

The Great Grid Upgrade

Eastern Green Link 5 (EGL 5)

Preliminary Environmental Information Report

Volume 1

Part 2

Chapter 10 Geology and Hydrogeology

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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 (EGL) 5 English Onshore Scheme, with respect to Geology and Hydrogeology, including contamination, groundwater resources, groundwater dependent water bodies and ecosystems and groundwater flood risk. The preliminary assessment is based on information obtained to date. It should be read in conjunction with the description of the project provided in **Volume 1, Part 1, Chapter 4: Description of the Project**.

10.1.2 This chapter describes the methodology used, the datasets that have informed the preliminary assessment, baseline conditions, environmental measures, and the preliminary geological and hydrogeological effects that could result from the English Onshore Scheme during the construction, operation (and maintenance), and decommissioning phases. Specifically, it relates to the English Onshore Scheme elements of EGL 5 landward of Mean Low Water Springs (MLWS).

10.1.3 This chapter should be read in conjunction with:

- **Volume 1, Part 1, Chapter 4: Description of the Project** (to provide context of the locations and areas detailed within this chapter);
- **Volume 1, Part 1, Chapter 5: PEIR Approach and Methodology** (to contextualise the assessment undertaken within this chapter in the context of the wider scheme);
- **Volume 1, Part 2, Chapter 6: Biodiversity** (due to the close association between some habitats, flora and fauna, and local geological and hydrogeological features);
- **Volume 1, Part 2, Chapter 9: Water Environment** (due to the close association between groundwater and surface water features);
- **Volume 1, Part 2, Chapter 11: Agriculture and Soils** (due to the overlap between soils and geological units), and;
- **Volume 1, Part 2, Chapter 26: Greenhouse Gases** (due to the influence of climate change / climate resilience on ground conditions and hydrogeology).

10.1.4 This chapter is supported by the following figures:

- **Volume 3, Part 2, Figure 9-3: Water Framework Groundwater Body Status;**
- **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 Potentially Contaminative Sources / Features;**
- **Volume 3, Part 2, Figure 10-4: Map of Walkover Areas (for Geology);**
- **Volume 3, Part 2, Figure 10-5: UXO Mapping;**
- **Volume 3, Part 2, Figure 10-6: Superficial Aquifer Designations;**

- **Volume 3, Part 2, Figure 10-7: Bedrock Aquifer Designations;**
- **Volume 3, Part 2, Figure 10-8: Groundwater Receptor and Features, and;**
- **Volume 3, Part 2, Figure 10-9: Groundwater Source Protection Zones.**

10.1.5 This chapter is supported by the following appendices:

- **Volume 2, Part 1, Appendix 2.A: Regulatory and Planning Context;**
- **Volume 2, Part 1, Appendix 5.B: Outline Code of Construction Practice (CoCP);**
- **Volume 2, Part 1, Appendix 5.A: Outline Register of Design Measures;**
- **Volume 2, Part 2, Appendix 10.A: EGL 5 Groundsure Report;**
- **Volume 2, Part 2, Appendix 10.B: Potential Contaminative Sources Walkover Photo Log, and;**
- **Volume 2, Part 2, Appendix 10.C: Scoping Opinion Response Summary.**

Limitations

- 10.1.6 The information provided in this Preliminary Environmental Information Report (PEIR) is preliminary, the final assessment of significant effects will be reported in the Environmental Statement (ES). This 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.
- 10.1.7 The EGL 5 Scoping Report (Ref 10.1) identified aspects and features of the English Onshore Scheme that were scoped out of the EIA process, these are detailed within the EGL 5 Scoping Report (Ref 10.1). Aspects that have been scoped out are detailed in **Table 10-19** and are not addressed further within this PEIR.
- 10.1.8 **Volume 2, Part 2, Appendix 10.A: EGL 5 Groundsure Report** (Ref 10.2), was obtained for the EGL 5 Project based on the available cable routeing at the time of purchase. At the time of writing this report, the cable routing has been refined which omits a central section of potential routing covered within the earlier cable routing (and Groundsure report), in addition to other slight variations to the draft Order Limits. The PEIR will assess the most current routeing design available for the Project. Therefore, there will be instances where sections included within the Groundsure Report are omitted from this PEIR assessment and vice versa.
- 10.1.9 The historical maps provided within the Groundsure Report (Ref 10.2) have been provided digitally and cover only the draft Order Limits of the earlier cable routing design. Where available these historical maps have been supplemented by freely available historical maps (Ref 10.3, Ref 10.4), ensuring the wider study area (250 m buffer) outside of the draft Order Limits has also been assessed.
- 10.1.10 Geology walkovers were conducted in early December 2025, with a total of 21 sites / locations identified from desk study as preferential locations to walkover, due to their historical / current land uses or geological significance. Access from Landowners was granted for a total of ten sites, and therefore where access was not permitted a walkover was not conducted. The lack of access to these land parcels is not considered to significantly impact the geology conclusions and baseline outlined within this PEIR.

- 10.1.11 Of the remaining 11 walkover sites identified that were not visited, 5 of these sites no longer fall within the 250 m Study area for Geology (due to refinements in the design of the English Onshore Scheme), 3 sites were denied access and therefore a walkover is not considered viable, and the 2 remaining sites are awaiting confirmation of if access is viable. Further surveys are not proposed for Geology, however, if additional potentially contaminative sources are identified prior to the authoring of the ES, then these would require a walkover.
- 10.1.12 Hydrogeology walkovers have not been conducted in advance of the preparation of this PEIR. These hydrogeology specific walkovers are due to be conducted in the second quarter (Q2) of 2026.

Preliminary significance conclusions

- 10.1.13 For ease of reference, a summary of the potentially significant effects from the preliminary geology and hydrogeology assessment is provided in **Table 10-1**.
- 10.1.14 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	Magnitude of change	Significance	Summary rationale
Geology	Not Applicable	Not Applicable	Not Applicable	Significant or potentially significant effects have not been identified. This is discussed further in Section 10.9.
Hydrogeology	Not Applicable	Not Applicable	Not Applicable	Significant or potentially significant effects have not been identified. This is discussed further in Section 10.9.

10.2 Relevant Technical Guidance

10.2.1 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 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, which has informed this PEIR and will inform the assessment within the ES is summarised below.

Technical guidance

10.2.2 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
Geology Technical Guidance Documents	
Land Contamination Risk Management (LCRM), Environment Agency, 2025 (Ref 10.5)	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 C552, A guide to good practice, Construction Industry Research and Information Association (CIRIA), 2001 (Ref 10.6)	CIRIA C552, sets out guidance for the approach to be undertaken for completing a contaminated land risk assessment.
BS 5930:2015 + A1:2020, Code of Practice for Ground Investigations, British Standards Institution (BSI), 2020 (Ref 10.7)	BS 5930 provides guidance on the, environmental, and technical matters relating to site investigation.
BS 10175:2011 + A2:2017, Code of Practice for the investigation of potentially contaminated sites, British Standards Institution (BSI), 2017 (Ref 10.8)	BS 10175 provides recommendations and guidance for investigation on site which could potentially be affected by contamination.
Design Manual for Roads and Bridges (DMRB) LA 109: Geology and soils, Highways England, 2019 (Ref 10.9)	DMRB LA 109 provides a framework for assessing and managing the effects associated with geology and soils.
National Planning Policy Framework (NPPF) Guidance: Land Affected by Contamination, Ministry of Housing, Communities and Local Government, 2024 (Ref 10.10)	This guidance provides guiding principles on how planning can deal with land affected by contamination.

Technical guidance document	Context
The Definition of Waste: Code of Practice (DoWCoP), Contaminated Land: Applications in Real Environments (CL:AIRE), 2011 (Ref 10.11)	Guidance on the classification of waste materials from construction, for re-use and disposal.
Environment Agency's Guiding Principles for Managing and Reducing Land Contamination (GPLC2), Environment Agency, 2010 (Ref 10.12)	This guidance clarifies the roles and responsibilities and compliance with regulations.
Hydrogeology Technical Guidance Documents	
Protect groundwater and prevent groundwater pollution guidance note, Environment Agency, 2025 (Ref 10.13)	This guidance sets out the control and permitting of activities that could affect the quality or quality of groundwater.
The Environment Agency's approach to groundwater protection, Environment Agency, 2018 (Ref 10.14)	This guidance sets out the principles of groundwater protection.
Regulatory Position Statement 261: Temporary dewatering from excavations to surface water, Environment Agency, 2023 (Ref 10.15)	This guidance sets out the regulatory approach for consenting the discharge of clean rainwater from excavations.
Design Manual for Roads and Bridges (DMRB) LA 113: Road drainage and the water environment, Highways England, 2020 (Ref 10.16)	This guidance sets out an EIA assessment approach for groundwater quality, flow, and resource protection, considering both construction and operational phases. Whilst highway orientated, the included simple assessment steps with use of hydrogeological conceptual site models and methodologies for identifying sensitive groundwater receptors, are applicable to this PEIR.

10.3 Consultation and Engagement

Overview

10.3.1 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

- 10.3.2 A Scoping Opinion (Ref 10.18) was issued by the Planning Inspectorate on behalf of the Secretary of State on 13 October 2025. A summary of the relevant responses received in the Scoping Opinion (Ref 10.18) in relation to Geology and Hydrogeology and confirmation of how these have been addressed within the assessment to date is presented in **Volume 2, Part 2, Appendix 10.C: Scoping Opinion Response Summary**.
- 10.3.3 The information provided in this PEIR is preliminary and not all of the Scoping Opinion (Ref 10.18) comments have been addressed at this stage, however, all comments will be addressed within the ES. References made to Sections and Figures within Column three (Topic for Consideration (Planning Inspectorate Comment)) of the table refers to the corresponding sections within the EGL 5 Scoping Report (Ref 10.1).

Technical engagement

- 10.3.4 Technical engagement with consultees in relation to the geology and hydrogeology is ongoing. A summary of the technical engagement undertaken to date is outlined in **Table 10-3**.

Table 10-3 Technical engagement on the environmental aspect assessment

Consultee	Consideration	How addressed in this PEIR
Greater Lincolnshire Partnership (Ref 10. 19).	Nature (GLNP) An email requesting the consultee share any known Locally or Regionally Important Geological Sites (RIGS). GLNP response highlights a Local Geological Site (LGS) at the landfall location of the EGL 5 route; the Lincolnshire Coast Submerged Forest LGS.	This information has been included within the baseline Section 10.4 (within Section 1 of the draft Order Limits) and the geological receptor has been considered within the assessment in Section 10.9.
Zetica Unexploded Ordnance (UXO) (Ref 10.20).	A desk study and risk assessment has been requested from Zetica to assess the UXO risk posed to the English Onshore Scheme.	This is included within the Overall Baseline Section (Section 10.4), which covers the five spatial sections of the English Onshore Scheme and pertinent information presented in Volume 3, Part 2, Figure 10-5 .
East Lindsey District Council.	Groundwater Private Water Supplies.	This information has been utilised within the assessment to identify private water supplies as potentially sensitive receptor locations, ensuring their protection is appropriately considered.

- 10.3.5 Continued engagement with the Environment Agency and Local Planning Authorities will continue throughout the assessment process to inform the ES.
- 10.3.6 In advance of the ES, engagement will also be undertaken with the following key stakeholders relevant to geology and hydrogeology to discuss the proposed assessment methodology:
- The Environment Agency will be consulted on the approach to assessment of thermal impacts from the cable in relation to groundwater. 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.
 - Natural England will be consulted in relation to works around Groundwater Dependent Terrestrial Ecosystems (GWDTEs) and their protection.
 - Anglian Water and the Environment Agency will be consulted in relation to works within Source Protection Zones (SPZ), the protection of supplies, and the use of water in construction.

10.4 Data Gathering Methodology

Study area

- 10.4.1 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** and **Volume 3, Part 2, Figure 10-2**.
- 10.4.2 Given the scale and nature of the English Onshore Scheme, this is considered an appropriate approach. The study area is based on professional judgement, knowledge of similar projects and the guidance within DMRB LA 109: Geology and Soil (Ref 10.9).
- 10.4.3 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 10-6**.
- 10.4.4 The distance of 500 m from the draft Order Limits is considered a worst-case distance for impacts on the groundwater environment, based on the limited depth of the English Onshore Scheme and professional judgement.

Desk study

- 10.4.5 The existing baseline has been characterised on the basis of desk-based sources, such as Groundsure reports (Ref 10.2), Environment Agency and local authority information requests and a Zetica Unexploded Ordnance (UXO) Desk study and Risk assessment report (Ref 10.20), for the English Onshore Scheme. This desk-based review of information has then informed Geology and Hydrogeology specific site walkovers, targeting areas of interest or important features that have been identified.
- 10.4.6 A summary of the organisations that have supplied data, together with the nature of that data is outlined in **Table 10-4**.

Table 10-4 Data sources used to inform the geology and hydrogeology assessment

Organisation	Data source	Data provided
MAGIC (Ref 10.21)	Magic Map GIS Viewer (website)	Various environmental GIS layers
Google (Ref 10.22)	Google Earth Pro (application)	Satellite imaging Historic mapping
British Geological Society (Ref 10.23)	BGS Geindex- (website)	Onshore Geological and Hydrogeological data
National Library of Scotland (Ref 10.4)	NLOS Side by Side Map Viewer (website)	Historic mapping
Natural England (Ref 10.24)	Natural England Designate Sites Viewer (website)	Environmental designations
East Lindsey District Council (Ref 10.25)	East Lindsey Local Plan (report)	Development details, environmental designations
British Geological Society (Ref 10.3)	BGS Sheet Maps, Sheet Number 104, 1:50,000 scale (map / report)	Geological setting and features
Mining Remediation Authority (Ref 10.27)	Mining Remediation Authority interactive map viewer (website)	Data on recorded mining activities
Environment Agency (Ref 10.28)	Historic Landfill Database (website)	Recorded environmental incidents (pollution incidents Potentially contaminative land uses, activities, stores and remedial works. Active and historical landfill data.
UK Health Security Agency (Ref 10.29)	UK Radon Interactive Map viewer (website)	Radon risk mapping
Greater Lincolnshire Nature Partnership (Ref 10.19, 10.30)	Greater Lincolnshire Nature Partnership Knowledge Hub (website)	RIGS / LGS recorded entries
GeoConservation UK (Ref 10.31)	GeoConservation (website)	UK RIGS / LGS recorded entries
Lincolnshire Naturalists Union (Ref 10.32)	Lincolnshire Naturalists Union -Geology (website)	RIGS / LGS recorded entries
Society for Lincolnshire History and Archaeology (Ref 10.33)	Society for Lincolnshire History and Archaeology- Archives (website)	RIGS / LGS recorded entries

Organisation	Data source	Data provided
Zetica UXO Ltd. (Ref 10.20)	EGL5 UXO Desk study and Risk Assessment (report)	UXO / UXB information for the English Onshore Scheme
Environment Agency	Abstraction Dataset (Licensed and deregulated) (dataset)	Details regarding Licensed and deregulated abstractions
East Lindsey District Council	Private Water Supply Dataset (dataset)	Private Water Supply data
British Geological Society (Ref 10.26, 10.34)	Hydrogeological Map of England and Wales (1977) Hydrogeological Map of North and East Lincolnshire (1967)	Hydrogeological setting and features
Environment Agency (Ref 10.35)	Environment Agency's Catchment Data Explorer (website)	Catchment information
Environment Agency (Ref 10.36)	Environment Agency GWDTE (website)	GWDTE information
Lincolnshire Parish Councils and the Environment Agency	Briefing Paper regarding Beach Management along the Lincolnshire Coast (report)	Report on the Beach nourishment / restoration works undertaken between 2021 – 2024.

Walkover / Surveys

Geology

- 10.4.7 A drive through of the English Onshore Scheme and targeted walkover areas of interest (identified from a review of the available desk-based information) was conducted between 9 to 12 December 2025. The areas visited were based on the cable routeing available at the time as shown on **Volume 3, Part 2, Figure 10-4** and selected photographs presented in **Volume 2, Part 2, Appendix 10.B: Potential Contaminative Sources Walkover Photo Log**.
- 10.4.8 The targeted walkovers were planned during an earlier design stage of the English Onshore Scheme and therefore the walkover routes covered a larger area than the current design. Areas were selected based on an initial review of desk-based information available at the time (Ref 10.2) and included; former landfill sites, historic railways and infrastructure, mineral sites (pits) and current / historical industrial land uses (brick fields, petrol stations etc.).
- 10.4.9 The drive through was conducted along the main access roads within the draft Order Limits. The walkover team stopped along the general route and along the main access roads, making observations and taking photographs of the general surrounding area and any important features / constraints noted.

- 10.4.10 For the targeted walkover, land access requests were made and those that were approved were visited. A walk over survey carried out with notes and photographs taken of features identified and or the general surrounding area.
- 10.4.11 All photographs and notes were geotagged using QField (a data collection application) and are presented on **Volume 3, Part 2, Figure 10-4** and images within **Volume 2, Part 2, Appendix 10.B: Potential Contaminative Sources Walkover Photo Log**.

Hydrogeology

- 10.4.12 A hydrogeology walkover has not been conducted in advance of the preparation of this PEIR. However, a groundwater features survey will be conducted and will be used to inform the assessment in the ES.

10.5 Overall Baseline

- 10.5.1 The baseline provides a characterisation of the study area in terms of the geological and hydrogeological setting. To provide spatial context, the study area has been split into the following geographical sections:
- Section 1: Anderby Creek Landfall;
 - Section 2: Underground Cable Route Corridor;
 - Section 3: EGL 5 Converter Station Area;
 - Section 4: Shared Grimsby to Walpole Haul Road; and
 - Section 5: Alford Construction Route
- 10.5.2 These sections are broadly the same as the geographical sections presented in the EGL 5 Scoping Report (Ref 10.1). However, the overall number of sections reported on have been reduced from six sections to five sections, as the cable routeing design has been refined. The sections discussed within this PEIR are mapped and shown on **Volume 3, Part 2, Figure 10-1**.

Current baseline - Geology

- 10.5.3 Data that has been gathered to date is presented as a summary of the baseline features (walkover description, current uses, mapped geology, desk-based assessment of areas of potential interest; history, unexploded ordnance risk, historical landfills, radon risk, pollution incidents) within the geology study area is summarised below (per section). Reference should also be made to:
- **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 Potentially Contaminative Sources / Features;**
 - **Volume 3, Part 2, Figure 10-4: Map of Walkover Areas (for Geology); and,**
 - **Volume 3, Part 2, Figure 10-5: UXO Mapping;**

- 10.5.4 The information presented below is based on freely available information, information supplied by the Environment Agency and local authorities as well as the Groundsure reports, which include historical maps of the cable routing. A list of sources utilised are presented within **Table 10-4** above.
- 10.5.5 Risks to the proposed development from radon gas, land instability and aggressive ground conditions were not identified within the EGL 5 Scoping Report (Ref 10.1). Relevant stakeholders were in agreement with this assessment and therefore these issues were agreed to be scoped out of the assessment within the EGL 5 Scoping Opinion (Ref 10.18). As such these topics are not discussed further.
- 10.5.6 Safeguarded minerals are not mapped within the English Onshore Scheme Scoping Boundary and therefore have not been considered further as a potential sensitive receptor.
- 10.5.7 Further local enquiries and engagement with relevant stakeholders will be made prior to the ES and will be included within the ES.

Current Baseline Geology - Section 1: Anderby Creek Landfall

- 10.5.8 Section 1 (Anderby Creek Landfall) covers the area from the landfall (on the eastern coast) to the Roman Embankment adjacent to Huttoft Road / Roman Road. It is roughly square in shape and approximately covers an area of 75 ha. This section of the route intersects with the Greater Wash Special Area of Conservation (SAC) and the Lincolnshire Coast Submerged Forest Local Geological Site LGS, these two features are greater in size than the draft Order Limits and continue northwards along the coastline.

Geological Setting

- 10.5.9 The following Geological units, as presented below in **Table 10-5**, are mapped (Ref 10.23) within Section 1 (Anderby Creek Landfall) of the cable route. An indicative thickness is presented from summarising available BGS borehole data (Ref 10.23). The age of some of the BGS boreholes use old naming conventions for geological units / logging standards and therefore these have been inferred using professional judgement.

Table 10-5 Geology within Section 1- Anderby Creek Landfall

Unit Name	Indicative Thickness	Description
Superficial Geology		
Beach and Tidal Flat Deposits (undifferentiated) - Clay, Silt and Sand	~9 m	Composite of Beach deposits comprising of shingle, sand, silt and clay; may be bedded, possible peat layers; from the tidal zone.
Blown Sand - Sand	~4 m	Blown sand is sand that has been transported by wind, or sand consisting predominantly of wind-borne particles.
Tidal Flat Deposits - Clay and Silt	~9 m	Tidal flat deposits, consist of unconsolidated sediment, mainly mud and / or sand.

Unit Name	Indicative Thickness	Description
Bedrock Geology		
Burnham Formation	Chalk >29 m	White, thinly bedded chalk with common tabular and discontinuous flint bands; sporadic marl seams.
BGS GeoIndex Borehole records accessed (Ref 10.23): TF57NW17, TF57NW54, TF57NW55, TF57NW62, TF57NW63, TF57NW64,		

Walkover Description

10.5.10 Section 1 currently comprises the following from east to west:

- A narrow sandy section of tidal beach (at the Anderby Creek Landfall) adjoining the North Sea. The beach extends beyond Section 1 to the north and south is a narrow sandy area;
- A series of sand dunes (approximately 3 - 4 m tall);
- A public footpath (King Charles II Coastal Pathway), which runs adjacent to the coastline;
- Along the northern side of the sand dunes is a small visitor's car park and toilets;
- A series of two agricultural fields (where the cable landfall is proposed) covered in crops;
- Huttoft Road / Roman Road which spans north to south; and
- Western edge is formed by a Roman Embankment and Marshlands (with two ponds); both are overgrown / covered in vegetation.

10.5.11 Section 1 is generally topographically flat except along the shoreline where the sand dunes are approximately 1 - 2 m above the beach / 3 - 4 m above the public footpath and the Roman Embankment (in the west) is approximately 1 - 2 m above the level of the surrounding ground.

10.5.12 The coastline is classified as part of the Greater Wash SAC and the Lincolnshire Coast Submerged Forest LGS. The submerged forest is only visible during very low tides and therefore was not visible during the time of the walkover. Both of these features extend further north outside of the draft Order Limits, whilst the Greater Wash SAC also extends further eastwards.

10.5.13 Inland from the sand dunes, the baseline review carried out prior to the walkover identified three areas for interest within the draft Order Limits of Section 1; two *unspecified yards 1 & 2 at Anderby Creek* (adjacent to each other, approximately 5 m apart) in the north, an *unspecified pit North of Anderby Creek* to the south and the *Roman Embankment and Marshland*. These areas are presented on **Volume 3, Part 2, Figure 10-3**. Access was obtained and the following was observed:

10.5.14 Within the area of the *Unspecified Yard 1 & 2*, four stockpiles of various types of Made Ground with pieces of brick and concrete visible. A large pipe (10 m long, 600 mm diameter) was visible, however, this looked like it had been present for a long period of time due to the overgrowth surrounding them.

- 10.5.15 Within the area of the *unspecified pit North of Anderby Creek*, evidence of the pit was not visible and appeared to form part of the sand dune network which was overgrown. Adjacent to this area (onsite), is a fenced outdoor storage / laydown area where large sections of piping circa (1 m in diameter) were noted. Signage around the fencing / car park indicate it forms part of a new beach nourishment scheme (plate 1d of **Volume 2, Part 2, Appendix 10.B: Potential Contaminative Sources Walkover Photo Log.**).
- 10.5.16 The *Roman Embankment and Marshland* was also a targeted due to the potential for Made Ground. Visible along the embankment were two piles of waste, one looked to be a pile of roofing tiles (could be asbestos containing material) and the second a discarded barrel. On the opposing side of the *Roman Embankment* is a marshland which slopes into the adjoining agricultural fields. Along Huttoft Road are a number of small residential properties however these are outside of the draft Order Limits.
- 10.5.17 The surrounding area is largely formed of agricultural fields with scattered farm buildings and tracks / roads. The shoreline / North Sea to the north east and east. Further away, the closest village is Anderby Creek some 400 m south.

Historical Context

- 10.5.18 The available historical maps (Ref 10.4) show that the study area has remained largely undeveloped agricultural farmland since the earliest available mapping circa 1888. A coast guard station is mapped near the beach between 1888 – 1969 and car park and local amenities (toilets) mapped after 2000's. The mapping from 1951, highlights roman pottery being discovered within the beach landing area.
- 10.5.19 The 1915 historical mapping shows in the footprint of the two Unspecified yards, two structures named as "Marsh Yard". The purpose of these structures is unknown.
- 10.5.20 In the west of Section 1, is Roman Bank / Sea Bank (a Roman Road on a raised embankment which we have referred to in **Volume 3, Part 2, Figure 10-3** and this report as the *Roman Embankment and Marshlands*); it follows the route of the current day Huttoft Road. The embankment is mapped from the earliest map (1888) and is assumed to be manmade.
- 10.5.21 The surrounding areas has largely remained undeveloped.

Geological Sites of Importance

- 10.5.22 The Lincolnshire Coast Submerged Forest LGS has been identified within the study area (from technical engagement with the Greater Lincolnshire Nature Partnership as detailed in **Table 10-4**), running adjacent to the coastline. The Lincolnshire Coast Submerged Forest is noted for its geological importance in highlighting the changing landscape of the Lincolnshire coastline due to ongoing erosion.
- 10.5.23 The LGS is noted to be an example of "*deposited submerged forest remains, which noted varied wood fragments, twigs and branches of a variety of tree species. This material was interspersed with clumps of silty clay and fragments to very large outcrops of peat sediments. The deposits derive from in-situ submerged forest outcrops located below the low tide line*" (Ref 10.19).

Landfills - Historical and Active

10.5.24 From Environment Agency information presented within the Groundsure report (Ref 10.2), landfill sites have not been recorded within Section 1 however there is a potential for unforeseen contamination / Made Ground locally, associated with unrecorded activities and the those identified below within Potential Contaminative Sources.

Potential Contaminative Sources

10.5.25 Section 1 has largely remained agricultural in use since the earliest available mapping, but the mapping has indicated an *unspecified pit North of Anderby Creek* within the south of the draft Order Limits and *unspecified yards 1 & 2 at Anderby Creek* are mapped to the north of the study area, within agricultural fields.

10.5.26 In the west of the section, historical groundworks (labelled as a “*Roman Bank and Sea Bank*”) have been noted running adjacent to Huttoft Bank Road. The road appears to be on an embankment and is topographically higher than the surrounding land, with ponds and marshland noted in the west and agricultural fields to the east.

10.5.27 Locally, Made Ground / unforeseen contamination may be present associated with recent construction works such as car parking and toilets, or associated with unrecorded activities.

Pollution Incidents

10.5.28 One pollution incident (as shown on **Volume 3, Part 2, Figure 10-3**, has been recorded within Section 1 of the study area. This pollution incident is recorded in the southeast (within the edge of the sand dune). The incident occurred in 2002 and was related to the disposal of waste (household waste). The incident was considered to be of a Category 3 pollution to land (minor impacts) and Category 4 to Water and Air (no impact) (Ref 10.2). The description suggests its fly tipping of waste and was not noted during the 2025 walkover, so it has been assumed to have been cleared and not considered further.

UXO Risk

10.5.29 The risks from UXO have been assessed by Zetica in a Desk study and Risk Assessment Report (Ref 10.20). This assesses Section 1 to be of a Low risk. A low risk assessment allows for construction works to proceed without further measures although Zetica recommends an awareness briefing prior to construction.

10.5.30 The beach landing area is categorised as having a Moderate risk from UXO, however as this is outside the study area of the English Onshore Scheme this is not considered within this assessment and PEIR chapter. The UXO risk posed to the English Offshore Scheme is discussed within **Volume 1, Part 3, Chapter 24: Other Marine Users**.

Current Baseline Geology- Section 2: Underground Cable Route Corridor

10.5.31 Section 2 of the study area is approximately 6 km long and irregular linear shape covering approximately 150 ha. The section starts from the western edge of the Roman Embankment and Marshland and runs northwest for approximately 2 km until routing west / southwest towards Boygriff Drain.

Geological Setting

10.5.32 The following Geological units, as presented below in **Table 10-6** are mapped (Ref 10.3, Ref 10.23) within Section 2 (Underground Cable Route Corridor) of the cable route. An indicative thickness is presented from available BGS borehole data (Ref 10.23). The age of some of the BGS boreholes use old naming conventions for geological units / logging standards and therefore these have been inferred using professional judgement.

Table 10-6 Geology within Section 2- Underground Cable Route Corridor

Unit Name	Indicative Thickness	Description
Superficial Geology		
Tidal Deposits and Silt	Flat ~8 m - Clay	Tidal flat deposits consist of unconsolidated sediment, mainly mud and / or sand.
Till - Devensian	~16 m	Till consists of a heterogenous mixture of clay, sand, gravel, and boulders varying widely in size and shape.
Bedrock Geology		
Burnham Formation	Chalk ~20 m	White, thinly bedded chalk with common tabular and discontinuous flint bands; sporadic marl seams.
Welton Formation	Chalk >40 m	White, massive or thickly bedded chalk with common flint nodules but generally lacking tabular flint bands; sporadic marl seams.
BGS Borehole records accessed (Ref 10.23): TF57NW14, TF57NW4, TF57NW6, TF57NW7, TF57NW8, TF57NW9, TF57NW79, TF57NW5, TF57NW48		

Walkover Description

10.5.33 Section 2 comprises the following from east to west:

- Numerous flat agricultural fields (either cropped or grassland); and
- The main roads which pass through Section 2 are Sea Lane (a small country road in an east to west orientation, adjacent to Sandilands National Trust Site), the A52 Sutton Road (roughly north to south, north of Bilsby) and Mill Lane (a small country road running east west, north of Huttoft).

10.5.34 The majority of the agricultural fields across Section 2 are bordered by drainage ditches of varying sizes. In some instances, these ditches are up to 2 - 3 m deep. Properties are not present within the draft Order limits within this section.

10.5.35 Within Section 2 of the study area, approximately 900 m (from east to west within the section) the Huttoft Roadside Nature Reserve is present (designated and managed by the Lincolnshire Wildlife Trust, in partnership with Lincolnshire County Council). When visited, this was mainly a grassed public footpath, lined by occasional trees and bushes and the occasional drainage ditch.

- 10.5.36 Within Section 2 of the study area, one area of potential contamination has been identified; the Historic Railway West of Huttoft, access along the route of the railway due to it being a public footpath. The following observations were noted. The former railway runs in a roughly north east to south west direction. The area is flat and level to the surrounding area and is grassed, with hedgerows to the west, and open agricultural fields to the east. Evidence of the former railway was not visible from the walkover conducted.
- 10.5.37 The surrounding area across Section 2 of the draft Order limits are agricultural fields separated by hedges, treelines and the occasional drains, there are occasional properties / residences adjoining the roads in this area, but these are very limited. A two further potential contamination areas have been identified (on the border of the study area) the first associated with a skip hire business to the south of the study area and the second an infilled pond (within a field) to the east of the Study area were identified, however access to these properties were not granted for walkovers.

Historical Context

- 10.5.38 The available historical maps (Ref 10.4) show that within the study area of this section and surrounding area has remained largely undeveloped agricultural farmland with rare farm properties, roads and tracks since the earliest available mapping circa 1888. The 1880s mapping shows the Sutton to Willoughby Branch of the Great North Railway (which opened in 1848), running north to south across the study area, up to 1.5 km north to north west of Huttoft. Historical mapping indicates that railway was closed for use by 1970. Small farm buildings are mapped across the section, these are predominantly barns and, are not all present in the current day. In general, significant developments are not present within Section 2 of the draft Order Limits.

Geological Sites of Importance

- 10.5.39 From the available information provided within the Groundsure report (Ref 10.2) and from the technical engagement and desk-based research conducted, Geological Sites of Importance (on both a regional and local scale) have not been recorded within Section 2 of the study area.

Landfills - Historical and Active

- 10.5.40 From Environment Agency information, presented within the Groundsure Report (Ref 10.2), landfill sites have not been recorded within Section 2, however, there is a potential for unforeseen contamination / Made Ground locally, associated with unrecorded activities and the those identified below within Potential Contaminative Sources.

Potential Contaminative Sources

- 10.5.41 Section 2 of the route crosses through agricultural fields, with limited structures and developments, therefore, significant potential contaminative sources have not been identified. Three locations have been identified from a review of the Groundsure Report (Ref 10.2), which include A Skip Hire Business (which is potentially also a breakers yard) located west of Huttoft, a historical railway (running north to south, discussed above in the Historical Context section) and an *Infilled Pond West of Huttoft* (with infilling material unknown). In addition to these, given the site setting there is a potential for unforeseen contamination / Made Ground locally, associated with unrecorded activities.

Pollution Incidents

10.5.42 From the available information summarised within the Groundsure Report (Ref 10.2), Pollution Incidents have not been recorded within Section 2 of the study area.

UXO Risk

10.5.43 The risks from UXO have been assessed by Zetica in a Desk study and Risk Assessment Report (Ref 10. 20). This assesses Section 2 to be of a Low risk. A low risk assessment allows for construction works to proceed without further measures although Zetica recommends an awareness briefing prior to construction.

Current Baseline Geology- Section 3: EGL 5 Converter Station Area;

10.5.44 Section 3 of the draft Order Limits is bound in the east by Boygrift Drain and extends to the A1111 Sutton Road in the east, it is situated approximately 550 m east of the village of Bilsby. The area is predominantly flat agricultural fields which cover an approximate area of 103 ha.

Geological Setting

10.5.45 The following Geological units, as presented below in **Table 10-7** are mapped (Ref 10.3, Ref 10.23) within Section 3 (EGL 5 Converter Station Area) of the cable route. The age of some of the BGS boreholes use old naming conventions for geological units / logging standards and therefore these have been inferred using professional judgement.

Table 10-7 Geology within Section 3 - EGL 5 Converter Station Area

Unit Name	Indicative Thickness	Description
Superficial Geology		
Tidal Deposits and Silt	Flat ~5 m Clay	Tidal flat deposits consist of unconsolidated sediment, mainly mud and / or sand.
Till – Devensian	~20 m	Till consists of a heterogenous mixture of clay, sand, gravel, and boulders varying widely in size and shape.
Alluvium	~20 m	A general term for clay, silt, sand and gravel. It is the unconsolidated detrital material deposited by a river, stream or other body of running water as a sorted or semi-sorted sediment in the bed of the stream or on its floodplain.
Bedrock Geology		
Welton Formation	Chalk >44 m	White, massive or thickly bedded chalk with common flint nodules but generally lacking tabular flint bands; sporadic marl seams.
BGS Borehole records accessed (Ref 10.23): TF47NE87, TF47NE88, TF47NE89, TF47NE123, TF47NE116, TF47NE68, TF47NE48, TF47NE129		

Walkover Description

10.5.46 Section 3 of the draft Order Limits comprises the following:

- Boygrift Drain in the east;
- Agricultural fields (cropped);
- A1111; Sutton Road in the west; and
- Woldgrift Drain in the west.

10.5.47 Section 3 is solely formed of agricultural fields which are topographically flat, occasional farm tracks and hedge lines / treelines that separate the fields.

10.5.48 A targeted walkover was scheduled for a potential contaminative source (Unspecified Tank North of Bilsby); however, this was situated behind a locked gate and therefore access / views were limited to behind this gate. As such due to this limited access, walkovers were limited to general drive through / sightings of the general route in this section. Therefore, to supplement the drive through three stops were made along the Section as follows (and shown in **Volume 3, Part 2, Figure 10-4**):

- At the start of a proposed access road where it adjoins to the existing road network (B1449). This area was an area of hardstanding currently used for stockpiling manure / animal waste. Bordering this area of hardstanding were flat agricultural fields, which open out to the indicative zone for the proposed converter station.
- The second and third walkover locations are north of the proposed converter station at the start and end of a farm track. The view from the farm track showed open agricultural fields which were relatively level. Buildings and infrastructure within the draft Order Limits were not visible from the walkover locations viewed.

10.5.49 The surrounding area of Section 3 is generally formed of agricultural fields bordered by hedges, tracks and ditches, with occasional farm structures and buildings. The nearest village is the village of Bilsby, some 550 m west of Section 3.

Historical Context

10.5.50 Section 3 of the route has remained predominantly agricultural since the earliest available mapping; circa 1880. An earlier map ;1880-1920, (Ref 10.4), "Water Engine's" (water mills) are mapped at multiple locations on the two main waterways which cross the section (Boygrift Drain and Woldgrift Drain).

10.5.51 The A1111 / B1197 (Sutton Road) is mapped since the early 1900s, however, the only interaction with this main road within this section is where the proposed Haul Road crosses the road as it approaches the converter station structure.

Geological Sites of Importance

10.5.52 From the available information (Ref 10.2 and **Table 10-4**), Geological Sites of Importance (on both a regional and local scale) have not been recorded within Section 3 of the study area.

Landfills - Historical and Active

10.5.53 From Environment Agency information (Ref 10.2), recorded Landfill sites have not been recorded within Section 3. However, there is a potential for unforeseen contamination / Made Ground locally, associated with unrecorded activities.

Potential Contaminative Sources

- 10.5.54 Within the 250 m study area surrounding the draft Order Limits, the area remained solely agricultural with limited developments present. From desk study information (Ref 10.2) at the PEIR stage, an unspecified tank (situated within an agricultural field) was identified. Given the distance from the proposed cable alignment, there is unlikely to be a significant risk to the proposed English Onshore Scheme, however, this is to be confirmed and assessed within the ES, following receipt of further information.
- 10.5.55 In addition to this, given the site setting there is a potential for unforeseen contamination / Made Ground locally, associated with unrecorded activities.

Pollution Incidents

- 10.5.56 From the available information presented within the Groundsure Report (Ref 10.2), Pollution Incidents have not been recorded within Section 3 of the study area.

UXO Risk

- 10.5.57 The risks from UXO have been assessed by Zetica in a Desk study and Risk Assessment Report (Ref 10.20). This assesses Section 3 to be of a Low risk. A low risk assessment allows for construction works to proceed without further measures although Zetica recommends an awareness briefing prior to construction.

Current Baseline Geology- Section 4: Shared Grimsby to Walpole Haul Road

- 10.5.58 Section 4 of the route is bound in the east by the A1111 Sutton Road and runs north west to the A1104 Alford Road. This section is approximately 2.4 km long and is a long linear shape covering approximately 21 ha.

Geological Setting

- 10.5.59 The following Geological units, as presented below in **Table 10-8** are mapped within Section 4 (Shared Grimsby to Walpole Haul Road) (Ref 10.3, Ref 10.23). The age of some of the BGS boreholes reviewed use old naming conventions for geological units / logging standards and therefore these have been inferred using professional judgement.

Table 10-8 Geology within Section 4 - Shared Grimsby to Walpole Haul Road

Unit Name	Indicative Thickness	Description
Superficial Geology		
Tidal Deposits and Silt	Flat ~5 m Clay	Tidal flat deposits consist of unconsolidated sediment, mainly mud and / or sand.
Till- Devensian	~14 m	Till consists of a heterogenous mixture of clay, sand, gravel, and boulders varying widely in size and shape.
Alluvium	~2 m	A general term for clay, silt, sand and gravel. It is the unconsolidated detrital material deposited by a river, stream or other body of running water as a sorted or semi-sorted sediment in the bed of the stream or on its floodplain.

Unit Name	Indicative Thickness	Description
Bedrock Geology		
Welton Formation	Chalk >34 m	White, massive or thickly bedded chalk with common flint nodules but generally lacking tabular flint bands; sporadic marl seams.
BGS Borehole records accessed (Ref 10.23): TF47NE85, TF47NE72, TF47NE122, TF47NE118, TF47NE102, TF47NE35/A, TF47NE67		

Walkover Description

10.5.60 Section 4 comprises the following features:

- A1111 Sutton Road in the east;
- Woldgrift Drain;
- Unnamed farm track / road off Mill Lane; and
- A1104 Alford Road in the West.

10.5.61 A review of the baseline information presented within the Groundsure report (Ref 10.2) indicates it remained in agricultural uses, therefore; a drive through of Section 4 was completed. Roadside access was available at three locations (the northern and southern ends of the haul road, and from a farm track in the centre of one of the minor access roads to the Site). From the viewing locations, the proposed haul road covers solely agricultural fields, crossing one watercourse / drain (Woldgrift Drain). The haul road is bound in the north by the A1104 Alford Road and the A1111 Sutton Road in the south. Both of these roads are major transport routes. At the time of visiting, minimal traffic was noted on these roads.

Historical Context

10.5.62 From the earliest available mapping; circa 1888, Section 4 has remained solely agricultural in use with limited buildings (such as barns) and infrastructure mapped in more recent aerial imagery (Ref 10.22).

Geological Sites of Importance

10.5.63 From the available information (Ref 10.2 and **Table 10-4**) indicates Geological Sites of Importance (on both a regional and local scale) have not been recorded within Section 4 of the study area.

Landfills - Historical and Active

10.5.64 From Environment Agency information presented within the Groundsure Report (Ref 10.2), it is revealed that Landfill sites are not recorded within Section 4. However, there is a potential for unforeseen contamination / Made Ground locally, associated with unrecorded activities.

Potential Contaminative Sources

- 10.5.65 From the available desk study information presented within the Groundsure report (Ref 10.2), two potential contaminative sources (two ponds at College Farm) requiring a walkover were identified within Section 4 of the route, however, access to these were denied by the landowner.
- 10.5.66 From satellite imaging, the two ponds identified at College Farm are no longer present and thus have been infilled. The composition of the material which has infilled the two ponds is unknown and therefore this may be a potential source of contamination present within the study area.
- 10.5.67 Given the agricultural land uses noted since the earliest available mapping and lack of significant developments / infrastructure, there is a very low risk of encountering potentially contaminative sources within Section 4 of the route (outside of the two identified). However, given the setting, there is a potential for unforeseen contamination / Made Ground locally, associated with unrecorded activities.

Pollution Incidents

- 10.5.68 From the available information, Pollution Incidents have not been recorded within Section 4 of the study area.

UXO Risk

- 10.5.69 The risks from UXO have been assessed by Zetica in a Desk study and Risk Assessment Report (Ref 10.20). This assesses Section 4 to be of a Low risk. A low risk assessment allows for construction works to proceed without further measures although Zetica recommends an awareness briefing prior to construction.

Current Baseline Geology- Section 5: Alford Construction Route

Geological Setting

- 10.5.70 Section 5 is an irregular linear shape approximately 4 km in length and covers an area of approximately 50 ha.
- 10.5.71 Section 5 is bound in the east by Woldgrift Drain, and continues east to west crossing, the A1104 East Street / Alford Road (the road running north to south) and ending in the south west at the A1104 Alford Road (the road running east to west). The section is predominantly flat agricultural fields bordering the town of Alford.
- 10.5.72 The following Geological units, as presented below in **Table 10-9** (Ref 10.3, Ref 10.23) are mapped within Section 5 (Alford Construction Route). The age of some of the BGS boreholes reviewed use old naming conventions for geological units / logging standards and therefore these have been inferred using professional judgement.

Table 10-9 Geology within Section 5 - Alford Construction Route

Unit Name	Indicative Thickness	Description
Superficial Geology		
Glaciofluvial Deposits Devensian	-	Glaciofluvial Deposits consist mostly of coarse-grained sediments (i.e., sand and gravel) with some finer-grained layers (i.e., clay and silt). Sand and gravel, locally with lenses of silt, clay or organic material.
Till - Devensian	~12 m	Till consists of a heterogenous mixture of clay, sand, gravel, and boulders varying widely in size and shape.
Alluvium		A general term for clay, silt, sand and gravel. It is the unconsolidated detrital material deposited by a river, stream or other body of running water as a sorted or semi-sorted sediment in the bed of the stream or on its floodplain.
Bedrock Geology		
Ferriby Formation	Chalk >6.5 m	Grey, soft, marly, flint-free chalk, typically weathering buff in exposures locally includes pinkish bands; some harder, gritty, shell-debris-rich beds, and thin discrete marl seams.
Carstone Formation	>4.5 m	Greenish-brown thick-bedded, cross-bedded, oolitic ferruginous sandstone. The formation is medium to coarse-grained and pebbly in part, especially at the base where it becomes a conglomerate. Pebbles comprising quartz, quartzite, pyritised sandstone, ironstone, grey siltstone and rolled ammonites. Some beds are silty and / or contain clay.
Hunstanton Formation	>11 m	Rubbly to massive chalks with marl bands; typically, pink to brick-red, but locally the upper part is grey. The lower part of the formation is commonly weakly sandy.
BGS Borehole records accessed (Ref 10.23): TF47NW24, TF47NW61, TF47NW17, TF47NW62, TF47NE99, TF47NE29		

Walkover Description

10.5.73 Section 5 generally comprises:

- Woldgrift Drain in the north (and a tributary of this in the central section);
- A1104 East Street / Alford Road (running north to south), in the north of Section 5;
- Tothby Lane (a small country road north of Alford, bordered by hedge lines);
- Flat agricultural fields (mostly cropped, bordered by treelines and hedge lines);
- Historical railway (west of Alford), running north west to south east; and
- A1104 Alford Road (running east to west), in the south of Section 5.

- 10.5.74 Section 5 of the route runs east to west and is bound in the east and west by the A1104 Alford Road. The Section borders the northern and western edges of the town of Alford. The section (in between the road crossings) is solely flat agricultural fields which are bordered by hedge lines and treelines.
- 10.5.75 Three potentially contaminative sources were identified and targeted during the walkover. One of these directly crosses the draft Order limits (Historic Railway (west of Alford)) whilst the remaining two sites are situated within the study area (Potential Landfill North of Bilsby and Brick Pits North of Alford).
- 10.5.76 The Groundsure report (Ref 10.2) indicated the presence of the East Lincolnshire Line of the Great Northern Railway, the following was noted from the walkover of this area;
- The historical railway is generally at ground level, although it does slightly slope to the edges.
 - The area is grassed over and lined on both sides by trees and hedges.
 - The land visibly rises in the centre of the partition between the two hedges, where the rough footprint of the former rail tracks is visible.
- 10.5.77 The Landfill entry noted within the Groundsure Report (labelled Potential Landfill north of Bilsby) had a walkover conducted and the following observations were noted:
- The area is a flat agricultural field with no visible signs of landfilling or topographical differences noted.
- 10.5.78 The final targeted walkover was conducted at the Brick Pits North of Alford, this was an area adjacent to the A1104 Alford Road, covering an approximate area of 3 ha. The walkover of the site noted the following observations:
- The site was divided into two sections;
 - The northern half of the site is currently a caravan park and fishing lake. The fishing lake is the site of one of the historically mapped brick pits (Ref 10.2).
 - The southern half of the site is an open grassed field with a further pond present. This pond was not historically mapped and was very shallow in depth. Present within this field was a mound of what appeared to be construction waste.

Historical Context

- 10.5.79 Across Section 5 of the draft Order Limits, the earliest historical mapping indicates that the agricultural fields have remained agricultural until the current day. The town of Alford progressively increases in size to the south of Section 5, however, no developments from this settlement cross into the draft Order Limits.
- 10.5.80 The East Lincolnshire Line of the Great Northern Railway is mapped running north west to south east within the western end of Section 5 of the route. It is mapped as being on an embankment although this is minimal on site. This feature is mapped since the earliest available mapping and is recorded online as opening in 1848. The line was closed in 1970 and since been left to rewild.
- 10.5.81 The area indicated (from the Groundsure Report- Ref 10.2) as the Potential Landfill North of Bilsby, is not indicated on historic mapping and this area has been mapped as an agricultural field since the earliest available mapping (Ref 10.4).

- 10.5.82 The earliest available mapping (1880) indicates the presence of the Brick pits adjacent to “Lake House” in the north of Section 5, the brick pits are named as “Thoresthorpe Brick Pits”. By the 1975 mapping, the brick pits are now named as Windmill Lake, and it assumed that at this point the pit was left to be water bearing. The pond in the southern half of the site is now also mapped.
- 10.5.83 The Alford & Sutton Tramway is mapped in the 1830-1880 map, running east to west from Alford to Bilsby, this is present adjacent to Alford Road. By 1915, the tramway is then mapped as a footpath, and no longer an active railway.
- 10.5.84 From the earliest available mapping (1830-1880), a Windmill has been mapped (for milling flour or corn), the windmill is still present to this day. The Groundsure report identified a potential tank present at the windmill site likely associated with the agricultural practices, present since 1971. As the Tank is outside of the draft Order Limits, and the proposed development is the creation of the Haul Road in this area, there is not considered to be a significant contamination risk posed by the Tank. If access is granted to the location, a targeted walkover will be conducted to ascertain the location and condition of the tank.

Geological Sites of Importance

- 10.5.85 From the available information (Ref 10.2 and **Table 10-4**), Geological Sites of Importance (on both a regional and local scale) have not been recorded within Section 5.

Landfills - Historical and Active

- 10.5.86 From Environment Agency information, one historical landfill (Land At Bilsby) has been identified within study area (but no further information is presented within the desk study). This Landfill entry is marked as just a point, and the extents of the landfilling are not indicated on the available current or historic mapping (Ref 10.2).
- 10.5.87 During the walkover there were no obvious evidence of the former landfill such as topographical differences (as an indicator of past infilling) during the walkover of the mapped location or surrounding land and visual evidence of wastes or other landfilling activities was not observed. Selected historical satellite images (Ref 10.4), LIDAR imaging (Ref 10.22) and historical mapping (Ref 10.21) have been reviewed however no additional information regarding the landfills presence or activities undertaken was obvious from these information sources. Ground Investigation is to be scoped within the adjacent areas to the potential landfill site where the proposed cable placement is, this will help ascertain if the landfill is present, and if there are any potential impacts noted if it is found to be present. This information is to be assessed prior to the ES.
- 10.5.88 In addition, there is a potential for unforeseen contamination / Made Ground locally, associated with unrecorded activities.

Potential Contaminative Sources

- 10.5.89 As Section 5 of the route is primarily agricultural fields, with limited structures and developments, significant potential contaminative sources have not been identified. A historical railway which closed in 1970 (discussed above in the Historical Context section) is present within the western confines of Section 5 and may be a source of contamination, in addition to the historical tramway running between Alford and Bilsby.

- 10.5.90 The Brick Pits North of Alford has been identified from a review of historic mapping, however, as the pits have not been infilled (they are present current day as a fishing lake) the risk posed by this feature is not considered to be a significant contaminative source. There does remain the potential outside of the pit area for unforeseen contamination to be encountered associated with the historic pit activities undertaken.
- 10.5.91 The Unspecified Tank at Windmill (North of Alford), is a potential contaminative source present within the Study Area, given the use of the tank is unknown, and what liquids were stored within it. There is the potential that usage of the tank may have led to spills occurring, or if the tank is in poor condition this may lead to leaks occurring into the surrounding soils / groundwater.
- 10.5.92 In addition, given the Site setting, there is a potential for unforeseen contamination / Made Ground locally, associated with unrecorded activities.

Pollution Incidents

- 10.5.93 From the available information, Pollution Incidents have not been recorded within Section 5 of the study area.

UXO Risk

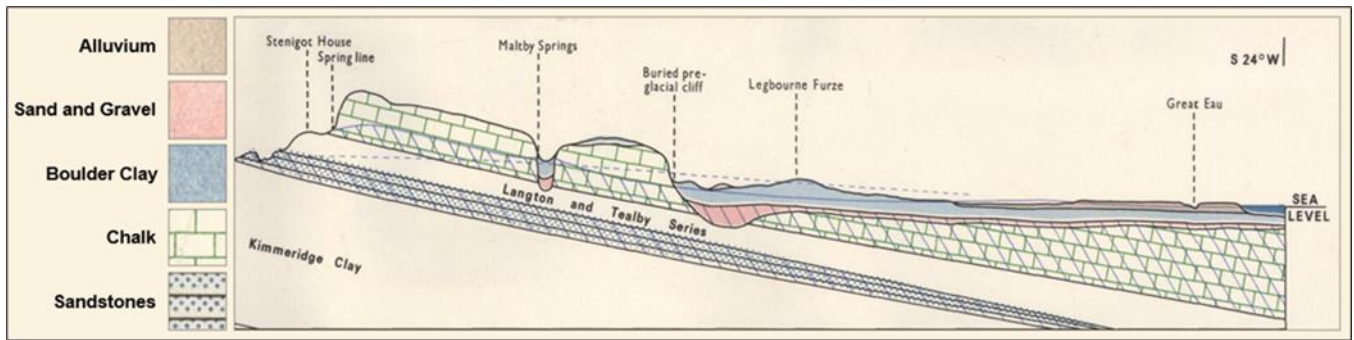
- 10.5.94 The risks from UXO have been assessed by Zetica in a Desk study and Risk Assessment Report (Ref 10.20). This assesses Section 5 to be of a Low risk. A low risk assessment allows for construction works to proceed without further measures although Zetica recommends an awareness briefing prior to construction.

Current baseline- Hydrogeology

Conceptual Setting

- 10.5.95 The preliminary hydrogeological conceptual site model is described below.
- 10.5.96 The English Onshore Scheme is primarily underlain by Chalk, a principal aquifer, which is highly fractured within the upper 30 m (from sea level). These fractures result in high permeability and substantial groundwater flow within this zone, while permeability decreases with depth below this zone. The aquifer is highly transmissive but has a relatively low storage capacity (Ref 10.37, Ref 10.38). These aquifers form a regionally important groundwater resource.
- 10.5.97 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. Contamination of shallow groundwater within superficial deposits may therefore be a risk to the wider Chalk aquifer system.
- 10.5.98 Across the study area, the Chalk aquifer is predominantly overlain by low permeability clay superficial deposits, although there are local areas of sand and gravel deposits.
- 10.5.99 The total thicknesses of the superficial deposits typically vary between 12 to 26 m with a minimum thickness of 4 m.
- 10.5.100 **Plate 10-1** presents a hydrogeological cross section located up to 10 km north of the draft Order Limits. Although this cross section is not situated within the study area, it is considered representative because the geological sequence is similar to that found in the study area. It is therefore used to provide an indicative understanding of the local hydrogeology.

Plate 10-1 Indicative hydrogeological cross section



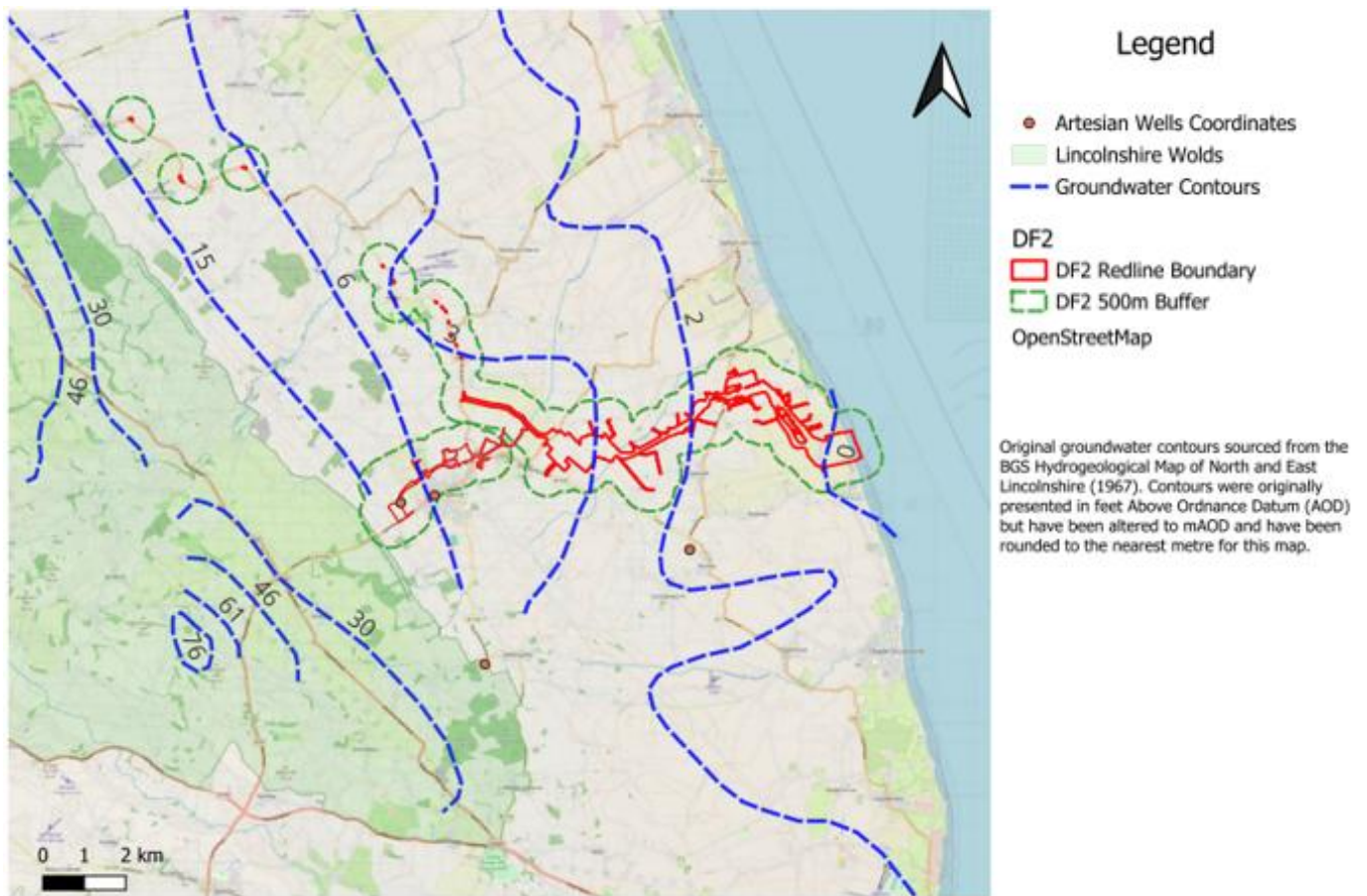
Note: modified from the BGS Hydrogeological Map of North and East Lincolnshire (Ref 10.34).

10.5.101 Previous stratigraphic terms are used on the BGS (1967) hydrogeological map (Ref 10.35), such as "boulder clay" for what is now referred to as glacial "till" and "alluvium" for tidal flat deposits.

Hydrogeology

- 10.5.102 Groundwater saturated rock is represented by dark blue hatching, in **Plate 10-1** with lines sloping downward from left to right. Artesian groundwater level, associated with deep sandstones, are indicated in **Plate 10-1**. Subartesian groundwater levels, possibly locally artesian in topographically low areas, appear to be indicated by **Plate 10-1**. The information source is over 50 years old and therefore current levels are likely to be different. For example, lower groundwater levels could be caused by greater yields from large scale groundwater abstractions.
- 10.5.103 Groundwater flow is generally eastward towards the coast, as shown on the hydrogeological map of this area (Ref 10.34). Groundwater level contours, within the Chalk aquifer, digitised from the hydrogeological map, are shown on **Plate 10-2**. The Chalk groundwater contours (blue dashed lines) indicate that groundwater levels are relatively shallow within the study area, although the small scale of the reference mapping is noted. The reference does not state if the contours represent a minimum or maximum condition. However, the groundwater levels are highest inland reaching up to 6.1 m AOD (above Ordnance Datum) within the project draft Order Limits and progressively decrease towards the coast, where levels approach sea level (0 m AOD). Further, groundwater levels across the study area appear to be shallow, particularly in the Alford and Bilsby area.

Plate 10-2 Chalk Groundwater Contours (mAOD) within the draft Order Limits.



- 10.5.104 To the west of the draft Order Limits, the Chalk outcrops at the Lincolnshire Wolds, the location of which are shown on Plate 10-2. Here the Chalk aquifer is unconfined and, although it may be overlain by thin soils, allows direct recharge from rainfall. Moving eastwards, the Chalk aquifer becomes a confined system beneath varying thicknesses of low permeability superficial deposits (comprising tidal flat deposits, clay rich till and alluvium). Across the draft Order Limits, the top of the Chalk is present at depths varying between 18 mbgl and 25 mbgl, with ground levels ranging from up to 12 m AOD near Alford to 0.3 m AOD near the coast. These depths are based on borehole log data obtained from the BGS GeoIndex (Ref 10.23).
- 10.5.105 Chloride concentrations in the Chalk aquifer, within the study area, are shown to range between 250 to 500 mg/l at the coast, reducing to up to 100 mg/l inland (Ref 10.37). The elevated coastal concentrations suggest the potential for saline intrusion. It should be noted that in geological time the position of the coastline has changed, shown through a paleo-cliff noted as a buried pre-glacial cliff on Plate 10-1. This may influence the current chloride concentrations observed within the Chalk.
- 10.5.106 Four artesian wells are shown on the BGS Hydrogeological map published in 1967 (Ref 10.35) which may be historical as groundwater levels in the Chalk aquifer have likely dropped since due to abstraction. This indicates there is potential for artesian groundwater in the area.
- 10.5.107 The BGS Hydrogeological Map (1967) (Ref 10.35) show springs at the boundary of the Lincolnshire Wolds, where the aquifer becomes confined.

Aquifer Designation

10.5.108 Aquifer designation for the superficial and bedrock geology within the draft Order Limits have been obtained from Department for Environment Food & Rural Affairs MAGIC mapping portal (Ref 10.21). The Environment Agency classify aquifers as follows:

- Principal aquifer: These are bedrock or superficial aquifers that are regionally important because they can supply significant quantities of water for drinking water or maintaining baseflow to rivers, lakes and wetlands. They typically have a high intergranular and / or fracture permeability, meaning they usually provide a high transmissivity. However, the northern Chalk appears to have moderately low storage coefficients;
- 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.

10.5.109 The following Aquifer Designations, presented within **Table 10-10** have been identified from MAGIC Map (Ref 10.21) within the study area.

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

Section	Superficial / Bedrock	Geological units	Aquifer classification
Section 1: Anderby Creek Landfall	Superficial	Beach and Tidal Flat Deposits	Secondary (undifferentiated)
		Blown Sand	Secondary A
	Bedrock	Burnham Formation	Chalk Principal
Section 2: Underground Cable Route Corridor	Superficial	Tidal Flat Deposit	Unproductive Strata
		Till – Devensian	Secondary (Undifferentiated)
	Bedrock	Burnham Formation	Chalk Principal
		Welton Formation	Chalk Principal
	Superficial	Tidal Flat Deposits	Unproductive Strata

Section	Superficial / Bedrock	Geological units	Aquifer classification
Section 3: EGL 5 Converter Station Area		Till – Devensian	Secondary (undifferentiated)
		Alluvium	Secondary (Undifferentiated)
	Bedrock	Welton Formation	Chalk Principal
Section 4: Shared Grimsby to Walpole Haul Road	Superficial	Tidal Flat Deposits	Unproductive Strata
		Till – Devensian	Secondary (undifferentiated)
		Alluvium	Secondary (undifferentiated)
	Bedrock	Welton Formation	Chalk Principal
		Ferriby Formation	Chalk Principal
Section 5: Alford Construction Route	Superficial	Tidal Flat Deposits	Unproductive Strata
		Till - Devensian	Secondary (undifferentiated)
		Glacial Deposits	Fluvial Secondary A
	Bedrock	Welton Chalk	Principal
		Ferriby Chalk	Principal
		Carstone Formation	Sandstone Principal

10.5.110 There are no principal superficial aquifers in the study area. However, the Blown sands and Glacial fluvial deposits, located in Section 1 and Section 5 respectively, are secondary A aquifers. The Chalk aquifer, comprising various geological formations, comprises the main principal aquifer in the study area and lies beneath nearly the whole study area.

Source Protection Zones

10.5.111 SPZs are shown on **Volume 3, Part 2, Figure 10-9** and 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, as a consequence, reduce the effectiveness of protection to groundwater afforded by any overlying or unsaturated zone strata.

10.5.112 For clarity, SPZs are not technically receptors themselves; rather they are areas designated to protect the underlying groundwater from which the associated abstraction (e.g., well) is the actual receptor. SPZs have been included as receptors as shown in Section 10.5, **Table 10-17**, **Table 10-22** and associated text, to ensure appropriate environmental measures are captured.

10.5.113 The Environment Agency have 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 to view on MAGIC mapping service (Ref 10.21) and are defined as follows:

- SPZ1 (Inner Protection Zone) - This zone is defined by a travel time of 50-days or less from any point within the zone at, or below, the water table. Additionally, the zone has as a minimum a 50 m radius. It is based principally on biological decay criteria and is designed to protect against the transmission of toxic chemicals and water-borne disease.
- SPZ2 (Outer Protection Zone) - This zone is defined by the 400-day travel time from a point below the water table. Additionally, this zone has a minimum radius of 250 m or 500 m, depending on the size of the abstraction. The travel time is derived from consideration of the minimum time required to provide delay, dilution and attenuation of slowly degrading pollutants.
- SPZ3 (Total catchment) - This zone is defined as the total area needed to support the abstraction or discharge from the protected groundwater source.
- SPZ1c, 2c and 3c - For some areas where there is a protective layer, such as clay, zones SPZ 1c, 2c and 3c consider activities below the surface, such as deep drilling, which could create pathways for pollutants to enter the groundwater (using the same travel time criteria as SPZ1, SPZ2 and SPZ3 respectively).

10.5.114 The presence of published SPZs within each section is identified in **Table 10-11** and presented in **Volume 3, Part 2, Figure 10-9**. Data has been derived from Environment Agency published data (Ref 10.39).

Table 10-11 Source protection zones

Section	No. of published zones	Classification
Section 1: Anderby Creek Landfall	1	SPZ3 over the entirety of this area
Section 2: Underground Cable Route Corridor	Multiple zones present	SPZ1, SPZ1c, SPZ2 and SPZ 2c present at the south western end of this section, and SPZ3 present over the entirety of the remaining section.
Section 3: Converter Station Area	Multiple zones present	SPZ1 and SPZ2 present at the south western end of this section, and SPZ3 present over the entirety of the remaining section.

Section	No. of published zones	Classification
Section 4: Shared Grimsby to 1 Walpole Haul Road		SPZ3 over the entirety of this area
Section 5: Alford Construction Route	Multiple zones present	SPZ1 and SPZ2c are present at the south western part of this section. SPZ3 is present over the remaining area of the section.

10.5.115 The draft Order Limits cross a SPZ1 at four locations and, where do so, represent the proposed use of existing highways for construction access. The SPZ2 at Bilsby is crossed by the draft Order Limits and potentially the buried cable route.

10.5.116 The locations of unpublished, default SPZs will be identified during the detailed assessment process and will inform the ES.

Drinking Water Safeguard Zones (DWSZ)

10.5.117 There are no groundwater DWSZ within the Scoping Boundary (Ref 10.21).

Public Water Supplies

10.5.118 The public water supply abstractions within the study area are operated by Anglian Water Services Ltd. There are four abstraction locations in total: two in Thurlby, one in Bilsby, and one in Alford. The published SPZ1 boundaries are used to indicate the general locations of these abstractions; however, it should be noted that the SPZ1 areas are indicative and do not represent the exact positions of the abstraction points.

10.5.119 A summary of the superficial geology, bedrock, and aquifer designation at each of the indicative public water supply abstraction locations is presented in **Table 10-12** below.

Table 10-12 Summary of hydrogeology at indicative locations of public water supplies (data sourced from BGS Geindex (Ref 10.23)).

Indicative Location	Superficial / Bedrock	Geological Units	Aquifer Designation
Thurlby 1	Superficial	Glaciofluvial Deposits – Sands and gravels (BGS Geindex)	Secondary A
		Till, Devensian – Diamicton	Secondary (undifferentiated)
	Bedrock	Welton Chalk Formation	Principal
Thurlby 2	Superficial	Glaciofluvial Deposits – Sands and gravels (BGS Geindex)	Secondary A
		Till, Devensian – Diamicton	Secondary (undifferentiated)
	Bedrock	Welton Chalk Formation	Principal

Indicative Location	Superficial / Bedrock	Geological Units	Aquifer Designation
Bilsby	Superficial	Till, Devensian – Diamicton	Secondary (undifferentiated)
	Bedrock	Welton Chalk Formation	Principal
Alford	Superficial	Till, Devensian – Diamicton	Secondary (Undifferentiated)
	Bedrock	Carstone Formation - Sandstone	Principal

10.5.120 At Thurlby and Bilsby, the superficial deposits mainly comprise glaciofluvial sands and gravels and diamicton till, which are classified as Secondary A or Secondary (undifferentiated) aquifers respectively. The underlying bedrock at these sites is predominantly the Welton Chalk Formation, designated as a principal aquifer. At Alford, the superficial deposits are dominated by diamicton till whilst the bedrock is the Carstone Formation, which is also classed as a Principal aquifer.

Licensed Groundwater Abstractions

10.5.121 Previous information requests sent to the Environment Agency for groundwater abstractions in relation to the EGL 3 and EGL 4 projects, received in June 2024, are being used to inform this EGL 5 PEIR Chapter. This is due to a sufficient geographical overlap in the areas of interest. Further review and assessment will be conducted as part of the ES.

10.5.122 The data received indicates that licensed groundwater abstractions within the study area comprise only public water supplies (see section below). Although their locations cannot be shown their presence is indicated by published SPZ1s shown in **Volume 3, Part 2, Figure 10-8**. Further data requests will be made to the Environment Agency and other relevant bodies, as necessary, to inform the ES.

10.5.123 Surface water abstractions are discussed in **Volume 1, Part 2, Chapter 9: Water Environment**.

Private Water Supplies

10.5.124 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.

10.5.125 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 "protected right" represents an established legal entitlement to abstract water that the Environment Agency must safeguard when managing water resources. Locations of deregulated abstractions are shown in **Volume 3, Part 2, Figure 10-8**.

- 10.5.126 A review of historical mapping (Ref 10.3) and the BGS GeoIndex (Ref 10.23) 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 10-8**. 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. Targeted assessment of whether any of the historically mapped wells are operational, will, where possible, include communication with landowners.
- 10.5.127 Consultation with East Lindsey District Council has provided a list of registered PWS, provided on 31 December 2025, which is shown in **Table 10-13**. 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. These regulations require all water intended for human consumption to be wholesome and not pose a risk to health and require local authorities to sample all supplies except those serving only a single, owner-occupied domestic property.
- 10.5.128 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 10.39). Identification of well locations, where possible, will be supported by communication with landowners and selected site walkovers. The approach and any findings will be reported as part of the ES.
- 10.5.129 As we are not assessing potential damage to buried services at this stage, risks to PWS arising from bisection of the private water supply distribution system by trenching or other construction work (severing the pipes for example) are not considered within the scope of the EIA. However, during the detailed design phase, consultation will be made with relevant landowners to identify distribution pipework.
- 10.5.130 A summary of all abstractions across the study area is given in **Table 10-14**.

Table 10-13 Summary of Private Water Supply details provided by the local authority.

Section	Location	Easting	Northing	Source type	Primary Use
Section 5: Jubilee Alford Construction Route	Fountain, Alford	545400	376000	Bore Water	Hole Non-Potable
	Tothby Manor, Alford	544400	376600	Unknown	Domestic
	Lake House, Thoresthorpe, Alford	545600	377100	Bore Water	Hole Domestic

Notes:

The eastings and northing have been rounded to the nearest 100 m.

The local authority had no listed private water supplies for section 1 to section 4 inclusively of the study area.

Data source: East Lindsey District Council (Local Authority)

Table 10-14 Groundwater abstraction summary table.

Section	No. of potential abstractions in the study area	Public supply sources
Section 1: Anderby Creek Landfall	Environment Agency Licensed Abstraction: 0 Environment Agency Deregulated Abstraction: 0 PWS Locations - Local Authority: 0 BGS Historical Wells: 2 OS Historical Mapping Wells: 5	Nil
Section 2: Underground Cable Route Corridor	Environment Agency Licensed Abstraction: 2 Environment Agency Deregulated Abstraction: 8 PWS Location - Local Authority: 0 BGS Historical Wells: 4 OS Historical Mapping Wells: 19	Sources at Thurlby (2no.)
Section 3: 5 EGL Converter Station Area	Environment Agency Licensed Abstraction: 1 Environment Agency Deregulated Abstraction: 2 PWS Locations - Local Authority: 0 BGS Historical Wells: 7 OS Historical Mapping Wells: 26	Sources at Bilsby
Section 4: Shared Grimsby Walpole Road	Environment Agency Licensed Abstraction: 0 Environment Agency Deregulated Abstraction: 0 PWS Location - Local Authority: 0 BGS Historical Wells: 11 OS Historical Mapping Wells: 18	Nil
Section 5: Alford Construction Route	Environment Agency Licensed Abstraction: 1 Environment Agency Deregulated Abstraction: 0 PWS Location - Local Authority: 3 BGS Historical Wells: 15 OS Historical Mapping Wells: 27	Sources at Alford

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

Groundwater flow and levels

10.5.132 No groundwater level monitoring borehole data is available at the time of writing. Should data become available it will be used to inform the assessment within the ES. Currently, data from the Environment Agency's Hydrology Data Explorer (Ref 10.40) provides relevant information from nearby monitoring boreholes:

- Ulceby:
 - Located in the unconfined Chalk outcrop up to 2.8 km west from the draft Order Limits. Ground level is 73.8 m AOD, with groundwater levels recorded between 9.6 to 11.4 m AOD from 2020 - 2025.
- Upphall West:
 - Situated approximately 9 km north from the draft Order Limits, with a ground level of 9.6 m AOD. Groundwater levels here have been recorded between 8.5 - 9.3 m AOD.

10.5.133 The Ulceby borehole provides insight into groundwater levels at higher topographical elevations in this area, such as nearing the eastern boundary of the Lincolnshire Wolds.

10.5.134 The Upphall West borehole better reflects the low-lying terrain and confined conditions across the remainder of the study area. The shallow piezometric levels observed at Upphall West indicate that similar shallow piezometric conditions are likely to be present across the draft Order Limits.

Water Framework Directive

10.5.135 For the purposes of this assessment, with regard to the WFD, surface water, groundwater and transitional / coastal water bodies within the study area have been identified and screened within the WFD Stage 1 Assessment report in **Volume 2, Part 2, Appendix 9.A: Water Framework Directive Stage 1 and 2**.

10.5.136 Information regarding the WFD groundwater body and its current status is discussed in **Volume 1, Part 2, Chapter 9: Water Environment**. This assessment is supported by the mapping presented in **Volume 3, Part 2, Figure 9-3**.

Groundwater Dependent Terrestrial Ecosystems

10.5.137 The "WFD Regulations" require Groundwater Dependent Terrestrial Ecosystems (GWDTE) to be identified and the pressures on them assessed. Where significant damage is occurring (or could occur) to a GWDTE the associated groundwater body is considered at risk of not attaining good status under the "WFD Regulations". Risks may be water quality or water quantity driven.

10.5.138 The presence of GWDTE, within 500 m of the draft Order Limits is described in **Table 10-15** and presented in **Volume 3, Part 2, Figure 10-8**, using data obtained from the Environment Agency (Ref 10.36).

Table 10-15 GWDTE and their geological location.

Section	Distance from indicative zone for underground cable assets	GWDTE	Underlying aquifer (aquifer designation)
Section 2: 539 m Underground Cable Route Corridor		Sea Bank Clay Pits – Hutoft Bank Pit	Tidal Flat Deposits – and silt (Unproductive Strata) Burnham Chalk Formation (Principal)
All other Sections		None Identified	N / A

10.5.139 It should be noted that the Sea Bank Clay Pits, including Hutoft Bank Pit nearest to the draft Order Limits (**Volume 3, Part 2, Figure 10-8**), are designated as a Site of Special Scientific Interest (SSSI) and are also classified as Groundwater Dependent Terrestrial Ecosystems (GWDTEs). Details of the nearest clay pit, such as its depth, are currently unknown. However, another Sea Bank Clay Pit located up to 3 km south of the draft Order Limits is reported to have a mean depth of 1.5 m (Ref 10.35). It is likely that this depth is representative of the nearest clay pit, as both are expected to have been excavated for similar purposes. If this is the case, the base of the clay pit would be within the superficial deposits, with the Chalk estimated to be approximately 13.5 m below the base. This will be confirmed through communication with Natural England and / or walkover surveys which will be used to inform the ES.

Chalk Streams

10.5.140 Chalk streams, as mapped on Natural England’s Chalk River dataset based on the Environment Agency Detailed River Network (DRN) (Ref 10.42), are present within Section 5 - Alford Construction Route. 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.

Watercourse and Baseflows

10.5.141 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 water courses in the study area is not known. Whilst it is considered that the English Onshore Scheme will not have any adverse impacts on baseflow, the issue will be considered within the ES.

Groundwater Flooding

10.5.142 Consultation with the Environment Agency and the Lead Local Flood Authorities will include discussion 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**.

Groundwater Vulnerability

- 10.5.143 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 10.43). Areas of medium to high vulnerability appear to be associated with areas underlain by Alluvium, such as Sections 3 and 4, and Glaciofluvial deposits, as in Section 5. The Landfall area, which is underlain by beach and tidal flat deposits and blown sand, is also classified as medium to high vulnerability. In contrast, Section 1 and some of Section 2, which are predominantly underlain by till and tidal flat deposits, are classified as low vulnerability areas.
- 10.5.144 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 proposed converter station. As a result, the vulnerability of groundwater may be greater than that designated by the published mapping.

Nitrate Vulnerable Zones

- 10.5.145 Designated Nitrate Vulnerable Zones (NVZ) are areas designated as being at risk from agricultural nitrate pollution. An NVZ is present across the western end of Section 3: EGL 5 Converter Station and across the whole of Section 4: Shared Grimsby to Walpole Haul Road and Section 5: Alford Construction Route.
- 10.5.146 Soil movement during construction activities may increase the amount of nitrate entering the unsaturated zone, which will be taken into account in further assessments within the ES if required.

Summary of Hydrogeological Setting

- 10.5.147 The preliminary hydrogeological conceptual site model is described above. In summary, the English Onshore Scheme is located across one distinct hydrogeological environment comprising mostly the Chalk aquifer, a regionally important principal aquifers, which is overlain by variable superficial deposits. These deposits are mostly low permeability.
- 10.5.148 A number of published SPZ's are present within the draft Order Limits and are associated with public groundwater abstractions from the Chalk aquifer.

Future baseline

- 10.5.149 Significant changes are not anticipated in relation to the outlined Geology baseline prior to, during construction or during the operational phase as a result of man-made changes. It is assumed that if changes are proposed (due to new developments) this would be appropriately permitted / controlled through the planning process and operated in accordance with current legislation to be preventative and limiting of adverse impacts to Ground Conditions (Human Health receptors) or Controlled Waters receptors.
- 10.5.150 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. Droughts may become more prolonged and more frequent. These could have an impact on soil erosion, groundwater levels, and indirectly (through groundwater level changes) - potential for mobilisation of contamination.
- 10.5.151 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 effects. However, this will be reviewed as part of the ES.

10.6 Environmental Measures

- 10.6.1 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.
- 10.6.2 **Table 10-16** outlines how these design and control measures will influence the geology and hydrogeology assessment. In addition to the measures listed in **Table 10-16**, standard mitigation measures, comprising management activities and techniques, would be implemented during the construction of the Project to limit effects through adherence to good site practices and achieving legal compliance.
- 10.6.3 Environmental measures relating to surface water and fauna / flora in protected areas are summarised in **Volume 1, Part 2, Chapter 9: Water Environment** and **Volume 1, Part 1, Chapter 6: Biodiversity**, respectively. Compliance with these measures will be secured through the DCO where required.

Table 10-16 Summary of the environmental measures

Receptor	Potential changes and effects	Environmental measures	ID reference
Construction			
<p>Human (construction workers, public open space users, nearby residents)</p> <p>Controlled (adjacent surface water bodies- drains etc., and all groundwaters receptors)</p>	<p>Health Potential for localised and unforeseen contamination / Made Ground to be disturbed during construction works, e.g. excavation of the cable trench, which could result in exposure of and/or migration of contamination impacting the receptors.</p>	<p>An intrusive ground investigation and risk assessment will be undertaken. Remediation strategy will be prepared (if required). A Contamination Discovery Strategy and Watching Brief Protocol developed (and agreed with the relevant Environmental Health Officers (EHO) / Regulators) in advance of the construction works commencing to establish the areas where contamination is present (with remediation strategies as required) and agree protocols to manage prior to the works.</p> <p>Appropriate Personal Protective Equipment (PPE) to be utilised during the construction works.</p> <p>A Materials Management Plan (MMP) will be developed for the reuse of materials during the construction works. The MMP will be developed in line with the CL:AIRE DoWCoP (Ref 10.11) to make sure that material generated is reused appropriately and sustainably (ensuring material is re-used as opposed to entering the waste hierarchy) reducing the risk to receptors.</p> <p>If remedial measures are considered to be necessary across the Site, then additional verification reporting of the remediation undertaken will be required.</p> <p>Use of appropriate occupational health and safety measures e.g., task / site specific risk assessments, PPE, in addition to the Dust Control measures outlined within Volume 1, Part 2, Chapter 14: Air Quality.</p> <p>Compliance would be through the Outline CoCP, detailed within Volume 2, Part 1, Appendix 5.B: Outline CoCP;</p>	GH01 (C)

Receptor	Potential changes and effects	Environmental measures	ID reference
<p>Human (construction workers, public open spaces users) Controlled Waters (adjacent surface water bodies- drains etc., and all groundwaters receptors)</p>	<p>Health Potential for the exposure and migration of contaminants as a result of an unforeseen / unplanned event (i.e. pollution incidents, spills, flooding). Potential for contaminated surface water runoff from construction areas.</p>	<p>secured via a Development Consent Order (DCO) requirement.</p> <p>An environmental action plan will be established prior to the construction phase, which will outline procedures to mitigate (as far as practicable) against the impact of unforeseen events and an action plan in the event of an unforeseen event occurring.</p> <p>Use and storage of chemicals and fuels to be undertaken in accordance with Environment Agency and Government Pollution prevention for business (Ref 10.45), controlled and monitored with general environmental and waste management procedures.</p> <p>All refuelling, oiling, and greasing of construction plant and equipment will take place above drip trays and also away from drains / watercourse. Appropriate spill kits and trained operatives will be made easily accessible for these activities.</p> <p>Where possible, site compounds are to be located outside of a SPZ1 and SPZ2. No refuelling, oiling, or storage of hazardous liquids should be allowed on a SPZ1 or SPZ2.</p> <p>To prevent effects of contaminated run off , the embedded mitigation would include a construction phase surface water management plan (Volume 1, Part 2, Chapter 9: Water Environment) and all water discharges to be undertaken under the correct Environment Agency permits (Volume 1, Part 2, Chapter 9: Water Environment).</p> <p>Compliance would be through Volume 2, Part 1, Appendix 5.B: Outline CoCP and secured via a Development Consent Order (DCO) requirement.</p>	GH02 (C)

Receptor	Potential changes and effects	Environmental measures	ID reference
Human (construction workers) Buildings and Infrastructure (nearby property in limited locations across the route, enclosed spaces)	Health Migration of ground gases through preferential pathways created by construction works from natural sources (high organic content) or unforeseen anthropogenic sources / contamination.	A ground gas risk assessment carried out in areas where ground gas sources are identified to assess the risks and develop appropriate mitigation measures that are incorporated during construction and into the design of structures, where appropriate. Correct PPE / monitoring to be utilised during the construction works and adherence to the appropriate regulations where required.	GH03 (C)
Human Health Receptors (construction workers, public open space users, nearby residents) Buildings (nearby property in limited locations across the route). Infrastructure (nearby utilities, construction already completed [HDVC cable])	Risks posed by the potential disturbance of UXO / UXB across the route.	A UXO specific desk study and risk assessment has been conducted which concludes that across the English Onshore Scheme there is a low risk posed by UXO. However, given that there are recorded bomb impacts within the wider / surrounding area, the UXO report recommends that construction workers undertaking excavations across the project are briefed on general UXO awareness, and actions to be undertaken if UXO / UXB's are encountered. These are included within Volume 2, Part 1, Appendix 5.B: Outline CoCP .	GH04 (C)
Locally Geological (The Lincolnshire Submerged Forest)	Important Site Degradation of important geological resources / sites designated and protected for their geological features and properties.	Design of works will aim to minimise any potential impact to this sensitive geological site. Intrusive ground investigation will be undertaken prior to construction works to inform the design stage with agreement with interested parties and regulators.	GH05 (C)
All water environment receptors (groundwater receptors listed in Table 10-17 , watercourses and associated protected areas)	Associated risk of pollution due to trenchless crossing construction beneath watercourses and other features. Drilling fluids (including any additives) or hydrocarbons	Ground investigation data will inform the design of crossings to reduce the risk of breakout of drilling fluids. Good practice drilling fluid management procedures will be employed. For the construction phase this will include, where appropriate, the contractor producing a Frac-Out Plan (drilling fluid loss) detailing prevention, containment, and clean-up procedures	GH06 (C)

Receptor	Potential changes and effects	Environmental measures	ID reference
(Volume 1, Part 2, Chapter 9: Water Environment))	associated with machinery could cause pollution.	of inadvertent fluid loss. Safety Data Sheets for the materials used will also be provided in the detailed Volume 2, Part 1, Appendix 5.B: Outline CoCP .	
Principal and secondary aquifers, SPZ1 and SPZ2, public water supplies, licensed abstractions and private water supplies	Mobilisation of contaminants into underlying groundwater bodies due to creation of preferential pathways, temporary or permanent, caused by piling or other foundation work.	Good practice piling techniques will be followed, including the provision of a Foundation Works Risk Assessment (FWRA), once the proposed foundation solutions are known. In accordance with Environment Agency guidance Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination (Ref 10.46).	GH07 (C)
Groundwater bodies	Construction work might affect the quality and availability of groundwater, especially for people using private water sources.	Whenever possible, the English Onshore Scheme 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 process.	GH08 (C)
Controlled waters (surface and groundwater)	Potential risk from uncontrolled discharge to ground (e.g., contaminated runoff or contaminated dewatering discharge).	All water discharges to be undertaken under the correct Environment Agency permits, with appropriate pre-treatment (e.g., de-silting) where required.	GH09 (C)
Controlled waters (surface and groundwater)	Groundwater control at the opencut trenches or trenchless crossings (e.g., dewatering) causing groundwater level lowering, loss or reduced flow to wells, or reduced baseflow to watercourses.	Should groundwater control be required, dewatering would be limited to the depth and time required to facilitate construction activities. To be undertaken in accordance with Environment Agency guidance, and if necessary, abstraction licence and discharge permits.	GH10 (C)

Receptor	Potential changes and effects	Environmental measures	ID reference
Operation			
Human (maintenance nearby residents) Buildings and Infrastructure (Limited property i.e. barns present, enclosed spaces)	Health workers, The proposed buried cable and associated trenching may act as a preferential pathway for ground gas migration. The risk is considered to be low due to limited currently identified gas sources. The migration of gasses may lead to an accumulation within enclosed spaces (above or below ground structures, within excavations).	Mitigated through assessment of ground investigation data and through engineering design (in accordance with the relevant building regulations).	GH01 (D)
Controlled (Groundwaters), groundwater supply (wells), groundwater bodies, or groundwater fed receptors (e.g., GWDTE)	Waters e.g., HV cable causing warming of groundwater and potential detriment to groundwater supply (wells) or groundwater fed bodies (e.g., GWDTE).	A simple assessment, based on a conceptual model approach, is to be undertaken and reported within the ES. The results from this will identify any related risks and these will be discussed with the Environment Agency.	GH02 (D)
Principal and secondary aquifers, public water supplies (SPZ 1 and 2), licensed abstractions and / or private water supplies	Trench acting as a groundwater flow pathway causing drainage of shallow groundwater.	Good practice measures to be employed in the design of relevant trench sections to impede potential drainage, e.g., insertion of barriers.	GH03 (D)
Land susceptible to groundwater flooding	Trench acting as a groundwater flow pathway causing conveyance of groundwater into an area susceptible to flooding.	Good practice measures to be employed in the design of relevant trench sections to impede potential drainage, e.g., insertion of barriers.	GH03 (D)

10.7 Scope of the Assessment

Spatial scope and study area

- 10.7.1 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 (and outlined previously in **Section 10.3**). The study areas for geology and hydrogeology are shown on **Volume 3, Part 2, Figure 10-1**, **Volume 3, Part 2, Figure 10-2**, and **Volume 3, Part 2, Figure 10-8**, respectively.
- 10.7.2 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.

Temporal scope

- 10.7.3 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. As detailed in **Volume 1, Part 1, Chapter 4: Description of the Project**, it covers the period 2029 – 2035 for construction, and the lifetime of the Project for operation (expected to operate for 40 years, although likely extended through replacement and repair).
- 10.7.4 The English Onshore Scheme is expected to have a minimum life span of approximately 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 two years. Acknowledging the complexities of completing a detailed assessment for decommissioning works up to 40 years in the future, it is considered that the 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 4-19** in **Volume 1, Part 1, Chapter 4: Description of the Project** 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

- 10.7.5 The principal geology and hydrogeology receptors that have been identified as being potentially subject to significant effects are summarised in **Table 10-17** and are shown in **Volume 3, Part 2, Figure 10-3** and **Volume 3, Part 2, Figure 10-8**.

Table 10-17 Geology and hydrogeology receptors subject to potential effects

Receptor (sensitivity / value)	Reason for consideration
Geology	
Human Health Construction workers, Public open space users, adjacent residents	– Human Health receptors are identified and could be impacted or come into contact with localised off-site contamination during construction.

Receptor (sensitivity / value)	Reason for consideration
Buildings and infrastructure	Buildings are present but spread out through the study area. These structures are predominantly farms (on and adjacent to the study area), farm buildings and barns etc. Structures / infrastructure associated with the English Onshore Scheme include the buried cabling and the converter station; these will be considered as receptors for the operational phase due to the potential for aggressive ground conditions weakening structures or buried cables (however this matter has been scoped out following appropriate mitigation), and the potential for the migration and accumulation of ground gases within structures and enclosed spaces.
Controlled Waters All groundwater aquifers Adjacent surface water receptors: <ul style="list-style-type: none"> • Statutory main rivers • Ordinary watercourses / drains • Other surface waterbodies 	Surface water receptors are within the geology study area and potential impact could occur during construction. Potential for localised contamination to be mobilised during excavation works and subsequently migrate into controlled water receptors.
The Lincolnshire Coast Submerged Forest – Local Geological Site	Potential for degradation of geological resources of local importance as the Project passes beneath the LGS through trenchless installation at the Anderby Creek Landfall.
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.
Groundwater in aquifers (quality)	Risk of long-term contamination to groundwater quality due to the presence of buried infrastructure, potential leaks, or changes to groundwater flow pathways, which could mobilise existing contaminants or introduce new pollutants.
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.

Receptor (sensitivity / value)	Reason for consideration
GWDTEs	GWDTEs 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 (including large concentrations of nutrients).
Land 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.

Potential effects considered within this assessment

10.7.6 The effects on geology and hydrogeology receptors, which have the potential to be significant (after mitigation) and have been taken forward for detailed assessment are summarised in **Table 10-18**.

Table 10-18 Geology and hydrogeology receptors scoped in for further assessment

Receptor	Likely significant effects
Geology	
Human (Construction Workers, residents, Public Open Space users)	Health nearby Potential for existing localised / unforeseen contamination (associated with historical or current land uses) within the study area, disturbed and mobilised during earthwork operations including soil stripping, excavation of the cable route placement and backfilling of the cable route.
	Potential for ground gases from both natural and anthropogenic sources (Made Ground), to migrate along preferential pathways (potentially created during construction) and accumulate within enclosed spaces.
Locally important Geological Sites - The Lincolnshire Coast Submerged Forest LGS currently identified	- Potential for degradation / loss of important geological features.
Surface water features (Statutory main rivers, watercourses / drains and other surface waterbodies)	Potential for existing localised / unforeseen contamination (associated with historical or current land uses) and introduced factors from construction (such as bentonite breakout) within the study area to be disturbed and mobilised into surface water receptors reducing quality. The impacts would be greatest on receptors crossed by the Project and/or located immediately adjacent to construction work sites.
Buildings (Converter Station) and Infrastructure (Below ground cables / joint bays etc.) – Operation	Potential for ground gases from both natural and anthropogenic sources (Made Ground), to migrate along preferential pathways (potentially created during construction) and accumulate within enclosed spaces.

Receptor	Likely significant effects
Hydrogeology	
Groundwater in aquifers (quality)	<p>Potential for existing contamination (as a result of historical land uses) within the study area to be disturbed and mobilised. This would lead to a reduction in groundwater quality.</p> <p>Impacts to groundwater quality from turbidity and sediment runoff due to earthwork and foundation activities are possible.</p> <p>Creation of preferential contaminant pathways to groundwater resources through the installation of foundations to support above ground infrastructure and trenchless crossings.</p> <p>Impacts of underground cable (thermal and degradation) on surrounding, local groundwater.</p> <p>Groundwater lowering near the coast, due to groundwater control (e.g., groundwater dewatering), if required as part of trenchless techniques, causing saline intrusion of aquifer(s).</p>
Groundwater in aquifers (resource)	<p>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.</p>
Public groundwater supplies	<p>Impacts to groundwater quality from turbidity and sediment runoff due to earthwork activities are possible and would impact groundwater supply quality.</p> <p>Groundwater lowering, impacting flows and levels, would impact the groundwater supply.</p>
Private groundwater abstractions	<p>Impacts to groundwater quality from turbidity and sediment runoff due to earthwork activities are possible and would impact groundwater supply quality.</p> <p>Groundwater lowering, impacting flows and levels, would impact the groundwater supply.</p>
GWDTE	<p>Impacts to groundwater quality from turbidity (e.g., sediment runoff) due to earthwork activities are possible and would impact groundwater quality which may impact ecological receptors dependant on groundwater. Interception of poor-quality drainage may pollute the receptor with high nutrient concentrations.</p> <p>Groundwater lowering, impacting flows and levels, would impact the groundwater supply to the groundwater dependent body.</p>
Chalk rivers	Same effects as for GWDTE.

Receptor	Likely significant effects
Land at risk of groundwater flooding	<p>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.</p> <p>Risk to buildings and infrastructure was scoped out at scoping (Ref 10.1).</p>

10.7.7 The receptors / effects detailed in **Table 10-19** have been scoped out from being subject to further assessment because the potential effects are not considered likely to be significant.

Table 10-19 Summary of effects scoped out of geology and hydrogeology assessment

Receptors / potential effects	Justification
Construction	
Impacts from land instability / geohazards affecting buildings (residential properties., farm structures etc.) and infrastructure (below ground services)	Potential geohazards and land instability are proposed to be managed through design in line with relevant standards and informed by ground investigations.
Potential introduction of contaminants through the use and refuelling of construction plant, and the handling of construction material and wastes during construction and operation, effecting Human Health (construction workers, public open space users) and Controlled Waters (all groundwater and surface water receptors- statutory rivers, ordinary watercourses, drains) receptors	<p>Appropriate controls are set out within Volume 2, Part 1, Appendix 5.B: Outline CoCP; to manage the storage and handling of construction materials, excavated soils and wastes.</p> <p>An emergency response / spill plan would be established with suitable response training established for site operatives.</p>
Impacts from discovery and disturbance of unforeseen contamination on Human Health (construction workers and public open space users) and Controlled Waters (all groundwater and surface water receptors- statutory rivers, ordinary watercourses, drains) receptors, during earthwork operations, excavations and soil stripping	A contamination discovery strategy and watching brief protocol is to be developed for the project and to be used where appropriate. 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 impacting controlled waters receptors	Appropriate controls are set out within Volume 2, Part 1, Appendix 5.B: Outline CoCP ; to manage the storage

Receptors / potential effects	Justification
(all groundwater and surface water receptors- statutory rivers, ordinary watercourses, drains)	<p>and handling of construction materials, excavated soils and wastes.</p> <p>Runoff from working areas will be managed appropriately during construction with respect to both quantity and quality.</p> <p>An emergency response / spill plan would be established with suitable response training established for site workers. Activities with the potential to cause pollution will not be undertaken within an SPZ 1.</p>
Operation	
Impacts to Human Health (residents and operations / maintenance workers within the converter station and joint bays) from the build-up of radon gas within structures and enclosed spaces	An elevated risk from radon is noted within the western part of the scheme (from desk-based information search) but no structures or enclosed spaces are proposed therefore this can be scoped out.
Accidental spills / pollution into the environment e.g., uncontrolled leaks, spills from machinery like converter coolers and transformers	<p>The study area will return to its current use except where there is above ground infrastructure such as the proposed converter station.</p> <p>In areas of above ground infrastructure, appropriate controls are set out within Volume 2, Part 1, Appendix 5.B: Outline CoCP; to manage the storage and handling of materials.</p> <p>An emergency response / spill plan would be established with suitable response training for site operatives. Activities with the potential to cause pollution will not be undertaken within an SPZ 1.</p>
Aggressive ground conditions being present causing the degradation of subsurface buildings and infrastructure (below ground cables, converter station foundations)	Subsurface structures, foundations etc are to be designed with the correct concrete classification, following appropriate chemical testing of soils. This will mitigate against the potential risks caused by aggressive ground.

10.8 Key Parameters for Assessment

Realistic worst-case design scenario

- 10.8.1 The assessment has followed the Rochdale Envelope approach as outlined in **Volume 1, Part 1, Chapter 4: Description of the Project** and **Volume 1, Part 1, Chapter 5: PEIR Approach and Methodology**. The assessment of effects has been based on the description of the Project and parameters outlined in **Volume 1, Part 1, Chapter 4: Description of the Project**. 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 scheme.

10.8.2 In relation to Geology and Hydrogeology the following assumptions are made regarding the current preliminary design parameters at the time of writing this report in order to ensure a realistic worst-case assessment has been undertaken.

- Ground investigation data and assessments for the preliminary Indicative Cable Alignment, trenchless crossings, and the proposed converter station were not available for this PEIR assessment. As such ground conditions, soil contamination, groundwater and ground gas regime are not currently known. Therefore, the 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, it is considered that no new receptors would be impacted or pathways would be created.
- The cable trench could represent a potential preferential pathway if not effectively designed or mitigated against in areas where potential contamination is present. These effects are to be mitigated through appropriate risk assessments, remedial measures (if required) and the engineered design of the cable installation, and converter station construction.
- Unforeseen ground conditions may impact the scheme and proposed construction technique such as locally thicker poor / unsuitable ground conditions or contamination requiring significantly deeper excavations. However, ground investigations are proposed for the scheme and potential contaminative sources identified will be targeted; the data will be used to inform the design and embedded mitigation measures.
- Trenchless crossings are proposed (e.g., horizontal directional drilling (HDD)) across the route to avoid significant obstructions. This technique is technically more challenging than the open cut trenching technique used to install the majority of the cable routeing. As such, where they are proposed, their inclusion is considered to represent the reasonable worst case for the geology and hydrogeology chapter.
- Trenchless installation is proposed for Anderby Creek Landfall which passes beneath the Lincolnshire Coast Submerged Forest LGS. Sufficient investigation information will be collected to inform design in order to avoid damage of the significant geological feature.
- A watching brief and procedures for encountering unforeseen contamination will be in place during construction. This approach was set out in the EGL 5 Scoping Report (Ref 10.1), 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.
- An assessment for the worst-case scenario in relation to the maximum depths of excavation is to be undertaken following a review of geological investigation information. This is to be conducted for the ES.

10.8.3 In absence of the hydrogeology survey data, this PEIR assessment has assumed:

- Environment Agency licensed and deregulated abstraction and local authority listed abstractions, within the study area, are present and in use for supply at this current time;
- BGS historical wells and OS historical mapping wells within the study area are assumed to not be in use for supply, however those closest to the study area will be confirmed during the hydrogeological site walkover survey; and,
- GWDTE is groundwater dependent across its entire extent.

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

- The entire draft Order Limits is to be assessed in relation to the potential impacts on hydrogeology, although the cables will be located within only a small part of the draft Order Limits.
- Cabling for the EGL 5 project is to be installed at shallow depths (0.9-1.2 mbgl) and primarily installed (where practicable) through open trenching. Cabling is to be installed in ducting.
- Where trenching is not possible and significant obstacles are in place (such as some major roadways, larger watercourses, landfall), trenchless crossing techniques will be utilised (e.g., HDD).
- Foundations of above ground infrastructure (i.e., the converter station) will be deep enough to require foundations into the underlying bedrock. It is assumed that deeper foundations will only be necessary in the instance of the converter station and not required elsewhere within the English Onshore Scheme.
- Excavations for both the converter station and the cable installation may locally encounter groundwater ingress due to high groundwater levels. This ingress will require further assessment within the ES should suitable data become available.

Consideration of construction scenarios

10.8.5 As detailed in **Volume 1, Part 1, Chapter 4: Description of the Project**, the timing of construction activities set out within this PEIR is indicative. To allow for any unexpected circumstances and a realistic worst-case assessment, the impact assessment for the English Onshore Scheme considers the following construction scenario to ensure the worst-case scenario for Geology and Hydrogeology can be identified and assessed:

- For geology, there is not considered to be significant potential impacts to receptors as a result of altering the timing or duration of the planned construction activities. As such, for geology, construction scenarios are less impacted by temporal changes and more impacted by the spatial variability in ground conditions and the potential for localised unforeseen contamination / Made Ground to be encountered.
- Encountering unforeseen ground conditions / contamination is likely to impact the proposed excavation depths, excavation volumes of material generated, the need for management of pollution, and further assessment / design measures required to avoid the creation of preferential pathways to receptors.

- However, the environmental mitigation measures proposed (and to be agreed) such as the adoption of a watching brief and contamination discovery strategy during construction are likely to help mitigate and manage the potential risks of a realistic worst-case scenario.

10.9 Assessment Methodology

Overview

- 10.9.1 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.
- 10.9.2 The assessment detailed within this PEIR (and to be further refined within the ES) comprises the collection and assessment of available baseline information to characterise the English Onshore Scheme from a Geological and Hydrogeological perspective. This approach is consistent with the methodology outlined within DMRB LA 109 (Ref 10.9), DMRB LA 113 (Ref 10.16) and LCRM (Ref 10.5) and other subject specific guidance documents outlined in **Table 10-2**.

Receptor sensitivity / value

- 10.9.3 The sensitivity of the identified receptors will be defined using the criteria in **Table 10-20**.

Table 10-20 Receptor sensitivity

Sensitivity	Geology / Contamination	Hydrogeology
Very High	<p><u>Geology</u></p> <ul style="list-style-type: none"> • Very rare and of international importance with no potential for replacement e.g., United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Sites, UNESCO Global Geoparks, Sites of Special Scientific Interest (SSSIs) and Geological Conservation Review (GCR) where citations indicate features of international importance). Geology meeting international designation citation criteria which is not designated as such. <p><u>Contamination</u></p> <ul style="list-style-type: none"> • Human Health: Very high sensitivity land use such as residential or allotments. • Surface water: Watercourse having a WFD classification shown in a River Basin Management Plan (RBMP) and $Q95 \geq 1.0 \text{ m}^3/\text{s}$. 	<ul style="list-style-type: none"> • Principal Aquifer providing a regionally important resource and / or supporting a site protected under EC and UK legislation. • Groundwater that substantially supports Groundwater Dependent Terrestrial Ecosystems (GWDTE). • Public water supply abstraction • SPZ 1 for public water supply.

Sensitivity	Geology / Contamination	Hydrogeology
High	<ul style="list-style-type: none"> Surface water: Site protected / designated under European Commission (EC) or UK legislation (SAC, Special Protection Areas (SPA), SSSI, Ramsar site). Species protected by EC legislation. <p><u>Buildings and Infrastructure</u></p> <ul style="list-style-type: none"> Buildings of international historical importance, hospitals, fire stations and essential public buildings 	<ul style="list-style-type: none"> Principal aquifer providing locally important resource or supporting a river ecosystem. Groundwater supports a GWDTE. Spring flow supporting a Chalk River. Published SPZ2 Published SPZ3 Chalk rivers Land and residents vulnerable to groundwater flooding.
	<p><u>Geology:</u></p> <ul style="list-style-type: none"> Rare and of national importance with little potential for replacement (e.g., geological SSSI, National Nature Reserves). Geology meeting national designation criteria which is not designated as such. <p><u>Contamination:</u></p> <ul style="list-style-type: none"> Human health: high sensitivity land use such as public open space and construction workers. Surface water: watercourse having a WFD classification shown in an RBMP and $Q95 < 1.0 \text{ m}^3/\text{s}$. Surface water: Species protected under EC or UK legislation DMRB LA 108. <p><u>Buildings and Infrastructure</u></p> <ul style="list-style-type: none"> Grade I and Grade II* Listed Buildings, significant transport links e.g. railways, airports and significant utilities 	
Medium	<p><u>Geology:</u></p> <ul style="list-style-type: none"> Of regional importance with limited potential for replacement (e.g., Regionally Important Geological Site). Geology meeting regional designation criteria which is not designated as such. <p><u>Contamination:</u></p> <ul style="list-style-type: none"> Human health: medium sensitivity land use such as commercial or industrial. Surface water: watercourses not having a WFD classification shown in an RBMP and $Q95 > 0.001 \text{ m}^3/\text{s}$. <p><u>Buildings and Infrastructure</u></p>	<ul style="list-style-type: none"> Aquifer providing water for agricultural or industrial use with limited connection to surface water. Secondary A aquifer. Domestic or agricultural abstraction. Default SPZ1 for a private water supply

Sensitivity	Geology / Contamination	Hydrogeology
	<ul style="list-style-type: none"> Grade II Listed Buildings, residential or industrial / commercial developments. 	
Low	<p><u>Geology:</u></p> <ul style="list-style-type: none"> Of local importance / interest with potential for replacement (e.g., non-designated geological exposures, former quarries / mining sites). <p><u>Contamination:</u></p> <ul style="list-style-type: none"> Human health: low sensitivity land use such as highways and rail Surface water: watercourses not having a WFD classification shown in an RBMP and $Q9.5 \leq 0.001 \text{ m}^3/\text{s}$ <p><u>Buildings and Infrastructure</u> Locally Listed Buildings, local infrastructure, services.</p>	<ul style="list-style-type: none"> Secondary B aquifer. Secondary undifferentiated aquifer.
Negligible	<p><u>Geology</u></p> <ul style="list-style-type: none"> No geological exposures, little / no local interest. <p><u>Contamination:</u></p> <ul style="list-style-type: none"> Human health: undeveloped surplus land / no sensitive land use proposed <p><u>Buildings and Infrastructure</u> Buildings of no architectural or historical note, disused or dilapidated buildings</p>	<ul style="list-style-type: none"> Unproductive strata.

Magnitude of impact

10.9.4 The magnitude of impact for Geological and Hydrogeological features and impacts will be rated based on the criteria outlined below in **Table 10-21**.

Table 10-21 Magnitude of impact

Sensitivity	Geology	Hydrogeology
High	<p><u>Geology:</u></p> <ul style="list-style-type: none"> Loss of geological feature / designation and / or quality and integrity, severe damage to key characteristics, features or elements. <p><u>Contamination:</u></p> <p><u>Human health:</u></p> <ul style="list-style-type: none"> Significant contamination identified. Contamination levels significantly exceed background levels and relevant screening criteria (e.g., C4SLs) (Ref 10.46) with potential for significant harm to human health. Contamination heavily restricts future use of land. <p><u>Surface water:</u></p> <ul style="list-style-type: none"> Loss or extensive change to a fishery Loss of regionally important public water supply Loss or extensive change to a designated nature conservation site Reduction in water body WFD classification <p><u>Buildings and Infrastructure</u></p> <ul style="list-style-type: none"> Catastrophic damage to buildings, structures or the environment 	<ul style="list-style-type: none"> Loss of, or extensive change to, an aquifer. Loss of regionally important water supply. Potential high risk of pollution to groundwater. Loss of, or extensive change to, GWDTE, Chalk river or baseflow contribution to protected surface water bodies. Loss of, or significant damage to, major structures or land through subsidence, groundwater flooding or similar effects.
Medium	<p><u>Geology:</u></p> <ul style="list-style-type: none"> Partial loss of geological feature / designation, potentially adversely affecting the integrity; partial loss of / damage to key characteristics, features or elements. <p><u>Contamination:</u></p> <p><u>Human health:</u></p> <ul style="list-style-type: none"> Contaminant concentrations exceed background levels and are in line with limits of relevant screening criteria (e.g., C4SLs) (Ref 10.46) Significant contamination can be present. Control / remediation measures are required to reduce risks to human health / make land suitable for intended use. 	<ul style="list-style-type: none"> Partial loss or change to an aquifer. Degradation of regionally important public water supply or loss of significant commercial / industrial / agricultural supplies. Cause of potential medium risk of pollution to groundwater. Partial loss of the integrity of GWDTE or Chalk river. Damage to major structures through subsidence, groundwater flooding or

Sensitivity	Geology	Hydrogeology
Low	<p><u>Surface water:</u></p> <ul style="list-style-type: none"> • Partial loss in productivity of a fishery • Degradation of regionally important public water supply or loss of major commercial / industrial / agricultural supplies • Contribution to reduction in water body WFD classification <p><u>Buildings and Infrastructure</u></p> <ul style="list-style-type: none"> • Significant damage to buildings, structures or the environment 	<p>similar effects or loss of minor structures.</p>
	<p><u>Geology:</u></p> <ul style="list-style-type: none"> • Minor measurable change in geological feature / designation attributes, quality or vulnerability; minor loss of, or alteration to, one or more key characteristics, features or elements. <p><u>Contamination:</u></p> <p><u>Human health:</u></p> <ul style="list-style-type: none"> • Contaminant concentrations are below relevant screening criteria (e.g., C4SLs) (Ref 10.46). Significant contamination is unlikely with a low risk to human health. Best practice measures can be required to minimise risks to human health. <p><u>Surface water:</u></p> <ul style="list-style-type: none"> • Potential for a low risk of pollution. • Minor effects on water supplies / abstractions <p><u>Buildings and Infrastructure</u></p> <ul style="list-style-type: none"> • Minor damage to sensitive buildings, structures services or the environment. 	<ul style="list-style-type: none"> • Potential low risk of pollution. • Minor effects on an aquifer, GWDTEs, Chalk river, abstractions and structures.
Negligible	<p><u>Geology:</u></p> <ul style="list-style-type: none"> • Very minor loss or detrimental alteration to one or more characteristics, features or elements of geological feature / designation. Overall integrity of resource not affected. 	<ul style="list-style-type: none"> • No measurable impact upon an aquifer and / or groundwater receptors.

Sensitivity	Geology	Hydrogeology
	<p><u>Contamination:</u></p> <p><u>Human health:</u></p> <ul style="list-style-type: none"> Contaminant concentrations substantially below levels outlined in relevant screening criteria (e.g., C4SLs) (Ref 10.46). No requirement for control measures to reduce risks to human health / make land suitable for intended use. <p><u>Surface water</u></p> <ul style="list-style-type: none"> No measurable change. <p><u>Buildings and Infrastructure</u></p> <ul style="list-style-type: none"> Easily repairable effects of damage to buildings or structures. 	

Significance of effect

- 10.9.5 The significance will be derived using the matrix set out in **Volume 1, Part 1, Chapter 5: PEIR Approach and Methodology**.
- 10.9.6 The assessment will classify each potential effect as either negligible, minor, moderate or major as outlined within the below matrix in **Table 10-22**.
- 10.9.7 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 significant effects occurring, rather than indicating that there is a predicted adverse effect that would be of a minor nature.
- 10.9.8 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.
- 10.9.9 The main impacts to surface water (hydrology) will be assessed as part of **Volume 1, Part 2, Chapter 9: Water Environment**. Within this chapter, the assessment will consider water receptors in relation to existing historical contamination and whether pollutant linkages currently exist. Also, potential impacts to baseflow from groundwater will be assessed in this chapter.

Table 10-22 Significance of Effects Matrix

Sensitivity of Receptor	Magnitude of impact					
	High	Medium	Low	Negligible		
Very High	Major (significant)	Major or Moderate (significant)	Moderate (potentially significant)	Minor (not significant)	(not significant)	
High	Major or Moderate (significant)	or Moderate (potentially significant)	Moderate or Minor (potentially significant)	Minor (not significant)	(not significant)	
Medium	Moderate (potentially significant)	Moderate or Minor (potentially significant)	Minor (not significant)	Minor (not significant)	or Negligible (not significant)	or (not significant)
Low	Moderate or Minor (potentially significant)	Minor (not significant)	(not significant)	Minor (not significant)	or Negligible (not significant)	or (not significant)
Negligible	Minor (not significant)	(not significant)	Minor (not significant)	or Negligible (not significant)	or Negligible (not significant)	(not significant)

Preliminary assessment of cumulative effects

- 10.9.10 At the current stage of the English Onshore Scheme (PEIR stage), design information for the English Onshore Scheme is insufficient to allow for a robust cumulative assessment to be undertaken.
- 10.9.11 Furthermore, given the current position in relation to baseline data collection, with much of the environmental surveys still to be undertaken during 2026, the baseline identified at this PEIR stage cannot be taken as a complete picture of the potential presence and significance of sensitive receptors.
- 10.9.12 Therefore, a cumulative assessment has not been undertaken at this stage; however, **Volume 1, Part 4, Chapter 27: Cumulative Effects** and **Volume 2, Part 4, Appendix 27.A Long List of other Developments** present the long and short lists of 'other developments' for the inter-project cumulative effects which will be considered at the ES stage (with updates as necessary), 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 English Onshore Scheme design further evolves and in response to any comments raised at statutory consultation.

10.10 Preliminary Assessment of Geology and Hydrogeology Effects

- 10.10.1 A preliminary assessment of the impacts to Geology and Hydrogeology of the English Onshore Scheme have been assessed compared to the baseline characteristics, using available information. Effects have been considered during the lifetime of the proposed scheme, during construction and operation / maintenance. Considerations and assessments regarding the decommissioning of the English Onshore Scheme will be undertaken at the appropriate time.
- 10.10.2 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 10.6.

Geology - Sensitive Geological Receptors (Lincolnshire Coast Submerged Forest LGS) - Construction Phase

- 10.10.3 The sensitivity of the identified LGS, The Lincolnshire Coast Submerged Forest, is of **Low** sensitivity, given its local designation (not national) as a site of geological importance.
- 10.10.4 However, the proposed magnitude of the risk is considered to be **high** given the design to install the cabling through trenchless methodologies underneath the area. As design depths of the trenchless installation at landfall, and the depth at which the LGS is present are currently unknown, at present there is uncertainty regarding their interaction and as such the potential magnitude of the effect is seen to be high as there is the potential loss of a locally important site.
- 10.10.5 With sufficient investigation information to inform the design of the trenchless installation works, direct interaction with the sensitive feature is likely to be reduced and it is anticipated that the magnitude of impact will be reduced to low.
- 10.10.6 Therefore, the overall significance of this is considered to be **minor to moderate**, and therefore **not significant**, as the design of the cable routing at landfall will mitigate the potential risks.

Contamination - Human Health Receptors

Construction workers (Construction Phase)

- 10.10.7 Current land use across the English Onshore Scheme is predominantly undeveloped agricultural greenfield land with limited significant developments, and therefore the likelihood of encountering Made Ground / contamination is considered to be **low** and if encountered it is also likely to be localised.
- 10.10.8 Risks posed to construction workers during construction are predominantly from encountering Made Ground / contamination during the excavation works and the physical dermal contact and inhaling of contaminants and dusts. Construction workers are considered to have a **high** sensitivity.

- 10.10.9 With the adoption of appropriate mitigation measures (in accordance with the relevant legislation and guidance) such as the adoption of appropriate task specific risk assessments and method statements and the use of appropriate PPE, good hygiene and working practices being adopted the magnitude of the impact would be considered to be **low** on the receptor.
- 10.10.10 Works would be undertaken under the supervision of a watching brief, which would include a contamination discovery strategy, which is outlined within **Volume 2, Part 1, Appendix 5.B: Outline CoCP** and agreed with the Local Planning Authority (LPA), to mitigate against the potential for encountering unforeseen Made Ground / contamination.
- 10.10.11 In addition to mitigation measures undertaken during the construction phase, the overall significance of effects can be further mitigated during the design process. Ground investigation undertaken during the design stage, 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.
- 10.10.12 Therefore, when considering appropriate mitigation measures (as outlined within **Volume 2, Part 1, Appendix 5.B: Outline CoCP**) are followed, the sensitivity of this receptor is considered to be **high**, the magnitude of effect is considered to be **low**, and therefore the overall significance of effects to be **minor to moderate** and therefore, these risks are **not considered to be significant**.

Public open space users (Construction phase)

- 10.10.13 Risks posed to public open space users (within the study area) during the construction phase are related to the mobilisation of contamination predominantly in the form of dust, however, there is the potential for dermal contact to occur for these receptors. Public open space users are considered to have a **high** sensitivity.
- 10.10.14 The magnitude of impact to Public Open space users is considered to be **low**, given the current understanding of contamination on site and the assumed adoption of appropriate mitigation measures. Mitigation measures protective of public open space users would focus on the restriction of access to areas of the project during construction thus preventing direct access to potentially contaminated soils. In addition, Dust Control measures outlined within **Volume 1, Part 2, Chapter 14: Air Quality**, would help to minimise the risk to these receptors.
- 10.10.15 Therefore, when considering appropriate mitigation measures (as outlined within **Volume 2, Part 1, Appendix 5.B: Outline CoCP**) are followed, the sensitivity of this receptor is considered to be **high**, the magnitude of effect is considered to be **low**, and therefore the overall significance of effects to be **minor to moderate** and therefore, these risks are **not considered to be significant**.

Neighbouring Residents (Construction phase)

- 10.10.16 The construction works have the potential risk for contamination to be disturbed and mobilised. Although the environmental setting along the routeing of the English Onshore Scheme, is predominantly undeveloped agricultural land, there remains some residents within the study area. The sensitivity of these neighbouring residents is regarded as **high**; however, the magnitude of impact is considered to be **low** due to the proximity to the route and the adoption of suitable environmental mitigation measures. Therefore, the overall significance of effect would be **minor to moderate** and thus **not significant**.

Neighbouring Residents and Buildings and Infrastructure (Operational Phase)

10.10.17 The construction works has the potential risk for ground gases to migrate through the creation of preferential pathways. Although the environmental setting along the routing of the English Onshore Scheme is predominantly undeveloped agricultural land, there remains some structures and residents within the study area. The sensitivity of these neighbouring residents is regarded as **high**, with buildings and infrastructure given a **medium** (residential) to **negligible** (barns) sensitivity; however, the magnitude of impact is considered to be **low** due to the proximity to the route and the adoption of suitable environmental mitigation measures during the construction phase and therefore it would be assumed that design measures have been incorporated to reduce / prevent the creation of preferential pathways. Therefore, the overall significance of effect would range from **minor to moderate** and **minor to negligible** and thus **not significant**.

Contamination - Controlled Waters Receptors

Groundwater, Surface Waters (Construction Phase)

10.10.18 Risks posed to Controlled Waters (groundwater and surface water) within the study area during the construction phase are related to the mobilisation of existing contamination and the potential impact of construction works (such as drilling fluids or bentonite breakout) occurring leading to a loss event. The sensitivity of these receptors range from **high to low**. Following the completion of an intrusive ground investigation and the implementation of embedded mitigation measures or environmental controls (such as localised remediation, good volumetric control when using drilling fluids etc) and given the site setting (a low potential for encountering contamination / Made Ground) the magnitude of impact to Controlled Waters receptors are considered to be **low**. As such the significance of effect is considered to range from **minor to moderate** and **minor to negligible** and thus **not significant**.

Groundwater, Surface Waters (Operational Phase)

10.10.19 Once construction works have been completed, the cable alignment is to be restored to its former land use, which is primarily agricultural fields across the English Onshore scheme. There is the potential that cable installation creates preferential pathways for which contamination can be mobilised into groundwaters and surface waters.

10.10.20 The sensitivity of these receptors range from **high to low**. As the magnitude of impact is considered post-construction it is assumed that if contamination was encountered during the construction phase, appropriate mitigation measures (such as remediation) of encountered contamination would have occurred, thus removing the potential source of the impact. In addition to this, construction methodologies adopted during the installation of the cable (both during trenching and trenchless installation) should limit the creation of preferential pathways, and if identified to be present these are able to be remediated post construction (the addition of clay fillers etc.). Therefore, the magnitude of potential impact to Controlled Waters receptors during the operational phase is considered to be **low**. As such the significance of effect is considered to range from Minor to Moderate and **minor to negligible** and is thus **not significant**.

Preliminary Assessment of Effects: Groundwater resources and quality

Groundwater Abstractions

- 10.10.21 The receptor sensitivity of public groundwater abstractions, with associated published SPZ1 or SPZ1a, is very high.
- 10.10.22 Potential impacts on groundwater abstractions include reduction in groundwater quality due to construction. 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 will 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, particularly in areas of SPZ1s and SPZ2s. The magnitude of impact is therefore minor, which is **not significant**.
- 10.10.23 The receptor sensitivity of PWS groundwater abstractions is medium if in currently active use for potable or agricultural purposes. 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 flow pathways due to the presence of below ground structures during the operational phase.
- 10.10.24 Assessment of the impacts on groundwater abstractions will be undertaken as part of the ES.
- 10.10.25 It is considered that any impact can be mitigated by the continuity of supply, such as provision of 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)**.

Project specific effects: Thermal Impacts on groundwater

- 10.10.26 As part of its response to the EGL 5 Scoping Report (Ref 10.1), 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.
- 10.10.27 The ES will provide an assessment of the risks arising from heat to groundwater, based on a simple assessment and a conceptual site model approach.

Project specific effects: Trenchless technology

- 10.10.28 The use of trenchless technologies is proposed at up to nine locations including crossings of watercourses and roads. The nature of the technology proposed is not known at this stage but may include the use of drilling fluids such as bentonite and associated additives. If not properly controlled, drilling fluid loss can occur resulting in impacts to controlled waters.
- 10.10.29 The currently proposed locations for the use of trenchless technology include sites that are situated within a SPZ3.
- 10.10.30 Mitigation of risks arising from the use of drilling fluid can typically be addressed through robust construction management practices including volumetric control and monitoring. The drilling fluid management plan is as outlined in **Volume 2, Part 1, Appendix 5.B: Outline CoCP**.

Preliminary Assessment of Effects: GWDTEs

Sea Bank Clay Pit (Section 2 – Underground Cable Route Corridor)

- 10.10.31 The southern area of the Sea Bank Clay Pit SSSI is crossed by the 500 m buffer of the draft Order Limits and is designated as a GWDTE. It is of high sensitivity.
- 10.10.32 Potential impacts include reductions in groundwater quality during construction works, alterations to groundwater flow resulting from dewatering activities, and long-term changes to recharge or flow pathways due to the installation of below-ground infrastructure during the operational phase.
- 10.10.33 Given the likely shallow depth of the clay pit and likely low permeability of the strata that the clay pit is within, it is anticipated that any changes to groundwater flow or quality will be highly attenuated before reaching the receptor. Therefore, the impact to this receptor is considered to be **low to negligible**. The significance of effect is assessed as minor and **not significant**.

Preliminary Assessment of Effects: Groundwater flooding susceptible land

- 10.10.34 For groundwater flooding, the receptor comprising land, of potentially different land uses, has a value that ranges between very high (e.g., land associated with essential infrastructure) to low (e.g., water compatible land). Details of the land values are shown in **Volume 1, Part 2, Chapter 9: Water Environment, Table 9-10** and are based on the National Planning Policy Framework (Ref 10.10).
- 10.10.35 The potential causes of groundwater flooding to susceptible land include creation of barriers to the flow of shallow groundwater. This could be due to the Project trench construction. Conversely, the Project trench construction could create a flow pathway which could convey water to a down gradient area that is susceptible to flooding.
- 10.10.36 An assessment of the impacts on groundwater flooding will be undertaken as part of the ES in conjunction with **Volume 1, Part 2, Chapter 9: Water Environment**.
- 10.10.37 The potential impacts to land from groundwater flooding by the English Onshore Scheme is considered to be negligible due to the typically shallow depth of trench excavation, and hence limited disruption or conveyance of flow of groundwater bodies. Further assessment of areas susceptible to groundwater flooding will be conducted for the ES. Mitigation measures will be provided by good practice design for shallow groundwater level areas, where necessary. This assessment is subject to change if the design and hence the depth proposed changes. The significance of effect is assessed as **minor** and **not significant**.

10.11 Further Work to be Undertaken

- 10.11.1 The information provided in this PEIR is preliminary, the final assessment of significant effects will be reported in the ES. This section describes the further work to be undertaken to support the Geology and Hydrogeology assessment to be presented in the ES.

Baseline Geology

- 10.11.2 Access to all the targeted areas were not possible, therefore if any of these remaining walkover areas are considered significant or further areas are identified during preparation of the ES, these will be completed and assessed as part of the ES.

- 10.11.3 An intrusive ground investigation is scheduled to be undertaken to inform the design of the English Onshore Scheme, including ground investigation to target the sites which are likely candidates for trenchless crossings. This information is to be reviewed once received and will be assessed for geological matters and reported within the ES.
- 10.11.4 Requests for information will continue to be made to relevant stakeholders, including local authorities to obtain information not currently presented within this PEIR chapter.
- 10.11.5 Any changes to the design between the PEIR stage and ES stage will be reflected within the ES, and if required further assessment of relevant geological and hydrogeological receptors of the new area will be undertaken. This may require further site walkovers and desk-based information to be purchased if the areas targeted are vastly different to those currently proposed.

Baseline Hydrogeology

- 10.11.6 A groundwater features survey for hydrogeological receptors will be undertaken and will be used to inform the assessment to be presented in the ES.
- 10.11.7 Additional data requests to the Environment Agency will be made regarding groundwater flooding risk, abstraction data (licensed and deregulated), discharges to ground, groundwater levels, and groundwater quality.
- 10.11.8 Where possible, landowners will be contacted to determine if any historically mapped wells (which are potential private water supplies) are operational.
- 10.11.9 Additional review of historical and current OS mapping will be made to identify spring locations. Similarly, further review of historical hydrogeological mapping will be used to investigate potential artesian groundwater in the Chalk aquifer.
- 10.11.10 Technical discussions with stakeholders will be conducted as part of the assessment process and the outcomes will be reported in the ES. This will include agreeing the scope of the hydrogeological risk assessment with the Environment Agency and consulting with Natural England about the depth and other details of the nearest Clay Pits SSSI (GWDTE). Additionally, consultation with Anglian Water will be held, should potential impacts be identified within the SPZ1 and SPZ2 of the public water supply abstractions.
- 10.11.11 Requests, if necessary, will be made to Alford Town Council for information regarding the reported Alford – Bilsby corridor high water table.

Assessment Geology

- 10.11.12 After finalisation of the proposed cable alignment and converter station location and the receipt of further information (such as Ground Investigation reports), 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 within the subsequent ES.

Assessment hydrogeology

- 10.11.13 The assessments conducted for the PEIR will be reviewed in light of stakeholder consultation feedback and further design development. Subsequently, the following assessments will be updated or undertaken:

- Impact Assessment of GWDTE;
- Impact Assessment of Groundwater abstractions, including both public water supplies and private water supplies; and
- Potential thermal impacts on groundwater from the buried cables.

Further environmental measures geology

10.11.14 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 carried out 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

10.11.15 No additional changes are proposed at this stage, in relation to Section 10.5, to design measures or control managements for hydrogeology. This will be reviewed following completion of the aforementioned additional assessments.

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