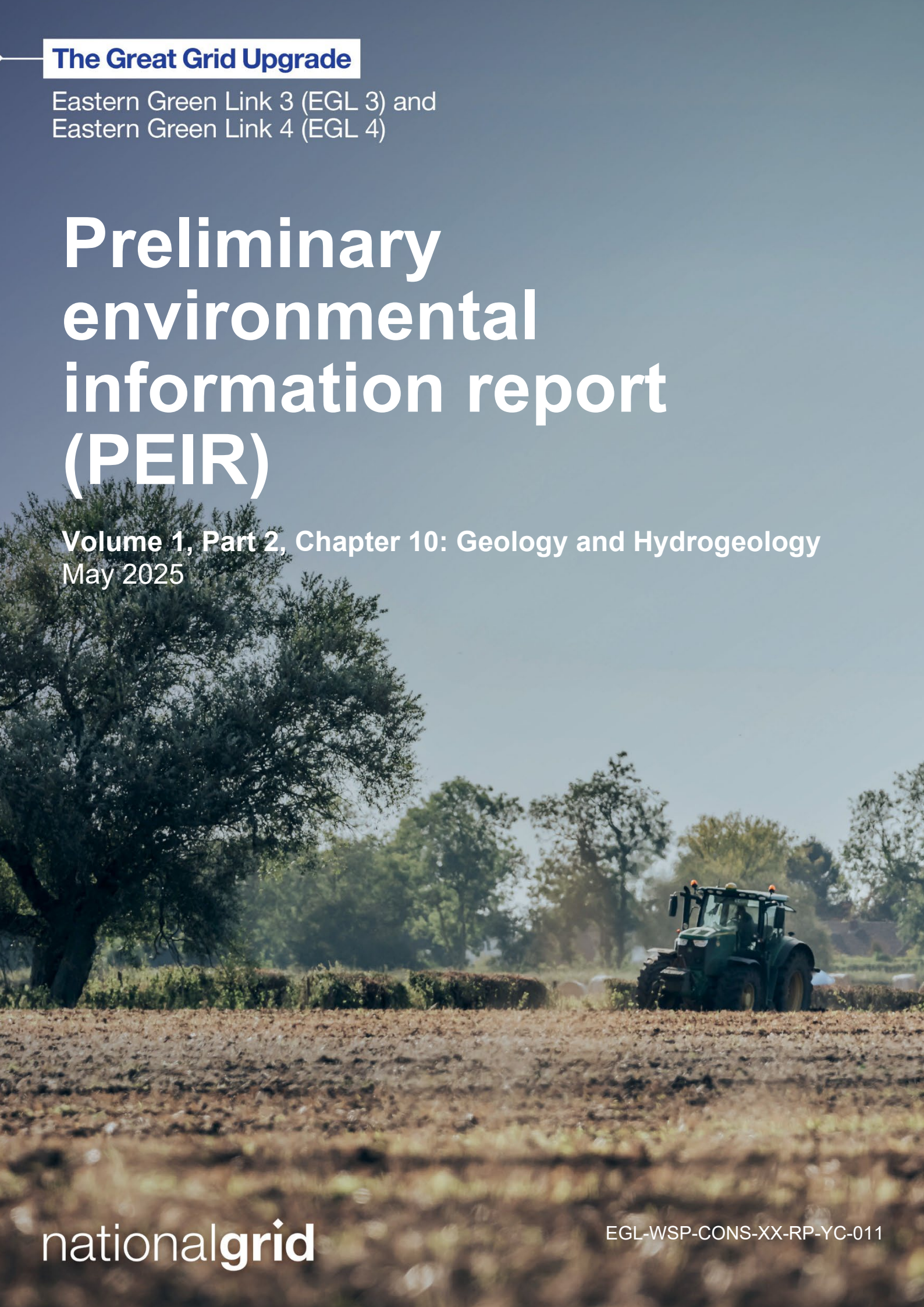
The Great Grid Upgrade

Eastern Green Link 3 (EGL 3) and
Eastern Green Link 4 (EGL 4)

Preliminary environmental information report (PEIR)

Volume 1, Part 2, Chapter 10: Geology and Hydrogeology

May 2025



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10. Geology and Hydrogeology

10.1 Introduction

10.1.1 This chapter presents the preliminary findings of the Environmental Impact Assessment (EIA) undertaken to date for the Eastern Green Link 3 (EGL 3) and Eastern Green Link 4 (EGL 4) English Onshore Scheme, with respect to geology and hydrogeology. The preliminary assessment is based on information obtained to date. It should be read in conjunction with the description of the Projects provided in **Volume 1, Part 1, Chapter 4: Description of the Projects.**

10.1.2 This chapter describes the methodology used, the datasets that have informed the preliminary assessment, baseline conditions, environmental measures, and the preliminary geology and hydrogeology effects that could result from the English Onshore Scheme during the construction and operation (and maintenance) phases. Specifically, it relates to the English Onshore elements of EGL 3 and EGL 4 (the English Onshore Scheme) landward of Mean Low Water Springs (MLWS).

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

- **Volume 1, Part 1, Chapter 4: Description of the Projects** (due to this chapter containing relevant information about the Projects);
- **Volume 1, Part 1, Chapter 5: PEIR Approach and Methodology** (due to this chapter containing relevant information about the methodology applied to this chapter);
- **Volume 1, Part 2, Chapter 6: Biodiversity** (due to consideration of cross-discipline impacts related to changes in the hydrogeological regime leading to impacts on ecology and biodiversity) ;
- **Volume 1, Part 2, Chapter 7: Cultural Heritage,** (due to the potential for impacts on heritage assets outside the English Onshore Scheme by changes to drainage, and preservation conditions);
- **Volume 1, Part 2, Chapter 9: Water Environment** (due to consideration of cross-discipline impacts related to changes in the hydrogeological regime leading to impacts on the water environment);
- **Volume 1, Part 2, Chapter 11: Agriculture and Soils** (due to consideration of how the underlaying geology influences soil characteristics and how soil characteristics may influence groundwater recharge); and;

10.1.4 **Volume 1, Part 2, Chapter 16: Health and Wellbeing** (due to the potential for water availability and quality, as well as contamination, to affect human health). This chapter is supported by the following figures:

- **Volume 3, Part 2, Figure 10-1 Map of Superficial Geology**;
- **Volume 3, Part 2, Figure 10-2 Map of Bedrock Geology**;
- **Volume 3, Part 2, Figure 10-3 Map of Landfills and Mineral Sites**;

- **Volume 3, Part 2, Figure 10-4 Map of Geology Hazard Identification**;
- **Volume 3, Part 2, Figure 10-5 Map of Walkover Areas (Geology)**;
- **Volume 3, Part 2, Figure 10-6 Map of UXO Risk**;
- **Volume 3, Part 2, Figure 10-7 Superficial Aquifer Designations**;
- **Volume 3, Part 2, Figure 10-8 Bedrock Aquifer Designations**; and
- **Volume 3, Part 2, Figure 10-9 Groundwater Receptors and Features.**

10.1.5 This chapter is supported by the following appendices:

- **Volume 2, Part 1, Appendix 1.2.A: Regulatory and Planning Context;**
- **Volume 2, Part 1, Appendix 1.5.A: Outline Register of Design Measures**; and
- **Volume 2, Part 1, Appendix 1.5.B: Outline Code of Conduction Practice (CoCP).**

10.2 Limitations

10.2.1 The information provided in this Preliminary Environmental Information Report (PEIR) is preliminary, the final assessment of potentially significant effects will be reported in the Environmental Statement (ES). The PEIR has been produced to fulfil National Grid Electricity Transmission plc (NGET)'s consultation duties in accordance with Section 42 of the PA2008 and enable consultees to develop an informed view of the preliminary significant effects of the English Onshore Scheme.

10.2.2 The Scoping Report (Ref 10.1) identified aspects of the English Onshore Scheme that were scoped out of the EIA process. Aspects that have been scoped out are not addressed in this PEIR.

10.2.3 The Groundsure reports (Ref 10.2 – Ref 10.6) were obtained for the indicative cable route and indicative zone for converter stations and this PEIR has been based upon these Groundsure reports.

10.2.4 The historical maps within the Groundsure reports (Ref 10.2 – Ref 10.6) have been provided digitally for the indicative cable route plus a 200 m buffer; therefore, locally, in some areas, the mapping does not fully cover the draft Order Limits. The wider historical surrounding area (up to 250 m buffer from the draft Order Limits) has not been provided digitally and is therefore not discussed. Additional information will be obtained prior to and used within the ES as stated in **Section 10.19** to ensure full coverage of the geology and hydrogeology study area.

10.2.5 For geology, the site walkover targeted areas of potential interest such as former landfills, former Royal Airforce (RAF) bases, current industrial land uses, etc. The site walkover also included a drive-by of main access roads to provide a general coverage of the English Onshore Scheme. Due to access constraints, the site walkover is phased, and the initial site walkover (reported in this PEIR) was undertaken between the 19 and 21 November 2024. A second walkover is planned and will be reported within the final ES.

10.2.6 Hydrogeology walkovers have not been conducted in advance of the preparation of the PEIR. These are to be completed in March-April 2025 and will inform the ES.

10.2.7 Abstractions of smaller than 20 m^3 per day may be located along the route if the abstraction user has not reported the abstraction to the Local Planning Authority. Where possible, endeavours would be made to identify these through conversations with other neighbouring landowners.

10.3 Preliminary significance conclusions

10.3.1 For ease of reference, a summary of the significant and potentially significant effects from the preliminary geology and hydrogeology assessment is provided in **Table 10-1**. All other effects in relation to geology and hydrogeology have been assessed as not significant. Further details of the methodology behind the assessment and a detailed narrative of the assessment itself are provided within the sections below.

Table 10-1 – Preliminary summary of significance of effects

Receptor and summary of predicted effects	Sensitivity/ importance/ value of receptor[1]	Magnitude of change[2]	Significance[3]	Summary rationale
Geology				
No likely significant effects have been reported for geology receptors				
Hydrogeology				
No likely significant effects have been reported for hydrogeology receptors				

10.4 Relevant technical guidance

10.4.1 The legislation and planning policy which has informed the assessment of effects with respect to geology and hydrogeology is provided within **Volume 2, Part 1, Appendix 1.2.A**: **Regulatory and Planning Context**. Further information on policies relevant to the English Onshore Scheme is provided in **Volume 1, Part 1, Chapter 2: Regulatory and Policy Overview.** Relevant technical guidance, specific to geology and hydrogeology, that has informed this PEIR and will inform the assessment within the ES is summarised below.

Technical guidance

10.4.2 A summary of the technical guidance for geology and hydrogeology is given in **Table 10-2**.

Table 10-2 –Technical guidance relevant to the geology and hydrogeology assessment

Technical guidance document	Context
Land Contamination: Risk Management (LC:RM), Environment Agency (2020) (Ref 10.7)	Land Contamination Risk Management involves assessing, identifying, and managing potential risks associated with contaminated land to protect human health and the environment.
Contaminated Land Risk Assessment (CIRIA) 552, A guide to good practice, CIRIA (2001) (Ref 10.8)	CIRIA sets out guidance for the approach to contaminated land risk assessment.
BS 10175:2011+A2:2017 Investigation of potentially contaminated sites. Code of Practice, British Standards Institution (2017) (Ref 10.9)	This code of practice provides recommendations and guidance for investigations on site, which could potentially be affected by contamination.
BS 5930:2015+A1:2020 Code of Practice for ground investigations, British Standards Institute, (2020) (Ref 10.10)	This document provides guidance on the legal, environmental, and technical matters relating to site investigation.
Design Manual for Roads and Bridges (DMRB) LA 109: Geology and soils, Highways England, (2019) (Ref 10.11)	DMRB LA109 provides a framework for assessing and managing the potential effects associated with geology and soils.
Protect groundwater and prevent groundwater pollution. Environment Agency (2024) (Ref 10.12)	This guidance sets out the control and permitting of activities that could affect the quantity or quality of groundwater.
The Environment Agency's approach to groundwater protection, Environment Agency (2018) (Ref 10.13)	This guidance sets out the principles of groundwater protection.
Regulatory Position Statement 261: Environment Agency (2018) (Ref 10.14)	This guidance sets out the regulatory approach for consenting the discharge of clean rainwater from excavations.

Technical guidance document	Context
Regulatory Position Statement LIT 16814, Environment Agency (2019) (Ref 10.15)	This guidance sets out the position status of low risk passive dewatering.
National Planning Policy Framework Guidance: Land Affected by Contamination, Ministry of Housing, Communities and Local Government (2024) (Ref 10.16)	This guidance provides guiding principles on how planning can deal with land affected by contamination.
The Definition of Waste: Development Industry Code of Practice, CL:AIRE, (2011) (Ref 10.17)	Guidance on the classification of waste materials from construction for re-use and disposal.

10.5 Consultation and engagement

Overview

10.5.1 The assessment has been informed by consultation responses and ongoing stakeholder engagement. An overview of the approach to consultation is provided in **Section 5.9** of **Volume 1, Part 1, Chapter 5: PEIR Approach and Methodology**.

Scoping opinion

10.5.2 A Scoping Opinion was adopted by the Secretary of State, administered by the Planning Inspectorate, on 05 September 2024. A summary of the relevant responses received in the Scoping Opinion in relation to geology and hydrogeology and confirmation of how these have been addressed within the assessment to date is presented in **Table 10-3**.

10.5.3 Since issue of the Scoping Opinion changes to the Projects design has resulted in Fenland District Council and Cambridgeshire County Council falling withing the draft Order Limits. Whilst the preliminary assessment has taken account of the relevant baseline information for these local planning authorities the scope of the assessment remains unchanged.

10.5.4 The information provided in the PEIR is preliminary, and not all the Scoping Opinion comments have been addressed at this stage; however, all comments will be addressed within the ES.

Table 10-3 – Summary of EIA Scoping Opinion responses for Geology and Hydrogeology

Consultee	Consideration	How addressed in this PEIR
The Planning Inspectorate	The Scoping Report does not appear to make specific reference to the effects of any changes to groundwater physical or chemical properties as a result of thermal effects from the cables during operation. The Inspectorate considers that this should be scoped into the assessment of groundwater quality.	The Inspectorate's comment is noted, and the thermal effects from the cables on groundwater resources will be addressed within the ES. Consultation on the matter will be undertaken to seek agreement on the approach with the Environment Agency as the Regulator.

Consultee	Consideration	How addressed in this PEIR
	The Inspectorate notes that the descriptions of the geological units given are simplified to chalk and mudstone, siltstone, and sandstone. Where possible, the ES should present the full British Geological Survey names of the strata and differentiate between the different geological units	The British Geological Survey (BGS) names of the geological strata have been identified within the baseline reported within this PEIR and will be carried forward into the baseline reported within the ES.
	Whilst the Inspectorate notes that "*degradation of geological resources*" is proposed to be scoped in, the specific details of the assessment are not given. The Inspectorate notes that peat soils are present within the study area, as such peat should be considered within the assessment of geological resources (including any assessment required of peat as an extractable resource for use elsewhere). The presence of peat soils should also be considered within the assessment of presence of contamination in relation to ground gas during construction and where relevant operation.	The Inspectorate's comment is noted; peat as a resource and a potential ground gas source has been included within the PEIR and will be carried forward into the ES.
	The Inspectorate notes that the title of Figure 10-4 is "*Groundwater Source Protection Zones*", however the legend indicates that this also shows Sites of Special Scientific Interest. The ES should ensure that the titles, legends and presentation of figures are consistent.	This has been addressed in the PEIR and carried forward into the ES.
	The Scoping Report proposes to scope out the matter of potential introduction of contaminants through the use and refuelling of construction plant, and the handling of construction material and wastes, on the basis that the standard control or mitigation measures would be implemented during the refuelling of plant and handling of construction materials and wastes. On the basis that these measures would be implemented, and that pollution during other activities are proposed to be scoped in, the Inspectorate is in agreement that this matter can be scoped out of the ES. The Inspectorate would expect however the mitigation measures relied upon for	The Inspectorate's comment is noted and the Applicant proposes to scope this matter out. Environmental mitigation measures related to geology and hydrogeology are discussed in **Section 10.14** Environmental mitigation measures relied upon by the conclusions of the ES will be set out in the ES along with the securing mechanism.

Consultee	Consideration	How addressed in this PEIR
	this to be included in the application documents where appropriate and secured within the DCO.	
	The Scoping Report sets out that a watching brief protocol would be specified for earthworks activities to observe for any unforeseen contamination. The Scoping Report also refers to the requirements for a ground investigation to inform detailed design. The Inspectorate is in agreement that this matter can be scoped out of the ES. The Inspectorate would expect however the watching brief protocol relied upon for this is to be included in the application documents and secured within the DCO.	The Planning Inspectorate's comment is noted, and the Applicant proposes to scope this matter out. A watching brief protocol has been identified as an environmental mitigation measure in **Section 10.14**. This protocol will be set out in the ES, along with the securing mechanism.
	The Scoping Report proposes to scope out the matter of 'storage of construction materials and wastes leading to the generation of potentially contaminated runoff', on the basis that appropriate controls would be set out within the Outline Code of Construction Practice (Outline CoCP) to manage the storage and handling of construction materials, excavated soils and wastes. The Inspectorate is in agreement with this reasoning and that this matter can be scoped out of the ES. The Inspectorate would expect however the mitigation measures relied upon for this to be included in the application documents and secured within the DCO such as a site waste management plan	The Inspectorate's comment is noted and the Applicant proposes to scope this matter out. Environmental mitigation measures related to geology and hydrogeology are discussed in **Section 10.14**. Environmental mitigation measures relied upon by the conclusions of the ES will be set out in the ES along with the securing mechanism.
	The Scoping Report details that a drainage strategy would be in place which would incorporate attenuation, and where required treatment prior to discharge. The Inspectorate agrees that this matter can be scoped out of the ES. The Inspectorate would expect however a drainage strategy and the other mitigation measures relied upon for this to be included in the application documents and secured within the DCO.	The Inspectorate's comment is noted, and the Applicant proposes to scope this matter out. The surface water drainage strategy will set out the Project's approach to managing surface water runoff, including details of the treatment train. Environmental mitigation measures relied upon by the conclusions of the ES will be set out in the ES along with the securing mechanism.

10.6 Technical Engagement

10.6.1 Technical engagement with consultees in relation to geology and hydrogeology is ongoing. A summary of the technical engagement undertaken to 03 February 2025 is outlined in **Table 10-4**.

Table 10-4 – Technical engagement on the environmental aspect assessment

Consultee	Consideration	How addressed in this PEIR
The Planning Inspectorate	On 29 July 2024, NGET submitted a Scoping Report to the Planning Inspectorate. The Inspectorate has returned a Scoping Option (dated 05 September 2024), where it has/has not agreed to scope out certain aspects / matters on the basis of the information provided as part of the Scoping Report.	Comments created by the Inspectorate have been noted. Where possible these matters have been addressed within this PEIR or will be deferred to be included in the ES. A response to the comments raised by the Planning Inspectorate is provided in **Table 10-3**.
Environment Agency	The Scoping Report was issued to the Environment Agency, and comments were received on 26 August 2024.	Contaminated land records have been requested from Local Authorities as part of the data requests. Reference has been made to the CL:AIRE (Contaminated Land: Applications in Real Environments) Definition of Waste: Code of Practice (DoW CoP)
	Teams meeting with the Environment Agency on 10 December 2024 to discuss the various technical aspects of the EIA.	Feedback from the Environment Agency on the guidance used, baseline features and key issues has been incorporated into this PEIR.
Environment Agency – Lincolnshire and Northamptonshire Area	A request for environmental data was issued to the Environment Agency on 30 May 2024, and information was received on 17 July 2024.	The information that has been obtained from the Environment Agency has been utilised as part of the assessment.
East Lindsey District Council – Information Management Kings Lynn and West Norfolk Borough Council – environment and planning	Information request submitted to local authorities regarding the location of private water supplies, pollution incidents, landfilling activities, storage of hazardous material, current	Information received from the Local Authorities has been used, where applicable.

Consultee	Consideration	How addressed in this PEIR
Boston Borough Council – Environmental Health	and historic contaminative activities and any other information on environmental conditions, land contamination site investigation and remedial works.	
South Holland District Council – Environmental Protection		
Fenland District Council – Environmental Health		

10.6.2 Engagement with the Environment Agency and Local Authorities will continue to inform the ES.

10.6.3 In advance of the ES, engagement will also be undertaken with the following key stakeholders relevant to the geology and hydrogeology to discuss the proposed assessment methodology:

- The Environment Agency and National Grid will be consulted on the approach to assessment of thermal impacts from the cable. The approach to the thermal (analytical) assessment of heat effects from buried cables will be agreed with the Environment Agency. Agreed measures will be incorporated into the design, as required.
- Anglian Water will be consulted in relation to works within SPZ, the protection of supplies, and the use of water in construction.
- A prioritised subset of groundwater abstraction owners within the study area will be consulted through site surveys.
- Further engagement with Local Authorities to confirm the presence or absence of sites designated as regional and local geological sites.

10.7 Data gathering methodology

10.7.1 For geology, the characterisation of the existing baseline has been informed by a preliminary site walkover targeting areas of interest, information requests submitted to the Environment Agency and Local Authorities, Groundsure reports for the indicative cable route and indicative zone for converter stations and a Zetica Unexploded Ordnance (UXO) preliminary assessment report (Ref 10.18).

10.7.2 Data gathering for geology has also comprised a desk review of the following data:

- British Geological Survey (BGS), Geoindex (onshore) (Ref 10.19);
- BGS Sheet Maps, 1:50,000 scale (Sheet Numbers, 104 (Ref 10.20) , 115 (Ref 10.21), 116 (Ref 10.22), 128 (Ref 10.23), 129 (Ref 10.24), 144 (Ref 10.25), 145 (Ref 10.26), 159 (Ref 10.27));
- Department for Environment Food and Rural Affairs (DEFRA), Magic Maps (Ref 10.28);
- Mining Remediation Authority Interactive Viewer (Ref 10.29);
- Google Earth (Ref 10.30);
- Environment Agency Historical Landfill Sites WMS data file (Ref 10.31);

- UK Radon Information Map (Ref 10.32); and
- Local conservation and geology interest webpages (Ref 10.33, Ref 10.34, Ref 10.35).

10.7.3 Data gathering for hydrogeology has comprised a desk review of the following data:

- Information from the Environment Agency:
  - Licensed abstractions (Ref 10.36); and
  - Deregulated abstractions (Ref 10.37).
- Records of active Private Water Supplies from:
  - East Lindsey District Council (Ref 10.38);
  - Boston Borough Council (Ref 10.39);
  - South Holland District Council (Ref 10.40);
  - Fenland District Council (Ref 10.41); and
  - Kings Lynn and West Norfolk Borough Council (Ref 10.42).
- Multi-Agency Geographic Information for the Countryside (MAGIC) interactive map, Department for Environment Food and Rural Affairs (Defra) (Ref 10.28);
- BGS Hydrogeological Maps (Sheet 2: Hydrogeological Map of North and East Lincolnshire (1967) (Ref 10.43), and Sheet 1: Hydrogeological Map of England and Wales (1977) (Ref 10.44);
- Environment Agency's Catchment Data Explorer (Ref 10.45);
- Natural England Designated Sites Viewer (Ref 10.46);
- Environment Agency Groundwater Dependent Terrestrial Ecosystems (Ref 10.47); and
- Old Ordnance Survey mapping (various scales / dates) available on the National Library of Scotland online mapping (Ref 10.48).

10.8 Study area

10.8.1 The study area for geology comprises the draft Order Limits for the English Onshore Scheme, plus a 250 m buffer. This is presented in **Volume 3, Part 2 Figure 10-1: Bedrock Geology** and **Figure 10-2 Superficial Geology**.

10.8.2 Given the scale and nature of the English Onshore Scheme, this is considered an appropriate approach. The study area is also based on professional judgement, knowledge of similar projects and the DMRB LA109: Geology and Soil.

10.8.3 For hydrogeology, the study area comprises land directly affected by the English Onshore Scheme (draft Order Limits) plus a 500 m buffer as presented in **Volume 3, Part 2, Figure 10-9: Groundwater Receptors and Features**.

10.8.4 The distance of 500 m from the draft Order Limits is in line with The Water Abstraction and Impounding (Exemptions) Regulations (2017) (Ref 10.49) for small-scale dewatering, which states that distances of "*500 metres of a conservation site or within 250 metres of a spring, well or borehole used to supply water for any lawful use*" are

permissible for small scale dewatering. The study area extent is also selected based on the expected shallow depth of the English Onshore Scheme and knowledge of similar projects.

10.9 Desk study

10.9.1 A summary of the organisations that have supplied data, together with the nature of that data is outlined in **Table 10-5**.

Table 10-5 - Local Planning Authority and Environment Agency data used to inform the geology and hydrogeology assessment

Organisation	Data source	Data provided
Environment Agency	Data held by the Environment Agency	Recorded environmental incidents (pollution incidents). Surface and groundwater quality data. Potentially contaminative land uses, activities, stores and remedial works. Surface and groundwater flooding risk. Abstraction data (licensed and deregulated) Active Discharge data. Ecology data. Active and historic landfill data.

10.10 Walkover / Surveys

Geology:

10.10.1 An initial walkover was undertaken between the 19 – 22 November 2024. This involved a drive-by and visiting areas of potential interest; as shown on **Volume 3, Part 2, Figure 10-5: Geology Walkover Route**.

10.10.2 The drive-by was conducted along the main roads around the indicative cable route, with the team stopping along the route making observations and taking photographs of the general surrounding area.

10.10.3 For the walkover, land access requests were made for the areas of potential interest identified including former landfills, former RAF bases, current industrial land uses, former mineral sites, and the landing location. During the walkover, photos and notes were taken and geotagged using QField (data collection application).

10.10.4 Not all access requests were granted and only 14 of 28 land parcels were accessed during the November 2024 walkover. A second walkover is proposed which will incorporate areas not previously accessible, a review of additional data received after the first walkover and gaps identified during the preparation of the ES.

Hydrogeology:

10.10.5 A two staged approach has been adopted to inform the assessment of risks arising from the English Onshore Scheme on groundwater receptors:

- Stage 1: Consideration of all receptors within 500 m of the draft Order Limits to develop a robust conceptual understanding of baseline conditions. The Phase 1 dataset is collated using distances measured on a worst-case basis i.e. from the edge of the draft Order Limits.

10.10.6 However, it is considered that features close to junction and road improvements but situated at distance from the indicative zone for underground cable assets are unlikely to be at significant risk from the English Onshore Scheme, since the primary risks to groundwater receptors are associated with the installation of the cables. Therefore, the ES will adopt a proportionate risk based approach. Data collection and assessment will prioritise features closer to the working width as described in Stage 2 below:

- Stage 2: A refinement of the receptors identified in Stage 1 taken forward for detailed assessment. Receptors will be refined using the criteria set out in **Table 10-6** and will allow a proportionate assessment based on the separation distances from the indicative zone for underground cable assets (as that will be the principal area of below ground works) and likely use.

Table 10-6 Priority Ranking Criteria for Groundwater Receptors

Priority Rank	Criteria (measured from the indicative zone for underground cable assets)
1	Environment Agency Licensed, Environment Agency deregulated, and Local Planning Authority registered features within 250 m
2	BGS and historical (OS) within 100 m
3	Environment Agency licensed and Environment Agency deregulated, greater than 250 m but less than 500 m
4	BGS greater than 100 m, but less than 250 m

10.10.7 A large number of features have been identified during Stage 1. As the Projects timelines develop and the indicative zone for underground cable assets becomes refined, a PWS survey will be programmed. Receptors to be visited during the survey will thus be a subset of the locations identified in Stage 1, based on a combination of distance from the working width and use.

10.10.8 The surveys will comprise a visit to groundwater receptors to ground truth data, ascertain their existence and use of potential water supplies. Photographic evidence is to be taken, and any details on usage quantities and abstraction horizon is to be recorded.

10.10.9 No hydrogeological surveys have been conducted prior to this PEIR. This is likely to be undertaken in March – April 2025, depending on land access.

10.11 Overall baseline

Current baseline Geology:

10.11.1 The baseline provides a characterisation of the study area in terms of geological and hydrogeological settings. To provide geographical context, the study area has been split into the following sections:

- Landfall at Anderby Creek;
- Section 1: Landfall at Anderby Creek to Thurlby;
- Section 2: Thurlby to Welton Le Marsh;
- Section 3: Welton Le Marsh to Little Steeping;
- Section 4: Little Steeping to Sibsey Northlands;
- Section 5: Sibsey Northlands to Hubbert's Bridge;
- Section 6: Hubbert's Bridge to Moulton Seas Ends;
- Section 7: Moulton Seas Ends to Foul Anchor; and
- Section 8: Foul Anchor to Walpole (including the indicative zone for converter stations).

10.11.2 These sections reflect the geographical sections presented in the Scoping Report (Ref 10.1), with the exception of the landfall at Theddlethorpe, which is no longer part of the Projects. The sections are shown in **Volume 3, Part 2**, **Figure 10-4 Map of Geology Hazard Identification** and **Figure 10-5 Map of Walkover Areas (Geology)**.

Current baseline Geology:

10.11.3 The superficial and bedrock geology for each of these sections is presented in **Table 10-7.**

10.11.4 A high-level summary of the baseline features (walkover description, current uses, mapped geology, desk-based assessment of areas of potential interest; history, unexploded bomb risk, historical landfills, radon risk, pollution incidents) within the geology study area is summarised in below. Reference should also be made to **Volume 3, Part 2**:

- **Figure 10-1 Map of Superficial Geology;**
- **Figure 10-2 Map of Bedrock Geology;**
- **Figure 10-5 Map of Walkover Areas (Geology);** and
- **Figure 10-6 Map of UXO Risk.**

10.11.5 Key features described are also noted in **Volume 3, Part 2 Figure 10-3: Landfills and Mineral Sites** and **Figure 10-4 Geology Hazard Identification Map**.

10.11.6 The below is based on freely available information, information supplied by the Environment Agency and local authorities (described above) as well as the Groundsure reports, which include historic maps of the indicative cable route.

10.11.7 The Lincolnshire Minerals Local Plan (Ref 10.50), East Lindsey Minerals Safeguarding Areas Policies Map (Ref 10.51) and Cambridgeshire and Peterborough Minerals and

Waste Local Plan (Ref 10.52) were reviewed, and Mineral Safeguarding Areas or strategically designated sites and facilities were not identified within the study area.

10.11.8 Sites designated for their regional or local geological importance have not been identified within the study area. As these designations are made and recorded at local levels, combined data sets of sites registered for their local or regional geological importance are not available. This included a review of a number of online sources such as the Greater Lincolnshire Nature Partnership (Ref 10.33), Norfolk Geodiversity Partnership (Ref 10.34) and Geological Society of Norfolk (Ref 10.35).

10.11.9 Further local enquiries will be made prior to the ES, and should local or regionally important geological sites be identified, these will be reported and taken forward within the ES.

10.11.10 Of the SSSI identified (outlined in **Volume 1, Part 2, Chapter 6 Biodiversity**), none were noted to be designated for their geological interest.

Baseline – Landfall at Anderby Creek

Walkover description:

10.11.11 The landfall at Anderby Creek is a roughly rectangular section of land that covers an area of approximately 187 hectares (ha).

10.11.12 From the publicly accessible areas of the landfall, agricultural fields with a road "*Roman Bank*" running northsouth roughly through the centre were visible. Farm buildings and a small number of residential houses are present in the middle of the landfall, west of the road. The topography is relatively level.

10.11.13 The immediate surrounding land is agricultural with a network of ditches except to the east where it is bound by Anderby Creek beach where there are sea defences (and extending to the Mean Low Water Springs (MLWS)). To the north, small (1-2 m high) stockpiles of soil were noted within the field and further northeast where there is Sandiland Golf Course (National Trust nature reserve) and clusters of residential properties surrounding.

10.11.14 Access to land parcels within this area was not arranged, as areas of potential interest were not identified prior to the Site walkover (November 2024), and this section was visible from public roads.

Historical context:

10.11.15 The available historical maps (Ref 10.3) show the indicative cable route has remained largely undeveloped agricultural farmland since the earliest available map C.1886 with a coast guard station mapped near the beach between 1886 – 1969 and Roman pottery being shown as being found within the landing area in the 1951 mapping.

UXO risk:

10.11.16 The risks from UXO have been assessed by Zetica in a preliminary risk assessment report (Ref 10.18) which assessed this area to be low risk. A low risk assessment allows for construction works to proceed without further measures, although Zetica recommends an awareness briefing prior to construction.

Radon risk:

10.11.17 Radon gas is a natural geological phenomenon for which prolonged elevated exposure can lead to health risks. Radon risk for this section is characterised as low, as <1 % of homes are at or above the action level at which protection measures may be considered necessary (Ref 10.32).

Landfills:

10.11.18 Landfills are known to be potential sources of contamination and hazardous ground gas and, as such are noted in baseline land assessments. Historical or registered landfills are not mapped within the study area for this geographical section (Ref 10.31).

Pollution incidents:

10.11.19 Pollution incidents are not reported, the closest is approximately 50 m to the south. This incident occurred in 2002 and involved household waste. This incident had no impact on water or air and only a minor impact on the land (Ref 10.3).

Baseline – Landfall to Walpole

Section 1: Landfall at Anderby Creek to Thurlby

Walkover description:

10.11.20 The Anderby Creek to Thurlby section (Section 1) comprises an irregularly shaped and elongated parcel as the indicative cable route extends westwards from the landfall, covering an area of approximately 117 ha (Ref 10.1).

10.11.21 From the publicly accessible areas of Section 1, this section comprises undeveloped largely flat, agricultural land with field drains and tracks with the A52 crossing northsouth through the approximate centre of the section and Long Lane transecting northwest to southeast at the western end of the Section 1.

10.11.22 Although mapped in historical maps in the far west (running northeast to southwest) of Section 1, evidence of the former railway was not observed during the walkover, with fields and trees being visible.

10.11.23 Access to land parcels within this Section 1 was not arranged as areas of potential interest were not identified prior to the site walkover completed in November 2024, and this section was visible from public roads. The location of the former railway was visible from the road.

10.11.24 The land surrounding Section 1 primarily comprises agricultural fields with farms, small villages (Huttoft, to the north and Anderby to the south) and a campsite (Simon Field Farm Campsite) and caravan parks (Manor Farm Caravan Park and Captain Bluebells) to the south of the draft Order Limits in Section 1.

Historical context:

10.11.25 The available historical maps (Ref 10.4), dated from 1888, shows predominantly undeveloped agricultural land with a property (later called Stripe Farm by 1905) mapped in the northernmost field of this section (within the footprint of a current day pond).

10.11.26 No significant changes are noted to the present day, although Stripe Farm was last mapped in 1968 and was demolished prior to 2003, when the current day pond is shown.

UXO risk:

10.11.27 The risks from UXO have been assessed by Zetica in preliminary risk assessment report (10.18) which assessed this area to be low risk. A low risk assessment allows for construction works to proceed without further measures although Zetica recommends an awareness briefing prior to construction.

Radon risk:

10.11.28 Radon gas is a natural geological phenomenon for which prolonged elevated exposure can lead to health risks. Radon risk is characterised as low, as <1 % of homes are at or above the action level at which protection measures may be considered necessary (Ref 10.32).

Landfills:

10.11.29 Landfills are known to be potential sources of contamination and hazardous ground gas and, as such, are noted in baseline land assessments. Historic or registered landfills are not mapped within the study area of Section 1 (Ref 10.31).

Pollution incidents:

10.11.30 Pollution incidents are not reported within 250 m of the indicative cable route (Ref 10.4).

Section 2: Thurlby to Welton Le Marsh

Walkover description:

10.11.31 The Thurlby to Welton-le-Marsh section comprises an irregularly shaped parcel of land, extending southwards and then westwards from Thurlby and covers an area of approximately 400 ha (Ref 10.1).

10.11.32 From the publicly accessible areas of Section 2, the section is largely flat, undeveloped agricultural land with surface water drains and private and public roads and tracks. Alford Road is mapped in the north, Cumberworth Road and Mill Lane in the centre, two unclassified roads in the south and the A1028 runs northwest to southeast at the southern boundary of the section. According to satellite imagery (Ref 10.3), there are two agricultural laydown/storage areas in the north.

10.11.33 Access to land parcels within this section was requested, however, access was not arranged by the time of the walkover (November 2024) but most areas of the section were visible from roads and along the A158, B1196 and A1028 in the south of this section. The sandpits shown in historical mapping (see below) are currently a small, wooded area next to the B1196 and a field, respectively. There was no evidence of the mapped former landfill identified during the walkover, with the location currently visible as a field.

10.11.34 The area surrounding Section 2 primarily comprises agricultural land with farms, small villages (Welton Le Marsh, Orby) and residential buildings.

Historical context:

10.11.35 The available historical maps (Ref 10.4), dated from 1887, shows predominantly undeveloped agricultural land with the Sutton and Willoughby Branch railway line within the draft Order Limits. In the far north, there is a farm building close to Willoughby Farm and Morley Farm and two sand pits within the draft Order Limits within the field north of Gunby Roundabout.

10.11.36 The earliest map for the middle portion of Section 2 is from 1905 and shows the area as undeveloped agricultural land with Station Farm in the north, the farm buildings close to Willoughby Farm are not mapped by 1975, being shown as farmland. In the 1995 mapping, Morley Farm and the two sand pits are shown as a small, wooded area and farmland, respectively, and the railway line is labelled as dismantled.

10.11.37 Station Farm was mapped in 1995, although the 2003 satellite imagery shows a single barn in the footprint of the farm. This barn was removed by 2016.

UXO risk:

10.11.38 The risks from UXO have been assessed by Zetica in preliminary risk assessment report (Ref 10.18) which assessed this area to be low risk. A low risk assessment allows for construction works to proceed without further measures, although Zetica recommends an awareness briefing prior to construction.

Radon risk:

10.11.39 The majority of this section lies within a low radon risk area (<1 %), although the south of this section (south of Welton Le Marsh) is designated as an intermediate risk (1-3 %) of homes are at or above the action level at which protection measures may be considered necessary (Ref 10.32).

Landfills:

10.11.40 Data from the Environment Agency records (Ref 10.31) a single former landfill within the draft Order Limits. This former landfill is located in a current agricultural field approximately 70 m east of the B1196 and approximately 500 m north of the Gunby roundabout. This landfill is recorded as having received household waste, although no date is recorded. The location recorded for the landfill is different to the sand pits noted in the available historical mapping.

Pollution incidents:

10.11.41 Pollution incidents are not reported within 250 m of the indicative cable route (Ref 10.4).

Section 3: Welton Le Marsh to Little Steeping

Walkover description:

10.11.42 The Welton Le Marsh to Little Steeping section comprises an irregularly shaped parcel of land that extends southwest from Welton Le Marsh and covers an area of approximately 198 ha (Ref 10.1).

10.11.43 From the publicly accessible areas of Section 3, the land is largely flat, undeveloped agricultural fields with various public and private access roads, including the A158 and B1195 bounded in the south by Steeping River.

10.11.44 The land use across the section and in the immediate surrounding area is agricultural.

10.11.45 Access to land parcels within the study area was requested, as the former RAF Spilsby is mapped within the middle of this section, but access was not granted to the former RAF Spilsby at the time of the walkover. Observations were therefore made from public roads, which revealed the middle areas of the airfield were covered by fields with localised areas of hardstanding (potentially remnants of airfield) but no obvious above ground structures noted.

10.11.46 Access to the following areas outside of the draft Order Limits were granted (see **Volume 3, Part 2 Figure 10-5 Map of Walkover Areas (Geology)**), and the following noted:

- Access was granted for the parcel adjacent to the draft Order Limits and formerly occupied by RAF Spilsby, located off Eastfield Road. The walkover confirmed the parcel of land being occupied with caravans, plant, vehicles, and containers (barrels and large plastic tubs) present but labels / description of the content of the containers was not observed.
- During the walkover, the field immediately adjacent to the draft Order Limits (off-site), to the southeast of the Gunby Estate appeared undulating (0.5 m high furrows).

Historical context:

10.11.47 The available historical maps (Ref 10.4) dated from 1887, shows predominantly undeveloped agricultural land with a property (later shown to be within the footprint of the former RAF Spilsby) and unnamed roads.

10.11.48 The land use remains predominantly unchanged to the present day, although the 1904 map shows ‘armour’ (archaeology) found within the draft Order Limits in the fields west of Gunby Lane. The 1951 to 1955 maps record the former RAF Spilsby on-site (with more detail shown than on the 1971 to 1973 maps which show runways only). The former RAF Spilsby is noted to have comprised of runways, technical areas, bomb stores and a gun range (Ref 10.18). From the available mapping, runways and hardstanding were identified within the airfield. The airfield is reported as disused in 1976, although the infrastructure is still mapped until 1994, after which the airfield resembles its current day agricultural land use.

10.11.49 Records from International Bomber Command Centre Digital Archive (Ref 10.53) indicate RAF Spilsby was operational from 1943 until 1958.

UXO risk:

10.11.50 The risks from UXO have been assessed by Zetica in preliminary risk assessment report (Ref 10.18) which assessed this area to be low risk.

10.11.51 However, the historical maps show the airfield of RAF Spilsby as mapped within the footprint of the indicative cable route (Ref 10.18).

10.11.52 A low risk assessment allows for construction works to proceed without further measures although Zetica recommends an awareness briefing prior to construction.

Radon risk:

10.11.53 In this section, the risk varies between low <1 % and moderate 3-5 % of properties are above the radon action level (Ref 10.32) .

Landfills:

10.11.54 Historic or registered landfills are not recorded within the study area.

Pollution incidents:

10.11.55 Pollution incidents are not reported within 250 m of the indicative cable route (Ref 10.4).

Section 4: Little Steeping to Sibsey Northlands

Walkover description:

10.11.56 The Little Steeping to Sibsey Northlands section is irregular in shape, extending southwest from Little Steeping, and covers an area of approximately 675 ha (Ref 10.1).

10.11.57 From the publicly accessible areas of Section 4, the topography is predominantly flat and is formed of agricultural land with a number of public roads (Thorpe Bank, Midville Road, East Fen Lane), unnamed private roads and surface water drains (Dowse's Sewer, Thorpe Drain, Hobhole Drain, Bell Water Drain, Lade Bank Drain).

10.11.58 Land use within the study area and land use in the immediate surrounding area is largely agricultural, with occasional farms and residential properties within the study area.

10.11.59 Access to land parcels within this area was not arranged as areas of potential interest were not identified prior to the site walkover (November 2024) and this section was visible from public roads.

Historical context:

10.11.60 The available historical maps (Ref 10.4), dated 1887, only provide coverage for the southern part of Section 4. It shows the indicative cable route is predominantly undeveloped agricultural land with a single property (probably a farm) within the draft Order Limits, immediately south of East Fen Lane.

10.11.61 Later mapping for the indicative cable route is dated 1901-1906 and shows undeveloped agricultural land with three small (probably farm buildings) within the draft Order Limits in the north, with two possible ponds/pits located near the buildings.

10.11.62 The 1970-75 historic maps show the removal of the southern and northernmost farm buildings, and the two ponds/pits in the north of the section are no longer mapped (assumed to be infilled). Three new structures have been mapped within the draft Order Limits in the 1970-1975 mapping, named as Royalty Farm, in the centre of the draft Order Limits until 1995, but these are not present after 1999. Except for these changes, the historical mapping shows unchanged agricultural land use.

10.11.63 Peat is mapped within the study area in the central area of the section (Ref 10.19). Based on current searches, this has not been designated as a locally or regionally important geological site, however peat is considered to be geologically important and has been included within this assessment.

UXO risk:

10.11.64 The risks from UXO have been assessed by Zetica in a preliminary risk assessment report (Ref 10.18) which assessed this area to be low risk.

10.11.65 However, numerous bombing locations have been recorded roughly 200 m outside of the draft Order Limits, west of Leake Commonside (Ref 10.18).

10.11.66 A low risk assessment allows for construction works to proceed without further measures, although Zetica recommends an awareness briefing prior to construction.

Radon risk:

10.11.67 The majority of Section 4 falls within a low risk (<1 %) area, except for the north close to Firsby, which falls within a moderate risk from radon as 3-5 % of homes are at or above the action level at which protection measures may be considered necessary (Ref 10.32).

Landfills:

10.11.68 Historical or registered landfills are not reported within the study area (Ref 10.31).

Pollution incidents:

10.11.69 Five pollution incidents have been reported. These were outside of the draft Order Limits, but fall within the study area. One (dated 2001) is located immediately adjacent to the draft Order Limits, approximately 2 km south of Halton Fen, relating to firefighting runoff off, which had a minor impact on land and air, no impact on water. A second, dated 2003, is located immediately adjacent to the draft Order Limits and related to the release of algae into water (minor impact) but no impact to land or air. These are not considered significant given the impacts and dates of the incidents and are not considered further. The remaining three reported no impact to water or land, and only a significant impact to air (Ref 10.4).

Section 5: Sibsey Northlands to Hubbert's Bridge

Walkover description:

10.11.70 The Sibsey Northlands to Hubbert's Bridge section (Section 5) is comprised of an irregular shaped parcel of land as the indicative cable route progresses southwest from the Little Steeping to Sibsey Northlands section (Section 4) and covers an area of approximately 550 ha (Ref 10.1).

10.11.71 The topography is predominantly flat and largely undeveloped agricultural land with private and public roads crossing the section (A16, Trader Bank, Hale Lane, B1183, Frith Bank, Fenside Road, Punchbowl Lane & A1121). A number of surface water drains and rivers also cross the section (Stone Bridge Drain, Mill Drain, West Fen Drain, Firth Bank, River Witham, North Forty Foot Drain).

10.11.72 At the crossing of West Fen Drain, the Rochdale Envelope for the English Onshore Scheme includes two options, north and south of a residential property to the east of West Fen Drain (refer to Sheet 4 of **Volume 3, Part 1, Figure 4.5**). Both routes cross West Fen Drain east to west and converge shortly west of the crossing. On each side of West Fen Drain, the land is flat agricultural fields. There are also two options, east

and west of Slate House Farm, both of the indicative cable routes travel through agricultural fields, diverging approximately 600 m north of South Forty Foot Drain.

10.11.73 The land use within the immediate surrounding area is predominantly agricultural land, with residential and commercial buildings. The following features are located outside of, but immediately adjacent to the draft Order Limits: a small commercial/industrial estate is located north of Boston Golf Course, a garage north of Firth Bank road and Boston Airfield, north of the A1121.

10.11.74 Access to the two historical landfills identified by East Lindsey Council was not granted at the time of the walkover.

10.11.75 Access to the following area outside of the draft Order Limits was granted (see **Volume 3, Part 2: Figure 10-5 Map of Walkover Areas (Geology)**) and the following noted:

10.11.76 Access was granted to a solar farm, immediately adjacent to the draft Order Limits, east of Anton's Gowt. According to the landowner, the solar farm has been operational since 2015 and "Fuels or chemicals are not used except for dielectric fluids, used in transformers. These fluids are bunded and there have been no previous spills on the solar farm."

10.11.77 According to the landowner at the solar farm, there is a badger sett located within the draft Order Limits, within a field north off Firth Bank Road.

Historical context:

10.11.78 The available historical maps (Ref 10.4) dated 1887, shows predominantly undeveloped agricultural land. In the north buildings, pumps, and ponds (probably farm related) are mapped in the fields west of Stone Bridge Drain and north and south of Hale Lane (including former Black House Farm, mapped adjacent to the north of Hale Lane until 2004). A small pond is also mapped in the south, within the field north of South Forty Foot Drain, but not shown after 1970.

10.11.79 No significant changes are noted. By 1970, some of the farm buildings in the north and south of Hale Lane had been removed, but a new farm building is mapped in the middle of the draft Order Limits, north of Firth Bank.

UXO risk:

10.11.80 The risks from UXO have been assessed by Zetica in preliminary risk assessment report (Ref 10.18) which assessed this area to be low risk.

10.11.81 However, bombing locations have been recorded in the Zetica mapping off-site, adjacent to the draft Order Limits, within adjacent fields (Ref 10.18).

10.11.82 A low risk assessment allows for construction works to proceed without further measures although Zetica recommends an awareness briefing prior to construction.

Radon risk:

10.11.83 Radon risk is characterised as low, as <1 % of homes are at or above the action level at which protection measures may be considered necessary (Ref 10.32).

Landfills:

10.11.84 Historical or registered landfills are not recorded within the draft Order Limits (Ref 10.31).

10.11.85 Two historical landfills are recorded within 250 m of the draft Order Limits in the data provided by East Lindsey Local Planning Authority. Both were reported as active between 1843 – 1893. One landfill is located southwest of Sibsey, approximately 215 m east of the draft Order Limits, west of Stone Bridge Drain and is currently residential property. The other landfill is located immediately to the north to Boston Golf Course and 250 m south of the draft Order Limits. Access was not granted to these areas at the time of the walkover.

Pollution incidents:

10.11.86 Pollution incidents are not reported within 250 m of the indicative cable route (Ref 10.4).

Section 6: Hubbert's Bridge to Moulton Seas End

Walkover description:

10.11.87 The Hubbert's Bridge to Moulton Seas End section (Section 6) comprises an irregularly shaped parcel of land which extends southwards from Hubbert's Bridge and covers an area of approximately 680 ha (Ref 10.1).

10.11.88 From the publicly accessible areas observed during the walkover, Section 6 comprises predominantly undeveloped agricultural land. Private and public roads cross the study area (New Hammond Road, Swine Head Road, Frampton Bank, B1192, Kirkton Holme Road, Green Lane, B1391, Malmsgate Lane, Fishmere End Road, Boston Road, Mandike Road, Bush Green Lane, A17, B1357).

10.11.89 Surface drains and rivers cross the study area. (South Forty Foot Drain, New & Old Hammond Beck, Craile Eau, Kirkton Drain, Little Three Towns, Three Towns Drain, River Welland, Moulton River).

10.11.90 The Rochdale Envelope for the English Onshore Scheme includes for two options of crossing the South Forty Foot Drain, which are incorporated into the study area (Ref 10.1). The two options pass east and west of the Slate House farm buildings (north of South Forty Foot Drain, see above), after crossing South Forty Foot Drain. Both options pass through fields and east and west respectively of unnamed farm buildings on the north and south side of New Hammond Beck then across New Hammon Beck before returning to a single indicative zone for underground cable asset approximately 400 m south of New Hammond Beck.

10.11.91 Land use within the study area is predominantly agricultural, with occasional residential properties. Two solar farms are recorded immediately adjacent off-site, close to Kirkton, and one solar farm is recorded off-site approximately 100 m east of the draft Order Limits in the north of the section. A used car dealership (Revs Automotive) is present immediately west of the draft Order Limits on the south bank of New Hammon Beck.

10.11.92 Access to land parcels within the section was requested (historical landfill, solar farms, and former Kirkton Auxiliary Unit Base) but not granted prior to the site walkover (November 2024), but observations were made where possible along publicly accessible areas.

Historical context:

10.11.93 The available historical maps (Ref 10.4) dated from 1887, 1889 and 1903 show predominantly undeveloped agricultural land with numerous small ponds but are no longer present on current day mapping. Two large ponds/drains are mapped in the field south of the River Welland and two small properties are mapped adjacent to Mandike Road during this time.

10.11.94 The 1929 historic map shows a tramway within the draft Order Limits, within a field west of Washway Road, but not on the 1950 map.

10.11.95 The 1950 map shows the presence of three small buildings, within the draft Order Limits, in the field west of Holmes Road. By 1955, the two large ponds/drains had been altered into a single large pond but are not shown by the 1974 map. The 1973 map shows a 'council depot' north of Fishmere End Road, which is later demolished in 1999. The 1974 map also shows the presence of a new building and 'Tank' associated with Willoughby Farm, south of Swineshead Road later demolished by 1999.

UXO risk:

10.11.96 The risks from UXO have been assessed by Zetica in preliminary risk assessment report (Ref 10.18) which assessed this area to be low risk.

10.11.97 However, the UXO desk study (Ref 10.18) shows Kirkton Auxiliary Unit Base, a potential buried bunker, in a location off Cherry Holt Lane, located immediately adjacent to the draft Order Limits, roughly 1.5 km southwest of Kirkton. The approximate location was indicated in the Zetica UXO report (Ref 10.18), however the exact location of the base is unknown, and no evidence of the bunker was identified during the walkover.

10.11.98 The mapping in the UXO desk study indicates 2 bomb impacts have been reported within the draft Order Limits, in the south of the section.

10.11.99 A low risk assessment allows for construction works to proceed without further measures, although Zetica recommends an awareness briefing prior to construction.

Radon risk:

10.11.100 The on-site radon risk is classified as low, as <1 % of homes are at or above the action level at which protection measures may be considered necessary (Ref 10.32).

Landfills:

10.11.101 Historical and registered landfills are not recorded within the draft Order Limits. However, the Groundsure report details a 'historic waste site' at Breedon Aggregates Ltd, within the study area, located roughly 130 m east of the draft Order Limits, off Swineshead Road (Ref 10.4).

10.11.102 The Breedon Aggregates facility is noted as a licensed industrial activity under part A(1) of the environmental permitting regulations. This facility also holds a licensed pollutant release permit under Part A(2)/B (Ref 10.4).

Pollution incidents:

10.11.103 Pollution incidents have not been reported within the draft Order Limits (Ref 10.4), although two pollution incidents have been reported within the study area. One is

located immediately adjacent to the draft Order Limits, close to Frampton Fen, related to the release of silage liquors in 2007, this had a significant impact on water, but no impact on land or air. The other incident (dated 2010) is also reported immediately adjacent to the draft Order Limits, roughly 1 km west of Fosdyke, but no information is provided except there was a significant impact to water and no impact to air or land. Given the age, these are not considered further.

Section 7: Moulton Seas End to Foul Anchor

Walkover description:

10.11.104 The Moulton Seas End to Foul Anchor section (Section 7) comprises an irregular parcel of land which extends southeast from Moulton Seas End and covers an area of approximately 693 ha (Ref 10.1).

10.11.105 On the basis of the walkover and access to parcels, the section is comprised of predominately flat undeveloped agricultural land, bisected by public roads (A17, Sluice Road, Middle Marsh Road, Eastern Road, Hurn Road, Fleet Road, Haycroft Lane, Hazelwood Lane, Ben's Gate Road, Bullocks Short Gate, Moorswood Gate, St James Road, Cross Gate, Wisbech Road, Long Road), unnamed private roads, and surface water drains/rivers (Holbeach River, Fleet Drain, South Holland Drain, North Level Main Drain).

10.11.106 Access to the following parcels was granted (see **Volume 3, Part 2: Figure 10-5 Map of Walkover Areas (Geology)**) and the following noted:

- The land parcel off Bullocks Short Gate is currently agricultural fields.
- The land parcel off Mill Bank Road is currently a flat grassed area, although a depression in the ground that had filled with water was noted. A barn and a small pile of demolition waste were noted as being present within the land parcel.
- During the walkover of the former landfill land parcel off Mill Bank Road (outside of draft Order Limits), an old mobile tank was observed. The age, use and condition of the tank is unknown, but it is presumed to be decommissioned, and no evidence of leaks or spills was observed.

10.11.107 Where access was not granted or requested, the indicative cable route was followed using public roads, and photos taken.

10.11.108 The land use in the immediate surrounding area is predominantly agricultural land with residential housing, caravan parks and rare commercial structures, including large agricultural buildings, a recycling centre immediately adjacent to the draft Order Limits (approximately 2 km east of Holbeach), a garage immediately adjacent to the draft Order Limits (approximately 500 m north of Tydd St Mary) and a wind farm immediately adjacent to the draft Order Limits, (approximately 1.5 km east of Tydd St Mary).

Historical context:

10.11.109 The available historical maps (Ref 10.4), dated from 1887, shows this section comprises predominantly undeveloped agricultural land, with numerous small ponds throughout. Two buildings are mapped within the draft Order Limits, one adjacent to Common Road and the other in the field immediately adjacent to the River Nene.

10.11.110 By 1930 a number of the ponds had been infilled and all ponds are infilled by 1991. The 1955 map does not show the residential/agricultural property off Common Road. The 1980 map no longer shows the southernmost building (probably demolished).

UXO risk:

10.11.111 The risks from UXO have been assessed by Zetica in preliminary risk assessment report (Ref 10.18) which assessed this area to be low risk.

10.11.112 A low risk assessment allows for construction works to proceed without further measures although Zetica recommends an awareness briefing prior to construction.

Radon risk:

10.11.113 The on-site radon risk is classified as low, as <1 % of homes are at or above the action level at which protection measures may be considered necessary (Ref 10.32).

Landfills:

10.11.114 Historic landfills have been reported within the study area (Ref 10.31), as follows:

- Within draft Order Limits:
  - landfill off Bullocks Short Gate Road, Gedney Broadgate. No further information provided, location roughly coincides with a potentially infilled pond, noted on historic maps.
- Outside of the draft Order Limits:
  - landfill off Wisbech Road, Tydd St Mary, immediately adjacent to the draft Order Limits. Operational between 1960 – 1984, the site was also used as a sewage farm, licensed to receive household liquid sludge.
  - landfill off Mill Bank Road, Holbeach Fen, roughly 130 m west of the draft Order Limits. No further information was provided.
  - landfill by Angela's Motel, Fleet Hargate, roughly 150 m east of the draft Order Limits. No further information provided.

Pollution incidents:

10.11.115 Pollution incidents are not reported within the study area (Ref 10.4).

Section 8: Foul Anchor to Walpole (including the indicative zone for converter stations)

10.11.116 The four converter station options (Options A, B, C and D) and proposed Walpole B Substation and associated infrastructure to link the EGL 3 Project and EGL 4 Project to the national grid within the indicative zone for converter stations fall within the footprint of the draft Order Limits and are therefore incorporated into the baseline discussed below.

10.11.117 Based on the current understanding of the proposed infrastructure at the indicative zone for converter stations, the baseline geology is the same for the four converter station options regardless of the eventual selection and final design of the converter stations. This is also true of the proposed Walpole B Substation.

10.11.118 No qualitative assessment of the four converter station options is to be inferred by the baseline presented below. For details on the proposed converter stations options at the indicative zone for converter stations, refer **to Volume 1, Part 1, Chapter 4 Description of the Projects.**

10.11.119 The current design of the English Onshore Scheme includes an option for the River Nene Temporary Quay which would bring in construction materials and other equipment by water. The detail of the siting and design of the proposed temporary quay has not been confirmed at this point. Should the final design of the English Onshore Scheme include the construction of a temporary quay, this will be assessed, as required and the findings reported in the ES.

Walkover description:

10.11.120 This section comprises an irregular triangular parcel of land. From publicly accessible areas, this section is largely flat, undeveloped agricultural land bisected by public roads (Mill Road, Dixon's Drove, West Drove North Road), unnamed private roads, and surface drains/rivers, including the River Nene.

10.11.121 A number of features, including residential properties, agricultural buildings, camp sites, a solar farm, and a gas compressor station, are outside of the draft Order Limits but within the study area.

10.11.122 The walkover was conducted from public areas and roads. Land access was not permitted to any private land within this section due to ongoing construction works associated with the existing Walpole substation, which also extended into a neighbouring field (outside of the draft Order Limits).

Historical context:

10.11.123 The available historical maps are incomplete (Ref 10.2, Ref 10.6), but the first available map, dated 1886, shows undeveloped agricultural land with sporadic residential areas and farms. No significant changes were noted. A small pond and 'moat' is mapped in the east, the location of the pond roughly coincides with an identified Britpit (Ref 10.9) (Walpole West Drove Pit).

10.11.124 The off-site Wisbech gas compressor station on the west bank of the River Nene was first mapped in 1980, and sewage treatment works on the east bank of the River Nene (off site) were first mapped in 1989.

UXO risk:

10.11.125 The risks from UXO have been assessed by Zetica in preliminary risk assessment report (Ref 10.18) which assessed this area to be low risk. A low risk assessment allows for construction works to proceed without further measures, although Zetica recommends an awareness briefing prior to construction.

Radon risk:

10.11.126 The on-site radon risk is classified as low, as <1 % of homes are at or above the action level at which protection measures may be considered necessary (Ref 10.32).

Landfills:

10.11.127 Historical and registered landfills are not recorded within the study area (Ref 10.31).

10.11.128 However, Walpole West Drove Pit is mapped in the east of the draft Order Limits (Ref 10.19), located approximately 80 m east of West Drove North and 1.5 km north of the village of Walton Highway, the historical maps show a pond at this location, and this was targeted during the walkover, but surface features were not noted, and the pit is probably infilled.

Pollution incidents:

10.11.129 Pollution incidents are not reported within the study area (Ref 10.2).

10.12 Hydrogeology

10.12.1 The baseline provides a characterisation of the study area in terms of the hydrogeological setting based on currently available data and information.

Aquifer classification

10.12.2 Aquifer classifications for the superficial and bedrock geology within the draft Order Limits have been obtained from the Department for Environment Food & Rural Affairs MAGIC mapping portal (Ref 10.28). The Environment Agency classify aquifers as follows:

- Principal Aquifer: Provide significant quantities of drinking water, and water for business needs. They may also support rivers, lakes, and wetlands;
- Secondary A Aquifer: Comprise permeable layers that can support local water supplies, and may form an important source of base flow to rivers;
- Secondary B Aquifer: Comprise mainly lower permeability layers that may store and yield limited amounts of groundwater through characteristics like thin cracks (fissures) and openings or eroded layers;
- Secondary Undifferentiated: Aquifers 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; and
- Unproductive Strata: Largely unable to provide usable water supplies and are unlikely to have surface water and wetland ecosystems dependent on them.

10.12.3 The distribution of aquifers within each section of the draft Order Limits is summarised in **Table 10-7** and shown on **Volume 3, Part 2: Figure 10-7 Superficial Aquifer Designations** and **Figure 10-8 Bedrock Aquifer Designations.**

Table 10-7 - BGS Mapped geological units and aquifer classification within the study area

Section	Superficial /Bedrock	Geological Units	Aquifer Classification
Landfall at Anderby Creek	Superficial	Till, Devensian – Diamiction	Secondary (undifferentiated)
		Beach and Tidal Flat Deposits	Secondary (undifferentiated)
		Blown Sand	Secondary A
		Tidal Flat Deposits - clay	Unproductive
	Bedrock	Burnham Chalk Formation	Principal
Section 1: Landfall at Anderby Creek to Thurlby	Superficial	Tidal Flats	Unproductive
		Till, Devensian - Diamiction	Secondary (undifferentiated)
		Glacial Fluvial Deposits (sand and gravel)	Secondary A
	Bedrock	Burnham Chalk Formation and Welton Chalk Formation	Principal
Section 2: Thurlby to Welton Le Marsh	Superficial	Till, Devensian – Diamiction	Secondary (undifferentiated)
		Glacial Fluvial Deposits (sand and gravel)	Secondary A
	Bedrock	Welton Chalk Formation, Ferriby Chalk Formation, Carstone Formation	Principal
		Roach Formation	Secondary A
		Claxby Ironstone Formation, Tealby Formation and Roach Formation (undifferentiated)	Secondary B
		Spilsby Sandstone Formation	Principal

Section	Superficial /Bedrock	Geological Units	Aquifer Classification
Section 3: Welton Le Marsh to Little Steeping	Superficial	Till, Devensian – Diamiction	Secondary (undifferentiated)
		Glacial Fluvial Deposits (sand and gravel)	Secondary A
	Bedrock	Ferriby Chalk Formation, Carstone Formation	Principal
		Roach Formation	Secondary A
		Claxby Ironstone Formation, Tealby Formation and Roach Formation (undifferentiated)	Secondary B
		Spilsby Sandstone Formation	Principal
		Kimmeridge Clay Formation	Unproductive Strata
Section 4: Little Steeping to Sibsey Northlands	Superficial	Till, Devensian – Diamiction	Secondary (undifferentiated)
		Glacial Fluvial Deposits (sand and gravel)	Secondary A
		Peat	Unproductive Strata
		Tidal Flats	Unproductive Strata
	Bedrock	Spilsby Sandstone Formation	Principal
		Kimmeridge Clay Formation	Unproductive Strata
Section 5: Sibsey Northlands to Hubbert's Bridge	Superficial	Till, Devensian – Diamiction	Secondary (undifferentiated)
		Tidal Flats	Unproductive Strata
	Bedrock	Kimmeridge Clay Formation	Unproductive Strata
		Ampthill Clay Formation	Unproductive Strata
	Superficial	Tidal Flats	Unproductive Strata

Section	Superficial /Bedrock	Geological Units	Aquifer Classification
Section 6: Hubbert's Bridge to Moulton Seas End	Bedrock	Ampthill Clay Formation	Unproductive Strata
		West Walton Formation	Unproductive Strata
		Oxford Clay Formation	Unproductive Strata
Section 7: Moulton Seas End to Foul Anchor	Superficial	Tidal Flats	Unproductive Strata
	Bedrock	Oxford Clay Formation	Unproductive Strata
		Ampthill Clay Formation	Unproductive Strata
Section 8: Foul Anchor to Walpole (Including indicative zone for converter stations)	Superficial	Tidal Flats	Unproductive Strata
	Bedrock	Ampthill Clay Formation	Unproductive Strata
		Kimmeridge Clay Formation	Unproductive Strata

Source Protection Zones and Public Water Supply Abstractions

10.12.4 SPZs are non-statutory planning tools used by the Environment Agency for informing a risk-based approach to planning and environmental permitting. It is a material consideration that the English Onshore Scheme includes works both above and below ground and may, therefore, reduce the effectiveness of protection to groundwater afforded by any overlying or unsaturated zone strata.

10.12.5 The Environment Agency has published SPZs around strategic potable water abstractions, typically those used for Public Water Supply or large-scale commercial use such as hospitals or food manufacturing. These are available on MAGIC mapping service (Ref 10.28). In addition to delineated (published) SPZs, it is acknowledged that any source of groundwater which would be used for potable water abstraction purposes would benefit from a minimum level of protection defined by unpublished SPZs with default radius of 50 m (Source Protection Zone 1, described in this document as SPZ1) and 250 m (Source Protection Zone 2, described in this document as SPZ2) (Ref 10.54).

10.12.6 The presence of published SPZs within each section is identified in **Table 10-8** and presented in **Volume 3, Part 2: Figure 10-9: Groundwater Receptors and Features**. Data has been derived from Environment Agency published data (Ref 10.55).

10.12.7 When discussing SPZs within the ES, any reference to the specific location of public abstraction sources will incorporate degraded National Grid References for reasons of national security.

10.12.8 It should be noted that the design of the English Onshore Scheme does not incorporate liquid coolants within the buried cable elements; hence, this does not need to be considered as part of the hydrogeological risk assessment.

10.12.9 The locations of other water sources benefitting from the unpublished default SPZs will be identified during the detailed assessment process.

Table 10-8 - Source Protection Zones

Section	No. of Published Zones	Classification
Landfall at Anderby Creek	One	SPZ3 over the entirety of this area
Section 1: Landfall at Anderby Creek to Thurlby	Multiple zones present	SPZ1, SPZ2 and SPZ2 (confined) present at the southern end of this section, and SPZ3 present over approximately 90 % of the remaining section (not present in the northern end of this section)
Section 2: Thurlby to Welton Le Marsh	Multiple zones present	SPZ1, SPZ2 and SPZ2 (confined) at the southern end of this section, and SPZ3 present over the remainder of this section
Section 3: Welton Le Marsh to Little Steeping	Multiple zones present	SPZ1, SPZ2 and SPZ2 (confined) at the northern end of this section, and SPZ3 present over the remainder of this section
Section 4: Little Steeping to Sibsey Northlands	None published	N/A
Section 5: Sibsey Northlands to Hubbert's Bridge		
Section 6: Hubbert's Bridge to Moulton Seas End		
Section 7: Moulton Seas End to Foul Anchor		
Section 8: Foul Anchor to Walpole (including indicative zone for converter stations).		

Drinking Water Safeguard Zones

10.12.10 The Environment Agency designates Drinking Water Safeguard Zones (DWSZ) to drive improvements to long term trends in water quality and avoid deterioration. Typically, a suite of measures is adopted to influence, encourage, and incentivise beneficial land management practices and reduce pollution. Safeguard Zones are

defined for both surface and groundwater. There are no Groundwater DWSZ within the study area (Ref 10.28).

Licensed and deregulated groundwater abstractions

10.12.11 Two data sets have been provided by the Environment Agency; licensed abstractions and deregulated abstractions.

10.12.12 The groundwater derived licenced abstractions within the study area are listed in **Table 10-9**. The presence of surface water abstractions are discussed in **Volume 1, Part 2, Chapter 9, Water Environment**.

10.12.13 Where licensed abstractions are associated with strategic public supply sources, the reported grid references within the ES will be degraded for the purposes of national security.

10.12.14 The deregulated abstraction dataset is frozen in time at the point of deregulation (typically 2005) but these abstractions, if still active, may still enjoy Protected Rights that were afforded by the licence prior to deregulation. A summary of the number of licensed and deregulated abstractions identified are shown in **Table 10-9.**

Private Water Supplies

10.12.15 A Private Water Supply (PWS) is any supply from groundwater or surface water that is not provided by a water company. For PWS that are not licensed, locating historical wells may indicate the location of PWS. In rural areas, PWS may often supply potable water supply (drinking water) to individual residential buildings and businesses. They may also be used for non-potable uses such as agricultural stock watering or irrigation.

10.12.16 For the avoidance of doubt, the assessment of impacts on abstractions from springs and baseflow will be considered under hydrogeology. Assessment of the impact of any abstractions which occur directly from surface watercourses will be carried out within **Volume 1, Part 2, Chapter 9, Water Environment**.

10.12.17 A review of historical mapping (Ref 10.56) and the BGS GeoIndex (Ref 10.19) has been undertaken to locate historical wells. Historical wells within 500 m of the draft Order Limits are shown on **Volume 3, Part 2, Figure 10-9: Groundwater Receptors and Features** and listed in **Table 10.9**. It is not known whether the historical wells are active, have been decommissioned, or are abandoned. Most of these wells are noted on maps between 1945 – 1965. It is possible that wells noted on different maps in a similar location are the same well at a slightly different grid reference. For completeness, all wells within 500 m of the draft Order Limits are noted.

10.12.18 Consultation with the Local Authorities has provided a list of registered PWS. Whilst Local Authorities are required to maintain a Register of Private Water Supplies there is no obligation for users to register the source, and thus records provided may not be complete.

10.12.19 Where PWS are identified as being used for potable supply, default source protection zones will be generated to inform the risk assessment process based on the Environment Agency manual for production of groundwater source protection zones (Ref 10.54). This will be completed in advance of the ES and assessment will be included in the ES using the following approach.

- The default SPZ1 is a minimum 50 m radius buffer zone.

- The default SPZ2 is a minimum radius of 250 m or 500 m radius (for abstractions of less than 2000 m^3/day or greater than 2000 m^3/day, respectively).

10.12.20 Risks to PWS arising from bisection of the distribution system by trenching or other construction work (severing the pipes for example) are not considered within the scope of the hydrogeological assessment.

Table 10-9 - Groundwater Abstraction Summary Table

Section	No. of potential abstraction features identified within 500 m	Public Supply Sources
Landfall at Anderby Creek	Nil	Nil
Section 1: Landfall at Anderby Creek to Thurlby	Environment Agency licensed - Nil Environment Agency Deregulated - 1 PWS - Nil BGS – 8 Historical OS - 15	Nil
Section 2: Thurlby to Welton Le Marsh	Environment Agency licensed - 4 Environment Agency Deregulated - 3 PWS - Nil BGS - 33 Historical OS - 89	Sources at Thurlby Sources at Mumby
Section 3: Welton Le Marsh to Little Steeping	Environment Agency licensed - 6 Environment Agency Deregulated - 6 PWS - Nil BGS - 17 Historical OS – 116	Sources at Welton le Marsh
Section 4: Little Steeping to Sibsey Northlands	Environment Agency licensed - Nil Environment Agency Deregulated - Nil PWS - Nil BGS - 1	Nil

Section	No. of potential abstraction features identified within 500 m	Public Supply Sources
	Historical OS - 46	
Section 5: Sibsey Northlands to Hubbert's Bridge	Environment Agency licensed - Nil Environment Agency Deregulated - Nil PWS - Nil BGS - Nil Historical OS - 58	Nil
Section 6: Hubbert's Bridge to Moulton Seas End	Environment Agency licensed - 2 Environment Agency Deregulated - Nil PWS - Nil BGS - 3 Historical OS - 48	Nil
Section 7: Moulton Seas End to Foul Anchor	Environment Agency licensed - Nil Environment Agency Deregulated - Nil PWS - Nil BGS - 16 Historical OS - 150	Nil
Section 8: Foul Anchor to Walpole (including indicative zone for converter stations).	Environment Agency licensed - Nil Environment Agency Deregulated - Nil PWS - Nil BGS - 9 Historical OS - 41	Nil

10.12.21 It should be noted that abstractions records may be duplicated in several datasets. The project abstraction database will be refined to support the baseline reported in the ES following the survey completion.

Groundwater flow and levels

10.12.22 The English Onshore Scheme can broadly be considered as lying within two distinct conceptual hydrogeological settings. It is acknowledged that these settings are an oversimplification, but they are useful to identify the distinct hydrogeological regimes across the extent of the English Onshore Scheme.

Conceptual Setting 1

10.12.23 Landfall at Anderby Creek, Section 1: Landfall at Anderby Creek to Thurlby, Section 2: Thurlby to Welton le Marsh and Section 3: Welton le Marsh to Little Steeping (**Section 10.10**) are underlain by Principal Aquifers, which are overlain by variable superficial deposits. These aquifers comprise Chalk and Greensand units, which form a regionally important groundwater resource, harnessed for public supply.

10.12.24 The Chalk has a primary porosity within its matrix and a secondary porosity characterised by solution-enhanced fissures and fractures. These features make it susceptible to contamination. In Lincolnshire, the Chalk is often found in hydraulic continuity with Lower Cretaceous Formations and overlying Quaternary deposits. These granular formations can provide significant additional storage for the Chalk aquifer system (Ref 10.57). Contamination of shallow groundwater within superficial deposits may, therefore, be a risk to the wider Chalk aquifer system.

10.12.25 Chalk streams, as mapped on Natural England's Chalk Rivers dataset (Ref 10.58) based on the Environment Agency Detailed River Network (DRN), are present in the following sections of the route:

- Section 2 – Thurlby to Walton le Marsh. Chalk streams identified in this area are located on Ferrisby Chalk Formation (Ref 10.19). Chalk streams are designated as a Priority Habitat by the Environment Agency and are, therefore, deemed to be of principal importance for biodiversity. They are fed by groundwater from the Chalk aquifers, which means they can be sensitive to changes in groundwater levels in the aquifers (Ref 10.59). The Chalk streams with high certainty are Burland's Beck and Hog's Beck, and an unnamed tributary of the Willoughby High Drain is mapped with low certainty.
- Section 3 – Walton le Marsh to Little Steeping. Chalk streams identified in this section are assigned 'low confidence' classifications by Natural England as they are located on non-chalk bedrock geology. These locations are therefore not considered to represent chalk streams and are not included for further assessment on this basis. This includes Welton Beck (located on Roach Formation), a section of unnamed drains west of Gunby (located on Claxby Ironstone Formation and Roach Formation) and Steeping River (located on Kimmeridge Clay Formation).

10.12.26 This Conceptual Setting section includes the Anderby Creek Landfall, where activities would include directional drilling and under passing of flood defence structures.

Conceptual Setting 2

10.12.27 To the south, in Section 4: Little Steeping to Sibsey Northlands, Section 5: Sibsey Northlands to Hubbert's Bridge, Section 6: Hubbert's Bridge to Moulton Seas End, Section 7: Moulton Seas End to Foul Anchor and Section 8: Foul Anchor to Walpole (including indicative zone for converter stations), the English Onshore Scheme is generally underlain by thick mudstone and clay dominated formations which are designated as unproductive strata. These units are overlain by various superficial

deposits. Where the bedrock units comprise coarser granular material, limited quantities of groundwater may be present. These units are designated as Secondary Aquifers.

Springs

10.12.28 In their response to the 2024 Scoping Opinion (Ref 10.60), the Environment Agency highlighted the presence of Great Steeping Spring at National Grid Reference 543621, 364336. Ordnance Survey mapping does not indicate a spring at this location, and it is further noted that it is in a location mapped as Till overlying Kimmeridge Clay. The sensitivity of the spring at this location will be assessed as part of the ES, and if necessary, it will be visited as part of the hydrogeological site surveys in 2025.

10.12.29 No further springs have been identified within the study area based on available mapping (Ref 10.28).

Water Framework Directive

10.12.30 Within England, objectives under the European Union Water Framework Directive have been translated into the Water Environment (Water Framework Directive) (England and Wales) Regulations (2017) ("*WFD Regulations*") (WFD) (Ref 10.61).

10.12.31 Groundwater Bodies designated in WFD Regulations Cycle 3 are present within Section 1 Landfall at Anderby Creek to Thurlby, Section 2: Thurlby to Welton Le Marsh, Section 3: Welton Le Marsh to Little Steeping, and Section 4: Little Steeping to Sibsey Northlands inclusive of the English Onshore Scheme (Ref 10.62). These are detailed in **Table 10-10** and all are situated within Management Catchments of the Anglian River Basin District.

10.12.32 Classification information has been obtained from the Environment Agency's Catchment Data Explorer (Ref 10.63).

Table 10-10 - Water Framework Directive Groundwater Bodies

Section	Groundwater Body	Classification
Landfall at Anderby Creek Section 1: Landfall at Anderby Creek to Thurlby Section 2: Thurlby to Welton Le Marsh Section 3: Welton Le Marsh to Little Steeping	South Lincolnshire Chalk Unit (GB40501G104600)	Overall Status: Poor. Driven by 'poor' rating for 'General Chemical Test' attributed to diffuse source pollution associated with agriculture and rural land management.
Section 4: Little Steeping to Sibsey Northlands	Spilsby Sandstone Unit (GB40501G401700)	Overall Status: Poor. Driven by 'poor' rating for Quantitative Water Balance
Section 5: Sibsey Northlands to Hubbert's Bridge	None present	N/A

Section	Groundwater Body	Classification
Section 6: Hubbert's Bridge to Moulton Seas End		
Section 7: Moulton Seas End to Foul Anchor		
Section 8: Foul Anchor to Walpole (including indicative zone for converter stations)		

Groundwater Dependant Terrestrial Ecosystems

10.12.33 The "*WFD Regulations*" require Groundwater Dependent Terrestrial (as opposed to subterranean) Ecosystems to be identified and the impacts on them assessed. Where significant damage is occurring (or could occur) to a Groundwater Dependent Terrestrial Ecosystem (GWDTE), the associated groundwater body is considered at risk of not attaining good status under the "*WFD Regulations*".

10.12.34 Assessment of risk to identified GWDTEs will therefore be included within the ES. Risks may be water quality or water quantity-driven.

10.12.35 The presence of GWDTEs, within 500 m of the draft Order Limits is described in **Table 10-11** and presented in **Volume 3, Part 2, Figure 10-9 Groundwater Receptors and Features** using data obtained from the Environment Agency (Ref 10.28).

Table 10-11 - GWDTEs and their geological location

Section	Distance from indicative zone for underground cable assets	GWDTE	Underlying aquifer (aquifer designation)
Landfall at Anderby Creek	N/A	None Identified	N/A
Section 1: Landfall at Anderby Creek to Thurlby	N/A	None Identified	N/A
Section 2: Thurlby to Welton Le Marsh	Site is adjacent to access road and approx. 900 m from the indicative zone for underground cable assets.	Willoughby Meadow SSSI	Superficial: Glaciofluvial and diamicton (Secondary A) Bedrock: Roach Formation (Secondary A)
Section 3: Welton Le Marsh to Little Steeping	N/A	None Identified	N/A

Section 4: Little Steeping to Sibsey Northlands	N/A	None Identified	N/A
Section 5: Sibsey Northlands to Hubbert's Bridge	N/A	None Identified	N/A
Section 6: Hubbert's Bridge to Moulton Seas End	N/A	None Identified	N/A
Section 7: Moulton Seas End to Foul Anchor	N/A	None Identified	N/A
Section 8: Foul Anchor to Walpole (including indicative zone for converter stations)	N/A	None Identified	N/A

Watercourse and baseflows

10.12.36 Groundwater can contribute to the baseflow of a watercourse, which can be important during dry weather periods and low river flows. At the time of writing, the importance of groundwater to the flow of main rivers and ordinary watercourses in the study area is not known. Whilst it is considered that the English Onshore Scheme would not have any adverse impacts on baseflow, the issue will be considered within the ES.

Groundwater flooding

10.12.37 Consultation with the Environment Agency and the Lead Local Flood Authorities will include discussions of any known areas susceptible to groundwater flooding within the study area. The assessment of groundwater flooding will be assessed in conjunction with **Volume 1, Part 2, Chapter 9, Water Environment**. The English Onshore Scheme is however unlikely to increase the risk of groundwater flooding.

Groundwater vulnerability

10.12.38 Mapping showing the potential vulnerability of groundwater to the effects of activities taking place at the ground surface is published by the Environment Agency (Ref 10.28). Whilst detailed mapping is not currently available for the English Onshore Scheme, a high-level review of publicly available mapping has been carried out. Aquifers underlying Section 1: Landfall at Anderby Creek to Thurlby, Section 2: Thurlby to Welton le Marsh and Section 3: Welton le Marsh to Little Steeping are variably designated as High to Low risk by virtue of the variable thickness and lithologies of the overlying superficial deposits.

10.12.39 It should be noted that the English Onshore Scheme would comprise below ground construction and may necessitate ground reprofiling in the areas of the above ground infrastructure, such as the converter stations and Walpole B Substation. As a result, the vulnerability of groundwater may be greater than that designated by the published mapping.

Nitrate Vulnerable Zones

10.12.40 Designated Nitrate Vulnerable Zone (NVZ) are areas designated as being at risk from agricultural nitrate pollution. A NVZ is present full across Section 1: Landfall at Anderby Creek to Thurlby, Section 2: Thurlby to Welton le Marsh, Section 3: Welton le Marsh to Little Steeping, Section 4: Little Steeping to Sibsey Northlands, Section 5: Sibsey Northlands to Hubbert's Bridge, and Section 6: Hubbert's Bridge to Moulton Seas End.

10.12.41 A NVZ is present across the northern half of Section 7: Moulton Seas End to Foul Anchor (North of the A17), and no NVZ is present across the southern half of Section 7 or Section 8: Foul Anchor to Walpole (including indicative zone for converter stations) (Ref 10.28).

10.12.42 Soil movement as part of construction could result in increasing levels of nitrate being put into the unsaturated zone. It is considered that the potential for substantive impacts on NVZs arising from the English Onshore Scheme is limited. This will be considered further in the ES if necessary.

Summary of hydrogeological setting

10.12.43 The English Onshore Scheme is located across two distinct hydrogeological environments.

10.12.44 In the northern end of the draft Order Limit, the English Onshore Scheme is dominated by Chalk and Greensand Principal and Secondary A and B aquifer units, which form a regionally important groundwater resource. Sensitive groundwater-surface water interactions include the presence of baseflow fed streams and potential springs. A number of delineated SPZs are present associated with public groundwater abstractions within the Chalk.

10.12.45 In the southern end of the draft Order Limit, the English Onshore Scheme is predominantly underlain by clay dominated strata, which are classified as unproductive strata and hence have limited groundwater present.

10.12.46 Private Water Supplies and potential springs are located along the indicative zone for underground cable assets and the presence and usage of any supplies need to be verified by site survey prior to the commencement of the ES.

10.13 Future baseline

10.13.1 There are no foreseeable significant changes anticipated in relation to geology and 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.

10.13.2 Hydrogeological conditions may be prone to change because of climate change. 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.

10.13.3 Given the nature of the English Onshore Scheme, any change in baseline resulting from these factors would be unlikely to have a meaningful influence on the assessment of potential effects. However, this will be reviewed as part of the ES.

10.14 Environmental measures

10.14.1 As set out in **Volume 1, Part 1, Chapter 5: PEIR Approach and Methodology**, the environmental measures are characterised as design measures or control and management measures. A range of environmental measures would be implemented as part of the English Onshore Scheme and will be secured in the DCO as relevant.

10.14.2 **Table 10-12** outlines how the design and control measures will influence the geology and hydrogeology assessment. In addition to the measures listed in **Table 10-12**, standard mitigation measures, comprising management activities and techniques, would be implemented during the construction of the Projects to limit effects through adherence to good site practices and achieving legal compliance. These are listed in **Volume 2, Part 1, Appendix 1.5.B: Outline CoCP** and are not repeated below. Measures listed in **Table 10-12** have been assigned references, for example, (GG01). These align with the references provided in **Table 3.1 of Volume 2, Part 1, Appendix 1.5.B: Outline CoCP** for ease of cross-reference.

10.14.3 Design measures identified through the EIA process have also been applied to avoid or reduce potential significant effects. Design measures included that a relevant to geology and hydrogeology receptors are included in **Table 10-12** below under Design and Operation and are also included in **Volume 2, Part 1, Appendix 1.5.A: Register of Design Measures.**

Table 10-12 - Summary of the environmental measures

Receptor	Potential changes and effects	Embedded measures	ID reference
Construction			
Property and Infrastructure	Exposure to aggressive ground conditions weakening installed cables and structures. Migration and accumulation of hazardous ground gas.	Intrusive ground investigations and assessment would be undertaken prior to construction, which would inform appropriate geotechnical design in relation to the site/structure specific ground conditions, including ground instability/adverse ground conditions & remediation strategy as needed.	GH01
Groundwater bodies	Piling techniques may need to be utilised as part of the temporary or permanent works, which have the potential to create	A Foundation Works Risk Assessment (FWRA)/ Piling risk assessment would be undertaken in accordance with EA guidance 'Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination' (EA, 2001) (Ref 10.64).	GH02

Receptor	Potential changes and effects	Embedded measures	ID reference
	preferential pathways mobilising contaminates into underlying groundwater bodies.		
Human health – construction workers, site end users	Potential for human health receptors to be exposed to hazardous dust/soils or ground gas conditions.	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 (Ref 10.65) in relation to ground gas from working in confined spaces/trenches) to minimise the risks associated with anticipated/unexpected contamination. Based on risk assessment informed by site specific information.	GH03
Human Health – construction workers and neighbouring residents.	Potential impact of dust, waste, water, noise and vibrations generated during construction.	Appropriate training of construction and maintenance workers in the handling and use of potentially hazardous substances and the associated risks.	GH04
Controlled water receptors (groundwater and surface water)	Potential for leaks and spills of fuels and chemicals required during the construction phase.	All use and storage of chemicals are to be undertaken in accordance with the Control of Pollution (Oil Storage) Regulations and in accordance with the Control of Substances Harmful to Health Regulations (COSHH) and Classification, Labelling and Packaging of substances and mixtures (CLP) Regulation. The use and storage of chemicals and fuels would also be controlled and monitored under the Outline CoCP which would 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	GH05

Receptor	Potential changes and effects	Embedded measures	ID reference
		ready-mix concrete vehicles and equipment for treatment/disposal.	
Regionally or Locally Important Geological sites and resources	Degradation of important geology resources or sites designated for their geological properties.	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 (2011).	GH06
Controlled waters (surface and groundwater)	Potential for detrimental impact from dewatering	Any temporary dewatering activities during construction would be undertaken in accordance with EA guidance, and if required, an Abstraction Licence and Environmental Permit (for the discharge) and would be limited to the depth and time required to facilitate construction activities.	GH07
Sensitive receptors	Potential for migration of unforeseen contamination, encountered during excavation.	A protocol for dealing with any unexpected contamination being discovered during the construction phase.	GH08
Sensitive receptors – Human Health	The proposed buried cable may act as a preferential pathway for ground gas (inc. radon) migration. Ground gases and radon may accumulate within proposed enclosed above and below ground structures or within excavations.	The GI scope will be defined by the desk based assessment (CSM) and where investigation is needed to support design. The results will be assessed and recommendations presented, where required. The results will be discussed with the Environment Agency and/or relevant planning authority, as appropriate. Made ground and/or materials known or strongly suspected of being contaminated will be segregated from natural and uncontaminated materials and will be sampled and tested to determine the presence and level of any contamination. Material deemed unsuitable for reuse within the Projects would be removed from site to an appropriate waste management facility.	GH09
Earthworks and	Potential misuse or	Excavation materials identified as being unsuitable for reuse within the Projects	GH10

Receptor	Potential changes and effects	Embedded measures	ID reference
excavated soils	contamination of excavated soil arisings.	would be managed, segregated, stockpiled or loaded directly onto haulage wagons for removal offsite to an appropriate waste management facility.	
UXO - Construction	Disturbance of unexploded ordnance during construction.	The Contractor would comply with recommendations within the UXO assessments and be responsible for additional assessments and mitigation required. Areas of bomb risk including former airfields identified.	GH11
Controlled waters (surface and groundwater)	Potential for detrimental impact from unregulated water discharge	Measures related to discharge of water from dewatering activities and management of any contaminated soils will be described in the Outline CoCP	GH12
Groundwater bodies	Multiple watercourse crossings would be necessary for the construction of temporary and permanent accesses and the cable installation. The use of drilling fluids may be required.	The risks arising from the proposed use of drilling fluids will be assessed with particular reference to proximity to existing groundwater abstractions, watercourses and identified groundwater features. Appropriate mitigation and handling of fluids would be implemented.	GH13
Sensitive Receptors	Migration of ground gas through new pathways created by construction	The Contractor would ensure the implementation of appropriate gas protection measures or upgrading to radon (basic or full) protection measures and/or vapour resistance membrane as informed by the risk assessment, where required.	GH14
Controlled water receptors (surface waters and groundwaters)	Potential for contaminative surface water runoff from construction areas.	All use and storage of chemicals to be undertaken in accordance with Environment Agency and Government Pollution prevention for business (Ref 10.66) and controlled and monitored and general construction site good environmental and waste management procedures.	GH15

Receptor	Potential changes and effects	Embedded measures	ID reference
Groundwater bodies	Construction work might affect the quality and availability of groundwater, especially for people using private water sources.	Construction work might affect the quality and availability of groundwater, especially for people using private water sources. Whenever possible, the Projects will be planned to avoid disturbing existing water supplies during both construction and operation. The need for measures to reduce these impacts will be determined as part of the ongoing EIA.	GH16
Design and Operation			
Groundwater	Changes to the physical or chemical properties of groundwater because of the thermal effects of the buried cables.	The approach to the thermal (analytical) assessment of heat effects from buried cables will be agreed with the Environment Agency. Agreed measures will be incorporated into the design, as required.	GH01
Proposed buildings / structures	Risk of ground instability or adverse ground conditions impacting proposed buildings/structures.	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 & remediation strategy as needed.	GH02
Sensitive receptors – Human Health	The proposed buried cable may act as a preferential pathway for ground gas (inc. radon) migration. Ground gases and radon may accumulate within proposed enclosed above and below ground	The GI scope will be defined by the desk based assessment (CSM) and where investigation is needed to support design. The results will be assessed and recommendations presented, where required. The results will be discussed with the Environment Agency and/or relevant planning authority, as appropriate. Made ground and/or materials known or strongly suspected of being contaminated will be segregated from natural and uncontaminated materials and will be sampled and tested to determine the presence and level of any contamination. Material deemed unsuitable for reuse within	GH03

Receptor	Potential changes and effects	Embedded measures	ID reference
	structures or within excavations.	the Projects would be removed from site to an appropriate waste management facility.	
Sensitive receptors - human health, regionally or locally important geologies	Potential for the migration of contamination or ground gases in areas of landfills, Made or Artificial Ground or organic soils such as peat.	The Contractor would ensure the implementation of appropriate gas protection measures or upgrading to radon (basic or full) protection measures and/or vapour resistance membrane as informed by the risk assessment, where required.	GH04

10.15 Scope of the assessment

Spatial scope and study area

10.15.1 The spatial scope of the assessment of geology and hydrogeology covers the area of the English Onshore Scheme contained within the draft Order Limits, together with the study areas described below. The study areas for geology and hydrogeology are shown in **Volume 3, Part 2, Figure 10-5 Geology Walkover Route** and **Figure 10-9 Groundwater Receptors and Features**, respectively.

10.15.2 The geology aspect considers a study area of the draft Order Limits with a 250 m buffer zone, while the hydrogeology aspect considers the draft Order Limits with a 500 m buffer zone. The study area has been reduced since the issue of the Scoping Report, as design changes have refined the route of the proposed underground cables.

10.15.3 The study area has been identified based on the emerging design presented to support the Section 42 consultation. At this stage, the exact location and position of the converter station buildings has not been determined, therefore this chapter has considered the indicative zone for converter stations for Options A - D.

Temporal scope

10.15.4 The temporal scope of the assessment of geology and hydrogeology is consistent with the period over which the English Onshore Scheme would be carried out. It covers the period of construction and operation. Impacts on geology are most likely to occur during the construction phase of the English Onshore Scheme.

10.15.5 The English Onshore Scheme is expected to have a life span of more than 40 years. If decommissioning is required at this point in time, then activities and effects associated with the decommissioning phase are expected to be of a similar level to those during the construction phase works, albeit with a lesser duration of 2 years. Acknowledging the complexities of completing a detailed assessment for decommissioning works up to 40 years in the future, it is considered that the potential significance of effects relating to

the decommissioning phase would be no greater than those from the construction phase and decommissioning effects are not discussed in detail in this chapter; however, **Table 4.21** in **Volume 1, Part 1, Chapter 4: Description of the Projects** provides a high level summary assessment of the likely significant effects associated with decommissioning. Furthermore, should decommissioning take place it is expected that an assessment in accordance with the legislation and guidance at the time of decommissioning would be undertaken.

Identification of receptors

10.15.6 The principal geology and hydrogeology receptors that have been identified as being potentially subject to significant effects are summarised in **Table 10-13** and are shown in **Volume 3, Part 2, Figure 10-4: Geology Hazard Identification Map** and **Figure 10-9: Groundwater Receptors and Features** to be specified. Sites designated as Regionally or Locally Important Geological Sites have not been identified during this PEIR, however, the area of peat mapped within the study area to be geologically important and this receptor has been included in the assessment.

Table 10-13 - Geology and hydrogeology receptors subject to potential effects

Receptor	Reason for consideration
Geology	
Human Health – construction workers, site end users, off-site residents, visitors to both site end-users and nearby off-site residents.	Potential risk for contamination and/or hazardous ground gases / radon, which may pose a risk to human health receptors.
Property and infrastructure.	Potentially aggressive ground conditions weakening structures or buried cables. Migration and accumulation of hazardous gases.
Controlled waters such as groundwater aquifers and watercourses.	Potential for contamination to be mobilised and subsequently impact controlled water receptors.
Regional and locally important geology including sites designated for their geological importance (e.g. RIGS)	Potential for degradation of geological resources of local or regional importance, noting that Peat has been mapped within the draft Order Limits.
Hydrogeology	
Groundwater in aquifers (resource)	Aquifers are a key groundwater resource, supporting water supply and baseflow. Construction could disrupt natural flow, recharge, or introduce contamination risks. Consideration will also be given to impacts from climate change. Climate change could alter groundwater recharge, levels, and flow patterns over the Projects lifespan, potentially impacting resource availability, quality, and dependent ecosystems.

Receptor	Reason for consideration
Groundwater in aquifers (quality)	Risk of long-term contamination to groundwater quality due to the presence of buried infrastructure, potential leaks, trenchless watercourse crossings, or changes to groundwater flow pathways, which could mobilise existing contaminants or introduce new pollutants, including thermal impacts.
Public groundwater supplies	Public water supply abstractions are highly sensitive to changes in groundwater flow, levels, or quality. There is potential for contamination or disruption to supply from construction, operational activities, or alterations to recharge and flow pathways.
Private groundwater abstractions	Private water abstractions are sensitive to changes in groundwater flow, levels, or quality, with potential risks to supply from contamination, reduced recharge, or disruption to flow pathways.
GWDTEs	GWTDEs rely on groundwater flow and quality to sustain ecological habitats. There is potential for disruption due to changes in groundwater levels, flow pathways, or contamination.
People and property at risk of Groundwater flooding	Construction and operation activities could alter groundwater flow pathways or levels, potentially increasing the risk of groundwater flooding in areas with shallow water tables or vulnerable infrastructure.
WFD groundwater bodies	Groundwater bodies are protected under the Water Framework Directive (WFD), requiring the prevention of deterioration in quantitative and chemical status. Construction or operation could impact WFD objectives through changes to flow, recharge, or contamination risks.

Potential effects considered within this assessment

10.15.7 The effects on geology and hydrogeology receptors, which have the potential to be significant and have been taken forward for detailed assessment, are summarised in **Table 10-14**.

Table 10-14 - Geology and hydrogeology receptors scoped in for further assessment

Receptor	Likely significant effects
Geology	
Human Health	Potential for existing contamination (as a result of historic or current land uses) within the study area to be disturbed and mobilised.
	Potential for radon and ground gases from sources including Made Ground and Peat to be mobilised along preferential pathways and accumulate within enclosed spaces.
Regional and locally important geology including sites designated for their geological importance (e.g. RIGS)	Potential degradation of geological resources such as Peat.
Property and Infrastructure	Migration of ground gas
Hydrogeology	
Groundwater in aquifers (quality)	Potential for existing contamination (as a result of historic land uses) within the study area to be disturbed and mobilised. This would lead to a reduction in groundwater quality. Impacts to groundwater quality from turbidity and sediment runoff due to earthwork activities are possible. Creation of preferential contaminant pathways to groundwater resources through the installation of foundations to support above ground infrastructure and trenchless crossings. Impacts of underground cable (thermal and degradation) on surrounding geology and groundwater.
Groundwater in aquifers (resource)	Disruption of groundwater flows, recharge, and runoff patterns due to earthwork operations, including soil stripping, excavation and back filling of the cable route and installation of foundations impacting groundwater baseflows or spring flow. Disruption of shallow groundwater flow pathways within aquifer units due to permanent below ground infrastructure, such as the cable route and foundations
Private groundwater abstractions	Impacts to groundwater quality from turbidity and sediment runoff due to earthwork activities are possible would impact groundwater supply quality.

Receptor	Likely significant effects
Public groundwater supplies	Impacts to groundwater quality from turbidity and sediment runoff due to earthwork activities are possible would impact groundwater supply quality.
GWDTE	Impacts to groundwater quality from turbidity and sediment runoff due to earthwork activities are possible would impact groundwater quality, which may impact ecological receptors dependant on groundwater.
WFD groundwater bodies	Impacts to groundwater quality from turbidity and sediment runoff due to earthwork activities are possible would impact WFD groundwater bodies and have the potential to reduce their quality rating, which is an unacceptable impact.
People at risk of Groundwater flooding	Disruption of shallow groundwater flow pathways within aquifer units due to permanent below ground infrastructure, such as the cable route and foundations leading to groundwater flooding. Risk to buildings and infrastructure was scoped out at scoping.

10.15.8 The receptors/effects detailed in **Table 10-15** have been scoped out from being subject to further assessment because the potential effects are not considered likely to be significant. These were identified as effects scoped out of further assessment in the Scoping Report (Ref 10.1).

Table 10-15 – Summary of effects scoped out of the geology and hydrogeology assessment

Receptors/potential effects	Justification
Potential for the English Onshore Scheme, third party assets and land to be impacted by land instability and geohazards (including aggressive ground conditions) as a result of the earthwork and groundwork operations.	Geohazards and land instability would be considered and managed through the developing engineering design, in line with relevant design standards and informed by ground investigations. The English Onshore Scheme would be designed to avoid potentially adverse effects from land instability and other geohazards.
Potential introduction of contaminants through the use and refuelling of construction plant, and the handling of construction material and wastes.	Appropriate controls are set out within the Outline CoCP (**Volume 2, Part 1, Appendix 1.5.B Outline CoCP**) to manage the storage and handling of construction materials, excavated soils and wastes. An emergency response/spill plan would be established with suitable response training established for site workers. Site drainage would be established to manage runoff from working areas.
Discovery and disturbance of unforeseen contamination during earthwork operations, excavations and soil stripping.	A watching brief protocol would be specified for earthwork activities to observe for any unforeseen contamination, reducing the risk of disturbance and mobilisation. Suspected contaminated material would be handled and stored separately from other materials.
Storage of construction materials and wastes leading to the generation of potentially contaminated runoff.	Appropriate controls are set out within the Outline CoCP (**Volume 2, Part 1, Appendix 1.5.B Outline CoCP**) to manage the storage and handling of construction materials, excavated soils and wastes. Runoff from working areas would be managed appropriately during construction with respect to both quantity and quality.
Accidental spills/pollution into the environment e.g. uncontrolled leaks, spill from machinery at the converter stations and Walpole B Substation.	The study area would return to its current use except where the above ground infrastructure such as converter stations and the Walpole B Substation are proposed. There would be no significant fuel or oil storage, and other sources identified at the construction phase, such as dust, would no longer be a potential source to the receptors during operation.
Operational runoff from impermeable surfaces of the above ground infrastructure.	Rainfall runoff from above ground infrastructure would be sustainably attenuated (and if required treated) prior to discharge to the receiving water environment. There would be no other operational discharges to surface

Receptors/potential effects	Justification
	watercourses. The impacts during maintenance are anticipated to be mitigated through the embedded mitigation measures and good controls adopted during the construction phase.

10.16 Key parameters for assessment

Realistic worst-case design scenario

10.16.1 The assessment has followed the Rochdale Envelope approach as outlined in **Volume 1, Part 1, Chapter 4: Description of the Projects** and **Volume 1, Part 1, Chapter 5: PEIR Approach and Methodology of the PEIR**. The assessment of effects has been based on the description of the Projects and parameters outlined in **Volume 1, Part 1, Chapter 4: Description of the Projects**. However, where there is uncertainty regarding a particular design parameter, the realistic worst-case design parameters are provided below with regards to geology and hydrogeology along with the reasons why these parameters are considered worst-case. The preliminary assessment for geology and hydrogeology has been undertaken on this basis. Effects of greater adverse significance are not likely to arise should any other development scenario, based on details within the Rochdale Envelope (e.g., different infrastructure layout within the draft Order Limits), to that assessed here be taken forward in the final design of the English Onshore Scheme.

10.16.2 As set out in **Volume 1, Part 1, Chapter 4: Description of the Projects**, and specifically in **Section 4.4**, at this stage in the design process, four options have been identified with regards to the proposed siting of the Walpole converter stations. All four options (Options A-D) have been included within the baseline study. At this preliminary stage in the design development, it is considered that there are no clear differences in effects between the four options for the Walpole converter stations with regards to geology and hydrogeology receptors, and as such, **Section 10.18** has not made reference to the specific options.

Geology

10.16.3 In relation to geology, the following assumptions are made regarding the Projects design parameters to ensure a realistic worst-case assessment has been undertaken.

- This preliminary assessment is based on the current design.
- Ground investigation data and assessments for the indicative zone for underground cable assets, landfill, trenchless crossings, Walpole B Substation and indicative zone for converter stations are not available for this PEIR assessment. As such ground conditions, soil contamination, groundwater and ground gas regime are not known. Therefore, reasonable worst case for geology is based on the assumption that contamination, ground gas and aggressive soil conditions are present where a potential source has been identified.
- Intrusive investigations are proposed to be carried out. Assessments and remediation strategies will be prepared (if required) and recommendations incorporated into the design and embedded mitigation measures. Therefore, no new receptors would be impacted or pathways would be created.

- The cable trench could represent a potential pathway if not effectively mitigated in areas where potential contamination is present. This will be mitigated through engineering design.
- Unforeseen ground conditions may impact the proposed construction technique, such as locally thicker poor/unsuitable ground conditions or contamination requiring significantly deeper excavations. However, ground investigation is proposed based on the findings of the PEIR and to inform design and the findings/recommendation incorporated into the design and embedded mitigation measures.
- Trenchless crossings are proposed (e.g. horizontal directional drilling), which are technically more challenging than open cut trench, as such their inclusion is considered to represent the reasonable worst case.
- A watching brief and procedures for encountering unforeseen contamination would be in place during construction. This approach was set out in the Scoping Report and the Planning Inspectorate was in agreement with the approach with the expectation that these procedures will be prepared and included as part of the DCO application.
- Impacts to Geology are most likely to occur during the construction phase, even if the effects may not become apparent until a significant amount of time has elapsed.

Hydrogeology

10.16.4 In relation to the hydrogeology assessment, the following assumptions are made:

- Ground investigation data and assessments for the indicative zone for underground cable assets, landfill, trenchless crossings, Walpole B Substation and indicative zone for converter stations are not available for this PEIR assessment. The assessment is on the basis that all potential sources of contamination are present at concentrations higher than relevant screening levels.
- In the absence of the hydrogeology survey data, this PEIR assessment has assumed:
  - All identified PWS within the buffer zone defined above are present and in use for supply at this current time;
  - The identified springs are present and supplying flow to watercourses; and
  - All GWDTEs are groundwater dependent across their entire extent.

10.16.5 Due to the preliminary nature of the emerging design, the following design assumptions have informed this PEIR assessment:

- The entire indicative zone for underground cable assets is to be assessed in relation to the potential impacts on hydrogeology, although the cables installation would be located within the working width of this zone.
- Foundations of above ground infrastructure would be deep enough to require foundations in the underlying bedrock, hence would cause impacts on groundwater flow in the underlying aquifer units.
- Excavations would need to be sufficiently deep to cause groundwater ingress, which would need to be managed.

Consideration of construction scenarios

10.16.6 As detailed **in Volume 1, Part 1, Chapter 4: Description of the Projects**, the timing of construction activities set out within this PEIR is indicative. It has been identified that elements on the Projects could be constructed sequentially or concurrently. There is no significant difference with regards to potential impacts upon geology and hydrogeology receptors whether elements of the Projects were constructed concurrently or sequentially as described in **Volume 1, Part 1, Chapter 4: Description of the Projects**. With regards to construction other worst-case scenarios that have been considered are outlined as follows:

- The potential for unforeseen contamination and unexpected ground conditions, which may have an impact on excavation depths, excavation volumes, management of pollution and avoiding the creation of pathways to the receptors. The previously described environmental measures and watching briefs associated with construction would be in place until commission.
- The requirement for deeper excavation which may also lead to increased quantities of groundwater ingress that would need to be managed. This may require adjusted discharge consents, which may have an implication on construction timescales.
- The presence of poor ground conditions (loose, soft, organic soils), which would require local deepening and replacement with suitable materials to mitigate settlement. The presence of buried obstructions may require breaking out and replacement with suitable materials. This may result in below ground obstructions or pathways, which may impact established groundwater flow pathways.
- With regards to the potential to encounter contamination, it is assumed that unforeseen contamination may be encountered relating to the current or previous land use on-site. A watching brief / discovery strategy would be produced prior to construction works, which would set out the procedure to followed should unexpected contamination be encountered.
- With regards to excavations, the volume of excavated material proven to be geotechnically and / or chemically unsuitable for reuse may be greater than originally calculated. This may result in additional soil requiring reuse elsewhere on the Projects or requiring off-site disposal. This may also result in further sediment runoff, which could increase the turbidity of groundwater, which may adversely impact PWS and GWDTEs.
- Ground conditions requiring unanticipated excavation into bedrock strata, such as for foundations of permanent infrastructure.
- Sources for ground gas (Peat, Made Ground, organic material) being identified requiring additional protection measures to be included within buildings and structures.

10.17 Assessment methodology

Overview

10.17.1 The generic project-wide approach to the assessment methodology is set out in **Volume 1, Part 1, Chapter 5: PEIR Approach and Methodology**, and specifically in Sections 5.4 to 5.6. However, whilst this has informed the approach that has been used in this geology and hydrogeology assessment, it is necessary to set out how this

methodology has been applied, and adapted as appropriate, to address the specific needs of this geology and hydrogeology assessment. Details are provided below.

10.17.2 This assessment methodology comprises the collection of available baseline information to gather data to characterise the underlying ground conditions across the English Onshore Scheme. The approach is consistent with the methodology drawn from DMRB LA 109: Geology and Soils (Ref 10.11), Environment Agency LCRM (Ref 10.7) and CIRIA C552 (Ref 10.8).

Receptor sensitivity/value

10.17.3 The sensitivity of the identified receptors will be defined using the criteria in **Table 10-16**.

Table 10-16 - Receptor sensitivity

Sensitivity	Geology	Hydrogeology
High	Very rare/rare or nationally important sites. Existing/ Mineral Preferred Areas, high sensitivity land use such as residential/public open spaces use.	Public groundwater abstractions and associated SPZ1 and SPZ2. Groundwater within geological units that display a high level of water storage and may support water supply and/or river base flow on a strategic scale. Includes all Principal Aquifers.
Medium	Regionally important sites, Mineral Safeguarded Areas and Mineral Consultation Areas, medium sensitive uses such as commercial or industrial uses.	Private groundwater abstractions (including for agricultural and potable purposes) and nominal 50 m SPZ1. SPZ3 associated with public groundwater abstractions. Groundwater that is not currently abstracted, but which is within Secondary Aquifers that display generally good chemical quality (e.g. WFD Good chemical status) or currently poor chemical status with the capacity to improve to good within the next WFD cycle, and/or good groundwater quantities.
Low	Local interested geology sites. Mineral present but outside Mineral Preferred Areas Mineral Safeguarded Areas and Mineral Consultation	Groundwater that is not currently used for human consumption and is within Secondary Aquifers that display poor chemical quality (i.e. WFD Poor chemical status and do not

Sensitivity	Geology	Hydrogeology
	Areas. Low sensitivity land use such as highway and rail.	have potential to achieve Good chemical status within the next WFD cycle) and groundwater quantities. Groundwater that is abstracted for low sensitivity industrial purposes (e.g. cooling water).
Negligible	Very low important geology site. No mineral identified. Undeveloped surplus land with no sensitive land use proposed.	Groundwater that does not contribute meaningfully towards river base flow and is not used, and does not have a potential to be used, for drinking water supply.

Magnitude of impact

10.17.4 The magnitude of impacted will be rated based on the criteria in **Table 10-17**.

Table 10-17 Magnitude of Impact

Sensitivity	Geology	Hydrogeology
High	Permanent loss of geological feature/designation. Contamination significantly exceeding assessment criteria restricting future land use.	Release of Priority Hazardous Substances or substances regulated under 'The Water Framework Directive (Standards and Classification) Directions (England and Wales) (2015)' of the 'Water Supply (Water Quality) Regulations (2000)'. Physical or chemical effects on an aquifer (i.e. changes in groundwater levels, flows or quality) that substantively restrict its viability as an abstractable resource and/or reduce its WFD status or prevent it from reaching its target WFD status.
Medium	Partial loss of geological feature/designation. Contamination levels marginally exceeding assessment criteria and control/remediation required.	Release of Priority Hazardous Substances or substances regulated under ''The Water Framework Directive (Standards and Classification) Directions (England and Wales) (2015)' of the 'Water Supply (Water Quality) Regulations (2000)' at concentrations that exceed regulatory compliance criteria and may lead to substantial localised degradation in groundwater quality. Physical or chemical effects on an aquifer (i.e. changes in groundwater levels, flows or quality) that limit its effectiveness as a resource and/or

Sensitivity	Geology	Hydrogeology
		reduce its WFD status or prevent it from reaching its target WFD status.
Low	Minor change in geological feature/designation. Contamination below assessment criteria and remediation not required	Release of Priority Hazardous Substances or substances regulated under ‘‘The Water Framework Directive (Standards and Classification) Directions (England and Wales) (2015)’ of the ‘Water Supply (Water Quality) Regulations (2000)’ at concentrations that may lead to minor localised degradation in groundwater quality. Reduction of groundwater levels/ quantities or changes in groundwater flows, but with little effect on the use or WFD status of the groundwater resource.
Negligible	Very minor loss or detrimental alteration to 1 or more characteristics/features or elements of the geological feature/designation. Contamination levels substantially below assessment criteria and no control/remediation required	No/minimal measurable effect on groundwater levels, quantities, flows or chemical quality, or on the use or WFD status of a groundwater resource.

Significance of effect

10.17.5 The significance will be derived using the matrix set out in **Volume 1, Part 1, Chapter 5, PEIR Approach and Methodology**.

10.17.6 There is no equivalent published assessment methodology for the impacts relating to geology (for example, geological sites). For consistency, a source – pathway – receptor approach would be adopted to assess these effects (combination of receptor identification and associated sensitivity and magnitude of potential impacts) as stated above and in accordance with DMRB guidance.

10.17.7 The assessment will classify each potential effect as either negligible, minor, moderate or major.

10.17.8 However, it should be noted that the output of the assessment is a risk classification rather than a predicted effect. For example, minor ‘effects’ in relation to health risks from exposure to soil contamination would reflect an assessment that there is a low/very low risk of potentially significant effects occurring rather than indicating that there is a predicted adverse effect that would be of a minor nature.

10.17.9 Where the outcome of the assessment is a moderate or major risk, then the effect (risk) will be considered significant, and mitigation would be required. Where the outcome is a minor or negligible risk, then the effect (risk) will be considered not significant, and mitigation would not ordinarily be required.

Preliminary assessment of cumulative effects

10.17.10 At the current stage of the Projects (PEIR stage), design information for the Projects is insufficient to allow for a robust cumulative assessment to be undertaken. Furthermore, given the current position in relation to baseline data collection, with much of the environmental surveys still to be undertaken during 2025, the baseline identified at this PEIR stage cannot be taken as a complete picture of the potential presence and significance of sensitive receptors. Therefore, a cumulative assessment has not been undertaken at this stage; however, **Volume 1, Part 4, Chapter 28 Cumulative Effects**, presents the long and short lists of 'other developments' which will be considered at the ES stage, and the methodology which allowed for the identification of these other developments, to allow consultation bodies to form a view and provide comment on the other developments included. The long-list will be reviewed and if necessary, updated, in the lead up to the ES, as the Projects design further evolves and in response to any comments raised at statutory consultation.

10.17.11 Combined effects (sometimes called intra-project effects) result principally from different types of impacts from one development acting in combination on a specific receptor. In this chapter, the following combined effects have been assessed:

- Consumptive water use is not currently proposed. However, the design is not finalised, and if there is any requirement to abstract as part of construction e.g. to produce concrete for structures, to supply drinking water for site temporary compounds, or as dust suppression, this will require permitting. Any combined effects on the hydrology regime arising from dewatering activity during construction will be presented in:
  - **Volume 1, Part 2, Chapter 9 Water Environment**.
- This chapter has identified combined effects on GWDTE arising from dewatering activity during construction. For further information on GWDTE, please also refer to:
  - **Volume 1, Part 2, Chapter 6 Biodiversity**;
- Combined effects relating to changes in the groundwater regime on surface water receptors, in particular, the potential for changes in groundwater quality and quantity of flow to impact on the baseflow (low flow) regimes of watercourses;
  - **Volume 1, Part 2, Chapter 9 Water Environment**.
- Combined effects relating to changes in baseline land drainage and rainfall runoff regimes, and subsequent potential for increases in surface water flood risk;
  - **Volume 1, Part 2, Chapter 9 Water Environment**.
- Changes to water quality and flow regimes of watercourses that support designated interest features of protected areas/nature conservation sites will be presented in the ES, pending ongoing ecology survey work/awaited data.

10.18 Preliminary assessment of geology and hydrogeology effects

10.18.1 The preliminary significant effects of the English Onshore Scheme have been assessed using current available data relating to both the construction and operation (and maintenance) phases of the English Onshore Scheme and have assumed the following:

- The majority of the underground cables would be installed at shallow depth within ducting that has been installed within shallow backfilled trenches. Therefore, the

potential for interaction with groundwater would be limited. Some control of shallow groundwater inflow to trenches may be required.

- The converter station and Walpole B Substation sites are large and areas may require ground reprofiling.
- In places, including at the landfall, trenchless technologies would be deployed to traverse watercourses, roads, and other features.
- During operation, the underground cables would generate heat. In the worst-case scenario, this may cause a local rise in groundwater temperature, where the underground cables are buried below the maximum (winter) water table of aquifers.
- The potential for significant impact on geology and hydrogeology arising from the English Onshore Scheme is considered low, as demonstrated within the preliminary assessment of effects below, and assumes implementation of the environmental measures outlined in **Section 10.14** above.

Preliminary Assessment of Effects: Human Health

10.18.2 An initial assessment of the risk to human health receptors has been carried out, based on the baseline conditions.

Construction workers

10.18.3 The risk to construction workers has been considered, given the potential for unforeseen contamination to be encountered during excavation works and the potential exposure to ground gases and vapours associated with landfills, Made Ground, and/or Peat, in enclosed or confined spaces.

10.18.4 The sensitivity of this receptor is considered low, on the assumption that a task/site specific risk assessment would be carried out prior to construction works and appropriate mitigation (i.e. PPE and safe working practises) undertaken.

10.18.5 The following control and management measures, as set out in **Table 10-12**, have been identified:

- Mitigation measures would be implemented through task-specific method statements, clean excavation practices, materials segregation, and management (to be detailed in the **Volume 2, Part 1, Appendix 1.5.B Outline CoCP**).
- Mitigation of ground gas risks to construction workers (peat, landfills, contamination) would be mitigated in line with Safe Work in Confined Spaces Approved Code of Practice and Guidance, L101, HSE, 2014 and the Confined Spaces Regulations 1997.
- A watching brief including a strategy for managing unexpected contamination will be in place in the **Volume 2, Part 1, Appendix 1.5.B Outline CoCP**.
- Ground investigation will allow for the identification of areas of contamination or risk and enable suitable mitigation measures to be put in place prior to the construction phase.
- All construction works would be undertaken in accordance with the Health and Safety at Work Act 1974 and the Construction (Design and Management) Regulations (2015).

10.18.6 The current land use, which is noted as predominantly undeveloped agricultural land, is considered to be low risk. The potential for encountering localised higher risk ground (such as landfills, infilled ponds and Made Ground associated with former structures) is considered medium, however, these areas would be defined (through ground investigation) and mitigated (through safe construction practices) prior to construction. Therefore, the magnitude of impact is defined as low, resulting in significance of low effect, which is **Not Significant**.

Site end users

10.18.7 On the basis that most of the indicative zone for underground cable assets comprises agricultural land use, the sensitivity of site end users (users of the fields, visitors, trespassers) is considered high but given the environmental setting along much of the indicative zone for underground cable assets the likelihood for encountering contamination is considered low and therefore the overall magnitude is low.

10.18.8 For the areas of the proposed converter stations and Walpole B Substation, it is assumed that the land would comprise hardstanding and buildings (commercial / industrial land use) and would likely remove any potential pollutant pathway to site users. The sensitivity of site users (i.e. workers during the operational phase) is considered to be low, and due to the lack of credible pollutant pathway, the magnitude of impact is assessed as low, resulting in a negligible effect, which is **Not Significant.**

10.18.9 This will be confirmed following the completion of an intrusive ground investigation and the implementation of embedded mitigation measures or environmental controls (such as localised remediation).

Neighbouring residents

10.18.10 There is the potential risk for contamination and/or hazardous ground gases / radon to be disturbed and mobilised by the construction works. Although, the environmental setting along much of the indicative zone for underground cable assets is noted as predominantly undeveloped agricultural land, there are a number of residential properties (human health receptors) in proximity to the study area. The sensitivity of neighbouring (human health) residents is regarded as high, and the magnitude of impact is considered low (minor change in geology feature/designation, remediation not required) and **Not Significant.**

10.18.11 This will be confirmed following the completion of the programme of intrusive ground investigation and the implementation of embedded mitigation measures or environmental controls (such as localised remediation or dampening down).

Preliminary Assessment of Effects: Controlled Waters

10.18.12 The sensitivity of controlled waters (groundwater aquifers and surface water features) is regarded as high, on the basis that the study area overlies a Principal Aquifer in the north and given the abundance of surface water drains and rivers located on-site. The construction works have the potential to result in pre-existing contamination to be mobilised and subsequently impact the water environment. However, given that the current land use, which is noted as predominantly undeveloped agricultural land, the potential for encountering localised higher risk ground (such as landfills, infilled ponds and Made Ground associated with former structures) is considered to be low and the overall magnitude is considered low (minor change in geology feature/designation, remediation not required) and **Not Significant.**

10.18.13 This will be confirmed following the completion of the completion of an intrusive ground investigation and the implementation of embedded mitigation measures or environmental controls (such as localised remediation or dampening down).

10.18.14 In addition, in areas of potential contamination such as landfills, Made Ground etc these will be investigated and considered within the design (such as avoidance, management, avoiding creating pathways etc).

Preliminary Assessment of Effects: Regional and Local Geological Sites

10.18.15 The sensitivity of designated regional and local geological sites is generally considered negligible as no sites designated as being of local or regionally important geology have been identified.

10.18.16 Sensitive geology is not mapped except locally between Little Steeping and Sibsey Northlands, where Peat is mapped. Therefore, the sensitivity is considered low and the overall magnitude is also considered low and **Not Significant**, as the proposed works will be designed to have a minor impact to the Peat deposits.

Preliminary Assessment of Effects: Property / Infrastructure

10.18.17 The potential effects of geology on property and infrastructure are expected to be localised to the ground directly associated with the construction of the English Onshore Scheme, and geology hazards due to stability and aggressive soil conditions were scoped out of the assessment (Ref 10.1)

10.18.18 The property and infrastructure of the English Onshore Scheme is considered to be a low sensitivity receptor as the property and infrastructure would be permanently installed for the operational lifespan, and the effects due to contamination and ground gas / radon can be mitigated by the engineering design or construction methods. The magnitude of the potential effects is assessed to be low as over the operational lifespan of the English Onshore Scheme, the potential for damage to the underground cables, converter stations and Walpole B Substation is **Not Significant,** providing the engineering design mitigation is appropriate.

10.18.19 The overall effect is assessed as being negligible, as the impacts can be mitigated through engineering design.

Preliminary Assessment of Effects: Groundwater resources and quality

Groundwater abstractions

10.18.20 The receptor sensitivity of public groundwater abstractions with associated published SPZs is high.

10.18.21 Potential impacts on groundwater abstractions include a reduction in groundwater quality due to construction and changes to groundwater recharge. The potential impacts on this receptor by the construction and installation of the underground cable is negligible as it is unlikely that any potential change to the wider groundwater regime would result from the English Onshore Scheme due to the limited depth of excavation anticipated and hence limited radius of influence. This is subject to change if design and hence the depth proposed changes. The magnitude of impact is therefore minor, which is **Not Significant**.

10.18.22 The receptor sensitivity of PWS groundwater abstractions is medium if in currently active use for potable or agricultural purposes. The potential impacts on these receptors would vary depending on their proximity to the construction and installation of the underground cable, the planned depth of excavation, and the nature of the bedrock and its aquifer status. The potential impacts include reductions in groundwater quality due to construction works, reduction of groundwater quantities for abstraction due to construction dewatering, or changes to groundwater recharge or flow pathways due to the presence of below ground structures during the operational phase.

10.18.23 A full assessment of the impacts on PWS will be undertaken as part of the ES, following site surveys of PWS locations considered at risk of impact from the English Onshore Scheme.

10.18.24 It is considered that any impact can be mitigated by the continuity of supply, such as provision of an alternative mains supply if necessary and that the impact to end-users is therefore negligible. Monitoring may be recommended. The magnitude of impact is therefore minor (**Not Significant**).

WFD groundwater bodies

10.18.25 The receptor sensitivity of WFD groundwater bodies are:

- Medium: if displaying generally good chemical quality (e.g. WFD Good chemical status) or currently poor chemical status with the capacity to improve to good within the next WFD cycle; and
- Low: if displaying WFD Poor chemical status and do not have potential to achieve Good chemical status within the next WFD cycle.

10.18.26 The potential impacts to WFD waterbodies include a reduction in quality through construction or operation, which reduces its WFD status or prevents it from reaching its target WFD status. A full assessment of the impacts on WFD will be undertaken as part of the ES. The potential impacts on this receptor by the construction and installation of the underground cables would be negligible as it is unlikely that any potential change to the WFD groundwater body quality would result from the English Onshore Scheme due to the limited depth of excavation anticipated and, hence limited interaction with WFD groundwater bodies. This is subject to change if design and hence the depth proposed changes. The magnitude of impact is therefore minor or negligible, which is **Not Significant.**

Project specific effects: Thermal impacts

10.18.27 As part of its response to the EIA Scoping Report, the Environment Agency requested that consideration is given to assessment of thermal impacts of the buried cables on groundwater, given that heat is considered to be a pollutant.

10.18.28 The ES will provide an assessment of the risks arising from heat with benefit of more design information than is currently available. In particular, the proximity of GWDTEs will be checked, in relation to potential thermal impacts. A thermal impact assessment is not needed in Conceptual Area 2, as the English Onshore Scheme here is underlain by Unproductive Strata, meaning there is little to no groundwater present.

10.18.29 An analytical approach may be used if the cables were buried below the maximum (winter) water table of aquifers. If the cables are not deep enough to interact with the water table, the impact on groundwater would be no change or negligible and therefore would be Not Significant. This approach is considered proportionate to the risk.

Project specific effects: Trenchless technology

10.18.30 The use of trenchless technologies is proposed at a number of locations, including watercourses and roads. The nature of the technology proposed is not known at this stage but may include the use of drilling muds and additives such as bentonite. If not properly controlled, bentonite loss can occur, resulting in impacts to controlled waters.

10.18.31 The locations for the use of trenchless technology include sites that are situated within the delineated source protection zones (SPZ1 and SPZ2 and SPZ3) for the Thurlby Public supply boreholes and within SPZ3 for the Walton le Marsh Public Supply boreholes. The requirement / need for this technology in these locations will be reviewed and risks assessed during the ES, in conjunction with engagement with the operating company and the Environment Agency. Other locations will be assessed with regards to proximity to private water supplies and watercourses.

10.18.32 Mitigation of risks arising from the use of bentonite can typically be addressed through robust construction management practices, including volumetric control and monitoring.

Preliminary Assessment of Effects: GWDTEs

Willoughby Meadow SSSI (Section 2: Thurlby to Welton Le Marsh)

10.18.33 Willoughby Meadow SSSI is considered to be of high sensitivity. Willoughby Meadow SSSI is adjacent to a proposed access road and approximately 900 m from the indicative zone for underground cable assets.

10.18.34 The potential impacts include reductions in groundwater quality due to construction works, reduction in groundwater flow due to construction dewatering, or changes to groundwater recharge or flow pathways due to the presence of below ground structures during the operational phase
Due to the significant distance between the GWDTE site and the working width, the impact to this receptor is considered to be negligible. The potential significance of effect is assessed as minor and **Not Significant.**

Preliminary Assessment of Effects: People at risk of Groundwater flooding

10.18.35 Consideration of the effects of Groundwater does not include buildings and infrastructure, which have been scoped out of this chapter. The receptor sensitivity is high. The potential impacts to groundwater flooding include changes to groundwater recharge and flow due to the English Onshore Scheme.

10.18.36 An assessment of the impacts on groundwater flooding will be undertaken as part of the ES in conjunction with the Water Environment ES chapter.

10.18.37 The potential impacts on this receptor by the English Onshore Scheme would be negligible as it is unlikely that significant impacts from the English Onshore Scheme would occur due to the limited depth of excavation anticipated and hence limited disruption of flow within groundwater bodies. This is subject to change if design and hence the depth proposed changes. The magnitude of impact is therefore negligible (**Not Significant**).

10.19 Further work to be undertaken

10.19.1 The information provided in this PEIR is preliminary; the final assessment of potentially significant effects will be reported in the ES. This section describes the further work to be undertaken to support the geology and hydrogeology assessment presented in the ES.

10.19.2 The ES will report the findings of the assessment of the selected option for the converter stations and the temporary quay should the quay remain part of the final Projects design.

Baseline Geology

10.19.3 The walkover survey is on-going and will be completed prior to the ES. It will target the remaining parcels of land not accessed during the first walkover survey and additional areas identified as part of this PEIR.

10.19.4 Incomplete historical mapping for sections of the study area will be obtained and used within the ES.

10.19.5 Ground investigation is proposed and is required to inform the design. Initial ground investigation has been carried out, but information was not available at the time of reporting in the PEIR. The data available at the time of the ES will be assessed within the ES chapter.

10.19.6 Requests will be submitted to Local Authorities and local groups, to obtain information on regional and local geological sites to confirm the absence of designated sites within the study area.

10.19.7 Any changes to the design will be considered within the ES and additional surveys required will be carried out and incorporated into the ES, as appropriate.

Baseline Hydrogeology

10.19.8 Site surveys for hydrogeological receptors will be undertaken prior to commencement of the ES. Discussions with technical stakeholders regarding the survey programme and methodology are ongoing.

10.19.9 Assessment of thermal effects on geology and hydrogeology will be undertaken in the ES, with the Environment Agency to be consulted on the approach.

10.19.10 Technical discussions with technical stakeholders, including the Environment Agency, Natural England, and Anglian Water are ongoing.

Assessment Geology

10.19.11 After finalisation of the indicative cable route and converter station sitings, the assessments undertaken within this PEIR for the risks to sensitive receptors, such as human health, controlled waters and property and infrastructure, can be undertaken/updated. If additional data (e.g. from ground investigations) is available, it will be considered in the updated assessments.

Assessment Hydrogeology

10.19.12 The assessments undertaken for the PEIR will be reviewed following stakeholder consultation feedback and further design refinement. The following assessments will

then either be updated or undertaken where they have not been undertaken for this PEIR:

- WFD assessment; and
- Impact assessment on:
  - GWDTE; and
  - Groundwater abstractions, including private and public water supplies.

10.19.13 Thermal effects will be assessed in the ES, the assessment approach will be agreed with the Environment Agency and will be likely to involve analytical calculation of heat output and dissipation in typical geologies expected along the indicative zone for underground cable assets and design mitigation.

Further Environmental Measures Geology

10.19.14 The assessments undertaken for the PEIR will be reviewed following stakeholder consultation feedback and further design refinement. The following assessments will then either be updated or undertaken where they have not been undertaken for this PEIR:

- Assessments updated in light of ground investigation data (contamination, ground gas and geotechnical information); and
- Environmental measures will be updated in light of the updated assessments.

Further Environmental Measures Hydrogeology

10.19.15 Further consultation with relevant statutory consultees will be undertaken to define the scope and extent of the environmental measures set out in the assessment above. If further design refinement, stakeholder consultation, or assessment identifies the need for additional measures, these will be outlined in detail within the ES.

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