrender process and their applications are currently being considered. We would highlight that the permit surrender process only requires the operator to demonstrate no deterioration in baseline conditions and does not require them to address historic land contamination issues pre permit.	The Applicant notes these comments. A desk-based geoenvironmental Preliminary Risk Assessment has been produced (Appendix 21A: Ground Conditions – Phase 1 Preliminary Risk Assessment Report, ES Volume III, Application Document Ref. 6.3) in accordance with LCRM which considered potential historic land contamination sources and includes a preliminary CSM. A phase of intrusive ground investigation is being planned and will be undertaken post-consent to investigate the presence of contamination to inform refinement of risk assessments and the design of a remediation strategy.

Determining receptor value/sensitivity, magnitude and significance of effect

- 21.3.8 **Chapter 2: Assessment Methodology (ES Volume I, Application Document Ref. 6.1)** sets out the standard EIA methodology and matrices to be used for the assessment. The methodology is based on the principle that the environmental effects will be determined by identifying potential receptors, assigning receptor value, assessing the magnitude of change on the receptor and identifying the significance of effect.

Receptor sensitivity

- 21.3.9 Table 21.3 describes the receptor value and sensitivity used in the assessment which have been adapted from existing guidance as set out in DMBRB LA109: Geology and Soils [Ref 22].

Table 21.3 Receptor value and sensitivity

Receptor value and sensitivity	Geological receptors	Human Health receptors	Controlled waters receptors
Very High	Very rare and internationally important geological sites with no potential for replacement (e.g. United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Sites, UNESCO Global Geoparks, SSSI's and Geological Conservation Review (GCR) sites. Geology meeting international designation criteria which is not designated as such.	Residential developments, allotments.	Surface water Watercourses with a WFD classification shown in a River Basin Management Plan (RBMP) and $Q_{95} \geq 1.0 \text{ m}^3/\text{s}$. Site protected/designated under EC or UK legislation (Special Protection Areas (SPA), SSSI, Ramsar sites, salmonid water)/Species protected by EC legislation. Groundwater Principal aquifer providing a regionally important resources and/or supporting a site protected under EC and UK legislation. Sites within a groundwater source protection zone (SPZ) 1. Groundwater locally supports a groundwater dependent terrestrial ecosystem (GWDTE).
High	Rare and nationally important geological sites with little potential for replacement	Public open space, schools.	Surface water Watercourses with a WFD classification shown in RBMP and $Q_{95} < 1.0 \text{ m}^3/\text{s}$. Species protected by EC or UK legislation.

Receptor value and sensitivity	Geological receptors	Human Health receptors	Controlled waters receptors
	(e.g. geological SSSI, Areas of Special Scientific Interest (ASSI), National Nature Reserves (NNR)). Geology meeting national designation citation criteria which is not designated as such.		<u>Groundwater</u> Principal aquifer providing locally important resource to supporting a river ecosystem. Sites within SPZ 2. Groundwater supports a GWDTE.
Medium	Regionally important geological sites with limited potential for replacement (e.g. Regionally Important Geological Site (RIGS)). Geology meeting regional designation citation criteria which is not designated as such.	Commercial or industrial land uses.	<u>Surface water</u> Watercourses not having a WFD classification shown in RBMP and a $Q_{95} > 0.001 \text{ m}^3/\text{s}$. <u>Groundwater</u> Aquifer providing water for agricultural or industrial use with limited connection to surface water. Secondary aquifers. Sites within SPZ3.
Low	Locally important geological sites with potential for replacement e.g. non-designated exposures, former quarries or mining sites.	Low sensitivity land use such as highways and railway land. Construction/maintenance workers with limited exposure during construction.	<u>Surface water</u> Watercourses not having a WFD classification shown in RBMP and a $Q_{95} \leq 0.001 \text{ m}^3/\text{s}$. <u>Groundwater</u> Unproductive strata.
Negligible	No geological exposures, little/no local interest.	Undeveloped surplus land Land with no sensitive uses proposed.	N/A

Magnitude of impact on receptors

21.3.10 The magnitude of impact on receptors as described in Table 21.4.

Table 21.4 Magnitude of impact on receptors

Magnitude	Criteria or definition	Definition
Major	Total loss or major alteration to key elements/features of the baseline conditions	<u>Geology</u> Loss of geological feature/designation of international importance, severe damage to key characteristics, features or elements, or; Creation of a new feature of international importance e.g. new permanently accessible exposure. <u>Contamination</u> Human Health: Risk assessments indicate that contaminant levels exceed relevant screening criteria (e.g. Category 4 screening levels) and may present unacceptable acute or substantial chronic human health risks. Contamination heavily restricts future use of land. Groundwater: Pollution of a Principal aquifer within a SPZ characterised by a breach in drinking water standards (DWS), or; Considerable local-scale/moderate to significant wide-scale improvement to the quality of groundwater. Surface water: Pollution of a surface watercourse characterised by a breach in Environmental Quality Standard (EQS) at a statutory monitoring location or resulting in a General Quality Assessment grade, or; Considerable local-scale/moderate to significant wide-scale improvement to the quality of surface water.
Moderate	Partial loss or alteration to one or more key elements/features of the baseline conditions	<u>Geology</u> Partial loss of nationally important feature/designation, damage to key characteristics, features or elements, or; Creation of a new nationally important exposure/feature, or new geological understanding. <u>Contamination</u> Human Health: Contaminant concentrations exceed background levels and are in line with the limits of relevant screening criteria. Land requires remediation in order to make it suitable for development, or; A reduction in contamination risk e.g. through remediation to make land suitable for development. Groundwater/Surface water: Local-scale, or moderate wide-scale improvement to the quality of groundwater or surface water resources.
Minor	Minor shift away from baseline conditions	<u>Geology</u> Minor, measurable change in geological feature of local importance, or minor loss of key characteristics, features or elements, or; Creation of a new feature/resource of local importance or a new short-term accessible geological exposure. <u>Contamination</u>

Magnitude	Criteria or definition	Definition
		Human Health: Contaminant concentrations are below relevant screening criteria. Significant contamination is unlikely with a low health risk, or; A slight reduction in contamination risk e.g. land that has a low contamination risk in the baseline becomes very low risk through the use of best practice measures to minimise risks to human health. Groundwater: Low levels of pollution of a principal aquifer outside a SPZ or an industrial abstraction, or pollution of a Secondary A or B aquifer.
Negligible	Very slight change from baseline conditions	<u>Geology</u> Very minor loss or detrimental alteration to one or more characteristics, features or elements of geological features. Overall integrity of resource not affected. <u>Contamination</u> Human Health: Contaminant concentrations significantly less than screening criteria. No requirement for control measures to reduce risks to human health/make land suitable for intended use. Groundwater/surface water: No appreciable pollution, or pollution of a low sensitivity receptor.
No change	No change from baseline conditions	<u>Geology</u> No temporary or permanent loss/disturbance of characteristics features or elements of geological designation. Overall integrity of resource unaffected. <u>Contamination</u> Human Health: Reported contaminant concentrations at or below background levels and risk assessments indicate that there is no significant potential for adverse human health effects from contamination. Groundwater/surface water: No measurable effect on water quality, no loss or alteration of status of surface water and groundwater resource.

Significant effects

The significance of an effect is determined by considering the sensitivity of the receptor alongside the magnitude of impact. In accordance with Table 3.8.1 of DMRB LA 104 [Ref 36], the significance of predicted effects likely to occur during the construction and operational phases of the Proposed Development have been determined using the matrix in Table 21.5.

Table 21.5 Assessment matrix

Magnitude of Impact						
Sensitivity of Receptor		Major	Moderate	Minor	Negligible	No Change
	Very High	Very Large	Large or very large	Moderate or large	Slight	Neutral
	High	Large or very large	Moderate or large	Slight or moderate	Slight	Neutral
	Medium	Moderate or large	Moderate	Slight	Neutral or slight	Neutral
	Low	Slight or moderate	Slight	Neutral or slight	Neutral or slight	Neutral
	Negligible	Slight	Neutral or slight	Neutral or slight	Neutral	Neutral

21.3.11 A Very Large, Large or Moderate effect is considered significant; a resultant effect of Slight or Neutral is considered not significant. This matrix approach provides a guide, however professional judgement will be used in concluding the significance of effect.

Limitations of the Assessment

21.3.12 The baseline conditions were identified by a desktop review of relevant data sets undertaken as part of the **Ground Conditions – Phase 1 Preliminary Risk Assessment Report (Appendix 21A, ES Volume III, Application Document Ref. 6.3)**. The baseline characterisation is considered adequate and robust to inform the assessment for the purpose of the ES.

21.3.13 A phase of intrusive ground investigation will be undertaken post-DCO submission (secured by Requirement) to inform detailed design of foundations, earthworks and to investigate the presence of soil and groundwater contamination. The data from this ground investigation will inform refinement of risk assessments and the design of a remediation strategy reported via the discharge of an appropriate DCO requirement prior to construction. The absence of the investigation results at ES stage is considered unlikely to change the conclusions of this EIA.

21.4 Baseline conditions

21.4.1 This section describes the baseline conditions at the Proposed Development site and surrounding area. The findings of the **Ground Conditions – Phase 1 Preliminary Risk Assessment Report (Appendix 21A, ES Volume III, Application Document Ref. 6.3)** form the basis of this assessment.

Historical uses

- 21.4.2 The Main Site was occupied by the natural environment of the Tees Estuary, comprising tidal flat deposits in the area known as Seal Sands, until 1950 when reclamation commenced with construction of a track and jetty in the south of the site enabling dredged material from the Tees Estuary and steelworks slag to be used to backfill the reclaimed area.
- 21.4.3 A chemical plant complex was developed in the east and centre of the Main Site in the 1960s which was originally owned by Monsanto. BASF Plc acquired the plant in 1985, and INEOS took ownership in 2008. Operations at the chemical plant ceased in 2020/2021 and the plant was demolished in 2023. The site was cleared to ground slab level, and it is assumed that former building foundations and other sub-structures remain beneath the site.
- 21.4.4 The western end of the Main Site was formerly a landfill site known as Seal Sands Waste Disposal Site which was operated by Cleveland County Council with waste input from December 1973 to December 1978 (based on the EA public register). In March 1977 a 'resolution permit' was issued and re-issued in November 1977. The end date of waste disposal operations is not clear, although anecdotal evidence suggests operations had ceased by 1985. The landfill area is currently covered in vegetation.
- 21.4.5 No development is understood to have occurred on the part of the Main Site to the north of Seal Sands Road following the land reclamation. This area of land is currently vegetated with grass and scrub.
- 21.4.6 On the Wider Site to the north of the River Tees, the access corridors remained largely undeveloped, with the exception of a period between 1893 and the 1920s when the area formed part of the Port Clarence Rifle Ranges. The corridors were subsequently developed into the roads that remain in place today. The off-site electrical connection corridor remained undeveloped until the 1960s, when the North Tees Oil refinery was constructed in this area.
- 21.4.7 On the Wider Site to the south of the River Tees, the pipeline corridor has historically been used for pipeline routes, while access corridors have predominantly functioned as roads.

Geology

- 21.4.8 The geology beneath the site is presented on **Figure 21.3: Superficial Geology** and **Figure 21.4: Bedrock Geology (ES Volume II, Application Document Ref. 6.2)** and described below.

Made ground

- 21.4.9 Geological mapping indicates that made ground is present across the majority of the Proposed Development Site, with its absence limited to the easternmost extent of the access corridors south of the River Tees and the westernmost extent of the access corridors north of the River Tees.
- 21.4.10 Made ground comprises both river dredgings and slag fill used for the land reclamation, as well as landfill wastes in the west of the Main Site.

Superficial deposits

- 21.4.11 Geological mapping indicates that the Proposed Development Site is predominantly underlain by Tidal Flat Deposits (estuarine and marine alluvium), comprising sand, silt and clay. On the southern side of the River Tees, Glaciolacustrine Deposits and Blown Sands are also mapped. The Tidal Flat Deposits are interpreted to overlie Glaciolacustrine Deposits (clay and silt) and Till Deposits.
- 21.4.12 Within the River Tees channel, the riverbed is expected to comprise recent river sediments overlying variably eroded superficial deposits.

Bedrock

- 21.4.13 The bedrock beneath the Main Site is the Mercia Mudstone Group. This comprises mudstone and subordinate siltstones with locally thick halite-bearing units, widespread thin beds of gypsum/anhydrite and thin sandstones. Historical ground investigations identified the Mercia Mudstone beneath the Main Site at depths of approximately 26.8m and 30.5m below ground level (bgl).
- 21.4.14 The Mercia Mudstone is underlain by the Sherwood Sandstone Group which comprises red, yellow and brown sandstone, and is pebbly in parts with subordinate mudstone and siltstone. The Sherwood Sandstone subcrops beneath superficial deposits approximately 75m west of the Main Site and underlies the western sections of the access corridors (Wider Site). Historical borehole records in the east of the Main Site recorded mudstone bedrock at a depth of approximately 30m, overlying sandstone bedrock which was encountered at a depth of approximately 144m.
- 21.4.15 To the south of the River Tees the easternmost extents of the pipeline and access corridors in the Wider Site are underlain by mudstones of the Penarth Group and Redcar Mudstone Formation.
- 21.4.16 Across the Wider Site, historical ground investigations have encountered bedrock at depths ranging from approximately 6m to 33m bgl, comprising the Sherwood Sandstone Group and Mercia Mudstone Group.

21.4.16.1 Regionally the bedrock has a dip of 1.25° east but is locally steeper in the vicinity of major west-east faults such as the Saltholme Fault. The Saltholme Fault is inferred to be present to the south of the southern boundary of the Main Site.

21.4.16.2 A summary of ground conditions encountered during historical ground investigations within the Main Site is presented in Table 21.6.

Table 21.6 Ground model summary within Main Site based on previous ground investigation records

Stratum	Approximate Depth	Description
Made ground landfill material (includes roadways of material similar to reclaimed land)	Up to 6m	Construction waste, incinerator ash and some un-burnt municipal waste. Mixed with silt/clay and sand. Basal layer of very soft silt/clay (dredgings or reworked tidal flats)
Made ground reclamation material (except where the landfill is present)	Up to 5m	Firm gravelly clay OR loose gravel with cobbles of concrete, brick and slag Basal layer of very soft silt/clay (dredgings or reworked tidal flats)
Tidal Flat Deposits	6m to 15m	Typically loose to medium dense silty medium sand Lower part may be very soft sandy silt/clay and laminated sandy silt.
Glacial Deposits	15m to 30m	Firm to stiff clay with gravel and cobbles (Glacial Till). Occasionally laminated silts and sands (Glacio-lacustrine deposits).
Mercia Mudstone	+30m	Red mudstone

Hydrogeology

21.4.17 The superficial Tidal Flat Deposits and Glacial Till are classified as a Secondary Undifferentiated aquifer.

21.4.18 The Blown Sands in the east of the Proposed Development Site are classified as a Secondary A aquifer.

21.4.19 The Glaciolacustrine deposits are classified as Unproductive strata.

21.4.20 The Mercia Mudstone Formation is classified as a Secondary B aquifer.

21.4.20.1 The Penarth Group and Redcar Mudstone Formation are classified as Secondary Undifferentiated aquifers.

21.4.21 The Sherwood Sandstone Group is classified as a Principal aquifer.

- 21.4.22 Groundwater monitoring undertaken as part of historical ground investigations in October 2024 [Ref 37] across the Main Site recorded groundwater levels ranging from approximately 0.78m to 2.86m bgl, indicating relatively shallow groundwater conditions. Similar shallow groundwater conditions are anticipated within the superficial deposits across the Wider Site on both sides of the River Tees. Groundwater within the superficial deposits is expected to be in hydraulic continuity with the River Tees.
- 21.4.23 The Proposed Development Site is not located within a groundwater source protection zone and there are none nearby.
- 21.4.24 There are no historic or active private or licensed groundwater abstractions recorded within the Main Site or Wider Site. However, two active groundwater abstraction licences are recorded within 250m of the Wider Site, all located to the north of the River Tees.
- 21.4.25 The nearest active licensed abstraction is located approximately 15m south of the Proposed Development Site (100m south of the Main Site) and comprises groundwater abstraction from the Mercia Mudstone for general industrial use by North Tees Ltd. The other active licensed abstraction is located 50m from the Proposed Development (600m southwest of the Main Site) and comprises abstraction from the Sherwood Sandstone for general industrial use by SABIC UK Petrochemicals, it is understood this facility is now closed.
- 21.4.26 The Proposed Development Site is located within two Water Framework Directive (WFD) groundwater body catchments. Land to the north of the River Tees lies within the Tees Sherwood Sandstone groundwater body (ID: GB40301G702000), which was classified as having good overall, chemical and quantitative status in 2019. Land to the south of the River Tees lies within the Tees Mercia Mudstone and Redcar Mudstone groundwater body (ID: GB40302G701300), which was classified as having poor overall, chemical and quantitative status in 2019.

Hydrology

- 21.4.27 The River Tees flows through the Proposed Development Site and forms the eastern boundary of the Main Site. The river flows northwards, discharging to the North Sea approximately 3km to the north-east. The River Tees is tidal from the Tees Barrage at Stockton-on-Tees downstream to Teesmouth.
- 21.4.28 On the eastern side of the River Tees, Dabholm Gut, adjacent to the Proposed Development Site, is hydraulically connected to the estuary. Dabholm Gut is a modified, narrow, tidally influenced estuarine channel

which conveys industrial drainage and treated effluent discharges to the wider Tees Estuary. As such, it is subject to tidal exchange and provides a linkage between inland industrial sources and the main estuarine water body. There are several other minor watercourses in the surrounding area which discharge into the Dabholm Gut and River Tees, including the Fleet 200m north of the Proposed Development.

- 21.4.29 The area of the River Tees within the Proposed Development boundary is within the Tees WFD transitional water body (ID: GB510302509900), which has a Moderate ecological rating. The easternmost extent of the Proposed Development is located within the Tees Estuary (S Bank) WFD surface water body (ID: GB103025072320), which has a Moderate ecological rating.
- 21.4.30 Water quality data for the River Tees is presented in the South Bank Quay EIA [Ref 34] report for the EA monitoring station Tees at Smiths which is approximately 1.2km to the south of the site. The data indicates that low concentrations of metals (cadmium, copper, lead, nickel, zinc) which were below EQS for saline water. Most of the results for polycyclic aromatic hydrocarbons (PAHs) and organotin compounds such as tributyl tin (TBT) were below limits of detection except for fluoranthene and benzo(a)pyrene where maximum concentrations are an order of magnitude above the EQS.
- 21.4.31 Riverbed sediment quality sampling data is also presented in the South Bank Quay EIA [Ref 34] and indicates the presence of metals (arsenic, copper, mercury, lead and zinc), organotins, PAHs and polychlorinated biphenyls (PCBs) within the sediment sampled.
- 21.4.32 **Chapter 11: Freshwater and Marine Ecology (ES Volume I, Application Document Ref. 6.1)** should be referred to for further details of River Tees water and sediment quality.

[Mining, ground workings and natural cavities](#)

- 21.4.33 The Proposed Development Site is not located within a Mining Remediation Authority coal mining reporting area.
- 21.4.34 The Teesside area is underlain at depth by Permian evaporite deposits which are a safeguarded mineral under the Tees Valley Joint Minerals and Waste Development Plan (Ref 38). The southern extent of the Main Site and Wider site on the northern side of the River Tees (access corridors and off-site electrical connection) lies within the mapped extents of the Saltholme Brinefield and Haverton Hill Brinefield. Historical mapping and available environmental datasets indicate that brine extraction activities have occurred to the north of the River Tees.

- 21.4.35 No records of brine extraction or associated influence zones have been identified within the Proposed Development Site on the northern side of the River Tees.

Geological designated sites

- 21.4.36 There are no potential Local Geological Sites (formerly referred to as RIGS) within the Study Area.

Ecological designations

- 21.4.37 Teesmouth and Cleveland Coast Site of SSSI is located on and adjacent to the Proposed Development Site along the River Tees and Dabholm Gut and adjacent to the Access Corridors in the westernmost extent of the Proposed Development. The site is also designated as a Ramsar site and SPA.
- 21.4.38 There are no National Nature Reserves (NNR) or Local Nature Reserves (LNRs) within the Study Area.

Landfills and waste management

- 21.4.39 The locations of historic and authorised landfill sites within the Study Area are presented on **Figure 21.5: Historic and Authorised Landfill Sites (ES Volume II, Application Document Ref. 6.2)**.
- 21.4.40 The vegetation-covered land in the west of the Main Site is an historic landfill formerly known as Seal Sand Waste Disposal Site, which was operated by Cleveland County Council, with waste input from December 1973 to December 1978. In March 1977 a 'resolution permit' was issued and re-issued in November 1977 (licence reference CLE/R4/1, 0700/R4, CLE/170/1 and CLE72) for up to 600m³/d of inert, industrial and commercial waste. The end date of waste disposal operations is not clear, although anecdotal evidence suggests that the filling operations had ceased by 1985. The landfill site has no current environmental permits, and no ongoing monitoring or management is required.
- 21.4.41 Ground investigations undertaken in 2008 indicate that the landfill comprises heterogeneous waste materials (ash, concrete, brick, pottery, glass, metal, plastic, wood) and is likely unlined and uncapped.
- 21.4.42 An active or recent landfill, known as Bran Sands, is also located within the Wider Site (pipeline corridor) on the southern side of the River Tees. The permit for this facility is held by Anglo American Woodsmith (Teesside) Limited under Environmental Permit EA/EPR/FB3601GS for special waste.
- 21.4.43 There are four historic landfill sites and three active or recent landfill sites within 250m of the Proposed Development Site. The closest is located adjacent to the north site boundary of the construction laydown area, and is

a historic landfill operated by Imperial Chemical Industries Ltd (licence 0700/CLE/019) in 1977. The landfill accepted inert and industrial wastes.

Unexploded ordnance (UXO)

- 21.4.44 Zetica UXO online risk mapping indicates that the Proposed Development Site is within an area of moderate UXO risk. The land reclamation at the Site was undertaken post-Second World War (WWII) and therefore it is considered likely that any UXO, if present, would be located at depth beneath the original tidal flats ground surface.
- 21.4.45 A specialist UXO risk assessment has been undertaken by Zetica UXO (included in **Appendix 21A: Ground Conditions – Phase 1 Preliminary Risk Assessment Report, ES Volume III, Application Document Ref. 6.3**). The assessment concluded that there is a low UXO risk for intrusive works within the post-WWII made ground, increasing to a moderate risk for works extending beneath the made ground into underlying natural deposits.
- 21.4.46 Although the UXO assessment covers only the Main Site, a similar risk profile is anticipated across the Wider Site, given the comparable history of land reclamation.

Other potential contamination sources

- 21.4.47 Industrial sites with environmental permits and hazardous substance consents, radioactive substance authorisations, licensed discharges to controlled waters and recorded pollution incidents are described in **Appendix 21A: Ground Conditions – Phase 1 Preliminary Risk Assessment Report (ES Volume III, Application Document Ref. 6.3)**.

Land contamination

- 21.4.48 Potential contamination sources, pathways and receptors have been identified as part of the development of a preliminary CSM and the risk presented by these potential contaminant linkages (PCLs) has been assessed. The full details are presented in **Appendix 21A: Ground Conditions – Phase 1 Preliminary Risk Assessment Report (ES Volume III, Application Document Ref. 6.3)**. This section summarises the sources of contamination, potential receptors and pathways identified within the study area.

Sources of land contamination

- 21.4.49 There are no sites within the Study Area that have been designated as contaminated land under Part 2A of the Environment Act.
- 21.4.50 Potentially contaminative land uses have been identified within the Study Area associated with historical and current industrial land uses, historic

landfills and made ground used for land reclamation which includes steel works furnace slag.

21.4.51 The potential sources of contamination that require further assessment are summarised in Table 21.7.

Table 21.7 Summary of potential sources of contamination

Possible source		Contaminants of concern	Comments
Main Site			
On-site	Residual contamination in soils or groundwater from historical use as a chemical plant	Metals and metalloids Asbestos Extremes of pH Inorganic compounds (e.g. cyanide, sulphates, nitrates, ammonia)	Previous ground investigation indicates thick made ground present across the Main Site associated with land reclamation and subsequent construction and demolition of the chemical works and deposition of waste in the landfill.
	Waste deposited within historic landfill	Acids and alkalis Phenols PAHs TPH Volatile and semi-volatile organic compounds (VOCs/SVOCs) Solvents PCBs Per- and polyfluoroalkyl substances (PFAS) Ground gas (methane, carbon dioxide, carbon monoxide, hydrogen sulphide)	The nature of waste material deposited within the landfill is uncertain. Previous ground investigation indicates that the landfill has been used for disposal of construction waste, incinerator ash and municipal waste, with materials described as including concrete, brick, pottery, glass, metal, plastic, batteries, wood and ash. The landfill is likely unlined and uncapped, and there is potential for contamination of the underlying groundwater. It is also considered to represent a potential source of ground gas.
	Residual contamination in made ground from land reclamation (including steel works furnace slag and chemical works releases)	Metals and metalloids PAHs Sulphates Extremes of pH Asbestos	Hazardous chemicals were historically stored and manufactured within the Main Site. Localised contamination has been identified associated with recorded leaks and spillages from the former chemical works infrastructure. In addition, there is potential for PFAS contamination where historical chemical fires may have occurred, due to the use of firefighting foams.
Wider site			
On-site	Residual contamination in made ground from land reclamation including steel works furnace slag	Metals and metalloids PAHs Sulphates Extremes of pH Asbestos	Thick made ground is anticipated to be present associated with land reclamation and subsequent industrial development.

Possible source		Contaminants of concern	Comments
	Residual contamination in soils or groundwater from historical use (railway land, industrial works, rifle range)	Metals and metalloids Asbestos Extremes of pH Inorganic compounds (e.g. cyanide, sulphates, nitrates, ammonia) Acids and alkalis Phenols	Historic heavy industry includes Lackenby Iron Works (east of the River Tees) and the North Tees Works oil refinery (west of the River Tees). Railway infrastructure was present on both sides of the River Tees within the wider site area. The Port Clarence Rifle Range was located to the north of the River Tees.
	Historic and active/recent landfills	PAHs TPH Benzene, toluene, ethylbenzene and xylenes (BTEX) VOCs/SVOCs Solvents PCBs PFAS Ground gas (methane, carbon dioxide, carbon monoxide, hydrogen sulphide) Creosote Herbicides and pesticides	There are numerous historic and active landfills which cross the wider site boundary. Details of waste types in these landfills are unknown. The landfills may be unlined and therefore there is potential that contamination of the underlying groundwater could have occurred. The landfills are a potential source of ground gas.
	Contaminants within River Tees riverbed sediment to east of the Main Site	Metals and metalloids PAHs Organotins PCBs	The River Tees is surrounded by historical and current industrial activities which include chemical and pharmaceutical manufacture and processing and waste sites. Unloading and loading activities for many of these sites is via jetties on the River Tees. There is potential that accidental releases could have resulted in contamination of riverbed sediments.
Surrounding area			
Off-site	Residual contamination in soil and/or groundwater resulting from current and historical industrial activity	Metals and metalloids Asbestos Extremes of pH Inorganic compounds (e.g. cyanide, sulphates, nitrates, ammonia) Acids and alkalis Phenols BTEX	The site is surrounded by historical and current industrial activities which include chemicals and pharmaceutical manufacture, oil refineries and processing and waste sites and associated rail infrastructure. There is potential that accidental releases (e.g. toluene spill at Vertellus site) from these sites could have resulted in localised

Possible source		Contaminants of concern	Comments
		PAHs TPH	contamination of shallow soils or groundwater;
	Historic and recent landfills	VOCs/SVOCs Solvents PCBs PFAS Ground gas (methane, carbon dioxide, carbon monoxide, hydrogen sulphide)	The nature of waste material deposited in the landfills is uncertain. The landfills may be unlined and therefore there is potential that contamination of the underlying groundwater could have occurred. The landfills are considered a potential source of ground gas.

Receptors

21.4.52 The identified receptors associated with the Proposed Development Site based on the intended use and their sensitivity are summarised in Table 21.8, based on Table 21.3.

Table 21.8 Summary of receptors and sensitivity

Human Health		Sensitivity
Construction workers during construction		Low
Site neighbours and site visitors during construction		Medium
Site users and visitors during operation		Medium
Maintenance workers during operation		Low
Controlled Waters		
River Tees including Dabholm Gut (transitional water body and SSSI)		Very high
Underlying Secondary B, Secondary A and undifferentiated aquifers		Medium
Sherwood Sandstone Principal aquifer		Very high
Groundwater abstractions (industrial use)		Medium
Building materials and services		
Building materials and services		Medium

Pathways

21.4.53 Potential pathways which may be present during the construction and operation of the Proposed Development are summarised in Table 21.9.

Table 21.9 Summary of potential contaminant pathways

Human Health
Ingestion/dermal contact of soil or soil derived dust
Ingestion/dermal contact with groundwater
Inhalation of soil derived dust or asbestos fibres
Migration of hazardous ground gas or vapours and accumulation in confined spaces
Inhalation of ground gases or vapours
Controlled Waters
Infiltration of rainwater and leaching of contamination
Creation of preferential pathways during construction (e.g. piling)
Migration of dissolved phase contaminants in groundwater
Release of sediment due to jetty construction works and dredging operations in river
Building materials and services
Direct contact of concrete and services with aggressive/contaminated soil or groundwater

21.5 Future baseline

- 21.5.1 The Applicant is not aware of any development or activity that would alter the baseline relevant to this assessment.
- 21.5.2 Changes in groundwater abstractions could affect the groundwater flow regime and climate change could influence the future baseline conditions, due to changes in rainfall, recharge, groundwater levels and flow. However, these changes are long-term and are not predictable at this stage.
- 21.5.3 The volume and intensity of precipitation falling on the Proposed Development Site could increase due to climate change with or without development, leading to increased mobilisation of contamination in the ground, which may result in impact on groundwater and surface water quality. An increase in water levels and increased precipitation could also result in higher groundwater levels, which could result in increased mobilisation of contamination to groundwater and surface water.

21.6 Development design and impact avoidance

- 21.6.1 This section describes the embedded and good practice mitigation for ground conditions that has been incorporated into the Proposed Development design or assumed to be in place before undertaking the assessment of likely significant effects.

Construction

21.6.2 Relevant mitigation measures that will be implemented include:

- Ground investigation will be undertaken, in accordance with good practice, that will include assessing whether and to what extent contamination is present at the Main Site. Ground investigation will also be undertaken as required, dependant on the depth of construction, where below ground works are to be completed in the Wider Site.
- Ground investigation data will inform risk assessment that will be undertaken in accordance with LCRM Guidance [Ref 13]. Remediation options appraisal and a remediation strategy and verification plan will be developed and implemented as appropriate to deal with identified contamination risks;
- A foundation or piling risk assessment will be produced, in accordance with CL:AIRE guidance [Ref 35], to ensure any associated risks such as potential for pathway creation from near surface contamination to greater depth, are mitigated;
- Promotion of sustainable reuse of excavated made ground and natural soils within the Proposed Development or at a receiver or hub site. Where soils are intended to be reused, earthworks would be undertaken in accordance with either a CL:AIRE Definition of Waste Code of Practice [Ref 32] Materials Management Plan (MMP) prepared by the Contractor or environmental permit;
- The fCEMP sets out the key measures to be employed during the construction of the Proposed Development, to control and minimise the impacts on the environment. The detailed Construction Environmental Management Plan (CEMP) will set out pollution prevention measures to protect underlying soils and groundwater with reference to the EA's Groundwater Protection Guidance [Ref 20] and will set out how impacts on the River Tees will be managed during construction, including for example spill kit training and toolbox talks;
- DContractor health and safety measures to be implemented during construction will be detailed in a Health and Safety Plan;
- An incident response plan will be in place outlining measures to be implemented if any incidents occur during construction, including accidental releases.

21.6.3 Adherence to relevant legislation and best practice with respect to health and safety management, including the CDM Regulations 2015 and the detailed CEMP would mitigate any potential effects from the presence of

contamination in the made ground/soils during construction, to both construction workers and nearby human receptors.

- 21.6.4 During construction, a temporary surface water drainage strategy will be incorporated to limit any contaminated run-off from entering surface watercourses. Rainfall runoff from areas where there is a risk of contamination will be managed using temporary drainage systems and/or tankered offsite for treatment (including settlement of suspended solids and or oil interceptors) prior to discharge to local watercourses with the approval of the EA pursuant to a discharge licence. The drainage systems will incorporate pollution control systems designed in line with the Control of Water Pollution from Construction Sites – Guidance for consultants and contractors C532 or as agreed with the relevant authorities.
- 21.6.5 Stockpiled materials will be kept to a minimum as far as is reasonably practicable and stored away from watercourses. If necessary, suitable measures will be put in place to prevent sediment being washed outside of the Proposed Development Site, and the stockpiles will be monitored/checked during periods of high rainfall or flooding. Any suspected contaminated material encountered during earthworks would be segregated and placed on an impermeable membrane to prevent leaching of contaminants. These measures will be outlined in the detailed CEMP.
- 21.6.6 Depending on the design, there may be a requirement to retain crushed concrete, site clearance and excavated materials within the Proposed Development Site for re-use. Measures will be taken to establish acceptable re-use and import criteria and procedures defined for ensuring that the suitability of material can be demonstrated and verified. This would be included within the MMP or environmental permit. This will ensure reused material does not present a risk to human health or the environment and complies with UK waste legislation requirements. Soil which cannot be reused, will be removed from the Proposed Development Site.
- 21.6.7 Ground investigation will be undertaken prior to construction to assess ground conditions (including within the landfill in the west of the Main Site), to provide information for foundation design, aggressive ground conditions and, assess the presence of contamination. If contamination is found to be present and a risk assessment confirms that there are potential unacceptable impacts to the identified receptors, then a remediation strategy and verification plan will be developed to mitigate these risks. The remediation strategy and verification plan will be agreed with the Local Planning Authority (LPA) and EA prior to being implemented.
- 21.6.8 Possible remediation measures within the landfill on the Main Site and other areas across the Proposed Development Site where ground disturbance is

proposed may include localised hotspot removal, soil and groundwater remediation, provision of hardstanding/building cover to minimise rainfall infiltration and prevent direct contact with underlying soil, appropriate gas and vapour protection in buildings and selection of appropriate materials for below ground pipes and concrete.

- 21.6.9 As part of the detailed design, an assessment of potential risks associated with ground improvement methods or piling with respect to human health and controlled waters will be undertaken. The piling risk assessment will be submitted to the LPA prior to commencement of construction. Piled foundations would be installed within the Main Site and Marine Works Area. The foundation design would be confirmed following ground investigation. It is assumed that as a reasonable worst-case, piled foundations would extend into the underlying Mercia Mudstone bedrock, given the significant depth of Sherwood Sandstone beneath the Main Site piled foundations will not extend into the Principal aquifer.
- 21.6.10 Ground investigation data will be used to assess the presence of potential aggressive ground conditions. This will inform the appropriate materials design of buried concrete structures and below ground utilities.

Operation

- 21.6.11 The Proposed Development will require an Environmental Permit for its operation and will comply with this under The Environmental Permitting (England and Wales) Regulations 2016.
- 21.6.12 The Environmental Permit for the operation of the Proposed Development will require prevention of pollution. New areas of ground contamination or pathways to receptors as a result of both construction and operation will not be created.
- 21.6.13 Operational drainage systems will be implemented to control potential impacts from pollution to surface watercourses.
- 21.6.14 Mitigation measures during operation will include:
- standard industry practices to mitigate potential impacts from accidental spills or leaks to comply with industry best practice;
 - storage and handling of chemicals in appropriately surfaced and bunded areas;
 - rapid spill response planning and training; and
 - groundwater and/or surface water quality monitoring plans, if required as part of any environmental permit conditions.

Decommissioning

- 21.6.14.1 The potential impacts associated with decommissioning activities are likely to be similar to or less than those for construction activities, as the activities are expected to be broadly similar but without the works on the quay and infrastructure.
- 21.6.15 A Decommissioning Environmental Management Plan (DEMP) and an EA DEMP will be produced and agreed with the relevant planning authority in consultation with the EA as required.
- 21.6.16 As part of the Environmental Permit and site surrender process, there will be a requirement for a permit surrender Site Condition Report, which will determine, in agreement with the EA, if remediation of any deterioration in site condition at site surrender is required.

21.7 Likely impact and effects of the Proposed Development

Overview

- 21.7.1 This section presents the results of the assessment of likely significant effects with the embedded and good practice mitigation measures, described in the previous section, in place.
- 21.7.2 The section describes the effects from contamination on human health, controlled waters, building materials and accumulation of ground gas during construction and operation in accordance with the agreed scope of the EIA.
- 21.7.3 Potential contaminant linkages (PCLs) deemed to pose a 'moderate' risk or greater, in accordance with best practice guidance in CIRIA C552 [Ref 17], have been identified in **Appendix 21A: Ground Conditions – Phase 1 Preliminary Risk Assessment Report (ES Volume III, Application Document Ref. 6.3)** and will be further investigated by intrusive ground investigations (secured by post-consent DCO Requirement). Once the ground investigation results are available, further risk assessment in the form of a Tier 2 Generic Quantitative Risk Assessment (GQRA), and (if necessary) a Tier 3 Detailed Quantitative Risk Assessment (DQRA), will be completed in accordance with LCRM [Ref 13].
- 21.7.4 The following PCLs are taken forward for the environmental assessment of potential significant effects during construction:
- impacts to construction workers, site users and visitors and site neighbours from contaminants in soils and groundwater via direct contact, inhalation and ingestion pathways;
 - impacts to construction workers, site users and visitors, and site neighbours from migration and accumulation of ground gas or vapours;

- impacts to Secondary and Principal aquifers from leaching of contaminants from made ground or other sources and through infiltration and leaching of contaminants into shallow groundwater and lateral migration of mobile contamination in the aquifer;
 - impacts to Secondary aquifers from migration of contaminants from made ground or other sources via construction of new piled foundations into aquifer;
 - impacts to the chemical and ecological quality of the River Tees and Dabholm Gut from leaching of contaminants from made ground and other sources and through infiltration and leaching of contaminants into shallow groundwater and lateral migration of mobile contamination in the aquifer;
 - impacts to groundwater abstractions from mobilisation of contaminants into groundwater used for abstraction; and
 - impacts to the chemical and ecological quality of the River Tees from release of sediment due to jetty demolition and quay construction work including piling and dredging operations (also refer to **Chapter 11 Freshwater and Marine Ecology (ES Volume I, Application Document Ref. 6.1)**); and
 - impacts to buried concrete and services from direct contact with aggressive/contaminated soil or groundwater.
- 21.7.5 Contaminated land pathways to receptors will be addressed via the implementation of a remediation strategy incorporated into the construction phase ensuring the Proposed Development is 'suitable for use' from a contaminated land perspective as part of the operational phase.
- 21.7.6 Impacts to human health and controlled waters from the introduction of new sources of contamination to ground as a result of accidental releases are taken forward for the assessment of potential significant effects during construction.
- 21.7.7 The assessment presented is a reasonable worst-case based on the available baseline data and the incorporation of the embedded mitigation measures outlined in Section 21.6. Development specific ground investigation (to be undertaken prior to construction) will inform refinement of risk assessments and the remediation strategy.
- 21.7.8 Impacts to the River Tees water quality due to jetty and quay construction works and dredging are addressed in **Chapter 11 Freshwater and Marine Ecology (ES Volume I, Application Document Ref. 6.1)**.

Construction

- 21.7.9 Table 21.10 outlines the assessment for the construction phases of the Proposed Development. In summary, as a result of disturbance of made ground/groundwater potentially impacted with contaminants associated with historical and recent land uses as a chemical works, landfill and other industrial use, there is considered to be a negligible magnitude of change (adverse) upon human health, controlled waters and building materials. This therefore results in neutral to slight adverse effects, which are not considered significant.

Operation

- 21.7.10 Table 21.11 outlines the assessment for the operation phase of the Proposed Development. In summary, as a result of accidental releases of contaminants during operation, there is considered to be a negligible magnitude of change upon human health and controlled waters. This therefore results in neutral to slight adverse effects, which are not considered significant.

Table 21.10 Summary of effects - construction

Potential impact	Receptor	Receptor sensitivity	Embedded mitigation measures	Magnitude of impact	Significance of effect
Impacts to human health via direct contact, inhalation and ingestion pathways with contaminated soils and groundwater during construction	Construction workers	Low	Completion of ground investigation and risk assessment, prior to construction with remediation strategies developed as appropriate to deal with any contamination and gas risks.	Negligible	Neutral or slight (not significant)
	Site neighbours and site users	Medium		Negligible	Neutral or slight (not significant)
Impacts to human health from migration and accumulation of ground gas	Construction workers	Low	Appropriate health and safety management systems assumed to be in place during construction including personal protective equipment (PPE) and dust suppression measures. CEMP Health and Safety Plan	Negligible	Neutral or slight (not significant)
	Site neighbours and site users	Medium		Negligible	Neutral or slight (not significant)
Leaching of contaminants from made ground or other sources. Impacts to controlled waters and designated sites through infiltration and leaching of contaminants into shallow groundwater and lateral migration of mobile contamination in aquifer (dissolved and free phase).	Superficial Deposits (Secondary A and Secondary undifferentiated aquifer)	Medium	Completion of ground investigation and risk assessment prior to construction with remediation strategies developed as appropriate to deal with any contamination risks. CEMP	Negligible	Neutral or slight (not significant)
	Mercia Mudstone (Secondary B aquifer)	Medium	Health and Safety Plan Incident Response Plan, including spill kit training/contamination toolbox talks	Negligible	Neutral or slight (not significant)
	Sherwood Sandstone (Principal aquifer)	Very high		No change	Neutral (not significant)

Potential impact	Receptor	Receptor sensitivity	Embedded mitigation measures	Magnitude of impact	Significance of effect
	River Tees including Dabholm Gut (Moderate WFD classification, transitional waterbody and SSSI)	Very high		Negligible	Slight (not significant)
Mobilisation of contaminants into groundwater used for abstraction	Groundwater abstractions	Medium (offsite industrial abstraction)		Negligible	Neutral or slight (not significant)
Impacts to groundwater from migration of contaminants from made ground or other sources via construction of new piled foundations	Superficial Deposits (Secondary A and Secondary undifferentiated aquifer)	Medium	Completion of ground investigation and risk assessment prior to construction. A piling risk assessment will be produced and submitted to the Local Planning Authority prior to commencement of construction, to ensure an appropriate piling method is selected to ensure any associated risks from migration of contamination are mitigated.	Negligible	Neutral or slight (not significant)
	Mercia Mudstone (Secondary B aquifer)	Medium		Negligible	Neutral or slight (not significant)
Impacts to River Tees water quality from release of sediment associated with jetty demolition, quay construction and dredging	River Tees including Dabholm Gut (Moderate WFD classification, transitional	Very high	Appropriate mitigation will be required which will include assessment of sediment composition and contamination, minimising the volumes of sediment that must be dredged. Dredging activities will be controlled by a dredging licence. Refer to Chapter 11 Freshwater and	Negligible	Slight (not significant)

Potential impact	Receptor	Receptor sensitivity	Embedded mitigation measures	Magnitude of impact	Significance of effect
	waterbody and SSSI)		Marine Ecology (ES Volume I, Application Document Ref. 6.1).		
Impacts to buried concrete and services from direct contact with aggressive/contaminated soil or groundwater.	Buried concrete and services	Medium	Completion of ground investigation and risk assessment to assess potential for aggressive ground conditions prior to construction. The contractor will specify the concrete design and appropriate materials to be used for drainage and other services based on the outcomes of the assessment.	Negligible	Neutral or slight (not significant)

Table 21.11 Summary of effects - operation

Potential impact	Receptor	Receptor sensitivity	Embedded mitigation measures	Magnitude of impact	Significance of effect
Impacts to human health as a result of direct contact, ingestion or inhalation of potential pollutants from accidental spills, leaks and uncontrolled discharges.	Site users, maintenance workers and visitors	Medium	Measures to prevent new contamination will be required by the Environmental Permit. Standard industry practices will be in place to prevent and mitigate against any accidental releases Storage and handling of chemicals will be undertaken in properly surfaced and bunded areas Rapid spill response planning and training in place. Appropriate health and safety management systems assumed to be in place during construction including PPE and dust suppression measures.	Negligible	Neutral or slight (not significant)
Potential accidental spills, leaks and uncontrolled discharges of potential pollutants during operation entering drainage system and discharging to surface watercourses and infiltrating into shallow groundwater and lateral migration in aquifer	Superficial Deposits (Secondary A and Secondary undifferentiated aquifer)	Medium	Measures to prevent contamination will be required by the Environmental Permit. Standard industry practices will be in place to prevent and mitigate against any accidental releases Operational drainage systems will have pollution control measures in place specified in surface water drainage plan Storage and handling of chemicals will be undertaken in properly surfaced and bunded areas	Negligible	Neutral or slight (not significant)
	Mercia Mudstone (Secondary B aquifer)	Medium		No change	Neutral (not significant)
	Sherwood Sandstone	Very high		No change	Neutral (not significant)

Potential impact	Receptor	Receptor sensitivity	Embedded mitigation measures	Magnitude of impact	Significance of effect
	(Principal aquifer)		Rapid spill response planning and training in place		
	River Tees including Dabholm Gut (Moderate WFD classification, transitional waterbody and SSSI)	Very high		No change	Neutral (not significant)
Mobilisation of contaminants from accidental releases during operation into groundwater used for abstraction	Groundwater abstractions	Medium (offsite industrial abstraction)		Negligible	Neutral (not significant)

21.8 Mitigation and enhancement measures

- 21.8.1 Ground investigation is proposed ahead of the construction works to provide further information on the ground contamination conditions. This data will be used to inform refinement of risk assessments and produce a remediation strategy which will be implemented during the construction works.
- 21.8.2 Assessment of sediment quality and water quality sampling of the River Tees transitional waterbody has been undertaken close to the location of the proposed quay during April 2026 to inform the consenting strategy. Results are reported and assessed in **Chapter 11 Freshwater and Marine Ecology, ES Volume I, Application Document Ref. 6.1.**

21.9 Residual effects and conclusions

- 21.9.1 No further mitigation has been proposed, as such residual effects remain as assessed in Section 21.6.
- 21.9.2 Table 21.12 provides a summary of the construction and operation effects on human health, controlled waters, below ground structures and accumulation of ground gas from the Proposed Development.

Table 21.12 Summary of residual effects

Potential impact	Likely environmental effect without additional mitigation	Mitigation	Effect after mitigation (residual effect)
Construction			
Human health			
Impact on human health of construction workers, site users and neighbours from contact with contaminants in soils and groundwater	Neutral to slight	No further mitigation required	Neutral to slight (not significant)
Impact on human health of construction workers, site users and neighbours from migration and accumulation of ground gas	Neutral to slight	No further mitigation required	Neutral to slight (not significant)
Surface water			
Water quality of the River Tees (transitional waterbody and SSSI) and Dabholm Gut	Slight	No further mitigation required	Slight (not significant)
Groundwater			
Water quality of the Secondary A and undifferentiated aquifers (Superficial Deposits)	Neutral to slight	No further mitigation required	Neutral to slight (not significant)

Potential impact	Likely environmental effect without additional mitigation	Mitigation	Effect after mitigation (residual effect)
Water quality of the Secondary B aquifer (Mercia Mudstone)	Neutral to slight	No further mitigation required	Neutral to slight (not significant)
Water quality of the Principal aquifer (Sherwood Sandstone)	Neutral	No further mitigation required	Neutral (not significant)
Mobilisation of contaminants into groundwater used for abstraction	Neutral to slight	No further mitigation required	Neutral to slight (not significant)
Building materials and services			
Impact on buried concrete and services in contact with aggressive/contaminated soils or groundwater	Neutral to slight	No further mitigation required	Neutral to slight (not significant)
Operation			
Human health			
Impact on human health of site users, maintenance workers and visitors from accidental releases of pollutants during operation	Neutral to slight	No further mitigation required	Neutral to slight (not significant)
Surface water			
Water quality of the River Tees (transitional waterbody and SSSI)	Slight	No further mitigation required	Slight (not significant)
Groundwater			
Water quality of the Secondary A and undifferentiated aquifer (Superficial Deposits)	Neutral to slight	No further mitigation required	Neutral to slight (not significant)
Water quality of the Secondary B aquifer (Mercia Mudstone)	Neutral	No further mitigation required	Neutral (not significant)
Water quality of the Principal aquifer (Sherwood Sandstone)	Neutral	No further mitigation required	Neutral (not significant)
Mobilisation of contaminants into groundwater used for abstraction	Neutral	No further mitigation required	Neutral (not significant)

21.9.3 No likely significant adverse effects are identified.

21.10 Summary of significant effects

- 21.10.1 As described in Sections 21.6 and 21.8 no potential significant effects associated with the construction and operation of the Proposed Development in relation to Geology and Soils have been identified.

References

- Ref 1 Environmental Protection Act 1990 c.43. Available online:
<https://www.legislation.gov.uk/ukpga/1990/43/contents> [Accessed March 2026].
- Ref 2 The Contaminated Land (England) Regulations 2012 (SI 2012/263). Available online: <https://www.legislation.gov.uk/uksi/2012/263> [Accessed March 2026].
- Ref 3 The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (SI 2017/407). Available online:
<https://www.legislation.gov.uk/uksi/2017/407/contents> [Accessed March 2026].
- Ref 4 The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. Available online:
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