The Great Grid Upgrade

Sea Link

Preliminary Environmental Information Report

Volume: 1

Part 3 Kent Onshore Scheme

Chapter 6 Geology and Hydrogeology

Version A

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Contents

3.6 Geology and Hydrogeology 1

3.6.1 Introduction 1
3.6.2 Regulatory and Planning Context 2
3.6.3 Scoping Opinion and Consultation 12
3.6.4 Approach and Methodology 19
3.6.5 Basis of Assessment 27
3.6.6 Study Area 30
3.6.7 Baseline Conditions 30
3.6.8 Mitigation 34
3.6.9 Preliminary Assessment of Effects 36
3.6.10 Summary 42
3.6.11 References 43

Table of Tables

Table 3.6.1: NPS EN-1 requirements relevant to geology and hydrogeology 4
Table 3.6.2: NPS EN-5 requirements relevant to geology and hydrogeology 6
Table 3.6.3: NPPF requirements relevant to geology and hydrogeology 7
Table 3.6.4: Local Planning Policies relevant to geology and hydrogeology - Kent Minerals and Waste Local Plan and Safeguarding Supplementary Planning Document 10
Table 3.6.5: Local Planning Policies relevant to geology and hydrogeology - Dover District Council Core Strategy 11
Table 3.6.6: Local Planning Policies relevant to geology and hydrogeology - Emerging Dover District Local Plan 11
Table 3.6.7: Local Planning Policies relevant to geology and hydrogeology - Thanet Local Plan 11
Table 3.6.8: Comments raised in the Scoping Opinion 12
Table 3.6.9: Value/sensitivity criteria 21
Table 3.6.10: Magnitude criteria 25
Table 3.6.11: Flexibility Assumption 28
Table 3.6.12: Consideration of Scenarios 29
Table 3.6.13: Preliminary assessment of designated sites of geological importance 36
Table 3.6.14: Preliminary assessment of human health exposure to existing potential contamination through ground disturbance 37
Table 3.6.15: Preliminary assessment of the mobilisation of existing contamination impacting on land and/or groundwater quality. 38
Table 3.6.16: Preliminary assessment for the potential of ingress and accumulation of ground gas 39
Table 3.6.17: Preliminary assessment of the mixing of aquifer bodies due to the connection of aquifer units at trenchless crossings 39
Table 3.6.18: Preliminary assessment for changes to groundwater levels, quality and groundwater flow direction caused by dewatering. 40
Table 3.6.19: Preliminary assessment of changes to groundwater levels and/or recharge rates from the introduction of impermeable surfaces 41

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3.6 Geology and Hydrogeology

3.6.1 Introduction

3.6.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents information about the preliminary environmental assessment of the likely significant geology and hydrogeology effects identified to date, that could result from Sea Link (hereafter referred to as the Proposed Project) (as described in **Volume 1, Part 1, Chapter 4, Description of the Proposed Project**).

3.6.1.2 This chapter describes the methodology used, the datasets that have informed the preliminary assessment, baseline conditions, mitigation measures and the preliminary geology and hydrogeology residual significant effects that could result from the Proposed Project.

3.6.1.3 The draft Order Limits, which illustrate the boundary of the Proposed Project, are presented on **Figure 1.1.1 Draft Order Limits** and the Kent Onshore Scheme Boundary is presented on **Figure 1.1.3 Kent Onshore Scheme Boundary**.

3.6.1.4 This chapter should be read in conjunction with:

- **Volume 1, Part 1, Chapter 4, Description of the Proposed Project**;
- **Volume 1, Part 1, Chapter 5, PEIR Approach and Methodology**;
- **Volume 1, Part 1, Chapter 6, Scoping Opinion and EIA Consultation**;
- **Volume 1, Part 2, Chapter 1, Evolution of the Kent Onshore Scheme**;
- **Volume 1, Part 3, Chapter 3, Ecology and Biodiversity**:
- **Volume 1, Part 3, Chapter 5, Water Environment**; and
- **Volume 1, Part 5, Chapter 5, Water Framework Directive Screening Assessment**.

3.6.1.5 This chapter is supported by the following figures:

- **Volume 3, Part 3, Figure 3.6.1, Superficial Geology;**
- **Volume 3, Part 3, Figure 3.6.2, Bedrock Geology;**
- **Volume 3, Part 3, Figure 3.6.3, Source Protection Zones; and**
- **Volume 3, Part 3, Figure 3.6.4, Potential Sources of Contamination.**

3.6.1.6 This chapter is supported by the following appendices:

- **Volume 2, Part 1, Appendix 1.4.A, Outline Code of Construction Practice**; and
- **Volume 2, Part 3, Appendix 3.6.A, Preliminary Contamination Risk Assessment.**

3.6.2 Regulatory and Planning Context

3.6.2.1 This section sets out the legislation and planning policy that is relevant to the preliminary geology and hydrogeology assessment. A full review of compliance with relevant national and local planning policy will be provided within the Planning Statement that will be submitted as part of the application for Development Consent.

3.6.2.2 Policy generally seeks to minimise effects on geology and hydrogeology from development and to avoid significant adverse effects.

Legislation

Environmental Protection Act (1990)

3.6.2.3 Part 2A of the Environmental Protection Act 1990 (Ref. 3.6.1) and associated Statutory Guidance is the primary legislation on contaminated land. It provides a framework for the assessment and, where necessary, the remediation of contaminated land. Part 2A focuses on the identification and remediation of land which in its current use poses an unacceptable risk to people or the environment.

3.6.2.4 The Statutory Guidance that accompanies the Environmental Protection Act 1990, includes the Contaminated Land Statutory Guidance (Ref. 3.6.2) which provides a definition of what constitutes “contaminated land” and sets out the responsibilities of the Local Authority and the Environment Agency in the identification and management of contaminated land. The regulations also include a definition of ‘risk’, where a risk is said to be a combination of “(a) the likelihood that harm, or pollution of water, will occur as a result of contaminants in, on or under the land; and (b) the scale and seriousness of such harm or pollution if it did occur”.

Environmental Damage (Prevention and Remediation) Regulations (2015)

3.6.2.5 The Environmental Damage (Prevention and Remediation) Regulations 2015 (Ref. 3.6.3) aim to prevent new land contamination that will damage water or health. The Regulations also include enforcement procedures, including criminal sanctions, for breaches of the Regulations.

Environmental Permitting (England and Wales) Regulations (2016)

3.6.2.6 The Environmental Permitting (England and Wales) Regulations (Ref. 3.6.4) include transposition of the EU Landfill Directive (Ref. 3.6.5) into UK law. These Regulations cover sites that are covered by environmental permits, such as landfills, and how these are regulated. The Proposed Project may cross sites where there are permits currently held.

3.6.2.7 These Regulations also cover the licensing of surface waters and groundwater abstractions and protect water resources through Source Protection Zones (SPZs). The Proposed Project may require abstractions or discharges during construction.

Landfill Directive

3.6.2.8 The Landfill Directive (Ref. 3.6.5) was adopted by the European Community in 1999. Every Member State of the European Union (EU) was required to implement it from 16 July 2001. The Directive's overall objective is to prevent or reduce as far as possible the negative effects of landfilling on the environment, as well as any resulting risk to human health. It seeks to achieve this through specifying uniform technical standards at Community level. It also sets out requirements for the location, management, engineering, closure and monitoring for landfills. The Directive includes requirements relating to the characteristics of the waste to be landfilled. The Landfill Directive is currently implemented through the Environmental Permitting (England and Wales) Regulations 2016 (Ref. 3.6.4).

Water Resources Act (1991)

3.6.2.9 The Water Resources Act (Ref. 3.6.6) aims to maintain and improve the quality of controlled waters. Part II of the Act covers the licencing of surface water and groundwater abstractions.

The Water Environment (Water Framework Directive) Regulations (2017)

3.6.2.10 The Water Framework Directive (WFD) Regulations (Ref. 3.6.7) establish a framework for the protection of surface waters and groundwater and to prevent the deterioration of WFD water bodies.

3.6.2.11 A WFD assessment will be undertaken, and included within **Volume 1, Part 5, Chapter 5, Water Framework Directive Screening Assessment**. and this described further in **Volume 1, Part 3 Chapter 5, Water Environment.**

The Groundwater Regulations (2009)

3.6.2.12 The Groundwater Regulations (Ref. 3.6.8) cover potential groundwater contamination that could eventuate from spillages or disturbance of contaminated ground. The Proposed Project has the potential to cross contaminated land or to create pollution risks during construction.

Environment Agency Groundwater Protection Position Statements (2018)

3.6.2.13 The Environment Agency regulates activities that may impact groundwater resources, to prevent and limit pollution. The Environment Agency Groundwater Protection Position Statements (Ref. 3.6.9) are concerned with infrastructure schemes of national or regional significance, that pass through SPZs or are below the water table in Principal or Secondary aquifers.

3.6.2.14 Section A of the policy (general principles) includes the following:

- '*A1: Wherever legislation allows, the Environment Agency will use a tiered, risk-based approach to regulate activities that may impact groundwater resources and to prevent and limit pollution;*
- *A2: Development must be appropriate to the sensitivity of the site. Where the potential consequences of a development or activity are serious or irreversible the Environment Agency will adopt the precautionary principle to manage and protect groundwater. The Environment Agency will also apply this principle in the absence of adequate information with which to conduct an assessment; and*

- *A3: The Environment Agency encourages everyone whose activities may impact upon groundwater to consider the groundwater protection hierarchy in their strategic plans when proposing new development or activities. The aim is to avoid potentially polluting activities being located in the most sensitive locations for groundwater*.'

3.6.2.15 Section C Infrastructure states the following:

- '*If national need for the provision and location of major developments overrides Environment Agency objections, the Environment Agency will raise its concerns and make every use of environmental impact assessment in addition to other measures to achieve environmental protection. Where developments receive approval against Environment Agency advice, it will apply section A – general protection position statements*.'

National Policy

National Policy Statements

3.6.2.16 National Policy Statements (NPSs) set out the primary policy tests against which the application for a Development Consent Order (DCO) for the Proposed Project would be considered. A review of the NPS was announced in the 2020 Energy white paper: Powering our net zero future. This review was to ensure the NPSs were brought up to date to reflect the policies set out in the white paper. The below information reflects these updates currently under consultation.

3.6.2.17 Table 3.6.1 and Table 3.6.2 below provides details of the elements of the NPS for Energy (EN-1) (Ref. 3.6.10) and NPS for Electricity Networks Infrastructure (EN-5) (Ref. 3.6.11) that are relevant to this chapter, and how and where they are covered in the PEIR or will be covered within the Environmental Statement (ES).

Table 3.6.1: NPS EN-1 requirements relevant to geology and hydrogeology

NPS EN-1 section	Where this is covered in the PEIR
5.3.3 (part) Where the development is subject to EIA [Environmental Impact Assessment] *the applicant should ensure that the ES clearly sets out any effects on internationally, nationally and locally designated sites of … geological conservation importance.*	A desk-based assessment is presented in Section 3.6.7 of this chapter which identifies sites of geological conservation importance within the study area and any potential for effects on these features will be assessed within the ES.
5.3.4 The applicant should show how the project has taken advantage of opportunities to conserve and enhance geological conservation interests.	The optioneering has sought to avoid geological conservation sites where practicable. Further to this a desk-based assessment is presented in Section 3.6.7 of this chapter which identifies sites of geological conservation

NPS EN-1 section	Where this is covered in the PEIR
	importance within the study area and any potential for effects on these features will be assessed within the ES, with mitigation measures discussed, as appropriate.
5.3.7 As a general principle, and subject to the specific policies below, development should aim to avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives (as set out in Section 4.4 above); where significant harm cannot be avoided, then appropriate compensation measures should be sought.	A desk-based assessment is presented in Section 3.6.7 of this chapter which identifies sites of geological conservation importance within the study area and any potential for effects on these features will be assessed within the ES and if required appropriate mitigation measures discussed. Effects on biodiversity are considered in **Volume 1, Part 3, Chapter 3, Ecology and Biodiversity**.
5.10.8 (part) For developments on previously developed land, applicants should ensure that they have considered the risk posed by land contamination.	**Volume 2, Part 3, Appendix 3.6.A, Preliminary Contamination Risk Assessment** presents a preliminary contamination risk assessment to support the baseline information presented in Section 3.6.7 of this chapter. This identifies potential sources of contamination (PSC's) and includes risk estimation relating to those PSC's.
5.10.9 Applicants should safeguard any mineral resources on the proposed site as far as possible, taking into account the long-term potential of the land use after any future decommissioning has taken place.	Effects on mineral resources have been scoped out of the assessment for the Kent Onshore Scheme as safeguarded minerals have not been identified within the study area.
5.10.22 Where a proposed development has an impact upon a Mineral Safeguarding Area (MSA), the IPC should ensure that appropriate mitigation measures have been put in place to safeguard mineral resources.	Effects on mineral resources have been scoped out of the assessment for the Kent Onshore Scheme as safeguarded minerals have not been identified within the study area.
5.15.3 The ES should in particular describe:…	The desk-based assessment presented in Section 3.6.7 of

NPS EN-1 section	Where this is covered in the PEIR
any impacts of the proposed project…source protection zones (SPZs) around potable groundwater abstractions.	this chapter shows that the draft Order Limits do not cross any Groundwater SPZ. Requests for information on current abstractions and private water supplies have been sent to relevant authorities and the information obtained will be presented within the ES and any potential impacts identified.

3.6.2.18 There are no other new or materially different policy considerations relevant to geology and hydrogeology within the draft EN-1 (Ref. 3.6.12), when compared to the current EN-1 (Ref. 3.6.10).

Table 3.6.2: NPS EN-5 requirements relevant to geology and hydrogeology

NPS EN-5 section	Where this is covered in the PEIR
2.2.6 (part) developers will be influenced by Schedule 9 to the Electricity Act 1989, which places a duty on all transmission and distribution licence holders, in formulating proposals for new electricity networks infrastructure, to "have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest...	A desk-based assessment is presented in Section 3.6.7 of this chapter which identifies sites of geological conservation importance within the study area and any potential for effects on these features will be assessed within the ES. Impacts on biodiversity receptors are considered in **Volume 1, Part 3, Chapter 3, Ecology and Biodiversity**.
2.8.9…….the environmental and archaeological consequences (undergrounding a 400kV line may mean disturbing a swathe of ground up to 40 metres across, which can disturb sensitive habitats, have an impact on soils and geology, and damage heritage assets, in many cases more than an overhead line would).	Impacts on geology has been considered within Section 3.6.9 and potential significant effects on these features have been assessed. Impacts on soils are assessed within **Volume 1, Part 3, Chapter 7, Agriculture and Soils** and impacts on archaeology are considered in **Volume 1, Part 3, Chapter 4, Cultural Heritage**.
2.4.2 Section 4.8 of EN-1 advises that the resilience of the project to climate change should be assessed in the Environmental Statement (ES)	The future baseline in regard to geology and hydrogeology is set out in Section 3.6.7 and

NPS EN-5 section	Where this is covered in the PEIR
accompanying an application. For example, future increased risk of flooding would be covered in any flood risk assessment (see Section 5.7 in EN-1).	includes discussion relating to climate change impacts on geology, minerals, contamination and groundwater. Effects of climate change on flood risk is discussed within the Flood Risk Assessment (FRA) included within **Volume 1, Part 3, Chapter 5, Water Environment**
2.4.2 Section 4.8 of EN-1 advises that the resilience of the project to climate change should be assessed in the Environmental Statement (ES) accompanying an application. For example, future increased risk of flooding would be covered in any flood risk assessment (see Section 5.7 in EN-1).	The future baseline in regard to geology and hydrogeology is set out in Section 3.6.7 and includes discussion relating to climate change impacts on geology, minerals, contamination and groundwater. Effects of climate change on flood risk is discussed within the Flood Risk Assessment (FRA) included within **Volume 1, Part 3, Chapter 5, Water Environment**

3.6.2.19 There are no other new or materially different policy considerations relevant to geology and hydrogeology within the draft EN-5 (Ref. 3.6.13), when compared to the current EN-5 (Ref. 3.6.11).

National Planning Policy Framework

3.6.2.20 The National Planning Policy Framework (NPPF) (Ref. 3.6.14) has the potential to be considered important and relevant to the SoS' consideration of the Proposed Project. Table 3.6.3 below provides details of the elements of the NPPF that are relevant to this chapter, and how and where they are covered in the PEIR or will be covered within the ES.

Table 3.6.3: NPPF requirements relevant to geology and hydrogeology

NPPF section	Where this is covered in the PEIR
174 Planning policies and decisions should contribute to and enhance the natural and local environment by:	**Volume 2, Part 3, Appendix 3.6.A, Preliminary Contamination Risk Assessment** presents a preliminary contamination risk assessment which

NPPF section	Where this is covered in the PEIR
… remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.	identifies potential sources of contamination to support the baseline information presented in Section 3.6.7 of this chapter.
179 To protect and enhance biodiversity and geodiversity, plans should: *(a) Identify, map and safeguard components of local wildlife-rich habitats and wider ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity 61 ; wildlife corridors and stepping stones that connect them; and areas identified by national and local partnerships for habitat management, enhancement, restoration or creation 62 ; and* *(b) promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity.*	A desk-based assessment is presented in Section 3.6.7 of this chapter which identifies sites of geological conservation importance within the study area and any potential for effects on these features will be assessed within the ES. Ecologically important habitats and designated biodiversity sites are considered in **Volume 1, Part 3, Chapter 3, Ecology and Biodiversity.**
183 Planning policies and decisions should ensure that: *(a) a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation);* *(b) after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and* *(c) adequate site investigation information, prepared by a competent person, is available to inform these assessments.*	Impacts from land instability are considered within the engineering design of the Proposed Project and are therefore scoped out of the EIA (see Section 3.6.3 for further details) based on the mitigation measures within the Outline, mainly, GH01 relating to the need for ground investigation to inform appropriate geotechnical design. **Volume 2, Part 3, Appendix 3.6.A, Preliminary Contamination Risk Assessment** presents a preliminary contamination risk assessment which identifies potential sources of contamination to support the baseline information presented in Section 3.6.7. Contamination that requires remediation in relation to the Proposed Project hasn't currently been identified

NPPF section	Where this is covered in the PEIR
	within the Order Limits. Site investigation will be undertaken as part of the engineering design of the Proposed Project.
210 Planning policies should: *(a) provide for the extraction of mineral resources of local and national importance, but not identify new sites or extensions to existing sites for peat extraction;* *(b) so far as practicable, take account of the contribution that substitute or secondary and recycled materials and minerals waste would make to the supply of materials, before considering extraction of primary materials, whilst aiming to source minerals supplies indigenously;* *(c) safeguard mineral resources by defining Mineral Safeguarding Areas and Mineral Consultation Areas 70 ; and adopt appropriate policies so that known locations of specific minerals resources of local and national importance are not sterilised by non-mineral development where this should be avoided (whilst not creating a presumption that the resources defined will be worked);* *(d) set out policies to encourage the prior extraction of minerals, where practical and environmentally feasible, if it is necessary for non-mineral development to take place;* *(e) safeguard existing, planned and potential sites for: the bulk transport, handling and processing of minerals; the manufacture of concrete and concrete products; and the handling, processing and distribution of substitute, recycled and secondary aggregate material; and…* *(h) ensure that worked land is reclaimed at the earliest opportunity, taking account of aviation safety, and that high quality restoration and aftercare of mineral sites takes place.*	Effects on mineral resources have been scoped out of the assessment for the Kent Onshore Scheme as safeguarded minerals have not been identified within the study area.

National Planning Practice Guidance

3.6.2.21 The National Planning Policy is supported by the associated Planning Practice Guidance for the NPPF, including ‘Land Affected by Contamination’ (Ref. 3.6.15), which describes how to deal with land affected by contamination and also ‘Land Stability’ (Ref. 3.6.16), which describes how to ensure development is suitable for the ground conditions.

Local Planning Policy

3.6.2.22 The Kent Onshore Scheme lies within the jurisdiction of Kent County Council. County planning guidance which is relevant to a study of geology and hydrogeology and has informed the assessment of preliminary effects in this chapter are as follows:

- Kent Minerals and Waste Local Plan and Safeguarding Supplementary planning Document (Ref. 3.6.17);
- Dover District Council Core Strategy (Ref. 3.6.18); and
- Thanet Local Plan (Ref. 3.6.19).

3.6.2.23 The Kent Onshore Scheme Boundary (refer to **Figure 1.1.3 Kent Onshore Scheme Boundary**) lies within the boundary of the Kent Minerals and Waste Local Plan (Ref. 3.6.17), the Thanet Local Plan (Ref. 3.6.19) and the Dover District Local Plan (Ref. 3.6.18). Local Plan policies which are relevant to geology and hydrogeology matters and will inform the assessment in the ES are described in Table 3.6.4, Table 3.6.5,Table 3.6.6 and Table 3.6.7.

Table 3.6.4: Local Planning Policies relevant to geology and hydrogeology - Kent Minerals and Waste Local Plan and Safeguarding Supplementary Planning Document

Kent Minerals and Waste Local Plan and Safeguarding Supplementary Planning Document – Policy	**Where this is covered in the PEIR**
CSM 5: Land-won Mineral Safeguarding Policy CSM 5 relates to safeguarding minerals from unnecessary sterilisation by development. It points to a number of supporting plans identifying mineral safeguarded areas and mineral consultation areas.	In accordance with the Scoping Report (Ref. 3.6.20) and subsequent Scoping Opinion (Ref. 3.6.21), mineral resources were scoped out of the assessment, as safeguarded minerals have not been identified within the study area, and are not considered further.
DM 7: Safeguarding Mineral Resources Policy DM 7 describes a number of requirements that need to be demonstrated before planning permission would be granted for non-mineral development that is located within a minerals safeguarding area.	In accordance with the Scoping Report (Ref. 3.6.20) and subsequent Scoping Opinion (Ref. 3.6.21), mineral resources were scoped out of the assessment, as safeguarded minerals have not been identified within the study area, and are not considered further.

Table 3.6.5: Local Planning Policies relevant to geology and hydrogeology - Dover District Council Core Strategy

Dover District Council Core Strategy – Policy	Where this is covered in the PEIR
DM 17: Groundwater Source Protection Policy DM 17 identifies development that would not be permitted if located within either a Groundwater SPZ 1 or 2.	The desk-based assessment presented in Section 3.6.7 of this chapter identifies that the draft Order Limits do not cross any Groundwater SPZ.

Table 3.6.6: Local Planning Policies relevant to geology and hydrogeology - Emerging Dover District Local Plan

Emerging Dover District Local Plan – Policy	Where this is covered in the PEIR
NE5: Water Supply and Quality Policy NE5 describes that development will only be permitted if it is demonstrated that there is no risk of contamination to groundwater. The policy lists developments that would only be permitted in SPZ 1 and 2 if adequate safeguards against possible contamination are provided.	The desk-based assessment presented in Section 3.6.7 of this chapter identifies that the draft Order Limits do not cross any Groundwater SPZ.

Table 3.6.7: Local Planning Policies relevant to geology and hydrogeology - Thanet Local Plan

Thanet Local Plan – Policy	Where this is covered in the PEIR
SE02: Landfill Sites and Unstable Land Policy SE02 relates to development on or near landfill sites or on land which is known or suspected to be unstable and describes requirements for planning applications on these types of sites.	Impacts from land instability is considered within the engineering design of the Proposed Project. **Volume 2, Part 3, Appendix 3.6.A, Preliminary Contamination Risk Assessment** presents a preliminary contamination risk assessment to support the baseline information presented in Section 3.6.7 of this chapter. This identifies potential sources of contamination (including landfills)
SE03: Land Affected by Contamination	**Volume 2, Part 3, Appendix 3.6.A, Preliminary**

Thanet Local Plan – Policy	Where this is covered in the PEIR
Policy SE03 relates to bringing land affected by contamination into beneficial use and describes requirements for planning applications on land affected by contamination.	**Contamination Risk Assessment** presents a preliminary contamination risk assessment to support the baseline information presented in Section 3.6.7 of this chapter. This identifies potential sources of contamination.
SE04: Groundwater Protection Policy SE04 states that development within a groundwater SPZ will only be permitted where there is no risk of contamination to groundwater.	The desk-based assessment presented in Section 3.6.7 of this chapter identifies that the draft Order Limits do not cross any Groundwater SPZ.

3.6.3 Scoping Opinion and Consultation

Scoping

3.6.3.1 A Scoping Report (Ref. 3.6.20) for the Proposed Project was issued to the Planning Inspectorate (PINS) on 24 October 2022 and a Scoping Opinion (Ref. 3.6.21) was received from the Secretary of State (SoS) on 1 December 2022. Table 3.6.8 sets out the comments raised in the Scoping Opinion and how these have been addressed in this PEIR or will be addressed within the ES. The Scoping Opinion takes account of responses from prescribed consultees as appropriate.

Table 3.6.8: Comments raised in the Scoping Opinion

ID	Inspectorate's comments	Response
4.5.1	*[Connection of two aquifer units at trenchless crossings as a result of the excavation of trenchless crossings (construction)]* This matter is proposed to be scoped out on the basis that it is not likely to result in a significant effect due to the incorporation of the mitigation by design. Table 3.6.2 does not expand on the specific 'mitigation by design' proposed to ensure this does not occur. It is noted that the Code of Construction Practice (CoCP) measure GH02 comprises "Construction	The connection of two aquifer units at trenchless crossings is scoped into the ES based on the comments from the Planning Inspectorate and an assessment of each trenchless crossing will be undertaken as part of the ES.

ID	Inspectorate's comments	Response
	methods such as appropriate piling techniques (if required) to minimise the risk of mixing of aquifer bodies through the creation of new pathways…" However, it is unclear whether this reference to piling methods would apply to trenchless crossings such that it would mitigate for effects. In the absence of supporting information on the location of crossings, proposed techniques including depths, and mitigation, the Inspectorate cannot agree to scope out this matter. The ES should include an assessment where likely significant effects could occur or provide further justification as to why this would not arise.	
4.5.2	*[Introduction of new potential contaminants to the environment from leaks, spills, fuels and oils from construction activities (construction, maintenance, and decommissioning)]* This matter is proposed to be scoped out on the basis that it is not likely to result in a significant effect due to the incorporation of the mitigation by design. The Inspectorate is content to scope this matter out on the basis that such matters are capable of mitigation by standard measures. The ES must provide specific details regarding the mitigation measures to be adopted to demonstrate that such measures will be monitored and effective. However, as noted at point 2.1.6 above, there is some concern with regards to the potential for	Noted that the introduction of new potential contaminants can be scoped out of further assessment. Details on the mitigation will be included within the **Volume 2, Part 1, Appendix 1.4.A, Outline CoCP**. Protocols for dealing with breakouts of drilling fluids during drilling activities are included within **Volume 1, Part 1, Chapter 4, Description of the Proposed Project**.

ID	Inspectorate's comments	Response
	break outs or frack-outs of bentonite during HDD activities. The ES should provide details of protocols/measures to be put in place to prevent break outs or frackouts of bentonite from occurring or minimise impacts should such events occur.	
4.5.3	*[Physical and chemical changes to groundwater as a result of discharge of groundwater from dewatering (construction)]* This matter is proposed to be scoped out on the basis that it is not likely to result in a significant effect due to the incorporation of the mitigation by design. The Scoping Report does not expand on the specific mitigation that would address this potential impact. The Inspectorate notes measure GH07 of the CoCP relating to temporary dewatering in accordance with EA guidance and an abstraction licence and EP (if required) and that dewatering activities during construction more generally are scoped into the assessment. The Inspectorate agrees that control measures applied would ensure no change to physical and chemical changes to groundwater and this matter can be scoped out of the assessment.	Noted. Matter is scoped out of further assessment based on mitigation measures included within the CoCP in relation to the requirement for any temporary dewatering activities to be undertaken in accordance with Environment Agency guidance and licences/permits, if required. See **Volume 2, Part 1, Appendix 1.4.A, Outline CoCP**.
4.5.4	**[***Effects on construction activities and the built development (at the operational phase) from natural geological hazards (i.e. dissolution features/soft ground/landslides/ aggressive*	Noted. Matter is scoped out of further assessment based on mitigation measures within the Outline CoCP, mainly GH01 which relates to the need for ground investigation to inform appropriate geotechnical design. See **Volume 2, Part 1, Appendix 1.4.A, Outline CoCP**.

ID	Inspectorate's comments	Response
	ground conditions etc) (construction)] This matter is proposed to be scoped out on the basis that it is not likely to result in a significant effect due to the incorporation of the mitigation by design. As previously, the Scoping Report does not expand on the specific measure to mitigate such effects, but it is assumed this relates to the inclusion of GH01, intrusive ground investigations and assessment will be undertaken prior to construction to inform appropriate geotechnical design in relation to the site/structure specific ground conditions including ground instability/adverse ground conditions. On the basis that natural hazards would be considered during the engineering design of the Proposed Development and avoided where possible, the Inspectorate is in agreement that this matter can be scoped out of the ES."	
4.5.5	*[Sterilisation of safeguarded minerals (construction and operation)]* On the basis that no safeguarded minerals have been identified in the scoping study area through a desk-based assessment, the Inspectorate agrees to scope this matter out.	Noted. Matter is scoped out of further assessment as safeguarded minerals have not been identified within the study area.
4.5.6	*[Human health exposure to existing contamination – site workers and neighbours (operation and maintenance)]* This matter is proposed to be scoped out on the basis that it is not likely to result in a	Noted. Matter is scoped out of further assessment during the operation and maintenance stage as contamination will be assessed within the construction phase and therefore significant effects during operation and maintenance stages are unlikely.

ID	Inspectorate's comments	Response
	significant effect due to the nature of the project and the incorporation of the mitigation by design. The Inspectorate agrees, given the nature of the Proposed Development and existing legislation, that such effects are unlikely during the operation and maintenance stage and can be scoped out of the impact assessment.	
4.5.7	*[Introduction of new potential contaminants to the environment from leaks, spills, fuels and oils during the operational phase (operation and maintenance)]* This matter is proposed to be scoped out on the basis that it is not likely to result in a significant effect given the nature of the project and in consideration of best practice measures and maintenance. The Inspectorate agrees that such effects are unlikely during the operation and maintenance stage and can be scoped out of the impact assessment.	Noted. Matter is scoped out of further assessment during the operation and maintenance stage as the operation of the Proposed Project is not considered to be contaminative and in consideration of best practise measures during any maintenance activities.
4.5.8	*[Changes to groundwater levels and/or recharge rates as a result of the introduction of impermeable surfaces (operation)]* This matter is proposed to be scoped out on the basis that it is not likely to result in significant effects due to the small surface area of the built parts of the Proposed Development. Any new areas of hardstanding would be designed to meet current drainage standards. The Scoping Report does not confirm the likely area of the convertor	Changes to groundwater levels and/or rechange rates as a result of the introduction of impermeable surfaces during operation is scoped in and will be assessed as part of the ES.

ID	Inspectorate's comments	Response
	site that would comprise hardstanding. Similarly, it does not confirm likely run-off rates and measures controlling these. The Inspectorate therefore cannot agree to scope this matter out at this stage. Details of the design of the convertor site and the location of drainage should be included in the ES, together with an assessment of their effectiveness at mitigating operational discharges and runoff. The ES should assess effects on groundwater levels and/or recharge rates as a result of impermeable surfaces, where significant effects are likely to occur.	
4.5.9	*[All phases - ground instability effects relating to historical coal mining]* The historical coal mining located within the scoping boundary is at 'significant depth' and is relatively thin and it is not located in a high risk area (Scoping Report paragraphs 3.6.4.11 and 3.6.4.12). Provided the ES demonstrates that construction would not interact with the historical coal mining measures, the Inspectorate agrees to scoped this matter out.	Noted, risks from coal mining are scoped out of further assessment as the Proposed Project is outside of a development high risk zone, where the Coal Authority consider instability risks from historical coal mining are low.
4.5.10	*[Mobilisation of existing contamination during general construction, impacting on land and/or groundwater quality on environmentally sensitive sites, groundwater, GWDTE, surface water, land quality (operation and maintenance)]*	Mobilisation of existing contamination during the operation and maintenance phase is agreed to be scoped out as this will be dealt with during the construction phase of the Proposed Project (and assessed as such in the EIA).

ID	Inspectorate's comments	Response
	No reasoning is provided within the Scoping Report for the scoping out of this matter. Despite this, the Inspectorate is of the view that provided a comprehensive construction stage assessment of this matter has been provided and mitigation/remedial measures are secured (as appropriate) that effects during the operation and maintenance stage can be scoped out of the assessment.	
4.5.11	*[Changes to groundwater levels, quality and groundwater flow direction caused by dewatering and discharge on environmentally sensitive sites, groundwater, GWDTE, and surface water (operation, decommissioning, and maintenance)]* The Inspectorate agrees that such effects are unlikely during the operation, maintenance and decommissioning stages and can be scoped out of the impact assessment.	Noted that changes to groundwater levels, quality and flow by dewatering and discharge during the operation, decommissioning and maintenance phase can be scoped out of the ES.
4.5.12	*[Damage to/destruction of designated sites of geological importance (operation, maintenance and decommissioning)]* Scoping Report paragraph 3.6.4.13 identifies that the Sandwich Bay to Hacklinge Marshes Site of Special Scientific Interest (SSSI) is designated as a geological conservation review site. The Scoping Report has not explained why there would be no impact pathway to this site during the operation, maintenance and decommissioning of the Proposed Development,	The Proposed Project has made a commitment that the Kent landfall will be made using a trenchless crossing techniques, as stated in **Volume 1, Part 1, Chapter 4, Description of the Proposed Project,** and therefore where the draft Order Limits cross the SSSI, there will be no need for excavations associated with undergrounding cables. In this context it is not anticipated there will be any impacts on the designated site (from a geology perspective) during any phase – but particularly during the operational/maintenance/decommissioning phases as the cables will be in ducts below ground and any maintenance/decommissioning would be conducted from the transition joint bays outside of the SSSI. Therefore, physical damage to or destruction of the

ID	Inspectorate's comments	Response
	therefore the Inspectorate does not agree to scope this matter out. The ES should explain what impact pathways there are to any geologically designated sites and assess significant effects where they are likely to occur.	designated site (in the context of geological importance) is scoped out of the assessment for the operational/maintenance and decommissioning phases.

Consultation and Project Engagement

3.6.3.2 Engagement with consultees has been primarily through the Scoping Opinion and through the data requests made to consultees to inform the baseline conditions.

3.6.3.3 Additional engagement with the Environment Agency to agree the land contamination assessment methodology will be undertaken and reported in the ES.

3.6.4 Approach and Methodology

3.6.4.1 **Volume 1, Part 1, Chapter 5, PEIR Approach and Methodology** sets out the overarching approach which has been used in developing the preliminary environmental information. This section describes the technical methods used to determine the baseline conditions, sensitivity of the receptors and magnitude of effects and sets out the significance criteria that have been used for the preliminary geology and hydrogeology assessment.

Guidance specific to the geology and hydrogeology assessment

3.6.4.2 The preliminary geology and hydrogeology assessment has been carried out in accordance with the following good practice guidance documents:

- Land Contamination Risk Management (LCRM) (Ref. 3.6.22);
- CIRIA 552: Contaminated Land Risk Assessment, A guide to good practice (Ref. 3.6.23);
- CIRIA 665: Assessing risks posed by hazardous ground gases to buildings (Ref. 3.6.24);
- BS 8485:2015+A1:2019 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings (Ref. 3.6.25);
- BS 10175:2011+A2:2017 Investigation of potentially contaminated sites. Code of Practice (Ref. 3.6.26);
- The Environment Agency's Guiding Principles for Managing and Reducing Land Contamination (GPLC2) (Ref. 3.6.27);
- The Environment Agency's Hydrogeological Impact Appraisal for Dewatering Abstractions (Ref. 3.6.28);
- Design Manual for Roads and Bridges (DMRB), LA 109: Geology and soils (Ref. 3.6.29);

- DMRB, LA 113: Road drainage and the water environment (Ref. 3.6.30); and
- Guidance for the Safe Development of Housing on Land Affected by Contamination (Ref. 3.6.31).

3.6.4.3 The above core guidance documents provide the technical framework for applying a risk management process when dealing with land affected by contamination in a way that is consistent with government policies and legislation within the UK.

Baseline Data Gathering and Forecasting Methods

3.6.4.4 The methodology for assessing contaminated land and that has been used to develop the baseline and inform the preliminary risk assessment for contaminated land is presented within **Volume 2, Part 3, Appendix 3.6.A, Preliminary Contamination Risk Assessment**.

3.6.4.5 The contaminated land risk assessment will be transposed into EIA methodology as described in the following sections and integrates the topic specific requirement for effects to be assessed via a risk-based approach into the EIA methodology requiring impacts and significance of effects to be assessed. For each potential effect the receptor sensitivity and impact magnitude will be assigned which will then be combined to give a significance of effect.

There is no equivalent published assessment methodology for impacts relating to geology (e.g. geo-conservation) and hydrogeology. Therefore, for consistency, a similar approach will be adopted for geology and hydrogeology, as contaminated land, to assess these effects (i.e. combination of receptor identification and associated sensitivity and magnitude of potential impacts).

3.6.4.6 As part of the ES risks to groundwater will be assessed utilising the source-pathway-receptor linkage approach, as described within **Volume 2, Part 3, Appendix 3.6.A, Preliminary Contamination Risk Assessment,** to assess the potential for effects on groundwater receptors. Further localised hydrogeological risk assessment will be undertaken, where required, for example at trenchless crossings and the locations of any dewatering, to identify impacts and effects. Assessment of the impacts on groundwater receptors, including on private water supplies, will be undertaken based on the approach and methodology described in Environment Agency, Hydrogeological Impact Appraisal for dewatering abstractions guidance (Ref. 3.6.28).

3.6.4.7 The baseline assessment has been informed by a desk-based study which has drawn on the following information sources:

- Britain from Above, historical aerial imagery archive (Ref. 3.6.32);
- British Geological Survey (BGS) 1:50,000 scale geological mapping (Ref. 3.6.33);
- BGS GeoIndex Viewer (Ref. 3.6.34);
- BGS Hydrogeological Maps of the UK (Ref. 3.6.35);
- Environment Agency, Catchment Data Explorer (Ref. 3.6.36);
- Natural England, Designated Sites View (Ref. 3.6.37);
- Multi-Agency Geographic Information for the Countryside (MAGIC) interactive map (Ref. 3.6.38);

- National Library of Scotland, georeferenced historical maps for the United Kingdom for the period 1885 - 1970, (Ref. 3.6.39); and
- Geo Conservation Kent map of Regionally Important Geological Sites in Kent (Ref. 3.6.40).

Assessment Criteria

Sensitivity

3.6.4.8 The criteria used to determine the value and sensitivity of receptors specific to geology and hydrogeology are set out in Table 3.6.9. These values are based on the generic criteria presented in **Volume 1, Part 1, Chapter 5, PEIR Approach and Methodology** and Table 3.70 of DMRB LA 113: Road drainage and the water environment (Ref. 3.6.30), Table 3.11 of DMRB LA 109: Geology and soils (Ref. 3.6.29) and professional judgement.

Table 3.6.9: Value/sensitivity criteria

Value/sensitivity	General criteria
Very High	Very high importance and rarity. International scale and limited potential for substitution **Geology**: Very rare and of international importance with no potential for replacement (e.g. UNESCO World Heritage Sites, UNESCO Global Geoparks, SSSI and Geological Conservation Review (GCR) where citations indicate features of international importance). Geology meeting international designation citation criteria which is not designated as such. **Minerals:** Existing Mineral sites **Contamination:** 1) human health: very high sensitivity land use such as residential or allotments; 2) surface water: Watercourse having a Water Framework Directive (WFD) classification shown in a River Basin Management Plan (RBMP) and Q95 ≥ 1.0 m3/s. Site protected/designated under EC or UK legislation (Special Areas of Conservation (SAC), Special Protection Areas (SPA), SSSI, Ramsar site) 3) groundwater: Principal aquifer providing a regionally important resource and regionally important public water supplies, SPZ 1 **Hydrogeology:**

Value/sensitivity	General criteria
	Principal aquifer providing a regionally important source and regionally important public water supplies. Groundwater quality associated with SPZ 1 associated with licensed abstractions. Water supplying groundwater dependant terrestrial ecosystems (GWDTEs) with a high groundwater dependence with a high environmental importance and international or national value, such as Ramsar sites, SACs, SPAs and SSSIs.
High	High importance and rarity. National scale and limited potential for substitution **Geology:** Rare and of national importance with little potential for replacement (e.g. geological SSSI, Area of Special Scientific Interest (ASSI), National Nature Reserves (NNR)). Geology meeting national designation citation criteria which is not designated as such. **Minerals:** Mineral preferred areas **Contamination:** 1) human health: high sensitivity land use such as public open space, and construction workers; 2) surface water: Watercourse having a WFD classification shown in a RBMP and Q95 <1.0m^3/s. 3) groundwater: Principal aquifer providing locally important resource or supporting a river ecosystem, SPZ2. **Hydrogeology:** Principal aquifer providing a locally important source and locally important public water supplies, SPZ 2. Water supplying GWDTEs with a moderate groundwater dependence with high environmental importance and international or national value, such as Ramsar sites, SACs, SPAs and SSSIs; or water feeding highly groundwater dependent GWDTE with a national non-statutory UK Biodiversity Action Plan (BAP) priority
Medium	Medium or high importance and rarity, regional scale, limited potential for substitution **Geology:** Regional importance with limited potential for replacement (e.g. regionally important geological sites (RIGS)). Geology meeting

Value/sensitivity	General criteria
	regional designation citation criteria which is not designated as such. **Minerals:** Mineral Safeguarded Areas and Mineral Consultation Area **Contamination**: 1) human health: medium sensitivity land use such as commercial or industrial; 2) surface water: Watercourses not having a WFD classification shown in a RBMP and Q95 >0.001m3/s. 3) groundwater: Secondary A Aquifers. Extensive non-licensed private water abstractions (i.e. supplying ten or more properties or supplying large farming / animal estates). SPZ3. **Hydrogeology:** Secondary A aquifer. Groundwater flow and yield and quality associated with extensive non-licensed private water abstractions (i.e. supplying ten or more properties or supplying large farming / animal estates). Groundwater quality associated with SPZ2 (Outer Protection Zone) associated with licensed abstractions. Residential and commercial properties. Water supplying GWDTEs of low groundwater dependence with a high environmental importance and international or national value, such as Ramsar sites, SACs, SPAs and SSSIs; or water feeding moderately groundwater dependent GWDTE with a national non-statutory UK Biodiversity Action Plan (BAP) priority
Low	Low or medium importance and rarity, local scale **Geology:** Local importance / interest with potential for replacement (e.g. non designated geological exposures, former quarry's / mining sites). **Minerals:** Mineral present but outside of any MPS/MSA/MCA **Contamination:** 1) human health: low sensitivity land use such as highways and rail; 2) surface water: Watercourses not having a WFD classification shown in a RBMP and Q95 ≤0.001m3/s. 3) groundwater: Secondary B or Secondary Undifferentiated aquifer. Small scale private water abstractions (i.e. supplying fewer than ten properties).

Value/sensitivity	General criteria
	Hydrogeology: Secondary B or Secondary Undifferentiated aquifer. Groundwater flow and yield and quality associated with small scale private water abstractions (i.e. feeding fewer than ten properties). Groundwater quality associated with SPZ3 (Source Catchment Protection Zone) associated with licensed abstractions and with licensed abstractions for which no SPZ is defined. Water supplying GWDTEs of low groundwater dependence with a national non-statutory UK BAP priority; or water supplying highly or moderately groundwater dependent GWDTE sites with no conservation designation.
Negligible	Very low importance and rarity, local scale **Geology:** No geological exposures, little / no local interest. **Mineral:** No mineral identified **Contamination:** 1) human health: undeveloped surplus land / no sensitive land use proposed; 2) surface water: not present 3) groundwater: Unproductive strata **Hydrogeology:** Very poor groundwater quality and/or very low permeability make exploitation of groundwater unfeasible. No active groundwater supply. Water supplying GWDTEs of low groundwater dependence with no designation or groundwater that supports a wetland not classified as a GWDTE, although may receive some minor contribution from groundwater

Magnitude

3.6.4.9 The criteria used to determine the magnitude of change for geology and hydrogeology are set out in Table 3.6.10. These values are based on the generic criteria presented in **Volume 1, Part 1, Chapter 5, PEIR Approach and Methodology**, Table 3.71 of DMRB LA 113 (Ref. 3.6.30), Table 3.12 of DMRB LA 109 (Ref. 3.6.29) and professional judgement.

Table 3.6.10: Magnitude criteria

Magnitude	General criteria
Large	**Geology adverse**: Permanent loss of geological feature / designation and/or quality and integrity, severe damage to key characteristics, features or elements.
	Contamination adverse: Significant contamination identified, and contamination level significantly exceed human health and environmental assessment criteria with the potential for significant harm to be caused. Contamination heavily restricts future use of land. **Contamination benefit**: Substantial betterment of ground or groundwater quality/contamination conditions through remediation and/or mitigation.
	Hydrogeology averse: Major or irreversible change to groundwater aquifer(s) flow, water level, quality or available yield which endangers the resources currently available. Groundwater resource use / abstraction is irreparably impacted upon, with a major or total loss of an existing supply or supplies. Changes to water table level or quality would result in a major or total change in, or loss of, a groundwater dependent area, where the value of a site would be severely affected. Changes to groundwater aquifer(s) flow, water level and quality would result in major changes to groundwater baseflow contributions to surface water and/ or alterations in surface water quality. **Hydrogeology beneficial**: Major increase in groundwater resource availability. Results in the achievement of Good Status for a WFD groundwater body or GWDTE which is currently failing its WFD objectives. Removal of existing or potential polluting discharge to groundwater
Medium	**Geology adverse**: partial loss of geological feature / designation, potentially adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.
	Contamination adverse: Contamination levels marginally exceed human health and environment assessment criteria. Control / remediation measures are required to reduce risks to human health / make land suitable for intended use. **Contamination benefit**: Moderate Betterment of ground or groundwater quality/contamination conditions through remediation and/or mitigation.
	Hydrogeology adverse: Moderate long term or temporary significant changes to groundwater aquifer(s) flow, water level, quality or available yield which results in moderate long term or temporarily significant decrease in resource availability. Groundwater resource use / abstraction is impacted slightly, but

Magnitude	General criteria
	existing supplies remain sustainable. Changes to water table level or groundwater quality would result in partial change in or loss of a groundwater dependent area, where the value of the site would be affected, but not to a major degree. Changes to groundwater aquifer(s) flow, water level and quality would result in moderate changes to groundwater baseflow contributions to surface water and/ or alterations in surface water quality, resulting in a moderate shift from baseline conditions. **Hydrogeology beneficial**: Moderate increase in groundwater resource availability. Contributes, in combination with other effects, to the achievement of Good Status for a WFD groundwater body or GWDTE which is currently failing its WFD objectives. Significant reduction of existing or potential polluting discharge to groundwater.
Small	**Geology adverse**: minor measurable change in geological feature / designation attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.
	Contamination adverse: Contamination levels below human health and environment assessment criteria and remediation is not required. Significant contamination is unlikely with a low risk to human health. Best practice measures can be required to minimise risks to human health. **Contamination benefit**: Slight betterment of ground or groundwater quality/contamination conditions through remediation and/or mitigation.
	Hydrogeology adverse: Minor changes to groundwater aquifer(s) flow, water level, quality or available yield leading to a noticeable change, confined largely to the Proposed Project area. Changes to water table level, groundwater quality and yield result in little discernible change to existing resource use. Changes to water table level or groundwater quality would result in minor change to groundwater dependent areas, but where the value of the site would not be affected. Changes to groundwater aquifer(s) flow, water level and quality would result in minor changes to groundwater baseflow contributions to surface water and / or alterations in surface water quality, resulting in a minor shift from baseline conditions. **Hydrogeology beneficial**: Minor increase in groundwater resource availability. Leads to improvement of a WFD groundwater body which is currently failing its WFD objectives but insufficient effect to achieve Good Status. Minor reduction of existing or potential polluting discharge to groundwater.

Magnitude	General criteria
Negligible	**Geology adverse**: Very minor loss or detrimental alteration to one or more characteristics, features or elements of geological feature / designation. Overall integrity of resource not affected.
	Contamination: Contamination levels substantially below human health and environment assessment criteria and remediation is not required. No requirement for control measures to reduce risks to human health / make land suitable for intended use.
	Hydrogeology adverse: Very slight change from groundwater baseline conditions, approximating to 'no change' conditions. Dewatering effects create no or no noticeable effects.

Significance of effects

3.6.4.10 These factors are combined to give an overall significance of effect using the matrix set out in **Volume 1, Part 1, Chapter 5, PEIR Approach and Methodology.**

3.6.4.11 As set out in **Volume 1, Part 1, Chapter 5, PEIR Approach and Methodology** the general approach taken to determining the significance of effect in this preliminary assessment is only to state whether effects are likely or unlikely to be significant, rather than assigning significance levels.

Assumptions and Limitations

3.6.4.12 The proposed assessment approach in this chapter is based on published and readily available information, in accordance with a proportionate yet robust approach. 'Reasonable worst case' assumptions regarding the likely ground conditions have been made when assessing effects, determined from the information collated and reviewed. At the current time, based on the information collated and reviewed to date, it is not considered that specific intrusive ground investigation information is required to support the EIA in relation to geology and hydrogeology.

3.6.4.13 The information presented in the PEIR is preliminary and the final assessment of likely significant effects will be reported in the ES.

3.6.5 Basis of Assessment

3.6.5.1 This section sets out the assumptions that have been made in respect of design flexibility maintained within the Proposed Project and the consideration that has been given to alternative scenarios and the sensitivity of the preliminary assessment to changes in the construction commencement year.

3.6.5.2 Details of the available flexibility and assessment scenarios are presented in **Volume 1, Part 1, Chapter 4, Proposed Project Description** and **Volume 1, Part 1, Chapter 5, PEIR Approach and Methodology**.

Flexibility assumptions

3.6.5.3 The main preliminary assessments have been undertaken based on the description of the Proposed Project provided in **Volume 1, Part 1, Chapter 4, Description of the Proposed Project**. To take account of the flexibility allowed in the Proposed Project, consideration has been given to the potential for preliminary effects to be of greater or different significance should any of the permanent or temporary infrastructure elements be moved within the Limits of Deviation (LoD) or draft Order Limits.

3.6.5.4 The assumptions made regarding the use of flexibility for the assessment, and any alternatives assumptions are set out in Table 3.6.11 below.

Table 3.6.11: Flexibility Assumption

Element of flexibility	Proposed Project assumption for initial preliminary assessment	Flexibility assumption considered
Lateral LoD HVDC cables and Minister Substation	The entire draft Order Limits are being assessed in relation to the potential impacts on geology and hydrogeology, although the HVDC cables will be located within only a small part of the draft Order Limits.	The lateral LoD of the HVDC cables does not change the assessment presented in this chapter as they remain inside the area assessed.
Lateral LoD Minster Converter Station and Minster Substation	The entire draft Order Limits are being assessed in relation to the potential impacts on geology and hydrogeology, although the Minster Converter Station and Minster substation will be located within only a very small part of the draft Order Limits.	The lateral LoD of the proposed Minster Converter Station and Minster substation location does not change the assessment presented in this chapter as they remain inside the area assessed
Vertical LoD Minster Converter Station and Minster Substation	The vertical LoD above ground does not affect the likely significant effects on geology and hydrogeology receptors which are below ground. The vertical LoD below ground has been assumed to extend to the White Chalk Subgroup to allow for the potential for a piled foundation solution into the Chalk (bedrock).	The vertical LoD below ground does not change the assessment presented in this chapter as the most sensitive below ground receptor has been assessed (reasonable worst case).
Lateral LoD overhead line and Minster Substation	The entire draft Order Limits are being assessed in relation to the potential impacts on geology and hydrogeology.	The lateral LoD does not change the assessment presented in this chapter as they remain inside the draft Order Limits.
Vertical LoD overhead line and Minster Substation	The vertical LoD above ground does not affect the likely significant effects on geology and hydrogeology receptors which are below ground.	The vertical LoD below ground does not change the assessment presented in this chapter as the most sensitive below ground receptor has been assessed (reasonable worst case).

	The vertical LoD below ground has been assumed to extend to the White Chalk Subgroup to allow for the potential for a piled foundation solution (of the pylons) into the Chalk (bedrock).

Consideration of Scenarios and Options

3.6.5.5 Two alternative scenarios have been considered within each of the technical assessment chapters in Part 3. These are:

- The use of either low height or standard height pylons for the HVAC connection. Within this scenario there are three options as explained in **Volume 1, Part 1, Chapter 4, Description of the Proposed Project**; and
- Permanent access to Minster converter station and substation is either taken off the A256 (through bellmouth BM02) or off Jutes Lane through bellmouth BM03, but with bellmouth BM02 being retained for any abnormal indivisible load (AIL) movements required during maintenance and operation as explained in **Volume 1, Part 1, Chapter 4, Description of the Proposed Project**.

3.6.5.6 Table 3.6.12 details where these scenarios are relevant to the preliminary geology and hydrogeology assessment and how they have been assessed and reported in Section 3.6.9 of this chapter, preliminary assessment of effects.

Table 3.6.12: Consideration of Scenarios

Assessment scenario	How it has been considered within the preliminary assessment
Pylon types	The use of different pylon types that could have an impact on the geology and hydrogeology assessment is in relation to the foundation type required for the different pylons. It is not considered to make a difference in the preliminary assessment in consideration of the embedded mitigation and control and management measures within the CoCP, specifically the requirement for a Foundation Works Risk Assessment once the foundation types are known.
Permanent access to Minster converter station and substation	The entire draft Order Limits are being assessed in relation to the potential impacts on geology and hydrogeology and this includes both permanent access options.

Sensitivity Test

3.6.5.7 It is likely that under the terms of the draft DCO, construction could commence in any year up to five years from the granting of the DCO which is assumed to be 2026. Consideration has been given to whether the preliminary effects reported would be any different if the works were to commence in any year up to year five. It is considered that if the works were to commence in any year up to year five this will not change the assessment of effects in relation to geology and hydrogeology.

3.6.6 Study Area

3.6.6.1 The study area for geology and hydrogeology comprises the draft Order Limits for the Kent Onshore Scheme plus a 250m buffer for geology and up to a 500m buffer for hydrogeology.

3.6.6.2 Given the scale and nature of the Proposed Project, this is considered a robust yet proportionate approach, and although not directly relevant for this development type, accords with the study area recommended in Guidance for the Safe Development of Housing on Land Affected by Contamination (Ref. 3.6.31).

3.6.7 Baseline Conditions

3.6.7.1 This section of the chapter comprises an overview of the baseline conditions for Geology and Hydrogeology, in order to establish the likely type and nature of potential effects.

Geology

Superficial Deposits

3.6.7.2 The majority of the study area to the west of the A256 is shown to be underlain by Tidal Flat Deposits, described by the BGS (Ref. 3.6.33) as typically comprising "*unconsolidated sediment, mainly mud and/or sand…. soft silty clay, with layers of sand, gravel and peat*". Further areas of Tidal Flat Deposits are present to the east of the A256 beneath St. Augustine's Golf Course.

3.6.7.3 To the east of the Tidal Flat Deposits, along the eastern boundary of the draft Order Limits around Pegwell Bay, the BGS record deposits of Beach and Tidal Flat Deposits (Undifferentiated) described by the BGS (Ref. 3.6.33) as a "*composite of Beach Deposits: Shingle, sand, silt and clay;…and the Tidal Flat Deposits*" described above.

3.6.7.4 Limited areas along the northern boundary of the draft Order Limits are shown to be underlain by deposits of Head, described as a poorly sorted and poorly stratified deposit described by the BGS (Ref. 3.6.33) as typically comprising "*sand and gravel, locally with lenses of silt, clay or peat and organic material*".

3.6.7.5 There are also some areas within the study area, predominantly immediately adjacent either side of the A256, where there are no superficial deposits recorded on the BGS mapping.

3.6.7.6 The superficial geology present beneath the study area for the Kent Onshore Scheme is shown on **Figure 3.6.1 Superficial Geology**.

Bedrock Geology

3.6.7.7 The majority of the study area within the Kent Onshore Scheme is shown to be underlain by bedrock of the Thanet Formation, described by the BGS (Ref. 3.6.34) as typically a "*silty fine-grained sand, with sandy silt, silt or sandy, silty clay especially in the lower part, forming a coarsening-upwards sequence*". The BGS 1:50,000 geological map (Ref. 3.6.33) indicates that the Thanet Formation is approximately 30m thick.

3.6.7.8 Beneath the Thanet Formation, the BGS geological mapping (Ref. 3.6.33) and archive borehole logs record (Ref. 3.6.34) chalk bedrock of the White Chalk Subgroup. The BGS map (Ref. 3.6.33) indicates that the chalk is in excess of 200m thick. In the northern area of the study area, the Thanet Formation is absent and the superficial deposits are directly underlain by the White Chalk Subgroup.

3.6.7.9 The bedrock geology present beneath the study area is shown on **Figure 3.6.2 Bedrock Geology**.

Geo-Conservation

3.6.7.10 A review of the Geo Conservation Kent interactive map (Ref. 3.6.40) and DEFRA's MAGIC map (Ref. 3.6.38) indicates that with one exception, there are no Regionally Important Geological Sites (RIGS) or geological SSSI present within the study area.

3.6.7.11 The exception to this is the Sandwich Bay to Hacklinge Marshes SSSI which is also designated as a Geological Conservation Review Site and forms the eastern part of the draft Order Limits, at Pegwell bay.

3.6.7.12 The Sandwich Bay to Hacklinge Marshes SSSI also forms the wooded area between the former Richborough Power Station and Weatherlees Hill water treatment works in the southeast of the draft Order Limits, however this part of the SSSI isn't designated for its geological importance (based on the citation for the site).

Hydrogeology

Aquifer Designation – Superficial

3.6.7.13 DEFRA's MAGIC map (Ref. 3.6.38) indicates that the Undifferentiated Beach and Tidal Flat Deposits to the east of the study area are classified in parts as a Secondary A Aquifer and in parts as a Secondary Undifferentiated Aquifer. The Tidal Flat Deposits to the west of the study area and the Head Deposits to the north are classified as Unproductive Strata.

3.6.7.14 Secondary A Aquifers are described by the Environment Agency as "*permeable layers that can support local water supplies, and may form an important source of base flow to rivers*" (Ref. 3.6.36). The Secondary Undifferentiated Aquifer classification is applied by the Environment Agency "*where it is not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type. These have only a minor value*" (Ref. 3.6.36).

3.6.7.15 Unproductive Strata is described by the Environment Agency as "*largely unable to provide usable water supplies and are unlikely to have surface water and wetland ecosystems dependent on them*" (Ref. 3.6.36).

3.6.7.16 Groundwater flow within the shallow aquifer is likely to be generally to the east, towards the River Stour and the sea. Groundwater levels and movement may exhibit some tidal influence in the eastern part of the study area.

Aquifer Designation – Bedrock

3.6.7.17 The bedrock of the Thanet Formation, present beneath the whole of the study area, is classified by the Environment Agency as a Secondary A Aquifer (Ref. 3.6.36). The White Chalk Subgroup, which is present beneath the Thanet Formation and directly underlying the superficial deposits to the north, is classified as a Principal Aquifer (Ref. 3.6.36).

3.6.7.18 Principal Aquifers are described by the Environment Agency as strata that "*provide significant quantities of drinking water, and water for business needs. They may also support rivers, lakes and wetlands*" (Ref. 3.6.36).

3.6.7.19 The contours of 'Estimated minimum level of the chalk water table or pressure surface as shown on BGS' hydrogeological map (Ref. 3.6.35), indicate that the piezometric surface within the study area is likely to be zero metres above Ordnance Datum (m AOD).

3.6.7.20 The groundwater in the different strata (superficial and bedrock) may therefore be in hydraulic continuity.

Groundwater Vulnerability

3.6.7.21 DEFRA's MAGIC map (Ref. 3.6.38) indicates that the groundwater beneath the eastern part of the study area, i.e., approximately beneath areas where Undifferentiated Beach and Tidal Flat Deposits are present overlying the Thanet Formation, is of Medium to High vulnerability.

3.6.7.22 Within areas where the Thanet Formation is exposed at the surface, and not covered by a layer of superficial deposits, the groundwater vulnerability is considered to be High.

3.6.7.23 Within the remaining parts of the study area, where the Tidal Flat Deposits overly the Thanet Sand Formation the groundwater vulnerability is considered to be Medium to Low Vulnerability.

3.6.7.24 The Environment Agency define High vulnerability as "*Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits", and areas of Low vulnerability as "Areas that provide the greatest protection to groundwater from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability*". Medium vulnerability is described as intermediate between Low and High vulnerability (Ref. 3.6.43).

Groundwater Source Protection Zones

3.6.7.25 DEFRA's MAGIC map (Ref 3.6.38) indicates that there are no groundwater SPZs within the draft Order Limits for the Kent Onshore Scheme.

3.6.7.26 Within the study area there are two SPZ 2s located approximately 480m northwest and 450m northeast of the draft Order Limits. The associated SPZ 1s are located approximately 1km northwest and 1km northeast of the draft Order Limits, which are both outside of the study area. It is anticipated that these abstractions are from within the White Chalk Subgroup.

3.6.7.27 A SPZ1 is defined as the inner zone which is a 50-day travel time of a pollutant to the abstraction point. A SPZ2 Outer Zone is defined as a 400-day travel time of a pollutant to a abstraction source. A SPZ3 is defined as the total catchment, which is the area around a source within which all the groundwater ends at the abstraction point (Ref. 3.6.44).

3.6.7.28 The map also shows that the site is not located within a groundwater Drinking Water Safeguard Zone (DWSZ) or a groundwater Nitrate Issues Priority Zone (NIPZ) (Ref. 3.6.38).

Groundwater Body

3.6.7.29 The Environment Agency's Catchment Data Explorer (Ref. 3.6.36) indicates that groundwater beneath the study area is part of the East Kent Tertiaries groundwater body (ref: GB40702G501600). This groundwater body received an overall WFD status of "Poor" in 2019. This can be further broken down into a "Good" status for chemical quality and a "Poor" quantitative status.

Groundwater Abstractions

3.6.7.30 Information is currently in the process of being obtained from the relevant organisations for groundwater abstractions and private water supplies within the study area which will be assessed in due course and reported in the ES.

Potentially Contaminative Land Uses

3.6.7.31 The majority of the draft Order Limits for the Kent Onshore Scheme and the study area is indicated to have remained as undeveloped/agricultural land since the earliest available historical mapping (from the National Library of Scotland (Ref. 3.6.39)) dated 1885. In these areas it is considered that there is a very low risk of a significant source of potential contamination.

3.6.7.32 However, there are discrete areas within the draft Order Limits and wider study area where either the historical land use or the current land use have been identified as potentially contaminative. Where these areas are identified, readily available information relating to the Potential Sources of Contamination (PSC) has been gathered and an initial assessment has been undertaken to provide a classification score for their potential for generating contamination. This assessment is presented in **Volume 2, Part 3, Appendix 3.6.A, Preliminary Contamination Risk Assessment**.

3.6.7.33 Where the initial classification score is moderate or above within the study area these sites are taken forward for further assessment in relation to the risk to sensitive receptors. These site-specific assessments are also presented in **Volume 2, Part 3, Appendix 3.6.A, Preliminary Contamination Risk Assessment**.

3.6.7.34 Based on the assessment presented in **Volume 2, Part 3, Appendix 3.6.A, Preliminary Contamination Risk Assessment**, following the Tier 1 assessment, there were no sites that were assessed to have a potential Moderate or above risk to sensitive receptors from existing contamination.

Future Baseline

3.6.7.35 There are no foreseeable significant changes anticipated in relation to geology hydrogeology or land contamination either prior to, or during the construction and operational phases in relation to direct man-made changes. It is assumed that any man-made changes (e.g., due to new developments) would be appropriately permitted/controlled and operated in accordance with current legislation to prevent or limit adverse impacts to ground conditions or controlled waters.

3.6.7.36 Climate change predictions for the UK indicate a trend of wetter winters, drier summers, higher average temperatures and higher intensity rainfall events. These could have an impact on soil erosion, groundwater levels, and indirectly (through groundwater level changes) - potential for mobilisation of contamination.

3.6.7.37 In the context of soil erosion and groundwater levels, it is not considered these would have a significant impact on the significance of effects given the nature of the Proposed Project project and the inherent engineering design. In relation to contamination, as any areas that may have a significant impact would be remediated or mitigated during design and construction of the Proposed Project, it is not considered that climate change would have a significant impact on the significance of effects for contamination.

3.6.8 Mitigation

3.6.8.1 As set out in **Volume 1, Part 1, Chapter 5, PEIR Approach and Methodology**, mitigation measures typically fall into one of the three categories: embedded measures; control and management measures; and mitigation measures.

Embedded Measures

3.6.8.2 Embedded measures have been integral in reducing the geology and hydrogeology effects of the Proposed Project. Measures that that have been incorporated are:

- Sensitive routeing and siting of infrastructure and temporary works as to avoid sensitive features such as groundwater SPZ1; and
- Commitments made within **Volume 2, Part 1, Appendix 1.4.F, Outline Schedule of Environmental Commitment and Mitigation Measures**.

Control and Management Measures

3.6.8.3 The following measures have been included within **Volume 2, Part 1, Appendix 1.4.A, Outline Code of Construction Practice** relevant to the control and management of impacts that could affect geology and hydrogeology receptors:

- GG01 - The Proposed Project will be run in compliance with all relevant legislation, consents and permits;
- W05 - The contractor(s) will comply with all relevant consent conditions or DCO provisions regarding de-watering and other discharge activities. This will particularly be with regard to volumes and discharge rates and will include discharges to land, water bodies or third-party drains/sewers;

- W06 - Where new or additional surfacing is required on any access tracks and compound areas Sustainable Drainage Systems (SuDS) will be incorporated, appropriate to the existing ground conditions. The Proposed Project will incorporate appropriate surface water drainage measures into its final design for the haul roads and access tracks so that they do not lead to a significant increase in flood risk or significant impact on groundwater recharge and levels. Temporary haul routes within Flood Zone 3 and areas of high and medium risk of flooding from surface water will be removed at the end of the construction phase and the ground surface will be reinstated to pre-project levels. No construction materials should be stored within Flood Zone 3 and areas of high and medium risk of flooding from surface water, where this cannot be avoided adequate mitigation measures will be applied (as identified in the Flood Risk Assessment to be completed);
- W08 - Active private water supplies will be identified with landowners through the landowner discussions. Appropriate measures will be considered during construction. In the event of a landowner or tenant reporting that installation activities have affected their private water supplies, an initial response will be provided within 24 hours. Where the installation works have affected a private water supply, an alternative water supply will be provided, as appropriate;
- W09 - In the event of a significant spill during construction, all relevant landowners/tenants will be contacted within 24 hours, within 250m of the spill, to determine if there are any private water supplies that might be affected; an assessment of the likelihood of groundwater contamination reaching identified private water supplies will be undertaken, and where a private water supply is assessed as likely to be affected, an alternative water supply will be provided, as appropriate;
- GH01 - Intrusive ground investigations and assessment will be undertaken prior to construction which will inform appropriate geotechnical design in relation to the site/structure specific ground conditions including ground instability/adverse ground conditions;
- GH02 - Construction methods such as appropriate piling techniques (if required) and trenchless crossing techniques to minimise the risk of mixing of aquifer bodies through the creation of new flow pathways. This includes the provision of a Foundation Works Risk Assessment (FWRA), which would be undertaken once the proposed foundation solutions and trenchless crossing techniques are known, in accordance with EA guidance 'Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination' (Ref. 3.6.45);
- GH03 - Use of appropriate occupational health and safety measures e.g. Personal Protective Equipment (PPE), and statutory health and safety compliance (e.g. compliance with the Confined Spaces Regulations, 1997 in relation to ground gas from working in confined spaces/trenches) to minimise the risks associated with potential contamination;
- GH04 - Appropriate training of construction and maintenance workers in the handling and use of potentially hazardous substances and the associated risks;

- GH05 - All use and storage of chemicals and fuels are to be undertaken in accordance with Environment Agency guidance (Ref. 3.6.46 and Ref. 3.6.47), and the Control of Pollution (Oil Storage) Regulations (Ref. 3.6.48). The use and storage of chemicals and fuels will also be controlled and monitored under the Construction and Environmental Management Plan (CEMP) which will include, for example, procedures for good general construction site practices, environmental and waste management procedures, regular vehicle checks, use of spill kits, correct waste storage and disposal, use of oil-water separators as necessary (for example, for drainage from refuelling areas), collection of process water from the washout/cleaning of ready-mix concrete vehicles and equipment for treatment/disposal;
- GH06 - The control of earthworks or materials movement (including any re-use of materials) under appropriate Environmental Permits, exemptions or CL:AIRE 'The definition of Waste: The development industry Code of Practice' (Ref. 3.6.49);
- GH07 - Any temporary dewatering activities during construction will be undertaken in accordance with Environment Agency guidance, and if required, an Abstraction Licence and Environmental Permit (for the discharge) and will be limited to the depth and time required to facilitate construction activities;
- GH08 - A protocol for dealing with any unexpected contamination.

Mitigation Measures

3.6.8.4 Mitigation measures are additional topic and site-specific measures that have been applied to mitigate or offset any likely significant effects. Mitigation measures that are relevant to geology and hydrogeology receptors have not been identified as required at this time however they will be identified if required as part of further assessment.

3.6.9 Preliminary Assessment of Effects

3.6.9.1 The preliminary assessment of the effects of the Kent Onshore Scheme described in this section considers the embedded, control and management and mitigation measures described in Section 3.6.7 of this chapter.

3.6.9.2 The preliminary geology and hydrogeology assessment of the effects of the Kent Onshore Scheme is presented in the following tables.

3.6.9.3 Table 3.6.13 presents the preliminary assessment of designated sites of geological importance.

Table 3.6.13: Preliminary assessment of designated sites of geological importance

	Preliminary assessment
Receptor	Designated sites of geological importance: Sandwich Bay to Hacklinge Marshes SSSI
Potential Impact	Damage to/destruction of sites of geological importance through physical destruction during construction where the built development directly interacts with the designated site.
Proposed Project phase	Construction

	Preliminary assessment
Duration	Construction: Temporary
Mitigation	At Pegwell Bay, where the Proposed Project interacts with the parts of the SSSI that are of geological interest. The landfall will be undertaken via trenchless crossing techniques as stated in **Volume 1, Part 1, Chapter 4, Description of the Proposed Project**
Preliminary sensitivity	Very high
Preliminary magnitude	Negligible as the method to install the section of the Proposed Project that interacts with the SSSI will be installed via trenchless methods therefore avoiding the designated geology features.
Preliminary likely significance of effect	The SSSI is located at the Kent landfall and as there is a commitment for this landfall to be undertaken via trenchless methods this will not interact with the SSSI and therefore significant effects are not likely. As any potential damage to the SSSI would be confined to the construction phase there are unlikely to be significant effects during operation and maintenance. Therefore, there are unlikely to be any significant effects on the site and therefore this is considered to be **Not Significant.**
Sensitivity Test	No difference in significance of effect
Confidence in prediction	High confidence due to the commitment to use trenchless techniques at the landfall.

3.6.9.4 Table 3.6.14 provides the preliminary assessment of human health exposure to existing potential contamination through ground disturbance.

Table 3.6.14: Preliminary assessment of human health exposure to existing potential contamination through ground disturbance

	Preliminary assessment
Receptor	Human health (Construction Workers)
Potential Impact	Exposure to existing potential contamination through ground disturbance during construction and decommissioning activities
Proposed Project phase	Construction and decommissioning
Duration	Variable
Mitigation	GH03, GH04, GH08
Preliminary sensitivity	High
Preliminary magnitude	Small

	Preliminary assessment
Preliminary likely significance of effect	**Volume 2, Part 3, Appendix 3.6.A, Preliminary Contamination Risk Assessment** presents a preliminary contamination risk assessment which identified generally a very low/low risk of contamination to be present within the study area. In addition, there are commitments that relate to use of appropriate PPE (GH03), appropriate training to construction workers (GH04) and a protocol for dealing with unexpected contamination if encountered (GH08). Any contamination identified would be dealt with during the construction phase and therefore is unlikely to be encountered during decommissioning. Therefore, significant effects are unlikely and therefore **Not Significant.**
Sensitivity Test	No difference in significance of effect
Confidence in prediction	High based on the baseline information and preliminary contamination risk assessment.

3.6.9.5 Table 3.6.15 provides the preliminary assessment of the mobilisation of existing contamination impacting on land and/or groundwater quality.

Table 3.6.15: Preliminary assessment of the mobilisation of existing contamination impacting on land and/or groundwater quality.

	Preliminary assessment
Receptor	Groundwater and land quality
Potential Impact	The mobilisation of existing contamination, during general construction/decommissioning, impacting on land and/or groundwater quality
Proposed Project phase	Construction and decommissioning
Duration	Variable
Mitigation	GH02, GH08.
Preliminary sensitivity	Medium
Preliminary magnitude	Negligible
Preliminary likely significance of effect	**Volume 2, Part 3, Appendix 3.6.A, Preliminary Contamination Risk Assessment** presents a preliminary contamination risk assessment which identified generally a very low/low risk of contamination to be present within the study area. In addition, there is a commitment for a protocol for dealing with unexpected contamination if encountered (GH08). Any contamination identified would be dealt with during the construction phase and therefore is unlikely to be encountered during decommissioning. Therefore,

	Preliminary assessment
	significant effects are unlikely and therefore **Not Significant**.
Sensitivity Test	No difference in significance of effect
Confidence in prediction	High confidence based on the baseline information and contamination risk assessment.

3.6.9.6 Table 3.6.16 provides the preliminary assessment for the potential of ingress and accumulation of ground gas.

Table 3.6.16: Preliminary assessment for the potential of ingress and accumulation of ground gas

	Preliminary assessment
Receptor	Construction/maintenance workers, built environment
Potential Impact	Ingress and accumulation of ground gas in buildings/confined spaces/trenches (construction and operation) – resulting in explosion/asphyxiation/exposure
Proposed Project phase	Construction, operation, maintenance and decommissioning
Duration	Variable
Mitigation	GH01
Preliminary sensitivity	High
Preliminary magnitude	Negligible
Preliminary likely significance of effect	**Volume 2, Part 3, Appendix 3.6.A, Preliminary Contamination Risk Assessment** presents a preliminary contamination risk assessment which did not identify a significant source of ground gas within the draft Order Limits. Therefore, significant effects are unlikely and **Not Significant** for all project phases.
Sensitivity Test	No difference in significance of effect
Confidence in prediction	High confidence based on the baseline information and contamination risk assessment.

3.6.9.7 Table 3.6.17 provides the preliminary assessment for the mixing of aquifer bodies due to the connection of aquifer units at trenchless crossings.

Table 3.6.17: Preliminary assessment of the mixing of aquifer bodies due to the connection of aquifer units at trenchless crossings

	Preliminary assessment
Receptor	Groundwater

	Preliminary assessment
Potential Impact	Mixing of aquifer bodies due to the connection of aquifer units at trenchless crossings
Proposed Project phase	Construction
Duration	Long term
Mitigation	GH02
Preliminary sensitivity	Medium
Preliminary magnitude	Negligible
Preliminary likely significance of effect	A FWRA (GH02) will be undertaken once the proposed trenchless crossing technique is decided to minimise the risk of mixing aquifer bodies. Further assessment of the trenchless crossing locations will be undertaken for the ES Chapter and targeted hydrogeological risk assessment undertaken as necessary as the design evolves. In addition, **Volume 2, Part 3, Appendix 3.6.A, Preliminary Contamination Risk Assessment** presents a preliminary contamination risk assessment which identified generally a very low/low risk of contamination to be present within the study area. A groundwater risk assessment will also be undertaken as part of the ES at any location where trenchless techniques are proposed, and mitigation will be proposed if necessary. Therefore, significant effects are unlikely and **Not Significant** for all project phases.
Sensitivity Test	No difference in significance of effect
Confidence in prediction	Moderate confidence

3.6.9.8 Table 3.6.18 provides the preliminary assessment for changes to groundwater levels, quality and groundwater flow direction caused by dewatering.

Table 3.6.18: Preliminary assessment for changes to groundwater levels, quality and groundwater flow direction caused by dewatering.

	Preliminary assessment
Receptor	Groundwater
Potential Impact	Changes to groundwater levels, quality and groundwater flow direction caused by dewatering.
Proposed Project phase	Construction
Duration	Temporary (for the length of the dewatering activity)
Mitigation	GH07
Preliminary sensitivity	Medium
Preliminary magnitude	Negligible

	Preliminary assessment
Preliminary likely significance of effect	Currently the requirement for dewatering on the Proposed Project is unknown and further assessment and targeted hydrogeological risk assessment, will be undertaken as part of the ES Chapter if required and further mitigation measures proposed as appropriate. In addition, as per commitment GH07 any dewatering required for the construction of the Proposed Project will be undertaken in accordance with EA guidance and relevant permits. Therefore, based on the frisk assessment proposed as part of the ES Chapter and commitment mentioned above, significant effects are expected to be mitigated and therefore unlikely and **Not Significant**.
Sensitivity Test	No difference in significance of effect
Confidence in prediction	Moderate confidence

3.6.9.9 Table 3.6.19 provides the preliminary assessment of changes to groundwater levels and/or recharge rates from the introduction of impermeable surfaces.

Table 3.6.19: Preliminary assessment of changes to groundwater levels and/or recharge rates from the introduction of impermeable surfaces

	Preliminary assessment
Receptor	Groundwater
Potential Impact	Changes to groundwater levels and/or rechange rates from the introduction of impermeable surfaces
Proposed Project phase	Operation
Duration	Long term
Mitigation	W06
Preliminary sensitivity	Medium
Preliminary magnitude	Negligible
Preliminary likely significance of effect	Infiltration may be affected where new areas of hardstanding are incorporated into the design which could decrease infiltration to the ground and potentially affect aquifer recharge and therefore groundwater level. The proposed Minster Converter Station and Minster Substation are located on Tidal Flat Deposits which are generally low permeability clays therefore the effect on recharge is likely to be negligible. In addition, commitment W06 states that any new surfacing will be permeable surfaces where ground conditions allow. Hardstanding elsewhere within the Proposed Project will be confined to permanent access tracks, and as these will be a much smaller area the impact on groundwater

	Preliminary assessment
	recharge is also expected to be negligible. Therefore, significant effects are unlikely and **Not Significant**.
Sensitivity Test	No difference in significance of effect
Confidence in prediction	Moderate confidence

3.6.10 Summary

3.6.10.1 The assessment presented in Section 3.6.9 has concluded that significant effects are unlikely and therefore **Not Significant** in relation to geology and hydrogeology receptors. In addition, the sensitivity testing has shown that there would be no new or different effects through the application of the different scenarios or options.

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