RWE Renewables UK Dogger Bank South (West) Limited

RWE Renewables UK Dogger Bank South (East) Limited

Dogger Bank South Offshore Wind Farms

Environmental Statement

Volume 7

Chapter 19 – Geology and Land Quality (Revision 2) (Clean)

June 2025

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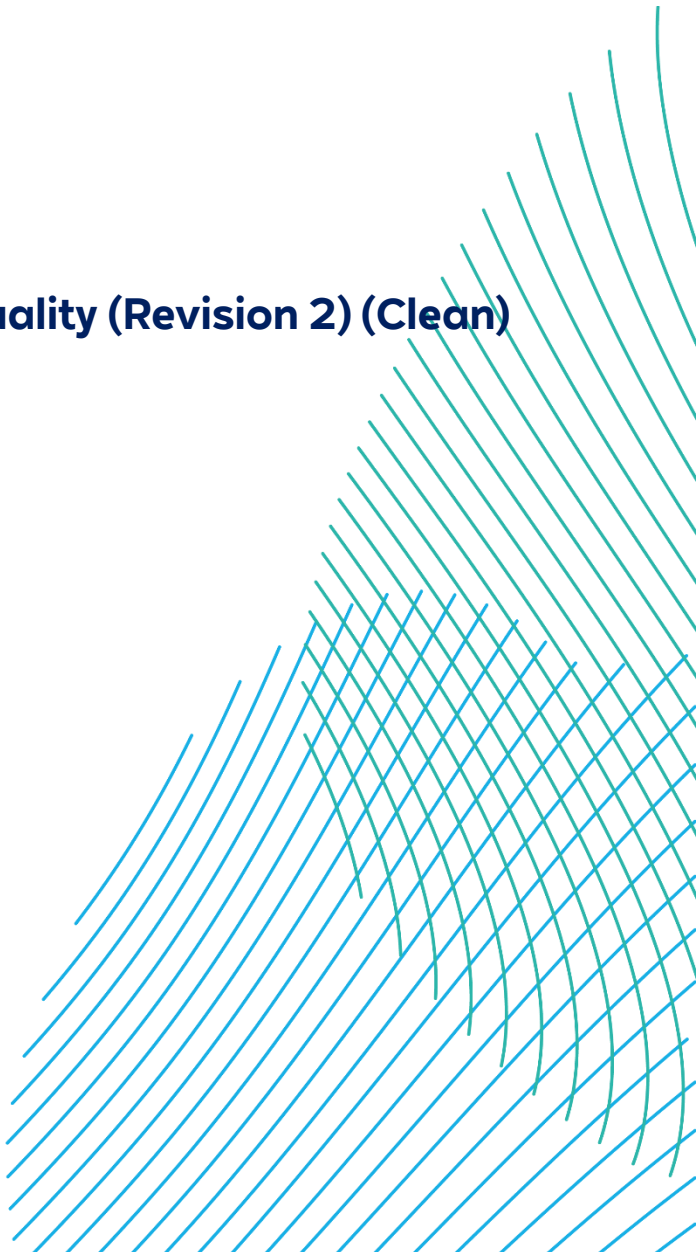

Unrestricted

Company:	**RWE Renewables UK Dogger Bank South (West) Limited and RWE Renewables UK Dogger Bank South (East) Limited**	Asset:	**Development**
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01	June 2024	Final for DCO Application	RHDHV	RWE	RWE
02	June 2025	Submission for Deadline 6	RHDHV	RWE	RWE

Revision Change Log			
Rev No.	**Page**	**Section**	**Description**
01	N/A	N/A	Submitted for DCO Application
02	Various	Various	Chapter 19 Geology and Land Quality has been updated at the request of the Examining Authority within the Rule 17 [PD-018] to accurately reflect the proposed development and contains all the updated information within the chapter as a result of **Project Change Request 2** (document reference 10.53).
02	Various	Various	Chapter 19 has been updated following the evidence provided in **The Applicants' Responses to April 2025 Hearing Action Points** [REP4-096] that confirms Skipsea Drain is not a Local Geological Site or a Regionally Important Geological Site. Chapter 19 has also been updated to clarify that the whole route is not impacted by Site of Special Scientific Interest risk zones. As a result, Impacts 6 and 12 "*Impacts to Designated Geological Sites*" has been deleted following consultation with Hull Geological Society confirmed that Skipsea Drain is not a Local Geological Site and had been mislabelled in the ERYC Local Plan. All reference to impacts to designated geological sites has been removed from Chapter 19.
02	Various	Various	Additional information regarding Burton Bushes SSSI assessment has been added following **The Applicants' Responses to ExQ2** [REP5-036]. This includes a discussion of groundwater within Glacial Till with reference to Impact 8.
02	83 101/102	Table 19-11 19.6.1.4.2	Additional detail with regards to the Preferred Areas that overlap with the Onshore Development Area has been included in response to April 2025 Hearing Action Points, Action Number 51 as outlined in **The Applicants' Responses to April 2025 Hearing Action Points** [REP4-096].
02	Various	Various	Impact 4 and Impact 9 Sterilisation of Future Mineral Resources have been updated to remove reference to Mineral Resource Assessment and re-assess the impact during operation which has been amended from minor adverse to moderate adverse residual significance as outlined in **The Applicants' Responses to April 2025 Hearing Action Points** [REP4-096].

Revision Change Log			
Rev No.	**Page**	**Section**	**Description**
02	19	19.3.1	Justification regarding the scoping out of potential impacts on designated geological sites following confirmation from Hull Geological Society that Skipsea Drain had been incorrectly identified as a Local Geological Site within East Riding of Yorkshire's Local Plan has been added in response to ExQ1 as outline in **The Applicants' Responses to ExQ1** [REP3-027] and April 2025 Hearing Action Points, Action Number 53 as outlined in **The Applicants' Responses to April 2025 Hearing Action Points** [REP4-096].. Justification has also been added with regards to why an assessment of the impacts on Burton Bushes SSSI as a result of disruption of shallow groundwater flow has not been included within the chapter as outlined in **The Applicant's Responses to Deadline 4 Documents** [REP5-037].
02	39/40	Table 19-3	Additional wording added to reflect the updates to the Outline Soil Management Plan (OSMP) given in **Appendix A** of the **OCoCP (Revision 4)** [REP4-040] in response to RR-039: I 19. This aligns with **Chapter 21 Land Use (Revision 4)** [REP5-022].
02	48	Table 19-4	Table 19-4, NPS reference 5.4.2, has been updated to clarify that impacts on ecologically designated sites discussed within the chapter is in relation to contamination.
02	104	19.6.1.5	Additional clarification between Chapter 19 and **Chapter 21 Lane Use (Revision 4**) [REP5-022] regarding impacts relating to contamination assessment has been added following **The Applicants' Responses to ExQ1** [REP3-027].
02	113	19.6.2.4.4	Additional information regarding the potential mitigation measures relating to the built environment (Impact 10) during the operational phase of the Projects has been added in response to ExQ1 as outlined in **The Applicants' Responses to ExQ1** [REP3-027].
Appendix 19-2 Geo-Environmental Desk Study and Preliminary Risk Assessment Report			
02	Various	Various	Refer to Appendix 19-2 Geo-Environmental Desk Study and Preliminary Risk Assessment Report for details of the updates.

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Appendix 19-3 Onshore Waste Assessment

Glossary

Term	Definition
Agricultural Land Classification	Agricultural Land Classification (ALC) is a grading system used to assess and compare the quality of agricultural land in England and Wales. A combination of climate, topography and soil characteristics and their unique interaction determines the grade of the land. The grades range from 1 to 5. Grade 1 being excellent, Grade 2 very good, Grade 3a and 3b good to moderate (no subdivide), Grade 4 poor and Grade 5 very poor.
Cable construction compound	Area set aside to facilitate construction of the Onshore Export Cables. These will be located adjacent to the Onshore Export Cable Corridor, with access to the highway.
Concurrent Scenario	A potential construction scenario for the Projects where DBS East and DBS West are both constructed at the same time.
Development Scenario	Description of how the DBS East and/or DBS West Projects would be constructed either in isolation, sequentially or concurrently.
Dogger Bank South (DBS) Offshore Wind Farms	The collective name for the two Projects, DBS East and DBS West.
Haul Road	The track along the Onshore Export Cable Corridor used by traffic to access different sections of the onshore export cable route for construction.
High Groundwater Vulnerability	High Groundwater Vulnerability areas can easily transmit pollution to groundwater. They are characterised by high-leaching soils and the absence of low-permeability superficial deposits.
Horizontal Directional Drill (HDD)	HDD is a trenchless technique to bring the offshore cables ashore at the landfall and can be used for crossing other obstacles such as roads, railways and watercourses onshore.

Term	Definition
In Isolation Scenario	A potential construction scenario for one Project which includes either the DBS East or DBS West array, associated offshore and onshore cabling and only the eastern Onshore Converter Station within the Onshore Substation Zone and only the northern route of the onward cable route to the proposed Birkhill Wood National Grid Substation.
Jointing Bays	Underground structures constructed at regular intervals along the onshore cable route to join sections of cable and facilitate installation of the cables into the buried ducts.
Landfall	The point on the coastline at which the Offshore Export Cables are brought onshore, connecting to the onshore cables at the Transition Joint Bay (TJB) above mean high water.
Link Boxes	An underground metal box placed within a concrete pit where the metal sheaths between adjacent export cable sections are connected and earthed, installed with a ground level manhole to allow access to the link box for regular maintenance or fault-finding purposes.
Low Groundwater Vulnerability	Low Groundwater Vulnerability areas that provide the greatest protection to groundwater from pollution. They are likely to be characterised by low-leaching soils and/or the presence of low-permeability superficial deposits.
Medium Groundwater Vulnerability	Medium Groundwater Vulnerability areas offer some groundwater protection from the transmission of pollution to groundwater.
Mineral Safeguarding Area	Areas of known mineral resources that are of sufficient value (economically or of conservation value) to warrant protection.
Onshore Converter Stations	A compound containing electrical equipment required to transform HVDC and stabilise electricity generated by the Projects so that it can be connected to the electricity transmission network as HVAC. There will be one Onshore Converter Station for each Project.

Term	Definition
Onshore Development Area	The Onshore Development Area for ES is the boundary within which all onshore infrastructure required for the Projects would be located including Landfall Zone, Onshore Export Cable Corridor, accesses, Temporary Construction Compounds and Onshore Converter Stations.
Onshore Export Cable Corridor	This is the area which includes cable trenches, Haul Roads, spoil storage areas, and limits of deviation for micro-siting. For assessment purposes, the cable corridor does not include the Onshore Converter Stations, Transition Joint Bays or temporary access routes; but includes Temporary Construction Compounds (purely for the cable route).
Onshore Export Cables	Onshore Export Cables take the electricity from the Transition Joint Bay to the Onshore Converter Stations.
Onshore Substation Zone	Parcel of land within the Onshore Development Area where the Onshore Converter Station infrastructure (including the Haul Roads, Temporary Construction Compounds and associated cable routeing) would be located.
Onward Cable Connection	The cable corridor between the Onshore Substation Zone and the Proposed Birkhill Wood National Grid Substation.
Other trenchless techniques	Other techniques (aside from HDD) for installation of ducts or cables where trenching may not be suitable such as micro tunnelling or auger boring.
Principal aquifer	These are layers of rock or drift deposits that have high intergranular and / or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and / or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifers.

Term	Definition
Project Change Request 2	The changes to the DCO application for the Projects set out in Project Change Request 2 - Onshore Substation Zone [AS-152] which was accepted into Examination on 21st January 2025.
Sand and Gravel Preferred Area	Areas of known resource where planning permission might reasonably be anticipated.
Sand and Gravel Area of Search	Areas where knowledge of mineral resources may be less than in a Preferred Area, but within which planning permissions could be granted.
Secondary A aquifer	These are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.
Secondary B aquifer	These are predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.
Secondary undifferentiated aquifer	These are assigned in cases where it has not been possible to attribute either a Secondary A or B aquifer to the soil type due to the variable characteristics. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifers in different locations due to the variable characteristics of the rock type.
Sequential Scenario	A potential construction scenario for the Projects where DBS East and DBS West are constructed with a lag between the commencement of construction activities. Either Project could be built first.

Term	Definition
Source Protection Zone 1	Inner protection zone - defined as the 50-day travel time from any point below the water table to the abstraction source. This zone has a minimum radius of 50 metres.
Source Protection Zone 2	Outer protection zone - defined by a 400-day travel time from a point below the water table. This zone has a minimum radius of 250 or 500 metres around the abstraction source, depending on the size of the abstraction.
Source Protection Zone 3	Source catchment protection zone - defined as the area around an abstraction source within which all groundwater recharge is presumed to be discharged at the abstraction source.
The Applicants	The Applicants for the Projects are RWE Renewables UK Dogger Bank South (East) Limited and RWE Renewables UK Dogger Bank South (West) Limited. The Applicants are themselves jointly owned by the RWE Group of companies (51% stake) and Masdar (49% stake).
The Projects	DBS East and DBS West (collectively referred to as the Dogger Bank South Offshore Wind Farms).
Transition Joint Bay (TJB)	The Transition Joint Bay (TJB) is an underground structure at the landfall that houses the joints between the Offshore Export Cables and the Onshore Export Cables.
Trenching	Open cut method for cable or duct installation

Acronyms

Term	Definition
ALC	Agricultural Land Classification
BGS	British Geological Survey
CDM	Construction Design Management
CEA	Cumulative Effects Assessment
CLR11	Contaminated Land Report 11
COMAH	Control of Major Accident Sites
COSHH	Control of Substances Hazardous to Health
DCO	Development Consent Order
DECC	Department for Energy and Climate Change
EIA	Environmental Impact Assessment
EPP	Evidence Plan Process
ERP	Emergency Response Plan
ES	Environmental Statement
ETG	Expert Topic Group
EU	European Union
GPCL	Guiding Principles for Contaminated Land
HDD	Horizontal Directional Drilling
LNR	Local Nature Reserve
MCA	Mineral Consultation Area
MIIA	Mineral Infrastructure Impact Assessment

Term	Definition
MPS	Minerals Policy Statement
MSA	Mineral Safeguarding Area
NNR	National Nature Reserve
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
NVZ	Nitrate Vulnerable Zone
OCoCP	Outline Code of Construction Practice
PCOC	Potential Contaminant of Concern
PEIR	Preliminary Environmental Information Report
PPE	Personal Protective Equipment
PPG	Planning Practice Guidance
PRA	Preliminary Risk Assessment
RIGS	Regionally Important Geological Sites
RoFRaS	Risks of Flooding from Rivers and Sea
SAC	Special Area of Conservation
SPA	Special Protection Area
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
TJB	Transition Joint Bay

Term	Definition
UK	United Kingdom
WER	Water Environment (Water Framework Directive) (England and Wales) Regulations 2017

19 Geology and Land Quality

19.1 Introduction

1. This chapter of the Environmental Statement (ES) considers the likely significant effects of the Projects on Geology and Land Quality. The chapter provides an overview of the existing environment for the proposed Onshore Development Area, followed by an assessment of likely significant effects for the construction, operation, and decommissioning phases of the Projects.

2. As detailed in **Volume 7, Chapter 1 Introduction (application ref: 7.1)**, Chapter 19 has been updated to incorporate the changes to the Projects Design Parameters resulting from **Project Change Request 2 – Onshore Substation Zone (document reference 10.53)**, and the incorporation of any associated responses and corrections provided on Geology and Land Quality throughout the Examination process.

3. The assessment should be read in conjunction with the following linked chapters:

   - **Volume 7, Chapter 18 Terrestrial Ecology and Ornithology (application ref: 7.18)** covers receptors including designated sites, habitats and protected and notable species. There is the potential for pre-existing contamination to be mobilised, or for new sources of contamination to be introduced as part of the construction, operation and decommissioning of the Projects. Any migration and discharge of contamination into surface waters could lead to a reduction in surface water quality and impact on the ecological habitats they support;
   - **Volume 7, Chapter 20 Flood Risk and Hydrology (application ref: 7.20)** covers hydrology, hydrogeology and flood risk. There is the potential for construction works to mobilise pre-existing contamination which may migrate into the surrounding water environment impacting on the quality of water resources. There is also the potential for construction works to create new preferential pathways between currently unconnected sources and receptors;
   - **Volume 7, Chapter 21 Land Use (application ref: 7.21)** covers agricultural land designations and soils. There is the potential for pre-existing contamination to be mobilised, or for new sources of contamination to be introduced as part of the construction, operation and decommissioning of the Projects. activities that may lead to the mobilisation of or introduction of new sources of contamination have the potential to adversely impact on the quality of agricultural land, potentially reducing its productivity; and

- **Volume 7, Chapter 27 Human Health (application ref: 7.27)** covers the health and well-being of the surrounding population. Potential impacts to and on the health and well-being may arises as a result of the construction, operation and decommissioning of the Projects.

4. Additional information to support the Geology and Land Quality assessment include:

   - **Volume 7, Appendix 19-1 Geology and Land Quality Consultation Responses (application ref: 7.19.19.1)**;
   - **Volume 7, Appendix 19-2 Geo-Environmental Desk Study and Preliminary Risk Assessment Report (application ref: 7.19.19.2)**;
   - **Volume 7 Appendix 19-3 Onshore Waste Assessment (application ref: 7.19.19.3)**, and
   - **Volume 7, Figure 19-1 to 19-9 (application ref: 7.19.1)**.

5. **Volume 7 Figure 19-1 to 19-9 (application reference: 7.19.1)** and **Volume 7, Appendix 19-2 Geo-Environmental Desk Study and Preliminary Risk Assessment Report (application ref: 7.19.19.2)** have been updated as a result of the changes referenced in paragraph 2. Following review of the changes referenced in paragraph 2 above, it has not been necessary to update any other appendices.

19.2 Consultation

6. Consultation with regard to Geology and Land Quality has been undertaken in line with the general process described in **Volume 7, Chapter 7 Consultation (application ref: 7.7)** and the **Consultation Report (Volume 5, application ref: 5.1)**. The key elements to date have including scoping, the ongoing Evidence Plan Process (EPP) via the Flood Risk and Geology Expert Topic Group (ETG) and the Preliminary Environmental information Report (PEIR).

7. The feedback received throughout this process has been considered in preparing the ES. This chapter has been updated following consultation in order to produce the final assessment submitted within the Development Consent Order (DCO) application. **Volume 7, Appendix 19-1 Geology and Land Quality Consultation Responses (application ref: 7.19.19.1)** provides a summary of the consultation responses received to date relevant to this topic, and details how the comments have been addressed within this chapter.

19.3 Scope

19.3.1 Effects Scoped In and Scoped Out

8. During the Projects' scoping stage it was agreed that the following construction and operational impacts are to be assessed within both the Geology and Land Quality PEIR and ES chapters:

   - Exposure of workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts;
   - Direct impacts on groundwater quality and groundwater resources (referred to as Impact on controlled waters (groundwater and surface waters) during operation);
   - Impacts on surface water quality and the ecological habitats they support from contamination;
   - Sterilisation of mineral resources; and,
   - Built environment.

9. Following submission of the **Scoping Report (Volume 5, application ref: 5.3)** it was decided that potential impacts on agricultural land from contamination should also be assessed within the Geology and Land Quality PEIR and ES chapters.

10. No impacts were scoped out of assessment during the scoping stage.

11. Following the submission of the ES in June 2024, it was identified that information contained on the GIS data provided within East Riding of Yorkshire's Local Plan incorrectly included Skipsea Drain as a Local Geological Site. This error was confirmed through correspondence with Hull Geological Society during the Projects Examination (see **The Applicant's Responses to ExQ1** [REP3-027]). Therefore, potential impacts on designated geological sites have not been assessed within this chapter due to their absence within the Geology and Land Quality study area.

12. In addition, following **The Applicants' Responses to ExQ2** [REP5-036]., with regards to Burton Bushes SSSI, groundwater within the vicinity of the designated site has been recorded within the deeper Principal Chalk Aquifer and not within the shallow geology of the Glacial Till. There is considered to be no viable linkage by which the Onshore Export Cable Corridor would disrupt shallow groundwater flow pathways as shallow groundwater is not present in this area. As such, an assessment of potential impacts to Burton Bushes SSSI as a result of disruption to shallow groundwater flow has not been undertaken within this chapter.

19.3.2 Study Area

13. The Geology and Land Quality study area has been defined on the basis of the distance over which impacts may occur and by the location of any receptors that may be affected by those potential impacts. This has been established using professional judgement and is supported by **Volume 7, Appendix 19-2 Geo-Environmental Desk Study and Preliminary Risk Assessment Report (application ref: 7.19.19.2)**. The study area for this assessment includes the following:

- A general 250m buffer around the Onshore Development Area as illustrated on **Volume 7, Figure 19-1 Geology and Land Quality Study Area (application ref: 7.19.1)**. Within the 250m buffer zone records relating to the following were reviewed (see **Volume 7, Appendix 19-2 (application ref: 7.19.19.2)** for full details):
  - Pollution control;
  - Waste;
  - Hazardous substances and health and safety;
  - Environmentally sensitive areas and visual/cultural designations;
  - Agricultural designations;
  - Historical and current industrial land uses;
  - Built environment;
  - British Geological Survey borehole records;
  - Mining and mineral extraction; and
  - Hydrology.
- A 100m buffer has been applied around the Onshore Development Area for the review of historical mapping due to the agricultural nature of the surrounding environment (see **Volume 7, Figure 19-1 Geology and Land Quality Study Area (application ref: 7.19.1)**); and
- The study area is extended to 1km for assessing the presence of:
  - Control of Major Accident Hazard (COMAH) sites as they can pose a high risk to developments; and
  - Groundwater abstraction wells and surface water abstractions due to their sensitivity to small changes in the environment surrounding them.

14. It should be noted that the Geology and Land Quality study area is landward of mean high water springs (MHWS). An assessment of the potential impacts within the intertidal zone is included within **Volume 7, Chapter 8 Marine Physical Environment (application ref: 7.8)**.

19.3.3 Realistic Worst Case Scenario

19.3.3.1 General Approach

15. The realistic worst case design parameters for likely significant effects scoped into the ES for the Geology and Land Quality assessment are summarised in **Table 19-1**. These are based on the project parameters described in **Volume 7, Chapter 5 Project Description (application ref: 7.5)**, which provides further details regarding specific activities and their durations.

16. In addition to the design parameters set out in **Table 19-1**, consideration is also given to the different Development Scenarios still under consideration as set out in sections 19.3.3.2 to 19.3.3.4.

Table 19-1 Realistic Worst Case Design Parameters

	Parameter			
	DBS East or DBS West in isolation	**DBS East and DBS West concurrently**	**DBS East and DBS West sequentially**	**Notes and rationale**
Construction				
Landfall Zone	• Number of completed trenchless crossing ducts (maximum): 3 (2 power cables, 2 fibre optic cables) • Total landfall zone area: 420,000m^2 • Indicative trenchless crossing depth: 20m • Number of Transition Joint Bays: 2 • Transition joint bay dimensions: 5 x 20m • Number of Link Boxes (2.5m x 4m): 2 – the only above ground infrastructure • Landfall TJB compound works area: 110m x 75m • Landfall satellite compound: 75m x 75m • Duration: up to 18 months overall (not continuous)	• Number of completed trenchless crossing ducts: 6 (4 power cables, 4 fibre optic cables) • Total landfall zone area: 420,000m^2 • Indicative trenchless crossing depth: 20m • Number of Transition Joint Bays: 4 • Transition joint bay dimensions: 5m x 20m • Number of Link Boxes (2.5m x 4m): 4 – the only above ground infrastructure • Landfall TJB compound works area: 190m x 75m • Landfall satellite compound: 75m x 75m • Duration of works: up to 18 months overall (not continuous)	• Number of completed trenchless crossing ducts: 6 (4 power cables, 4 fibre optic cables) • Total landfall zone area: 420,000m^2 • Indicative trenchless crossing depth: 20m • Number of Transition Joint Bays: 4 • Transition joint bay dimensions: 5m x 20m • Number of Link Boxes (2.5m x 4m): 4 – the only above ground infrastructure • Landfall TJB compound works area: 190m x 75m • Landfall satellite compound: 75m x 75m • Duration of works: up to 48 months overall (not continuous)	These parameters represent the maximum footprint of disturbance within the Onshore Development Area in which the potential disturbance of existing contamination and sterilisation of mineral resources could occur. The Projects together are considered as the worst case scenario when compared to the Projects in isolation due to the increased earthworks and piling required. Sequential construction of the Projects is considered as the worst case of the two together projects due to the longer period of time required. No exit pits are to be located within the intertidal zone.

	Parameter			
	DBS East or DBS West in isolation	**DBS East and DBS West concurrently**	**DBS East and DBS West sequentially**	**Notes and rationale**
Onshore Export Cable Corridor from Landfall Zone to the Onshore Substation Zone	• Indicative corridor length between Landfall Zone and the Onshore Substation Zone: 32km • Cable corridor width: 41m (up to 45m at trenchless crossings) • Total Onshore Export Cable Corridor works area (est.): 4,252,209m^2 • Cable duct trench dimensions: 1.1m base to 3.9m surface for each single HVDC. 3.35m base to 6.2m surface for dual HVDC • Number of export circuits: 1 (HVDC) • Number of power cables per circuit: 2 (HVDC) • Number of fibre optic (communication) cables per circuit: 1 • Number of earth cables per circuit: 1 • Maximum number of trenches: 2 • Maximum cable burial depth where restrictions aren't present: 2m • Indicative cable burial depth: 1.6m • Approximate depth of trench to top of duct / cables (m): 1.3 – 1.7 • Haul Road width: 5m (increasing to 8m at passing places) • Jointing Bays: every 0.75 – 1.5km • Indicative number of Jointing Bays: 103 • Jointing bay construction footprint (per bay): 10m x 25m	• Indicative corridor length between Landfall Zone and the Onshore Substation Zone: 32km • Cable corridor width: 75m (up to 90m at trenchless crossings) • Total Onshore Export Cable Corridor works area (est.): 4,503,397m^2 • Cable duct trench dimensions: 1.1m base to 3.9m surface for each single HVDC. 3.35m base to 6.2m surface for dual HVDC • Number of export circuits: 2 (HVDC) • Number of power cables per circuit: 2 (HVDC) • Number of fibre optic (communication) cables per circuit: 1 • Number of earth cables per circuit: 1 • Maximum number of trenches: 4 • Maximum cable burial depth where restrictions aren't present: 2m • Indicative cable burial depth: 1.6m • Approximate depth of trench to top of duct / cables (m): 1.3 – 1.7 • Haul Road width: 5m (increasing to 8m at passing places) • Jointing Bays: every 0.75 – 1.5km • Indicative number of Jointing Bays: 205 • Jointing bay construction footprint (per bay): 10m x 25m	• Indicative corridor length between Landfall Zone and the Onshore Substation Zone: 32km • Cable corridor width 75m (up to 90m at trenchless crossings) • Total Onshore Export Cable Corridor works area (est.): 4,503,397m^2 • Cable duct trench dimensions: 1.1m base to 3.9m surface for each single HVDC. 3.35m base to 6.2m surface for dual HVDC • Number of export circuits: 2 (HVDC) • Number of power cables per circuit: 2 (HVDC) • Number of fibre optic (communication) cables per circuit: 1 • Number of earth cables per circuit: 1 • Maximum number of trenches: 4 • Maximum cable burial depth where restrictions aren't present: 2m • Indicative cable burial depth: 1.6m • Approximate depth of trench to top of duct / cables (m): 1.3 – 1.7 • Haul Road width: 5m (increasing to 8m at passing places) • Jointing Bays: every 0.75 – 1.5km • Indicative number of Jointing Bays: 205 • Jointing bay construction footprint (per bay): 10m x 25m	

	Parameter			
	DBS East or DBS West in isolation	**DBS East and DBS West concurrently**	**DBS East and DBS West sequentially**	**Notes and rationale**
	• Jointing bay burial depth from existing ground level to bottom of jointing bay: 2.2m • Link box construction dimensions : 6.5m x 8m • Number of temporary construction compounds: 17 (2 main compounds, 15 satellite compounds including Landfall Zone satellite compound) • Size of main construction compound: 10,000m^2 (roughly 100x100m) • Size of satellite construction compounds: 5,625m^2 (roughly 75m x75m) • Expected maximum trenchless crossing depth: 20m • Trenchless crossing compound dimensions: 60m x 40m per project assumed for the Project's compounds on each side of the obstacle (entry and exit compounds) • No. of trenchless crossings compounds: Min 41 and up to maximum of 147 entry compounds • No. of trenchless crossings compounds: Min 41 and up to maximum of 147 exit compounds • All other crossings assumed to be open cut (see **Obstacle Crossing Register (Volume 7, Appendix 5-2 (application ref: 7.5.5.2)**) • Duration: 33 months	• Jointing bay burial depth from existing ground level to bottom of jointing bay: 2.2m • Link box construction dimensions : 6.5m x 8m • Number of temporary construction compounds: 17 (2 main compounds, 15 satellite compounds including Landfall Zone satellite compound) • Size of main construction compound: 10,000m^2 (roughly 100m x100m) • Size of satellite construction compounds: 5,625m^2 (roughly 75m x 75m) • Expected maximum trenchless crossing depth: 20m • Trenchless crossing compound dimensions: 60m x 40m per project assumed for the Project's compounds on each side of the obstacle (entry and exit compounds) • No. of trenchless crossings compounds: Min 82 and up to maximum of 294 entry compounds • No. of trenchless crossings compounds: Min 82 and up to maximum of 294 exit compounds • All other crossings assumed to be open cut (see **Obstacle Crossing Register (Volume 7, Appendix 5-2 (application ref: 7.5.5.2)**) • Duration: 33 months	• Jointing bay burial depth from existing ground level to bottom of jointing bay: 2.2m • Link box construction dimensions : 6.5m x 8m • Number of temporary construction compounds: 17 (2 main compounds, 15 satellite compounds including Landfall Zone satellite compound) • Size of main construction compound: 10,000m^2 (roughly 100x100m) • Size of satellite construction compounds: 5,625m^2 (roughly 75m x 75m) • Expected maximum trenchless crossing depth: 20m • Trenchless crossing compound dimensions: 60m x 40m per project assumed for the Project's compounds on each side of the obstacle (entry and exit compounds) • No. of trenchless crossings compounds: Min 82 and up to maximum of 294 entry compounds • No. of trenchless crossings compounds: Min 82 and up to maximum of 294 exit compounds • All other crossings assumed to be open cut (see **Obstacle Crossing Register (Volume 7, Appendix 5-2 (application ref: 7.5.5.2)**)	

	Parameter			
	DBS East or DBS West in isolation	**DBS East and DBS West concurrently**	**DBS East and DBS West sequentially**	**Notes and rationale**
			• Duration of works: up to 57 months overall (note this would not be continuous working within that timeframe)	

Onshore Substation Zone	• Total construction area: 62,208m^2 (based on one HVDC Convertor Station + temporary construction compound area)
	  ○ Area of Converter station: 32,208m^2 (based on one HVDC Convertor Station)
	  ○ No. of Converter Station compounds: 1 main temporary compound (3 location options identified)
	  ○ Converter Station compound: 30,000m^2
	• Duration: 4 years
		• Total construction area: 124,416m^2 (based on two HVDC Convertor Stations + temporary construction compound area)
		  ○ Area of Converter Station (s): 64,416m^2
		  ○ No. of Converter Station compounds: 2 (1 main temporary construction compound and 1 satellite temporary construction compound)
		  ○ Converter station compound: 60,000m^2
		• Duration: 4 years
			• Total construction area: 124,416m^2 (based on two HVDC Convertor Stations + temporary construction compound area)
			  ○ Area of Converter Station (s): 64,416m^2
			  ○ No. of Converter Station compounds: 2 (1 main temporary construction compound and 1 satellite temporary construction compound)
			  ○ Converter Station compound: 60,000m^2
			• Duration: 6 years	

Onward Cable Connection to Proposed Birkhill Wood National Grid Substation	• Onward corridor length from Onshore Converter Station to proposed Birkhill Wood National Grid Substation: 2.5km • Number of export circuits: 4 x 400kV • Technology: HVAC • Cabling from Project Converter Station to National Grid Substation: Buried • General cable corridor approximate permanent easement swathe: 20m • Cable corridor construction swathe: 53.5m • Cable construction satellite construction compound dimensions : 75m x 75m • Number of earth / Link Boxes: 35	• Onward corridor length from Onshore Converter Station to proposed Birkhill Wood National Grid Substation: 2.5km • Number of export circuits: 8 x 400kV • Technology: HVAC • Cabling from Projects Converter Station to National Grid Substation: Buried • General cable corridor approximate permanent easement swathe: 34m • Cable corridor construction swathe: 100m • Cable construction satellite construction compound dimensions : 75m x 75m • Number of earth / Link Boxes: 70	• Onward corridor length from Onshore Converter Station to proposed Birkhill Wood National Grid Substation: 2.5km • Number of export circuits: 8 x 400kV • Technology: HVAC • Cabling from Projects Converter Station to National Grid Substation: Buried • General cable corridor approximate permanent easement swathe: 34m • Cable corridor construction swathe: 100m • Cable construction satellite construction compound dimensions : 75m x 75m • Number of earth / Link Boxes: 70	

	Parameter			
	DBS East or DBS West in isolation	**DBS East and DBS West concurrently**	**DBS East and DBS West sequentially**	**Notes and rationale**
Operation				
Landfall Zone	• Permanent Land take for the total number of TJBs: 200m^2 – including below ground infrastructure • Number of manhole covers within Landfall Zone: 2 • Total area of permanent land take for manhole covers above ground: 20m^2 • All other construction disturbance restored to pre-existing condition	• Permanent Land take for the total number of TJBs: 400m^2 – including below ground infrastructure • Number of manhole covers within Landfall Zone: 4 • Total area of permanent land take for manhole covers above ground: 40m^2 • All other construction disturbance restored to pre-existing condition.	• Permanent Land take for the total number of TJBs: 400m^2 – including below ground infrastructure • Number of manhole covers within Landfall Zone: 4 • Total area of permanent land take for manhole covers above ground: 40m^2 • All other construction disturbance restored to pre-existing condition.	The Projects together are considered as the worst case scenario when compared to the Projects in isolation due to the increased area over which potential impacts to sensitive receptors could occur.
Onshore Export Cable Corridor from Landfall Zone to the Onshore Substation Zone	• Approximate permanent easement along the cable corridor: 15m • Number of trenches: Up to 2 (2 x HVDC) • Number of Earth/Link Boxes (buried, manhole at the surface and the only above ground permanent infrastructure along the cable corridor): up to 103 • Jointing Bay permanent infrastructure dimensions (all below ground): 3m x 8m • Link box dimensions / manhole cover permanent infrastructure above ground: 2.5m x 4m • Total permanent land take for link boxes/manhole covers: 1,030m^2	• Approximate permanent easement along the cable corridor: 24m • Number of trenches: Up to 4 (4 x HVDC) • Number of Earth/Link Boxes (buried, manhole at the surface and the only above ground permanent infrastructure along the cable corridor): up to 205 • Jointing Bay permanent infrastructure dimensions (all below ground): 3m x 8m • Link box dimensions / manhole cover permanent infrastructure above ground: 2.5m x 4m • Total permanent land take for link boxes/manhole covers: 2,050m^2	• Approximate permanent easement along the cable corridor: 24m • Number of trenches: Up to 4 (4 x HVDC) • Number of Earth/Link Boxes (buried, manhole at the surface and the only above ground permanent infrastructure along the cable corridor): up to 205 • Jointing Bay permanent infrastructure dimensions (all below ground): 3m x 8m • Link box dimensions / manhole cover permanent infrastructure above ground: 2.5m x 4m • Total permanent land take for link boxes/manhole covers: 2,050m^2	
Onshore Converter Stations	• Permanent Onshore Convertor Station area: 32,208m^2 (122m x 264m) (based on one HVDC converter station) • Permanent access road including adjacent access road landscaping: 8,236m^2	• Permanent Onshore Converter Station area: 64,416m^2 (122m x 264m plus 122m x 264m) (based on two HVDC converter stations)	• Permanent Onshore Converter Station area: 64,416m^2 (122m x 264m plus 122m x 264m) (based on two HVDC converter stations)	

	Parameter			
	DBS East or DBS West in isolation	**DBS East and DBS West concurrently**	**DBS East and DBS West sequentially**	**Notes and rationale**
	• Approximate area of landscaping and SuDs basin: 193,000m^2 • Implementation of landscape screening in accordance with **Volume 7, Figure 23-6 Indicative Landscape Plan (application ref: 7.23.1).** Worst case considers year 1, before planting matures. • All other construction disturbance restored to pre-existing condition. • Duration: 30 years	• Permanent access road including adjacent access road landscaping: 8,236m^2 • Approximate area of landscaping and SuDs basin: 193,000m^2 • Implementation of landscape screening in accordance with **Volume 7, Figure 23-6 Indicative Landscape Plan (application ref: 7.23.1).** Worst case considers year 1, before planting matures. • All other construction disturbance restored to pre-existing condition. • Duration: 30 years	• Permanent access road including adjacent access road landscaping: 8,236m^2 • Approximate area of landscaping and SuDs basin: 193,000m^2 • Implementation of landscape screening in accordance with **Volume 7, Figure 23-6 Indicative Landscape Plan (application ref: 7.23.1).** Worst case considers year 1, before planting matures. • All other construction disturbance restored to pre-existing condition. • Duration: 32 years	
Onward Cable Connection to Proposed Birkhill Wood National Grid Substation	• General cable corridor approximate permanent easement swathe: 20m • 35 manholes at the surface • Approximate total area of permanent land take for Link Boxes/manhole covers: 350m^2	• General cable corridor approximate permanent easement swathe: 34m • 70 manholes at the surface • Approximate total area of permanent land take for Link Boxes/manhole covers: 700m^2	• General cable corridor approximate permanent easement swathe: 34m • 70 manholes at the surface • Approximate total area of permanent land take for Link Boxes/manhole covers: 700m^2	
Decommissioning				
No final decision regarding the final decommissioning policy for the onshore project infrastructure including landfall, onshore cable route and onshore substation has yet been made. It is also recognised that legislation and industry best practice change over time. However, it is likely that the onshore project equipment, including the cable, will be removed, reused or recycled wherever possible and the transition bays and cable ducts being left in place. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and will be agreed with the regulator. It is anticipated that for the worst case scenario, the impacts will be no greater than those identified for the construction phase. A decommissioning plan for the onshore works would be submitted prior to any decommissioning commencing.			

19.3.3.2 Development Scenarios

17. Following Statutory Consultation high voltage alternating current (HVAC) technology (previously assessed in PEIR) was removed from the Projects' design envelope (see **Volume 7, Chapter 4 Site Selection and Assessment of Alternatives (application ref: 7.4**) for further information). As a result, only high voltage direct current (HVDC) technology has been taken forward for assessment purposes. The ES considers the following development scenarios:

    - Either DBS East or DBS West is built In Isolation; or
    - DBS East and DBS West are both built either Sequentially or Concurrently.

18. An In Isolation Scenario has been assessed within the ES on the basis that theoretically one Project could be taken forward without the other being built out. If an In Isolation Scenario is taken forward, either DBS East or DBS West may be constructed. As such the onshore assessment considers both DBS East and DBS West In Isolation.

19. If an In Isolation Scenario is taken forward, only the eastern Onshore Converter Station within the Onshore Substation Zone would be constructed. In either the concurrent or Sequential Scenario, both Onshore Converter Station locations within the Onshore Substation Zone would be taken forward for the onshore assessment.

20. In order to ensure that a robust assessment has been undertaken, all Development Scenarios have been considered to ensure the realistic worst case scenario for each topic has been assessed. A summary is provided here, and further details are provided in **Volume 7, Chapter 5 Project Description (application ref: 7.5).**

21. The three Development Scenarios to be considered for assessment purposes are outlined in **Table 19-2.**

Table 19-2 Development Scenarios and Construction Durations

Development Scenario	Description	Total Maximum Construction Duration (Years)	Maximum construction Duration Offshore (Years)	Maximum construction Duration Onshore (Years)
In Isolation	Either DBS East or DBS West is built in isolation.	Five	Five	Four
Sequential	DBS East and DBS West are both built sequentially, either Project could commence construction first with staggered/over lapping construction.	Seven	A five year period of construction for each project with a lag of up to two years in the start of construction of the second project (excluding landfall duct installation) – reflecting the maximum duration of effects of seven years.	Construction works (i.e. onshore cable civil works, including duct installation) to be completed for both Projects simultaneously in the first four years, with additional works at the landfall, substation zone and cable joint bays in the following two years. Maximum duration of effects of six years.
Concurrent	DBS East and DBS West are both built concurrently reflecting the maximum peak effects.	Five	Five	Four

22. Any differences between the Projects, or differences that could result from the manner in which the first and the second Projects are built (concurrent or sequential and the length of any gap) are identified and discussed where relevant in section 19.6. For each potential impact, the worst case construction scenario for the In Isolation Scenario and the Sequential or Concurrent Scenario is presented. The worst case scenario presented for the concurrent or Sequential Scenario will depend on which of these is considered the worst case. The justification for what constitutes the worst case is provided, where necessary, in section 19.6.

19.3.3.3 Operation Scenarios

23. Operation scenarios are described in detail in **Volume 7, Chapter 5 Project Description (application ref: 7.5)**. The assessment considers the following scenarios:

- Only DBS East in operation;
- Only DBS West in operation; and
- DBS East and DBS West operating concurrently with or without a lag of up to two years between each Project commencing operation.

24. If the Projects are built using a phased approach, there would also be a phased approach to starting the operational phase. The worst case scenario for the operational phases for the Projects have been assessed. See section 5.1.1 of **Volume 7, Chapter 5 Project Description (application ref: 7.5)** for further information on phasing scenarios for the Projects.

25. The operational lifetime of each Project is expected to be 30 years for an In Isolation and Concurrent Scenario and 32 years for a Sequential Scenario.

19.3.3.4 Decommissioning Scenarios

26. Decommissioning scenarios are described in **Volume 7, Chapter 5 Project Description (application ref: 7.5).** Decommissioning arrangements will be agreed through the submission of a Decommissioning Plan to be submitted and approved following cessation of commercial operation prior to decommissioning commencing. For the purpose of this assessment it is assumed that decommissioning of the Projects could be conducted separately, or at the same time.

19.3.4 Embedded Mitigation

27. This section outlines the embedded mitigation relevant to the Geology and Land Quality assessment, which has been incorporated into the design of the Projects or constitutes standard mitigation measures for this topic (**Table 19-3**). Mitigation is also detailed within the **Commitments Register (Volume 8, application ref: 8.6)** and cross-referenced within **Table 1-3**. Where additional mitigation measures are proposed, these are detailed in the impact assessment (section 19.6).

Table 19-3 Embedded Mitigation Measures

Parameter	Embedded Mitigation Measures	Where commitment is secured
Contaminated land and groundwater		
Cable Crossings beneath Main Rivers	All Main Rivers will be crossed using trenchless techniques such as HDD to avoid direct interaction with these watercourses. The crossing methodology will be agreed with the Environment Agency prior to construction. Trenchless crossing methodologies entry and exit points will be located at least 20m from Environment Agency surface water courses or the landward toe of the Environment Agency surface watercourse's flood defences and would be installed at a depth to minimise potential interaction with current, or any planned, infrastructure (e.g., sheet piles), at least 2m below the channel bed. This would minimise the potential for contamination (if present) from excavation works by limiting the potential for contaminated materials to enter surface waters via surface run off and shallow interconnected groundwater.	DCO Requirement 19
Cable Crossing beneath ordinary watercourses	Ordinary watercourses may be undertaken by open cut methods. In such cases, temporary measures will be employed to maintain flow of water along the watercourse. The crossing methodology for all water courses is set out in the **Volume 7, Appendix 5-2 Obstacle Crossing Register (application ref: 7.5.5.2).** Trenchless crossing methodologies (e.g. HDD) entry and exit points will	DCO Requirement 19

Parameter	Embedded Mitigation Measures	Where commitment is secured
	be located at least 9m away from Internal Drainage Board (IDB) and Ordinary surface watercourses to ensure the ongoing maintenance of IDB drains. The detailed methodology to be used for any temporary construction at crossing points over existing ditches and watercourses shall be agreed with the Environment Agency, LLFA and Internal Drainage Board (IDB), as appropriate.	
Construction Methodology and Reinstatement	As described in **Volume 7, Chapter 5 Project Description (application ref: 7.5),** in a Concurrent or Sequential construction scenario, the ducts for both Projects would be laid in the same phase of works i.e. the ducts for the second Project would be laid by the first. The areas of land between Jointing Bays would be reinstated with 2 years and returned to the landowner for agricultural use or the habitat restored. Cables would then be pulled through the ducts at Jointing Bay locations along the Onshore Export Cable Route, limiting physical disturbance to locations every 0.75 to 1.5km. Works to install the platform for the Onshore Converter Station(s) for the second Project within the Substation Zone and the ducting at the Landfall Zone would also be undertaken in the same phase of works. On completion of construction, the Landfall Zone and Onshore Export Cable Corridor, including Temporary Construction Compounds, would be reinstated to its previous condition (e.g. agricultural use) as far as reasonably practical. The only above-ground infrastructure that would remain would be manholes for link boxes.	DCO Requirement 19

Parameter	Embedded Mitigation Measures	Where commitment is secured
Outline Code of Construction Practice (OCoCP)	The **OCoCP (Volume 8, application ref: 8.9)** outlines the control measures and standards that will be implemented to control the impacts on the environment. The OCoCP will be adhered throughout construction. The OCoCP will be regularly reviewed and updated post consent, prior to and during the construction period. The OCoCP will be informed by the findings of pre-construction site investigation and the generic quantitative risk assessment. Based on that risk assessment appropriate working methods would be developed to avoid, minimise or mitigate impacts relating to the construction phase. The risk mitigation strategies incorporated into the OCoCP include: • Appropriate Personal Protective Equipment (PPE); • Provision of welfare facilities; • Monitoring of works including air quality and odour; and • Implementation of relevant good working practices applied including stockpile management and dust suppression activities to reduce the risk relating to the creation and inhalation of wind-blown dusts. The OCoCP incorporates legislation requirements including the Construction (Design and Management) Regulations 2015 (CDM), Health and Safety at Work	DCO Requirement 19

Parameter	Embedded Mitigation Measures	Where commitment is secured
	Act 1974, and Control of Substances Hazardous to Health Regulations 2002 (COSHH).	
Materials Management Plan (MMP)	A Materials Management Plan (MMP) would be drafted in advance of any construction works, this would include chemical screening criteria in order to ensure that imported and / or reused materials are chemically suitable for use. If materials identified as containing asbestos are identified, then a specialist contractor should be employed to aid in its removal from site, in line with current legislation. The MMP would form part of the final CoCP to be submitted for approval with the relevant bodies in advance of implementation.	DCO Requirement 19
	Adoption of a Contaminated Land: Applications in Real Environments (CL:AIRE) Definition of Waste: Code of Construction Practice (DoWCoP) to manage the re-use and disposal of excavated soils on site would also be incorporated into the MMP. This would aid in maximising sustainability and provide an audit trail to demonstrate the appropriate use of materials.	
Outline Site Waste Management Plan (OSWMP)	Waste will be managed in line with the **OSWMP, Appendix E** of the **OCoCP (Volume 8, application ref: 8.9)**. The OSWMP will be refined as part of the detailed CoCP(s) approved upon appointment of a Principal Contractor(s) and	DCO Requirement 19

Parameter	Embedded Mitigation Measures	Where commitment is secured
	details measures for ensuring compliant and best practice management of waste on site during construction.	
Outline Pollution Prevention Plan (OPPP)	The requirement for a Pollution Prevention Plan (PPP) is included within the **OCoCP (Volume 8, application ref: 8.9)**, an **OPPP** is included in **Appendix D** of the **OCoCP**. This plan would also incorporate the Environment Agency best practice guidelines for pollution prevention which have been withdrawn from use but still provide a useful best practice guide and include: • Environment Agency Pollution Prevention Guidance (PPG) 01 – Understanding your environmental responsibilities; • Environment Agency PPG 05 – Works and maintenance near water; • Environment Agency PPG 06 – Working at construction and demolition: preventing pollution guidance; • Environment Agency PPG 08 – Safe storage and disposal of used oils; • Environment Agency PPG 21 – Pollution incident response planning; and • Environment Agency PPG 22 –Dealing with spills. In areas that have been identified as potential areas of contamination within the Geo-Environmental Desk Study and Preliminary Risk Assessment (PRA) or encountered during construction works, perched waters within Made Ground or	DCO Requirement 19

Parameter	Embedded Mitigation Measures	Where commitment is secured
	groundwater from dewatering activities would be collected within a tank or lagoon prior to any treatment of discharge. This wastewater shall either be: • Discharged to foul sewer under a trade effluent consent agreed with the local water company / supplier; and/or • Discharged to surface water under an environmental permit issued by the Environment Agency. On site treatment plant may be required to treat the any wastewater prior to disposal in order to meet discharge limits set by either the Environment Agency or local water company. The Principal Contractor(s) would be responsible for managing any water runoff from its site boundary and will implement measures to manage surface water and silty runoff, particularly to limit run off directly to roads or into watercourses. The **OCoCP (Volume 8, application ref: 8.9)**, includes control measures for managing runoff and minimising risk of water pollution including: • Monitoring of construction drainage sediment traps (visual inspection) with increased monitoring during inclement weather. If required these traps can be pumped via settling tanks to remove sediment, based on a pre-defined level / depth of sediment;	

Parameter	Embedded Mitigation Measures	Where commitment is secured
	• Site water discharges or dewatering activities will be undertaken in adherence with Environment Agency and local authority legislation and any permits / consents will be obtained from the Relevant Authority (as necessary). Low risk discharges and groundwater activities may be exempt from requiring a licence/permit; • All foul discharges from temporary compounds will be agreed with the appropriate regulator and, if required, managed under a Trade Effluent Consent; and • Uncontrolled runoff from offsite areas within proximity to the site will be recorded, with dates and photographs collected by the Principal Contractor(s) for any regulator challenges.	
Outline Soil Management Plan (OSMP)	An **Outline Soil Management Plan (OSMP**) is included in the **OCoCP, Appendix A (Volume 8, application ref: 8.9)** and outlines the mitigation measures and best practice techniques, which contractors would be obliged to comply with. A detailed SMP would form part of the final CoCP. Mitigation measures included within the SMP include: • Consideration of weather conditions where it is appropriate to work for each soil type, e.g. not working in an area of poorly draining soils following a period of heavy rain;	DCO Requirement 19

Parameter	Embedded Mitigation Measures	Where commitment is secured
	• Storing soils appropriately; • Ensuring effective drainage systems are used during construction; and • Employing reinstatement and plant vegetation following completion of construction works. The SMP sets out procedures for the appropriate handling of soils during the works, including: • Using a competent contractor for soil handling, storage and reinstatement under Defra (2009) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites; • Storing topsoil adjacent to where it is stripped, wherever practicable; • Storing excavated subsoil separately from the topsoil, with sufficient separation to ensure segregation; • Restricting movements of heavy plant and vehicles to specified routes; and • Minimising the footprint of excavation works as much as reasonably possible. The **OCoCP, Appendix A (Volume 8, application ref: 8.9)** sets out guidance, in section 4.8 on cropping and aftercare for the landowners which will form part of	

Parameter	Embedded Mitigation Measures	Where commitment is secured
	the detail SMP. The length of the period of aftercare may extend for two to three years post reinstatement, key aftercare measures would include: • Early or 'sacrificial' cropping may be appropriate as opposed to no crop on reinstated soils and bare soils should be avoided for any extended periods, especially over winter; • The landowner(s) are to be advised and encouraged to manage the land sympathetically and, for the first two-three years after re-instatement, should be aware that re-instated land will farm differently to adjacent areas. The soils are likely to remain wetter for longer in spring and are likely to wet up earlier in autumn. Timeliness of access for arable cultivations, irrigation ,fertilising and spraying will be essential to facilitate soil structural recovery; • The use of organic manures is recommended, though not in the first 12 months after re-instatement; and An aftercare programme should be formulated by the Contractor to a fertiliser and cropping plan which is agreed with landowner.	
Outline Drainage Strategy	An **Outline Drainage Strategy (Volume 8, application ref: 8.12)** is submitted with the DCO application and includes the pre and post construction land drainage proposals.	DCO Requirement 16

Parameter	Embedded Mitigation Measures	Where commitment is secured
	The Projects have commissioned a detailed drainage survey, which is currently ongoing to establish the existing land drainage baseline environment. To fully understand the drainage a suitably qualified land drainage expert with experience of working in the local area has been enlisted to carry out the baseline surveys and to consult with landowners. They would also ensure local, site-specific, and landowner knowledge is effectively captured prior to construction commencing. A detailed drainage strategy would then be drafted based on the results of the outline drainage survey and in accordance with the **Outline Drainage Strategy (Volume 8, application ref: 8.12)**. The detailed strategy will be submitted to the Lead Local Flood Authority (LLFA) at ERYC for approval prior to the commencement of construction of the Projects, in consultation with the Environment Agency, Internal Drainage Boards (IDB) and the relevant sewerage and drainage authorities. Where the Projects intercepts land drainage, pre-construction drainage would be installed at the edge(s) of the onshore export cable route corridor. This permanent drainage would intercept existing field drains and ensure the integrity of the existing land drainage is maintained during construction and operation of the Projects. All drains and outfalls would be risk assessed and appropriate control measures used prior to discharge into any watercourses at a controlled rate. Temporary attenuation / storage would be provided, where necessary.	

Parameter	Embedded Mitigation Measures	Where commitment is secured
	At the Onshore Converter Stations, located within the Onshore Substation Zone a construction drainage system would also be implemented at the beginning of the construction phase. This would cover the drainage requirements for both the temporary and permanent working areas and ensure any land drainage has suitable pollution prevention measures implemented, including filter trenches and fuel interceptors.	
Agricultural Land Classification (ALC) and Soil Condition Surveys	Agricultural Land Classification (ALC) surveys have been undertaken for the Substation Zone, where the Onshore Converter Stations would be located, the results are included in **Appendix A, Outline Soil Management Plan (OSMP)** of the **OCoCP (Volume 8, application ref: 8.9)**. ALC surveys for the Onshore Export Cable Corridor and the Landfall Zone will be completed in Spring/Summer 2024 to inform the detailed Soil Management Plan (SMP) and reinstatement methodology following completion of the construction works. A contractor (or appointed Agricultural Land Officer) will undertake soil condition and intrusive soil survey trial pits to identify and describe the physical and nutrient characteristics of the existing soil profiles.	DCO Requirement 19
Cable routing	The route of the Onshore Export Cable Corridor has been determined as part of a detailed site selection process (see **Volume 7, Chapter 4 Site Selection and Assessment of Alternatives (application ref: 7.4)**). The route of the Onshore Export Cable Corridor has been designed to avoid potential sources of	DCO Schedule 1

Parameter	Embedded Mitigation Measures	Where commitment is secured
	contamination (e.g. landfills) and built environment receptors (e.g. residential and commercial properties) where possible.	
Operation and Maintenance (O&M) manual	Following the completion of construction works, details of the residual risks present within the Onshore Development Area identified during construction, will be handed to the Applicants by the Principal Contractor for inclusion in an operation and maintenance (O&M) manual as set out in the **OCoCP (Volume 8, application ref: 8.9).** Maintenance workers that are required to undertake ground excavations during the operation of the Projects would be provided with the information contained within the O&M manual regarding the nature of ground conditions within each area so that they can develop site and task specific risk assessments and method statements with their recommendations being implemented. An Emergency Response Plan (ERP) (or similar) would be developed and recorded within an O&M manual, this would include standard mitigation measures for cable repair / maintenance works and at the Onshore Converter Station(s), including: all fuels, oils, lubricants, and other chemicals would be stored in an impermeable bund with at least 110% of stored capacity and the requirement for pill kits on site. An ERP would outline the mitigation measures to be undertaken in the event of an uncontrolled release of hazardous materials.	DCO Requirement 19

Parameter	Embedded Mitigation Measures	Where commitment is secured
Groundwater quality and abstractions		
Hydrogeological risk assessments	Ground investigations and a hydrogeological risk assessment meeting the requirements of the Environment Agency's approach to groundwater protection (Environment Agency, 2018) would be undertaken at each trenchless crossing location, as stated in the **OCoCP (Volume 8, application ref: 8.9).** Hydrogeological risk assessments would also be undertaken where earthworks / excavations are within 50m (or 250m dependent upon volume abstracted) of private potable groundwater abstractions pose a potential risk from either existing or potentially introduced contamination. Further hydrogeological risk assessments will be undertaken where earthworks / excavations are within influencing distance of abstractions whereby they may interrupt flow pathways due to dewatering or other associated activities. The risk assessment, which would be desk-based, follows a tiered approach with more detailed assessments carried out in areas considered to be a potentially greater risk to groundwater. The production of the hydrogeological risk assessment would be undertaken prior to the commencement of construction works (should one be deemed	DCO Requirement 19

Parameter	Embedded Mitigation Measures	Where commitment is secured
	necessary) and meet the requirements of Environment Agency's Approach to Groundwater Protection 2018 Framework.	
Storage of Chemicals	**The OPPP, Appendix D** of the **OCoCP (Volume 8, application ref: 8.9)**, will include specific measures relevant to the storage of fuels, oils, lubricants, waste water and other chemicals during the works. This will include: • Storing all fuels, oils, lubricants, waste water and other chemicals in impermeable bunds with at least 110% of the stored capacity, with any damaged containers being removed from site; • Refuelling would take place in a dedicated impermeable area, using a bunded bowser. Biodegradable oils to be used where possible; and Ensuring that spill kits are available on site at all times as well as sand bags and stop logs for deployment in case of emergency spillages.	DCO Requirement 19

Parameter	Embedded Mitigation Measures	Where commitment is secured
Piling Risk Assessment	The **OCoCP (Volume 8, application ref: 8.9)** states a piling risk assessment would be undertaken if piles are to be used for the construction of Onshore Converter Station(s), in line with the Environment Agency's Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention (Environment Agency, 2001).	DCO Requirement 19
Mineral Safeguarding Areas		
Onshore Export Cable Corridor	Route refinement in the area of Long Riston has been carried out to limit the impact on the sand and gravel preferred area (SG-A) which is the subject of an ongoing planning application for continued extraction to the north (see section 19.7).	DCO Schedule 1

19.4 Assessment Methodology

19.4.1 Policy, Legislation and Guidance

19.4.1.1 National Policy Statements

28. The assessment of potential impacts upon Geology and Land Quality has been made with specific reference to the relevant National Policy Statements (NPS) including the Overarching NPS for Energy (EN-1), the NPS for Renewable Energy Infrastructure (EN-3) and the NPS for Electricity Networks Infrastructure (EN-5). These were published in November 2023 and were designated in January 2024. The specific assessment requirements for Geology and Land Quality, as detailed in the NPS, are summarised in **Table 19-4** together with an indication of the section of this chapter where each is addressed.

29. A review of the NPS identified that both NPS for Energy (EN-1) and NPS for Renewable Energy Infrastructure (EN-3) are relevant to Geology and Land Quality. NPS for Electricity Networks Infrastructure (EN-5) has not been included in the below table as it is not deemed to be relevant to this chapter.

Table 19-4 NPS Assessment Requirements

NPS Requirement	NPS Reference	ES Section Reference
EN-1 NPS for Energy		
In the 25 Year Environment Plan, the government set out its vision for a quarter of-a-century action to help the natural work regain and retain good health. A commitment to review the plan every 5 years was set into law in the Environment Act 2021. The Environmental Improvement Plan was published in 2023, which reinforces the intent of the 25 Year Environment Plan and sets out a plan to deliver on its framework and vision. The government's policy for biodiversity in England is set out in the Environmental Improvement Plan 2023, the National Pollinator Strategy and the UK Marine Strategy. The aim is to halt overall biodiversity loss in England by 2030 and then reverse loss by 2042, support healthy well-functioning ecosystems and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people. This aim needs to be viewed in the context of the challenge presented by climate change. Healthy, naturally functioning ecosystems and coherent ecological networks will be more resilient and adaptable to climate change effects.	Paragraph 5.4.2	Geological designated sites and impacts relating to climate change are discussed in **Table 19-11** and section 19.5.2 respectively. A review of geologically designated sites, within the Onshore Development Area has been undertaken as part of the preparation of this chapter (**Table 19-11**, see also **Volume 7**, **Figure 19-3 (application ref: 7.19.1)**). As there are no internationally or nationally geological designated sites located within the Onshore Development Area it is not considered necessary to undertake a Geodiversity Management Plan. Ecologically designated sites are also discussed in **Table 19-11**, with additional details in **Volume 7, Appendix 19-2 Geo-Environmental Desk Study and Preliminary Risk Assessment Report (application ref: 7.19.19.2))**. Potential impacts, and mitigation measures, to ecologically designated sites as a result of contamination are set out in sections 19.6.1.3 and 19.6.2.2. Further details on potential impacts to ecologically designated sites are

NPS Requirement	NPS Reference	ES Section Reference
Failure to address this challenge will result in significant adverse impact on biodiversity and the ecosystem services it provides.		discussed in **Volume 7, Chapter 18 Terrestrial Ecology and Ornithology (application ref: 7.18)**.
Many SSSIs are also designated as sites of international importance and will be protected accordingly. Those that are not, or those features of SSSIs not covered by an international designation, should be given a high degree of protection. Most National Nature Reserves are notified as SSSIs.	Paragraph 5.4.7	
Sites of regional and local biodiversity and geological interest, which include Regionally Important Geological Sites, Local Nature Reserves and Local Wildlife Sites, are areas of substantive nature conservation value and make an important contribution to ecological networks and nature's recovery. They can also provide wider benefits including public access (where agreed), climate mitigation and helping to tackle air pollution.	Paragraph 5.4.12	
Where the development is subject to EIA [Environmental Impact Assessment] the applicant should ensure that the ES [Environmental Statement] clearly sets out any effects on	Paragraph 5.4.17	

NPS Requirement	NPS Reference	ES Section Reference
internationally, nationally and locally designated sites of ecological or geological conservation importance (including those outside England), on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity, including irreplaceable habitats.		
The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests.	Paragraph 5.4.19	
To further minimise any adverse impacts on geodiversity, where appropriate applicants are encouraged to produce and implement a Geodiversity Management Strategy to preserve and enhance access to geological interest features, as part of relevant development proposals.	Paragraph 5.4.38	
As a general principle, and subject to the specific policies below, development should, in line with the mitigation hierarchy, aim to avoid significant harm to biodiversity and geological conservation interests, including through consideration of reasonable alternatives (as set out in Section 4.2 above). Where significant harm cannot be avoided, impacts should	Paragraph 5.4.42	

NPS Requirement	NPS Reference	ES Section Reference
be mitigated and as a last resort, appropriate compensation measures should be sought.		
In taking decisions, the Secretary of State should ensure that appropriate weight is attached to designated sites of international, national, and local importance; protected species; habitats and other species of principal importance for the conservation of biodiversity; and to biodiversity and geological interests within the wider environment.	Paragraph 5.4.48	
Development of land will affect soil resources, including physical loss of and damage to soil resources, through land contamination and structural damage. Indirect impacts may also arise from changes in the local water regime, organic matter content, soil biodiversity and soil process.	Paragraph 5.11.4	The baseline environment in relation to agricultural land is discussed in **Table 19-11**. Potential impacts, and mitigation measures, in relation to contamination that may occur during construction and operation are discussed in sections 19.6.1.6 and 19.6.2.6. Impacts associated with potential loss of agricultural land and disruption to farming practices are discussed in **Volume 7, Chapter 21 Land Use (application ref: 7.21)**.
Where pre-existing land contamination is being considered within a development, the objective is to ensure that the site is suitable for its intended use. Risks would require consideration in accordance with the contaminated land statutory guidance as a minimum.	Paragraph 5.11.5	The existing ground conditions and potential sources of contamination are discussed in section 19.5, with further details provided in **Volume 7, Appendix 19-2 Geo-Environmental Desk Study and Preliminary Risk Assessment Report (application ref: 7.19.19.2)**.

NPS Requirement	NPS Reference	ES Section Reference
		An assessment of the potential impacts associated with the construction and operation of the Projects is provided in sections 19.6.1 and 19.6.2 respectively. Potential mitigation measures, for example targeted ground investigations in areas of concern, are also discussed within these sections.
Applicants should seek to minimise impacts on the best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification) and preferably use land in areas of poorer quality (grades 3b, 4 and 5).	Paragraph 5.11.12	The baseline environment in relation to agricultural land is discussed in **Table 19-11**. Potential impacts, and mitigation measures, in relation to contamination that may occur during construction and operation are discussed in sections 19.6.1.6 and 19.6.2.5. Impacts associated with potential loss of agricultural land and disruption to farming practices are discussed in **Volume 7, Chapter 21 Land Use (application ref: 7.21)**. Details of the Soil Management Plan (SMP), which will form part of the embedded mitigation measures for the Projects, is provided in **Table 19-3** and **Volume 7, Chapter 21 Land Use (application ref: 7.21)**.
Applicants are encouraged to develop and implement a Soil Management Plan which could help minimise potential land contamination. The sustainable reuse of soils needs to be carefully considered in line with good practice guidance where large quantities of soils are surplus to requirements or are affected by contamination.	Paragraph 5.11.14	
Developments should contribute to and enhance the natural and local environment by preventing new and existing developments from contributing to, being put at unacceptable risk from, or being	Paragraph 5.11.15	The existing ground conditions and potential sources of contamination are discussed in section 19.5.The baseline environment and assessment discussed within this chapter have been informed by the

NPS Requirement	NPS Reference	ES Section Reference
adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.		**Volume 7, Appendix 19-2 Geo-Environmental Desk Study and Preliminary Risk Assessment Report (application ref: 7.19.19.2))** which reviewed potential sources of contamination associated with the current and historical land uses within the study area. An assessment of the potential impacts associated with the construction and operation of the Projects is provided in sections 19.6.1 and 19.6.2 respectively. Potential mitigation measures, for example targeted ground investigations in areas of concern, are also discussed within these sections. Following completion of targeted ground investigations, if required, as part of a contaminated land and groundwater scheme (see section 19.6.1.1) a generic quantitative risk assessment will be undertaken to assess the potential risks to human health and controlled water receptors from the Projects. The assessment will also include recommendations for further works, including remediation, should they be deemed necessary.
Applicants should ensure that a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination.	Paragraph 5.11.17	
For developments on previously developed land, applicants should ensure that they have considered the risk posed by land contamination, and where contamination is present, applicants should consider opportunities for remediation where possible. It is important to do this as early as possible as part of engagement with the relevant bodies before the official pre-application stage.	Paragraph 5.11.18	
Applicants should safeguard any mineral resources on the proposed site as far as possible, taking into	Paragraph 5.11.19	Mineral Safeguarding Areas are discussed in **Table 19-11**. Potential impacts to these areas during

NPS Requirement	NPS Reference	ES Section Reference
account the long-term potential of the land use after any future decommissioning has taken place.		construction and operation are discussed in sections 19.6.1.4 and 19.6.2.3, respectively.
Where a proposed development has an impact upon a Mineral Safeguarding Area (MSA), the Secretary of State should ensure that appropriate mitigation measures have been put in place to safeguard mineral resources.	Paragraph 5.11.28	
NPS for Renewable Energy Infrastructure (EN-3)		
Applicants are encouraged to develop and implement a Soil Resources and Management Plan which could help to use and manage soils sustainably and minimise adverse impacts on soil health and potential land contamination. This should be in line with the ambition set out in the Environmental Improvement Plan to bring at least 40% of England's agricultural soils into sustainable management by 2028 and increase this up to 60% by 2030.	Paragraph 2.10.34	The baseline environment in relation to agricultural land is discussed in **Table 19-11**. Potential impacts, and mitigation measures, in relation to contamination that may occur during construction and operation are discussed in sections 19.6.1.6 and 19.6.2.5. Impacts associated with potential loss of agricultural land and disruption to farming practices are discussed in **Volume 7, Chapter 21 Land Use (application ref: 7.21)**. Details of the SMP, which will form part of the embedded mitigation measures for the Projects, is provided in **Table 19-3** and **Volume 7, Chapter 21 Land Use (application ref: 7.21)**.

19.4.1.2 Other

30. In addition to the NPS, there are a number of pieces of legislation, policy and guidance applicable to the assessment of Geology and Land Quality. These include:

19.4.1.2.1 National Planning Policy Framework

31. The specific assessment requirements for Geology and Land Quality, as detailed in the National Planning Policy Framework Guidance (NPPF) (Department for Levelling Up, Housing and Communities, 2023) are detailed in **Table 19-5**.

Table 19-5 National Planning Policy Framework Guidance Relevant to Geology and Land Quality

NPPF Requirements	NPPF Reference	ES Reference
Planning policies and decisions should contribute to and enhance the natural and local environment by: a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan); b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland; c) maintaining the character of the undeveloped coast, while improving public access to it where appropriate; d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures; e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise	NPPF 15-180	In relation to Geology and Land Quality, the existing environment is discussed in section 19.5, with further details provided in **Volume 7, Appendix 19-1 (application ref: 7.19.19.1)**. Potential impacts and mitigation measures aimed at minimising the potential impacts on identified receptors, including remediation are set out in **Table 19-3** and sections 19.6.1 and 19.6.2. Potential impacts in relation to air, water, biodiversity and noise are discussed in: • **Volume 7, Chapter 18 Terrestrial Ecology and Ornithology (application ref: 7.18)**; • **Volume 7, Chapter 20 Flood Risk and Hydrology (application ref: 7.20)**; • **Volume 7, Chapter 21 Land Use (application ref: 7.21)**; • **Volume 7, Chapter 25 Noise (application ref: 7.25)**; and

NPPF Requirements	NPPF Reference	ES Reference
pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.		• **Volume 7, Chapter 26 Air Quality (application ref: 7.26)**.
Planning policies and decisions should ensure that: a) a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation); b) after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and	NPFF 15-189	The existing ground conditions and potential sources of contamination are discussed in section 19.5, with further details provided in **Volume 7, Appendix 19-2 Geo-Environmental Desk Study and Preliminary Risk Assessment Report (application ref: 7.19.19.2)**. Potential impacts and mitigation measures (including ground investigation works) are set out in **Table 19-3** and sections 19.6.1 and 19.6.2. Pre-consent ground investigations are currently ongoing. Following the completion of the targeted ground investigations, a generic quantitative risk assessment will be undertaken. Based on that risk assessment appropriate working methods would

NPPF Requirements	NPPF Reference	ES Reference
c) adequate site investigation information, prepared by a competent person, is available to inform these assessments.		be developed to avoid, minimise or mitigate impacts relating to the construction phase.
Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should: a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life; b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are	NPFF 15-190 and NPPF 15-191	The existing ground conditions and potential sources of contamination are discussed in section 19.5 with further details provided in **Volume 7, Appendix 19-2 Geo-Environmental Desk Study and Preliminary Risk Assessment Report (application ref: 7.19.19.2)**. An assessment of the potential impacts associated with the construction and operation of the Projects is provided in sections 19.6.1 and 19.6.2 respectively. Potential mitigation measures, for example targeted ground investigations in areas of concern, are also discussed within these sections. Potential interactions and inter-relationships between each of the identified impacts are discussed in sections 19.9 and 19.11 respectively.

NPPF Requirements	NPPF Reference	ES Reference
prized for their recreational and amenity value for this reason; and c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.		
The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.	NPPF 15-194	The existing environment is discussed in section 19.5, with further details provided in **Volume 7, Appendix 19-2 Geo-Environmental Desk Study and Preliminary Risk Assessment Report (application ref: 7.19.19.2)**. Potential impacts, and mitigation measures to reduce the significance of effect are discussed in **Table 19-3** and sections 19.6.1 and 19.6.2.
It is essential that there is a sufficient supply of minerals to provide the infrastructure, buildings, energy and goods that the country needs. Since minerals are a finite natural resource, and can only be worked where they are found, best use needs to be made of them to secure their long-term conservation.	NPPF 17-215 and NPFF 17-216	Mineral Safeguarding Areas are discussed in section 19.5, with further details provided in **Volume 7, Appendix 19-2 Geo-Environmental Desk Study and Preliminary Risk Assessment Report (application ref: 7.19.19.2)**. Potential impacts to these areas during the construction and operational phases of the Project are

NPPF Requirements	NPPF Reference	ES Reference
Planning policies should: c) safeguard mineral resources by defining Mineral Safeguarding Areas and Mineral Consultation Areas; and adopt appropriate policies so that known locations of specific minerals resources of local and national importance are not sterilised by non-mineral development where this should be avoided (whilst not creating a presumption that the resources defined will be worked); d) set out policies to encourage the prior extraction of minerals, where practical and environmentally feasible, if it is necessary for non-mineral development to take place.		discussed in sections 19.6.1.4 and 19.6.2.3 respectively.

19.4.1.2.2 East Riding of Yorkshire Council, East Riding Local Plan 2012 – 2029 (2016)

32. The East Riding Local Plan has been reviewed and the following policies and objectives are considered relevant to Geology and Land Quality.

33. Policy ENV4: Conserving and enhancing biodiversity and geodiversity states that:

"A. Proposals that are likely to have a significant effect on an International Site will be considered in the context of the statutory protection which is afforded to the site.

B. Proposals that are likely to have an adverse effect on a National Site (alone or in combination) will not normally be permitted, except where the benefits of development in that location clearly outweigh both the impact on the site and any broader impacts on the wider network of National Sites.

C. Development resulting in loss or significant harm to a Local Site, or habitats or species supported by Local Sites, whether directly or indirectly, will only be supported if it can be demonstrated there is a need for the development in that location and the benefit of the development outweighs the loss or harm.

D. Where loss or harm to a National or Local designated site, as set out in Table 9, cannot be prevented or adequately mitigated, as a last resort, compensation for the loss / harm must be agreed. Development will be refused if loss or significant harm cannot be prevented, adequately mitigated against or compensated for.

E. Proposals should further the aims of the East Riding of Yorkshire Biodiversity Action Plan (ERYBAP), designated Nature Improvement Areas (NIAs) and other landscape scale biodiversity initiatives. To optimise opportunities to enhance biodiversity, proposals should seek to achieve a net gain in biodiversity where possible and will be supported where they:

1. *Conserve, restore, enhance or recreate biodiversity and geological interests including the Priority Habitats and Species (identified in the ERYBAP) and Local Sites (identified in the Local Sites in the East Riding of Yorkshire).*
2. *Safeguard, enhance, create and connect habitat networks in order to:*
    - *i. protect, strengthen and reduce fragmentation of habitats;*
    - *ii. create a coherent ecological network that is resilient to current and future pressures;*
    - *iii. conserve and increase populations of species; and*
    - *iv. promote and enhance green infrastructure."*

34. Policy EC5: Supporting the energy sector states that:

"Proposals for the development of the energy sector, excluding wind energy but including the other types of development listed in Table 7, will be supported where any significant adverse impacts are addressed satisfactorily and the residual harm is outweighed by the wider benefits of the proposal. Developments and their associated infrastructure should be acceptable in terms of:

1. *The cumulative impact of the proposal with other existing and proposed energy sector developments;*
2. *The character and sensitivity of landscapes to accommodate energy development, with particular consideration to the identified Important Landscape Areas, as shown on Figure 11;*
3. *The effects of development on:*
    - i. *local amenity, including noise, air and water quality, traffic, vibration, dust and visual impact;*
    - ii. *biodiversity, geodiversity and nature, particularly in relation to designations, displacement, disturbance and collision and the impact emissions / contamination;*
    - iii. *the historic environment, including individual and groups of heritage assets above and below ground;*
    - iv. *telecommunications and other networks; including the need for additional cabling to connect to the National Grid, electromagnetic production and interference, and aeronautical impacts such as on radar systems;*
    - v. *transport, including the opportunity to use waterways and rail for transportation of materials and fuel, and the capacity of the road network to accommodate development;*
    - vi. *increasing the risk of flooding; and*
    - vii. *the land, including land stability, contamination and soil resources."*

35. Policy EC6: Protecting mineral resources states that:

"A. Mineral Safeguarding Areas for sand and gravel, crushed rock, limestone, industrial chalk, clay and silica sand are identified on the Policies Map.

B. Within or adjacent to Mineral Safeguarding Areas, non-mineral development, which would adversely affect the viability of exploiting the underlying or adjacent deposit in the future, will only be supported where it can be demonstrated that the:

1. *Underlying or adjacent mineral is of limited economic value;*

2. *Need for the development outweighs the need to safeguard the mineral deposit;*
3. *Non-mineral development can take place without preventing the mineral resource from being extracted in the future;*
4. *Non-mineral development is temporary in nature; or*
5. *Underlying or adjacent mineral deposit can be extracted prior to the non-mineral development proceeding, or prior extraction of the deposit is not possible."*

36. Policy ENV6: Managing environmental hazards states that:

"Environmental hazards, such as flood risk, coastal change, groundwater pollution and other forms of pollution, will be managed to ensure that development does not result in unacceptable consequences to its users, the wider community, and the environment."

And

"The risk of groundwater pollution will be managed by:

1. *Avoiding development that will increase the risk of pollution in Source Protection Zones (SPZ) and where this is not possible, ensuring that appropriate mitigation measures are employed;*
2. *Supporting developments which will decrease the risk of pollution in SPZs by cleaning up contaminated land and incorporating pollution-prevention measures;*
3. *Preventing inappropriate uses / activities in SPZ1 and SPZ2, unless adequate safeguards against possible contamination can be agreed;*
4. *Preventing non-mains drainage that would involve sewage, trade effluent or other contaminated discharges, as far as possible; and*
5. *Ensuring re-development of previously developed sites does not contaminate under-lying aquifers."*

19.4.1.2.3 East Riding of Yorkshire Council and Hull City Council, East Riding of Yorkshire and Kingston upon Hull Joint Minerals Local Plan 2016 – 2033 (2019)

37. The Joint Minerals Local Plan outlines the resources present within the East Riding of Yorkshire and Kingston upon Hull areas. In addition, the plan outlines the vision, approach, policies and allocations for both councils. The following Joint Minerals Local Plan Objective is relevant to this chapter:

"Help prevent the unnecessary sterilisation of sand and gravel, chalk, limestone, clay, silica sand and building and roofing stone mineral resources by non-mineral forms of development by refining the extent of Mineral Safeguarding Areas."

38. With regards to polices protecting Mineral Safeguarding Areas, the plan refers back to Policy EC6 of the East Riding of Yorkshire Council, East Riding Local Plan 2012 – 2029 (2016) discussed above (see paragraph 32). No additional safeguarding policies relating to non-mineral developments in safeguarded areas are included within the Joint Minerals Local Plan.

19.4.1.2.4 Environmental Protection Act 1990 (Part 2A): Contaminated Land Statutory Guidance

39. The Environmental Protection Act 1990 makes provision for the improved control of pollution arising from certain industrial and other processes. Section 78A of the Act provides the statutory definition of contaminated land:

"*Contaminated Land is any land which appears to the Local Authority in whose area it is situated to be in such a condition, by reasons of substances in, on or under land that:*

- *Significant harm is being caused or there is a significant possibility of such harm being caused; or*
- *Significant pollution of controlled waters is being caused, or there is a significant possibility of such pollution being caused*".

40. The Act also provides the regulatory basis for the identification, designation and remediation of contaminated land. The Onshore Development Area could be located on land potentially affected by contamination. This requires assessment to ensure that the land is suitable for use prior to and following the construction of the Projects and that the land cannot be determined as contaminated land under Part 2A of the Act.

19.4.1.2.5 Environmental Permitting (England and Wales) Regulations 2016

41. The 2016 Regulations set out an environmental permitting and compliance regime that applies to various activities and industries. The environmental permitting regime is a common framework for applying for, receiving, varying or transferring and surrendering permits, along with compliance, enforcement and appeals arrangements. It rationalises the previous permitting and compliance regimes into a common framework that is easier to understand and simpler to use. The framework introduces different levels of control, based on risk:

- Exclusions (lower risk activities which may be undertaken without any permit);
- Standard rules permit (standard requirements and conditions for the relevant activities are set out so applicants can determine in advance where the permit is applicable to their proposals); and

- Bespoke permits (permits written specifically for activities which are unique or higher risk).

42. These regulation are relevant to Geology and Land Quality as there may be the need to apply for environmental permits for activities such as discharging groundwater from dewatering activities during construction works (see **Other Consents and Licences (Volume 8, application ref: 8.3)**).

19.4.1.2.6 Water Environment (Water Framework Directive) (England and Wales) Regulations 2017

43. The aim of the directive, which is informed by Directive 2000/60/EC, is for all waterbodies to achieve Good Status by 2027 (which is comprised of scoring of both Ecological and Chemical Status) and to ensure no deterioration from current status. This legislation is relevant to Geology and Land Quality as it will assist in determining the sensitivity of water bodies within the Onshore Development Area. Water quality is assessed in **Volume 7, Chapter 20 Flood Risk and Hydrology (application ref: 7.20)**, which is informed by **Volume 7, Appendix 20-3 Water Environment Regulations (WER) Compliance Assessment (application ref: 7.20.20.3)**.

44. Following the UK's withdrawal from the European Union the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 remain in force under the Floods and Water (Amendments etc) (EU Exit) Regulations 2019.

19.4.1.2.7 Groundwater (Water Framework Directive) (England) Direction 2016

45. The aim of the direction, which is informed by Directive 2006/118/EC, is to set out instructions and obligations for the Environment Agency to protect groundwater, including monitoring and setting threshold values for both existing and new pollutants in groundwater. This legislation is relevant to Geology and Land Quality as it will assist in determining the sensitivity of groundwater resources within the Onshore Development Area.

19.4.1.2.8 The Water Resources Act 1991

46. The Act provides the definition of and regulatory controls for the protection of water resources including the quality standards expected for controlled waters. This legislation is relevant to Geology and Land Quality as it will assist in determining the sensitivity of controlled waters within the Onshore Development Area, particularly when assessing the effects during construction and operational phases.

19.4.1.2.9 Environment Act 1995

47. The Act established the Environment Agency and gave it responsibility for environmental protection of controlled waters. This legislation is relevant to Geology and Land Quality as it provides the principles to assess the sensitivity and potential effects of the construction and operational phases of the Projects. It will also aid in the identification of suitable mitigation measures to provide protection to the controlled waters present.

19.4.1.2.10 Environmental Damage (Prevention and Remediation) (England) Regulations 2015

48. The regulations transpose for England the EU Directive 2004/35/EC on environmental liability with regards to the prevention and remedying of environmental damage. This legislation is relevant to Geology and Land Quality as it will aid in the identification of suitable preventative measures and mitigation techniques for the construction and operational phases of the Projects.

19.4.1.2.11 Construction (Design and Management) Regulations 2015

49. The regulations are the main set of regulations used to manage the health, safety and welfare of construction projects. The legislation is relevant to Geology and Land Quality as it ensures the safety of human receptors involved in the construction phase.

19.4.1.2.12 Land Contamination Risk Management Framework 2023

50. The Environment Agency guidance provides an update to the former Environment Agency Model Procedures for the Management of Land Contamination, Contaminated Land Report 11 (CLR11). The guidance aims to help those assessing potentially contaminated sites to identify and assess the risks posed to sensitive receptors from potentially contaminated sites, make appropriate decisions in relation to the outcome of the assessment and identify the required actions necessary e.g., implement remediation if deemed necessary.

19.4.1.2.13 Guiding Principles for Contaminated Land

51. The Guiding Principles for Contaminated Land (GPCL) comprise three documents produced by the Environment Agency. The documents include GPCL 1 – Introduction, GPCL 2 – Frequently Asked Questions, technical information, detailed advice and references, and GPCL 3 – reporting checklist. The aims of these documents are to provide guidance to those who are involved with contaminated land, encourage good practice, promote compliance with regulatory requirements and to provide reference to applicable guidance.

19.4.1.2.14 The Environment Agency's Approach to Groundwater Protection Position Statements 2018 (under review)

52. These position statements provide information relating to the Environment Agency's approach to managing and protecting groundwater. They detail how the Environment Agency delivers government policy for groundwater and adopts a risk-based approach where legislation allows. The primary aim of all of the position statements is the prevention of pollution of groundwater and protection of it as a resource.

19.4.1.2.15 Highways England LA 104 Environmental Assessment and Monitoring

53. This guidance sets out the requirements and processes that should be followed when assessing the environmental impacts of a project. It also provides a steer as to which policies and legislation should be referred to for each stage of the EIA process. This guidance aids in determining the sensitivity and magnitude bandings for receptors, including those relevant to Geology and Land Quality, along with highlighting the need to include an assessment on geology and soils within an EIA.

19.4.1.2.16 Minerals Policy Statement 1: Planning and Minerals (MPS1)

54. MPS1 aims to secure adequate and steady supplies of the minerals needed by society and the economy. This publication has been withdrawn; however, it is still deemed relevant in the context of this assessment in the absence of any replacement guidance.

19.4.2 Data and Information Sources

19.4.2.1 Site Specific Surveys

55. Ground investigation data from within the Onshore Development Area has been used to inform the PRA (**Volume 7, Appendix 19-2 Geo-Environmental Desk Study and Preliminary Risk Assessment Report (application ref: 7.19.19.2)**) and the impact assessment presented in this chapter, where a potential consenting risk was identified i.e. where in close proximity to a registered landfill site. However, for the majority of the Onshore Development Area the assessment is based entirely on publicly available information. The assessments therefore adopt a precautionary approach i.e., if a potential pollutant linkage has been identified it is assumed to be present until further site-specific information is available to clarify whether the linkage exists.

19.4.2.2 Other Available Sources

56. In order to provide site specific and up to date information on which to base the impact assessment, a site characterisation study was conducted which consisted of reviewing available desk-based information related to Geology and Land Quality. The assessment is provided in the PRA (**Volume 7, Appendix 19-2 Geo-Environmental Desk Study and Preliminary Risk Assessment Report (application ref: 7.19.19.2)**). The PRA provides an assessment of ground conditions for the Projects and follows a risk-based approach including consideration of potential sources, pathways and receptors to identify potential pollutant linkages that may result in unacceptable risks to receptors from ground contamination.

57. The data sources used to inform the PRA are listed in **Table 19-6**.

Table 19-6 Available Data and Information Sources

Data Set	Spatial Coverage	Year	Notes
Envirocheck™ GIS data	Whole Onshore Development Area plus buffers as described in section 19.3.1.	2022 and 2023	Comprises historical maps, surface water features, trade directory and regulatory information, environmental sensitivity data, coal mining records and permitting records.
British Geological Survey (BGS) Geoindex web portal	England, Scotland and Wales	2024	Solid geology, superficial geology, borehole records and mineral extraction sites, radon gas risk.
BGS Geological Maps	Flamborough and Bridlington	1985	Solid and drift map, Sheet number 55 and 65. Scale 1:50,000.
	Beverley	1995	Solid and drift map, Sheet number 72. Scale 1:50,000.

Data Set	Spatial Coverage	Year	Notes
	Hornsea	1998	Solid and drift map, Sheet number 73. Scale 1:50,000.
BGS Hydrogeological Map	East Yorkshire	1980	Sheet number 10, Scale 1:100,000,
Google Earth	Global	2024	N/A
Multi Agency Government Information for the Countryside (MAGIC) map application	England, Scotland and Wales	2024	Aquifer designations and groundwater SPZs.
UK Health and Security Agency UK maps of Radon	UK	2024	N/A
Zetica UXO Unexploded Bomb (UXB) Risk Map	England, Scotland and Wales	2023	N/A

19.4.3 Impact Assessment Methodology

58. **Volume 7, Chapter 6 EIA Methodology (application ref: 7.6)** provides a summary of the general impact assessment methodology applied. The following sections describe the methods used to assess the likely significant effects on Geology and Land Quality.

19.4.3.1 Definitions

59. For each potential impact, the assessment identifies receptors sensitive to that impact and implements a systematic approach to understanding the impact pathways and the level of impacts (i.e. magnitude) on given receptors. The definitions of sensitivity and magnitude for the purpose of the Geology and Land Quality assessment are provided in **Table 19-7** and **Table 19-8**.

60. Receptor sensitivity has been defined with reference to the adaptability, tolerance, recoverability and value of individual receptors. **Table 19-7** provides an example of the likely criteria for appraisal of sensitivity for identified Geology and Land Quality receptors based on professional judgement with reference to section 19.4.1.

61. Receptor sensitivity considers, for example, whether the receptor:

- Is rare;
- Has protected or threatened status;
- Has importance at a local, regional or national scale; or
- Has a key role in ecosystem function (in the case of biological receptors).

62. Generic receptor sensitivity examples based on the above criteria are presented below in **Table 19-7**.

Table 19-7 Definition of Sensitivity for a Geology and Land Quality Receptor

Sensitivity	Definition
High – has very limited or no capacity to accommodate physical or chemical changes.	**General** • Receptor is internationally or nationally important / rare with limited potential.
	Land quality – human health • Construction workers involved in below ground construction works / ground breaking activities; • Public and local residents / children (on and offsite within 50m); and • Future end users (residential or allotment end use).
	Land quality – controlled waters and ecology • Groundwater source protection zones (SPZ) 1; • Public water supplies / licensed surface water and groundwater abstractions for potable use; • Private water supplies for potable use automatic 50m SPZ 1 applied (on and off-site within 50m); • Supports habitats or species that are highly sensitive to change in surface hydrology or water quality; and • Surface and groundwaters supporting internationally designated sites (e.g. Special Protection Areas (SPA) or Ramsar sites).

Sensitivity	Definition
	Land quality – geological sites and mineral resources • Mineral Safeguarding Area (MSA) or Mineral Consultation Areas (MCA) – nationally important resource; and • Designated geological sites of international importance.
	Built environment • Sites of international importance, World Heritage Sites and Scheduled Monuments (off site within 250m).
	Agricultural land • Land at Agricultural Land Classification (ALC) Grade 1, 2 or 3a* (agricultural land designated as Best and Most Versatile (BMV)).
Medium – has limited capacity to accommodate physical or chemical changes.	**General** • Receptor is regionally important / rare with limited potential for offsetting / compensation.
	Land quality – human health • Future end users (commercial / industrial end use / open space / farmers and workers on agricultural land); • Public and local residents / children (off-site at distances >50m but <250m); • Commercial / industrial workers (off-site within 50m); and • Construction workers (above ground).
	Land quality – controlled waters and ecology • Groundwater SPZ 2 and SPZ 3; • Principal Aquifers; • Secondary A and B Aquifers with private potable groundwater abstractions; • Private water supplies for potable groundwater abstraction (off-site within 250m); and • Surface and groundwaters supporting nationally designated sites (SSSI).

Sensitivity	Definition
	Land quality – geological sites and mineral resources • MSA or MCA – regionally important resources; and • Designated geological site of national importance e.g. SSSI (i.e. Regionally Important Geological Sites (RIGS)).
	Built environment • Commercial or residential buildings (off site within 250m).
	Agricultural land • Land at ALC Grade 3b (non-BMV land).
Low – has moderate capacity to accommodate physical or chemical changes.	**General** • Receptor is locally important / rare.
	Land quality – human health • Future end users (transport end use such as car parks or highways); • Public and local residents / children (off-site >250m); and • Commercial / industrial workers (off-site at distances >50m but <250m).
	Land quality – controlled waters and ecology • Secondary A and B Aquifers without groundwater abstractions; and • Groundwater or surface waters supporting locally important sites (e.g. Local Nature Reserves LNR).
	Land quality – geological sites and mineral resources • Geological site of local importance e.g. quarry face; • Adjacent to a MSA or MCA; and • Low economically viable mineral resource.
	Built environment • Car parks, highways, transport infrastructure and utilities (off site within 250m).
	Agricultural land • Land at ALC Grade 4 (non-BMV land).
Negligible – is generally tolerant of	**General** • Receptor is not considered to be particularly important / rare.

Sensitivity	Definition
physical or chemical changes.	**Land quality – human health** • Commercial / industrial workers (off-site >250m).
	Land quality – controlled waters and ecology • Unproductive strata; and • Supports or contributes to habitats that are not sensitive to changes in surface hydrology or water quality.
	Land quality – geological sites and mineral resources • No designated geological sites; and • No economically viable minerals.
	Built environment • Locally important roads and footpaths (off site within 250m).
	Agricultural land • Land at ALC Grade 5 (non-BMV land)
*ALC Grade 3 land can be subdivided into Grade 3a, which is considered good quality agricultural land, and Grade 3b which is considered to be of moderate quality. National datasets no longer subdivide Grade 3 land, as such all Grade 3 land is considered of high sensitivity.	

63. The magnitude of potential impacts are assessed qualitatively, according to the criteria set out in **Table 19-8**.

64. For impacts related to human health, magnitude reflects the likely increase or decrease in exposure risk for a receptor. For controlled waters, magnitude represents the likely impact an activity would have on resource availability or value, at the receptor. Magnitude is therefore affected by the distance connectivity between an impact source and the receptor.

Table 19-8 Definition of Magnitude of Impacts

Magnitude	Definition
High – permanent or large-scale change affecting usability, risk or value over a wide area, or certain	**Land quality – human health** • Permanent or major change to existing risk exposure (adverse / beneficial); • Unacceptable risks / severe harm to one or more receptors with a long-term or permanent effect (adverse); or

Magnitude	Definition
to affect regulatory compliance.	• Remediation and complete source removal (beneficial).
	Land quality – controlled waters • Permanent, long-term or wide scale effects on water quality or availability (adverse / beneficial); • Permanent loss or long-term derogation of a water supply source resulting in prosecution (adverse); • Change in Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (WER) water body status / potential or its ability to achieve WER objectives in the future (adverse / beneficial); • Permanent habitat creation or complete loss (adverse / beneficial); or • Measurable habitat changes that are sustainable / recoverable over the long-term (adverse / beneficial).
	Land quality – geological sites and mineral resources • Complete loss of designated sites; or • Complete sterilisation of mineral resources.
	Built environment • Catastrophic damage to buildings or structures.
	Agricultural land • Permanent or major change to existing ALC grade as a result of contamination.
Medium reversible change affecting usability, value, or risk over the medium-term or local area: possibly.	**Land quality – human health** • Medium-term or moderate change to existing risk of exposure (adverse / beneficial); or • Unacceptable risks to one or more of the receptors with a medium-term effect (adverse).

Magnitude	Definition
affecting regulatory compliance.	**Land quality – controlled waters** • Medium-term or local scale effects on water quality or availability (adverse / beneficial); • Medium-term derogation of a water supply source, possibly resulting in prosecution (adverse); • Observable habitat changes that are sustainable / recoverable over the medium-term (adverse / beneficial); or • Temporary change in status / potential of a WER water body or its ability to meet objectives (adverse / beneficial).
	Land quality – geological sites and mineral resources • Partial loss of designated geological sites; or • Medium-term or local scale loss of mineral resources.
	Built environment • Damage to buildings or structures.
	Agricultural land • Medium-term or local scale effects on ALC grade as a result of contamination.
Low – temporary change affecting usability, risk, or value over the short-term or within the study area; measurable permanent change with minimal effect, usability, risk, or value; no effect on regulatory compliance.	**Land quality – human health** • Short-term temporary or minor change to existing risk exposure (adverse / beneficial); or • Unacceptable risks to one or more receptors with a short-term effect (adverse).
	Land quality – controlled waters • Short-term or very localised effects on water quality or availability (adverse / beneficial); • Short-term derogation of a water supply source (adverse); • Measurable permanent effects on a water supply source that does not impact on its operations (adverse); • Observable habitat changes that are sustainable / recoverable over the short-term (adverse / beneficial); or • No change in status / potential of a WER water body or its ability to meet objectives (neutral).

Magnitude	Definition
	Land quality – geological sites and mineral resources • Temporary change in status of designated geological sites; or • Short-term or very localised effects on mineral resources.
	Built environment • Easily repairable damage to buildings or structures.
	Agricultural land • Short-term or very localised effects on ALC grade as a result of contamination.
Negligible – minor permanent or temporary change, indiscernible over the medium to long-term. Short-term, with no effect on usability.	**Land quality – human health** • Negligible change to existing risk exposure; or • Activity is unlikely to result in unacceptable risks to receptors (neutral).
	Land quality – controlled waters • Very minor or intermittent impact on local water quality or availability (adverse / beneficial); • Usability of a water supply source will be unaffected (neutral); • Very slight local changes that have no observable impact on dependent receptors (neutral); or • No change in status / potential of a WER water body or its ability to meet objectives (neutral).
	Land quality – geological sites and mineral resources • No change in status of designated geological site; or • Very minor impact on mineral resources.
	Built environment • Very slight, non-structural damage or cosmetic harm to buildings or structures.
	Agricultural land • Very minor effect on ALC grade as a result of contamination.

19.4.3.2 Significance of Effect

65. The assessment of significance of an effect is informed by the sensitivity of the receptor and the magnitude of the impact. The determination of significance is guided by the use of an impact significance matrix presented in **Volume 7, Chapter 6 EIA Methodology (application ref: 7.6** and **Table 19-9**. Definitions of each level of significance are provided in **Table 19-10**..

66. For the purposes of this assessment, any effect that is of major or moderate significance is considered to be significant in EIA terms, whether this be adverse or beneficial. Any effect that has a significance of minor or negligible is not significant.

Table 19-9 Geology and Land Quality Significance of Effect Matrix

		Adverse Magnitude				Beneficial Magnitude			
		High	**Medium**	**Low**	**Negligible**	**Negligible**	**Low**	**Medium**	**High**
Sensitivity	High	Major	Major	Moderate	Minor	Minor	Moderate	Major	Major
	Medium	Major	Moderate	Minor	Minor	Minor	Minor	Moderate	Major
	Low	Moderate	Minor	Minor	Negligible	Negligible	Minor	Minor	Moderate
	Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

Table 19-10 Definition of Effect Significance

Significance	Definition
Major	Very large or large change in receptor condition, which is likely to be important considerations at a regional or district level because they contribute to achieving national, regional or local objectives, or could result in exceedance of statutory objectives and / or breaches of legislation.
Moderate	Intermediate change in receptor condition, which is likely to be important considerations at a local level.
Minor	Small change in receptor condition, which may be raised as local issues but are unlikely to be important in the decision making process.
Negligible	No discernible change in receptor condition.
No change	No impact, therefore, no change in receptor condition.

19.4.4 Cumulative Effect Assessment Methodology

67. The cumulative effect assessment (CEA) considers other schemes, plans, projects and activities that may result in significant effects in cumulation with the Projects. **Volume 7, Chapter 6 EIA Methodology (application ref: 7.6)** (and accompanying **Volume 7, Appendix 6-1 (application ref: 7.6.6.1)**) provides further details of the general framework and approach to the CEA.

19.4.5 Assumptions and Limitations

68. The desk-based PRA (**Volume 7, Appendix 19-2 Geo-Environmental Desk Study and Preliminary Risk Assessment Report (application ref: 7.19.19.2)**) is based on a range of information, including both publicly available data and data requested from the Environment Agency and East Riding of Yorkshire Council. Ground investigation data from within the Onshore Development Area has been used to inform the PRA and the impact assessment presented in this chapter, where a potential consenting risk was identified i.e. where in close proximity to a registered landfill site. However, for the majority of the Onshore Development Area the assessment is based entirely on publicly available information. The assessments therefore adopt a precautionary approach i.e., if a potential pollutant linkage has been identified it is assumed to be present until further site-specific information is available to clarify whether the linkage exists.

19.5 Existing Environment

19.5.1 Baseline Environment

69. A summary of the baseline environment for the Onshore Development Area is provided in **Table 19-11**, with potential sources of contamination set out in **Table 19-12**. Full details are provided within **Volume 7, Appendix 19-2 Geo-Environmental Desk Study and Preliminary Risk Assessment Report (application ref: 7.19.19.2)).**

Table 19-11 Summary of Baseline Environment

Parameter	Landfall	Onshore Export Cable Corridor	Onshore Substation Zone
Geology (as illustrated on **Volume 7, Figure 19-6 (application ref: 7.19.1)**)	Although not identified on British Geological Survey (BGS) mapping, localised areas of Made Ground associated with historical land uses may be present within the Onshore Development Area. Superficial deposits are present throughout the Onshore Development Area, with the exception of a small area (approximately 0.7ha) in the western part of the Onshore Substation Zone.		
	Lacustrine Deposits: not present.	Lacustrine Deposits: isolated pockets.	Lacustrine Deposits: not present.
	Alluvium: isolated pockets.		
	Head Deposits: not present.	Head Deposits: not present.	Head Deposits: located to the southern end.
	Glaciofluvial Deposits: isolated pockets.		Glaciofluvial Deposits: not present.
	Glacial Till Deposits: present throughout the Onshore Development Area.		
	Sand and Gravel Deposits: not present.	Sand and Gravel Deposits: isolated pockets.	Sand and Gravel Deposits: not present.
	Rowe Chalk Formation: present.	Rowe Chalk Formation: present from boundary with landfall to the settlement of Dunnington.	Rowe Chalk Formation: not present.
	Flamborough Chalk Recorded on BGS geological cross sections as underlying the Rowe Chalk Formation.	Flamborough Chalk Formation: present - recorded on BGS geological cross sections as underlying the Rowe Chalk Formation (where present).	Flamborough Chalk Formation: present.
	Burnham Chalk Formation: Recorded on BGS geological cross sections as underlying the Flamborough Chalk Formation.	Burnham Chalk Formation: Recorded on BGS geological cross sections as underlying the Flamborough Chalk Formation.	Burnham Chalk Formation: present – recorded on BGS geological cross sections as underlying the Flamborough Chalk Formation.

Parameter	Landfall	Onshore Export Cable Corridor	Onshore Substation Zone
	No recorded linear features or faults at landfall.	Landform – back feature marking former coastline (Ipswichian age) located between Ings Road and Driffield Road within the Onshore Export Cable Corridor running in a north south orientation. Fault - a fault with an east west orientation bisects the southern reaches of the Onshore Export Cable Corridor and Onshore Substation Zone. The fault appears to correlate with the boundary between the Flamborough Chalk Formation and Burnham Chalk Formation.	
Hydrogeology (as illustrated on **Volume 7, Figure 19-8 (application ref: 7.19.1)**)	Secondary A Aquifers: Alluvium, Glaciofluvial Deposits (both high vulnerability) and Sand and Gravel (medium vulnerability). Secondary B Aquifer (high vulnerability): Lacustrine Deposits. Secondary Undifferentiated Aquifers (medium vulnerability): Head and Glacial Till. Principal Aquifers (low to high vulnerability): Rowe Chalk Formation, Flamborough Chalk Formation and Burnham Chalk Formation. The Onshore Export Cable Corridor to the west of Whitecross Road (A165) through to Newbald Road is located within an SPZ 3 Total Catchment. The Onshore Export Cable Corridor to the south of Newbald Road, and the Onshore Substation Zone (up to the area surrounding Park Lane) are located within an SPZ 2 Outer Catchment. The area of the Onshore Export Cable Corridor 200m southwards of the intersection of Park Lane and the A1079 is designated as an SPZ 1 Inner Catchment **(Volume 7, Figure 19-8 (application ref: 7.19.1)**). The Hull and East Riding Chalk WER groundwater body is present beneath the entirety of the Onshore Development Area. There are no recorded private East Riding of Yorkshire Council registered or public Environment Agency licensed groundwater abstractions located within the Onshore Development Area. There are however, seven active Environment Agency licensed and 18 private East Riding of Yorkshire Council registered abstractions located within 1km of the Onshore Development Area. Four of the active Environment Agency licensed abstractions and 16 private East Riding of Yorkshire Council registered abstractions are recorded as potable abstractions (**Volume 7, Figure 19-8 (application ref: 7.19.1) and Volume 7, Appendix 21-1 Land Quality Consultation Responses (application ref: 7.21.21.1)**). Not all records indicate which strata the groundwater is abstracted from, however where the information is recorded it indicates that the groundwater is abstracted from within the bedrock geology.		
Hydrology and surface drainage (as illustrated on **Volume 7, Figure 19-8 (application ref: 7.19.1)**) with additional details on the hydrology of the Onshore Development Area are provided in **Volume 7, Chapter 20 Flood Risk and Hydrology (application ref: 7.20)**).	Streams and ditches associated with agriculture are present at landfall, however, there are no named features that have been identified. Additional surface water features, including the North Sea, are located within 250m of landfall. The following WER surface water body catchments are present at landfall: • Coastal Catchment (name not recorded); and • Barmston Sea Drain / Skipsea Drain to Conf. The following WER surface water bodies are located at landfall: • Yorkshire South.	Streams and ditches associated with agriculture are present throughout the Onshore Export Cable Corridor. Named features include: • Stream Dike; • Monk Dike; • Meaux and Routh East Drain; • Foredyke Stream Upper; • Holderness Drain; • River Hull;	Streams and ditches associated with agriculture are present throughout the Onshore Substation Zone however, there are no named features that have been identified. Additional surface water features are located within 250m of the Onshore Substation Zone. The following WER surface water body catchments are

Parameter	Landfall	Onshore Export Cable Corridor	Onshore Substation Zone
		• Beverley and Bramston Drain; • High Hunsley to Arram Area; and • Catchwater Drain. Additional surface water features are located within 250m of the Onshore Export Cable Corridor. The following WER surface water body catchments are present within the Onshore Export Cable Corridor: • Barmston Sea Drain / Skipsea Drain to Conf*; • Old Howe / Frodingham Beck to R Hull; • Mickley Dike Catchment; • Catchwater Drain; • Foredyke Stream Upper*; • Foredyke Stream Lower to Holderness Dr*; • Holderness Drain Source to Foredyke Stream; • Beverley and Barmston Drain*; • High Hunsley to Arram Area*; and • High Hunsley to Woodmansey Area*. Hull from Arram Beck to Humber, a WER surface water body, is also located within the Onshore Export Cable Corridor. *also WER surface water body.	present within the Onshore Substation Zone: • High Hunsley to Woodmansey Area (also WER surface water body).
Surface water abstractions	There are no surface water abstractions located within the Onshore Development Area. There are three surface water abstractions located within 1km of the Onshore Development Area. All abstractions are used for the purposes of direct spray irrigation.		

Parameter	Landfall	Onshore Export Cable Corridor	Onshore Substation Zone
Sensitive land uses (as illustrated on **Volume 7, Figure 19-3 (application ref: 7.19.1)**)	The following sensitive land uses are located at landfall: • Greater Wash – SPA designated due to its habitat features and species of interest; • Barmston Sea Drain from Skipsea Drain to N Sea Nitrate Vulnerable Zone (NVZ); and • Priority habitat inventory – marine cliff and slope habitat. These features are also present within 250m of landfall.	The following sensitive land uses are located within the Onshore Export Cable Corridor: • Barmston Sea Drain from Skipsea Drain to N Sea Nitrate Vulnerable Zone (NVZ); • River Hull from Arram Beck to Humber NVZ; • Holderness Drain from Fordyke Stream to Humber NVZ; • Yorkshire Chalk NVZ; • SSSI impact risk zones; • Priority habitat inventory – deciduous woodland, traditional orchard, coastal and floodplain grazing marsh. In addition to the features discussed above, which are also present within 250m of the Onshore Export Cable Corridor, features including Burton Bushes SSSI**, designated ancient woodland, listed buildings and scheduled ancient monuments are also located within 250m of the Onshore Export Cable Corridor.	The following sensitive land uses are located within the Onshore Substation Zone: • Designated ancient woodland (unnamed); • River Hull from Arram Beck to Humber NVZ; • Yorkshire Chalk NVZ; and • Priority habitat inventory – deciduous woodland. In addition to the features discussed above, which are also present within 250m of the Onshore Substation Zone, scheduled ancient monuments are present within 250m.

Parameter	Landfall	Onshore Export Cable Corridor	Onshore Substation Zone
Mineral Safeguarding Areas (as illustrated on **Volume 7, Figure 19-7 (application ref: 7.19.1)**)	Land within the Onshore Development Area is designated as being located within a MSA. The minerals associated with the designations are sands and gravels (throughout the Onshore Development Area) and chalk (Onshore Substation Zone). The safeguarded areas are not present as continuous features, but as localised areas throughout landfall, Onshore Export Cable Corridor and Onshore Substation Zone **(Volume 7, Figure 19-7 (application ref: 7.19.1)**). The total area of MSAs within the Onshore Development Area is approximately 32ha (30ha within the Onshore Export Cable Corridor and 2ha within the Substation zone, which represents approximately 0.03% and 0.002% respectively of the total MSA within the ERYC boundary). Preferred Area Sand and Gravel are located within the Onshore Export Cable Corridor between Riston Road and A165, Catwick and is identified within the East Riding of Yorkshire and Kingston upon Hull Joint Minerals Local Plan 2016 – 2033 (East Riding of Yorkshire Council and Hull City Council, 2019) area as SG-A which covers 130 ha and is identified as containing 3,000,000 tonnes of extractable deposits. A Preferred Area is where resources are known to exist and where planning permission might reasonably be anticipated. The Onshore Export Cable Corridor which overlaps SG-A is 2.77 ha (potentially containing 63,923 tonnes) which is 2.13% of the total extractable deposits in SG-A, the access road is 0.96 ha (potentially containing 22,154 tonnes) which is 0.74% of the total extractable deposit in SG-A and an area that would potentially be sterilised from mineral extraction during construction and operation is 2.54 ha (potentially containing 58,615 tonnes) which is 1.95% of the total extractable deposit in SG-A. This area is the small triangle of land to the south of the Onshore Export Cable Corridor, as shown on **Figure 19-7b (application ref: 7.19.1)**. If an average depth is calculated based on the sand and gravel having a density of 1.5 – 2.5 then the extractable deposit would be between 0.92 – 1.54m depth (not accounting for topsoil or subsoil coverage). In the wider EYRC it is identified that there are four further preferred areas SG-B to SG-E, inclusive which cover a total area of approximately 88.3 hectares with an extractable quantity of approximately 4,930,000 tonnes. In context across all five preferred areas the Onshore Export Cable Corridor covers 1.27% of the total area which amounts to 0.81% of the total extractable deposit, the access road covers 0.44% of the total area which amounts to 0.28% of the total extractable deposit and an area potential sterilised during construction due to the small triangle of land covers 1.16% of the total area which amounts to 0.74% of the total extractable deposit. It should be noted, these areas have been calculated considering the total area within the Order Limits for construction, however the permanent easement would be reduced from 75m wide to a 24m wide corridor during operation. Therefore, these numbers are precautionary and worst case. Areas of Search Sand and Gravel are also located within the Onshore Export Cable Corridor to the north of Sigglesthorne and to the east and west of Whitecross Road. Areas of Search may be defined where there is less certainty about the mineral resource. These are generally broader areas within which planning permission for particular sites could be granted to meet any shortfall in supply should suitable applications be made.		
Human health (additional information in relation to human health, outside of the potential risks associated with contamination, is provided in **Volume 7, Chapter 27 Human Health (application ref: 7.27)**)	The Projects' onshore infrastructure comprises landfall works, Onshore Export Cables and Onshore Converter Stations as set out in **Volume 7, Chapter 5 Project Description (application ref: 7.5)**. Haul and access roads will also be required during the construction period as will construction compounds. During the installation of the onshore infrastructure, the critical human health receptors would be those involved with construction activities, adjacent offsite residents, nearby workers (e.g. agricultural workers) and visitors (e.g. where Public Rights of Way (PRoW) might be in use). During the operational phase, the human health receptors would be site users and workers at the Onshore Converter Stations.		

Parameter	Landfall	Onshore Export Cable Corridor	Onshore Substation Zone
Agricultural land (additional information in relation to the agricultural land baseline environment is provided in **Volume 7, Chapter 21 Land Use (application ref: 7.21)**)	Agricultural Land Classification (ALC) Grades 2 and 3 are present at landfall.	ALC Grades 2 and 3 are present throughout the Onshore Export Cable Corridor. An area of non-agricultural land is located between the settlements of Tickton and Arram.	The Onshore Substation Zone is located entirely within land designated as ALC Grade 2, based on the Natural England provisional ALC data. However, results of ALC Survey conducted within the area of the Onshore Substation Zone is Grade 3b land and so is not considered to be BMV land.
Built environment**	The eastern edge of the Landfall Zone interacts with the King Charles III England Coastal Path (Easington to Filey Brigg branch).	The route of the Onshore Export Cable Corridor crosses several public roads, private accesses, Public Rights of Way (PRoW), and a railway line.	The Onshore Substation Zone intersects a PRoW and an area of woodland.
	Commercial, residential / holiday properties, PRoW, public roads, private accesses, a railway line, public open spaces, a school and hospital are located within 250m of the Onshore Development Area.		
Potentially contaminative land uses (as illustrated on **Volume 7, Figures 19-4 and 19-5 (application ref: 7.19.1)**). Refer to **Table 19-12** for additional detail on contaminants associated with land uses.	Potentially contaminative land uses at landfall include: • Agricultural land; and • Former pits and ponds.	Potentially contaminative land uses within the Onshore Export Cable Corridor include: • Agricultural land; • Former pits and ponds; • Railway land; and • Pumping station.	Potentially contaminative land uses within the Onshore Substation Zone include: • Agricultural land; and • Former pits and ponds.
	No COMAH sites were identified within 1km of the Onshore Development Area.		

*Although SSSI impact zones are present along the route of the Onshore Export Cable Corridor, it is considered that the only impact zone relevant to this chapter relates to Burton Bushes SSSI. However, an assessment on the potential impacts on this designated site has not been undertaken as no viable linkage between the Projects and SSSI have been identified.

An assessment of the potential impacts associated with the effects of contamination and ground gas on existing utilities has not been included within this chapter as the responsibility for the existing infrastructure is with the utility provider. It is considered that there are minimal instances where potential interaction between the Projects, existing contamination and existing mapped utilities would occur. Should there be an interaction, the effects would be determined on a case by case basis as the pollutant linkage would be different depending on the source of contamination and the type of receptor (as secured by Requirement 29 of the **Draft DCO (Volume 3, application ref: 3.1).

Table 19-12 Potential Sources of Contamination (✓present, X absent)

Parameter	Potential Contaminant of Concern	Landfall	Onshore Export Cable Corridor	Onshore Substation Zone
Onsite*				
Agricultural land / practices for fertilisers, pesticides and herbicides	Herbicides and pesticides, in addition it is not uncommon for discarded material to be buried on farmland which could potentially contain a range of contaminants including asbestos and nitrates. Although not recorded on historical mapping, there is the potential for sheep dips to be present within the Onshore Development Area. Contaminants associated with sheep dipping include, but are not limited to, metals, organophosphorus and synthetic pyrethroids.	✓	✓	✓
Potentially infilled pits / ponds	Localised Made Ground may be present in areas associated with the backfilling of former pits and / or ponds should this have been undertaken within the Onshore Development Area. Potential contaminants include, but are not limited to, asbestos, metals and metalloids, polycyclic aromatic hydrocarbons (PAHs), fuel and oil hydrocarbons, volatile and semi-volatile organic compounds (VOCs and SVOCs), inorganic and organic contaminants, herbicides, polychlorinated biphenyls (PCBs) and ground gas.	✓	✓	✓
Made Ground (including potentially demolished infrastructure)	Asbestos containing materials and associated fibres are commonly identified in Made Ground deposits, particularly localised to where building demolition has occurred, and material has been buried / used. Other contaminants of concern that may be present are dependent on the nature of the Made Ground materials present within the Onshore Development Area.	✓	✓	✓
Railway land	Railway land (both current and historical) is a potential source of contamination and Made Ground. Contaminants associated with railway land includes herbicides, metals and metalloids, fuel and oil hydrocarbons, PAHs, PCBs, glycols and sulphates. Asbestos can also be associated with the materials used within the track bedding material, fill used in the formation of embankments and within the trains themselves.	X	✓	X
Pumping station	Lubricants and greases, PAHs and metals.	X	✓	X
Offsite (based on review of historical maps for the areas within 100m of the Onshore Development Area) *				
Agricultural land and historical practices (including sheep dipping and intensive poultry farming)	Herbicides, pesticides and fertilisers, in addition it is not uncommon for discarded material to be buried on farmland which could potentially contain a range of contaminants. Contaminants associated with sheep dipping include, but are not limited to, metals, organophosphorus and synthetic pyrethroids. In addition to the above, potential contaminants associated with intensive poultry farming includes nitrates.	✓	✓	✓

Parameter	Potential Contaminant of Concern	Landfall	Onshore Export Cable Corridor	Onshore Substation Zone
Slurry lagoon	Potential contaminants include, but are not limited to, nitrates, phosphorous, metals, pathogens and ground gas.	X	X	X
Landfill	Potential contaminants include, but are not limited to, asbestos, metals and metalloids, PAHs, fuel and oil hydrocarbons, VOCs and SVOCs, inorganic and organic contaminants, PCBs, polyfluoroalkyl substances (PFAS), landfill leachate and ground gas.	X	✓**	✓
Potentially infilled pits / ponds Made Ground (including potentially demolished infrastructure)	Asbestos, metals and metalloids, PAHs, fuel and oil hydrocarbons, VOCs and SVOCs, inorganic and organic contaminants, PCBs vapours and ground gas.	✓	✓	✓
Railway land	Contaminants associated with railway land includes herbicides, metals and metalloids, fuel and oil hydrocarbons, PAHs, PCBs, glycols and sulphates. Asbestos can also be associated with the materials used within the track bedding material, fill used in the formation of embankments and within the trains themselves.	X	✓	X
Airfield	Potential contaminants may include metals, VOCs and SVOCs, glycols, fuel / oil hydrocarbons, phenols, PFAS and PCBs.	X	✓	X
Unspecified tanks	A number of unspecified tanks have been recorded within 250m of the Onshore Development Area, therefore a range of potential contaminants of concern may be associated with these areas. These may include, but are not limited to, fuel and oil hydrocarbons, PAHs, VOCs and SVOCs. Vapour risks may also be present.	✓	✓	✓
Gas valve compound / gasometer / gas works / gas governor	Contaminants of concern include, but are not limited to, asbestos, metals and metalloids, inorganic and organic compounds, fuels, and oil hydrocarbons, PAHs and phenols.	X	✓	X
Sewage works	Potential contaminants could include, but are limited to, metals, cyanides, nitrates, sulphates, asbestos, fuel and oil hydrocarbons, VOCs and SVOCs, PCBs and PFAS. Biological contaminants, such as pathogens, may also be associated with the sewage works.	X	✓	✓
Brickworks	Potential contaminants could include, but are limited to, metals and metalloids, fuel and oil hydrocarbons, VOCs, SVOCs, organic and inorganic contaminants, PCBs, PAHs, PFAS and asbestos.	✓	✓	X
Whiting works		X	✓	X
Water works	Potential contaminants could include, but are limited to, metals and metalloids, nitrates, sulphates, fuel and oil hydrocarbons, VOCs, SVOCs, organic and inorganic contaminants, PCBs, PAHs and PFAS.	✓	✓	X

Parameter	Potential Contaminant of Concern	Landfall	Onshore Export Cable Corridor	Onshore Substation Zone
Garages	Metals and metalloids, PAHs, fuel and oil hydrocarbons, glycols, VOCs and SVOCs, asbestos, inorganic and organic contaminants.	✓	✓	X
Electricity substation	Asbestos, metals and metalloids, PAHs, fuel and oil hydrocarbons and PCBs.	✓	✓	X
Pumping station	Lubricants and greases, PAHs and metals.	✓	✓	✓
* Refer to **Volume 7, Figures 19-2, 19-4** and **19-5 (application ref: 7.19.1)** for locations of potential sources of contamination. ** Ground investigations conducted within the vicinity of the historical landfill located at Catfoss did not encounter landfill waste in the boreholes adjacent to the Onshore Export Cable Corridor.				

19.5.2 Future Trends

70. In the event that the Projects are not developed, an assessment of future conditions for Geology and Land Quality has been carried out and is described within this section.

71. Sections of the Onshore Development Area are located within areas identified as containing mineral resources. Should extraction of these materials take place, the baseline conditions for those areas would be altered. The potential changes not only relate to the geology of the area, but also the hydrogeology and hydrology. Removal of superficial deposits has the potential to impact on groundwater flow patterns, for example by removing more permeable strata, and discharges into surface water bodies. The removal of deposits also has the potential to expose pre-existing contamination which then may be mobilised.

72. Climate change is causing more extreme weather in the UK resulting in wetter winters and drier summers. This change in climate conditions has the potential to mobilise pre-existing contamination through, for example, increased rates of infiltration due to heavier rainfalls, increased surface run off due to heavy rainfall following a period of drought / dry weather, dust generation through drier summers and the creation of fissures (either via drier summers or periods of cold weather) within soils allowing infiltration into deeper layers where contamination may be present (Society of Brownfield Risk Assessment, 2022).

73. It should also be noted that natural degradation / attenuation of contaminants over time may result in a general improvement in ground conditions.

74. There is also the potential for groundwater levels to rise as a result of increased rainfall. A rise in groundwater levels into the unsaturated zone has the potential to mobilise pre-existing contaminants resulting in potential migration and adversely impacting controlled waters.

75. Climate change has the potential to impact on the hydrology of surface drainage networks, with higher winter flows, lower summer flows and a greater number of storm related flood flows. The risk of flooding would also be amplified as a result of the predicted increase in rainfall which may result in an increase in peak river flows and an increase in the magnitude of surface water flooding.

76. The changes in weather patterns as a result of climate change also has the potential to increase the rate of erosion observed along the UK coastline. Future trends associated with coastal erosion are covered in more detail in **Volume 7, Chapter 8 Marine Physical Environment (application ref: 7.8)**.

77. An increase in population, increasing urbanisation and improvement in living standards may lead to a reduction in land available for agriculture. For land that is retained for agricultural use, pressures for more productive practices may increase to feed the increased population. As such, there may be an increase in the use of agricultural chemicals and industrial fertiliser to ensure continued high crop yields at a high quality.

78. Although there is the potential for increased usage of agricultural chemicals to maintain crop yields, ongoing measures, such as the regulation of agricultural chemicals and catchment wide initiatives, as part of the implementation of the WER are likely to improve the baseline environment by reducing the existing pressures on groundwater bodies. Also, as the degradation of contaminants within soils, the baseline for groundwater quality is likely to improve over time through the natural breakdown of chemicals that may currently be present within the baseline environment.

79. Increasing demand from population growth may also drive the expansion of urban areas into new areas, including land that been previously developed (i.e. brownfield land). This expansion could result in an increase in the number of potential receptors to pre-existing sources of contamination. The expansion could also result in the introduction of new sources of contamination (e.g. fuel spills) and new pathways (e.g. piled foundations).

19.6 Assessment of Significance

19.6.1 Potential Effects During Construction

19.6.1.1 Impact 1 Exposure of Workforce, Landowners, Land Users and Neighbouring Land Users to Contaminated Soils and Groundwater and Associated Health Impacts

80. The excavation of cable trenches, earthworks and piling (if required for the Onshore Converter Stations) as well as the movement and stockpiling of soils have the potential to mobilise existing ground contamination (where present). This could result in impacts to human health through dermal contact, inhalation and ingestion of contaminants.

81. A PRA (**Volume 7, Appendix 19-2 Geo-Environmental Desk Study and Preliminary Risk Assessment Report (application ref: 7.19.19.2)**) has been undertaken for the Onshore Development Area to identify plausible contaminant linkages as a result of the potential presence of contaminants within the soils and groundwater. The PRA identified that the majority of land within the Onshore Development Area has an agricultural use where unacceptable risks from contamination are not anticipated.

82. The PRA also identified localised areas within the Onshore Development Area with a history of potentially contaminative uses. The areas identified include mineral extraction sites and ponds which may have been infilled, railway land and a pumping station (see **Table 19-11**).

83. The PRA identified potential contaminants of concern (PCOC) that could be present within the Onshore Development Area and could represent a risk to construction workers, landowners, land users and neighbouring land users if exposed during construction activities. Construction activities, particularly earthworks could disturb and expose construction workers and other site users to localised Made Ground soils and potential soil and / or groundwater contamination associated with historical and current land uses within the Onshore Development Area. Construction activities could create pollutant linkages through ingestion, inhalation and direct dermal contact pathways.

84. In the event of exposing soils and stockpiling construction waste (including excavated soils), dust could be generated during dry and windy conditions. Under these conditions, construction workers and landowners, land users and neighbouring land uses could temporarily be exposed to contamination via the inhalation of potentially contaminated dusts.

85. Additionally, the risks associated with soil contamination sources to human health could be altered by a change in the migration pathways by construction activities. A specific risk of concern is ground gases. Excavation of the Onshore Export Cable Corridor and piling work (if required for the Onshore Converter Stations) has the potential to create a preferential pathway for any gases or vapours to migrate and accumulate in confined spaces. The ground gas and vapour risk for the proposed Onshore Development Area is unknown. The potential risk from ground gas could represent a risk to human health through asphyxiation and explosion.

19.6.1.1.1 Sensitivity of Receptor

86. The sensitivity of construction workers, landowners, land users and neighbouring land users is considered to be high.

87. Construction workers are considered to be the most sensitive receptors as the activities they are engaged in constitute more direct exposure routes over longer periods of time.

19.6.1.1.2 Magnitude of Impact – DBS East or DBS West in Isolation

88. During the construction phase of the Projects in isolation, there would be the requirement for materials to be excavated to construct the Onshore Export Cable Corridor between landfall and the Proposed Birkhill Wood National Grid Substation, temporary Haul Road, joint bays, Link Boxes and temporary construction compounds. Excavation and movement of material would also be required at landfall and the Onshore Substation Zone.

89. The maximum construction period for the Projects in isolation is anticipated to be four years (as reported within section 19.3.3). Earthworks, would not be operating continuously or at the same location during the whole construction phase.

90. Potential impacts are therefore predicted to be of local spatial extent (localised to the work areas and areas where contamination may be present). Potential impacts are also anticipated to be of short-term duration, of intermittent occurrence and high reversibility (occurring only during the works). The magnitude of impact is therefore considered to be low for the Projects in isolation.

91. In relation to risks associated with the migration of ground gases and / or vapours along the Onshore Export Cable Corridor between landfall and the Proposed Birkhill Wood National Grid Substation, the impacts could be present in locations adjacent to potential sources of ground gas and vapours, for example areas of infilled land for the duration of the works. It should, however, be noted that this is subject to the plausibility of a ground gas / vapour source of contamination and receptor linkage.

92. With the implementation of embedded mitigation measures, as described in **Table 19-3**, the magnitude of impact is considered to be low.

19.6.1.1.3 Magnitude of Impact – DBS East and DBS West Together (Concurrent and Sequential)

93. The total volume of material that will require excavation for the Projects together (Concurrently or Sequentially) is anticipated to be greater than the Projects In Isolation.

94. Sequential construction of the Projects is considered to be the worst case scenario due to the longer period of time, up to six years, to which human health receptors could be exposed to potential contamination. It is anticipated that the construction works for the Sequential Scenario would be completed for both Projects in the same phase of works in the first four years with additional works in the Onshore Substation Zone and at cable Jointing Bays in the following two years (section 19.3.3).

95. Although stretching over a period of six years, any earthworks are not anticipated to be continuous or at the same location throughout the entire construction period. Sections between Jointing Bays will also be reinstated within two years from the start of construction works. As such, the impacts to human health associated with excavation would not exceed six years, would be of local spatial extent (localised to the work areas and areas where contamination may be present), of intermittent occurrence and high reversibility (occurring only during the works). The magnitude of impact is therefore considered to be low.

96. In relation to risks associated with the migration of ground gas and / or vapours along the Onshore Export Cable Corridor between landfall and the Proposed Birkhill Wood National Grid Substation, the impacts could be present in locations adjacent to potential sources of ground gas and vapours, for example areas of infilled land, for the duration of the works. It should, however, be noted that this is subject to the plausibility of a ground gas / vapour source of contamination and receptor linkage.

97. With the implementation of embedded mitigation measures, as described in **Table 19-3**, the magnitude of impact is considered to be low.

19.6.1.1.4 Significance of Effect for all Scenarios

98. For all scenarios, with the implementation of the embedded mitigation measures included in **Table 19-3**, the potential impacts associated with the excavation works required for the construction of the Projects is low on a high sensitivity receptor. Therefore, the significance of effect is considered **moderate** adverse.

99. In relation to potential impacts associated with the migration of ground gases and / or vapours to human health receptors, the magnitude of impact is low and a high sensitivity receptor. This therefore results in a **moderate** adverse significance of effect in the absence of additional mitigation.

19.6.1.1.5 Mitigation and Residual Significance of Effect for all Scenarios

100. Where areas of potential contamination cannot be avoided, such as the areas that cross the entire width of the Onshore Export Cable Corridor (e.g., historical and active railway lines) targeted ground investigations may be required prior to construction to determine the extent and source of any contamination, as part of the contaminated land and groundwater scheme described in the **OCoCP (Volume 8, application ref: 8.9)** and the **Commitments Register (Volume 8, application ref: 8.6)**, as secured in DCO Requirement 19. The ground investigation may include, but is not limited to, the collection of soil, soil-leachate, groundwater and surface water samples for laboratory analysis. The range of contaminants tested for may vary between locations and sample type, examples of contaminants that may be test for include, but are not limited to, metals, PAHs, PCBs and PFAS. If areas of potential concern are identified during ground investigation, then a remediation strategy would be developed and agreed with the relevant bodies prior to the commencement of remedial works and construction activities. The ground investigation, risk assessment and remediation would follow guidance provided within the 2023 Environment Agency Land Contamination Risk Management Framework.

101. Ground gas monitoring wells will be installed in areas identified as potentially containing ground gas generating materials. Groundwater monitoring wells would also be required as part of the ground investigation in order to establish the groundwater regime and to identify, for example, whether contamination is from onsite or offsite sources (see section 19.7).

102. This would characterise the conditions within the Onshore Development Area, identify unacceptable risks and determine whether remediation is required. If areas of potential concern are identified, then a remediation strategy would be developed and agreed with the relevant bodies prior to the commencement of remedial works and construction activities. The ground investigation, risk assessment and remediation would follow guidance provided within the 2023 Environment Agency Land Contamination Risk Management Framework.

103. Risks associated with the creation of a preferential pathway for ground gas and vapours via the Onshore Export Cable Corridor between landfall and the Proposed Birkhill Wood National Grid Substation can be mitigated via re-instating excavated materials following the installation of the Onshore Export Cables. If however, a different source of material is required to backfill excavations (i.e. because the excavated material was deemed to pose an unacceptable risk), the risks associated with the creation of preferential pathways can be mitigated via ensuring that the material has the same porosity as that of the excavated material. This would help reduce the risks posed to human health receptors as it would provide continuity with the surrounding environment and not introduce areas of lower porosity soils which could act as preferential pathways.

104. If a significant source of ground gas / vapour generating material is encountered during construction further consideration will be required.

105. Following the incorporation of both the embedded and additional mitigation measures, the risks to human health from exposure to potentially contaminated soils, ground gas and vapours during construction, would be minimised as far as is reasonably practicable. This would effectively reduce the magnitude of impact from low to negligible therefore the residual effect is **minor** adverse, which is deemed to be not significant.

19.6.1.2 Impact 2 Direct Impacts on Groundwater Quality and Groundwater Resources

106. Direct impacts to the Secondary A, B and Undifferentiated Aquifers within the superficial deposits may occur due to the intrusive nature of trenching and deeper ground workings related to trenchless crossing techniques. The significance of the disturbance will be dependent on the depth of the aquifer unit in relation to the proposed depth of the excavation, with superficial aquifers present at the surface at greater risk of direct impacts.

107. Glacial Till is present at shallow depth across the majority of the Onshore Export Cable Corridor. BGS borehole records and ground investigation undertaken to date does not indicate that a shallow water body exists within the Glacial Till and nor is it likely to on the basis that it comprises of clay which is generally of a low permeability.

108. During construction, surface layers would be excavated, which could allow increased infiltration of rainwater and surface run-off to the subsurface. This could potentially mobilise any residual contamination already present in the overlying unsaturated strata which could potentially migrate into the underlying shallow superficial aquifers impacting groundwater quality and associated groundwater abstractions. Whilst significant areas of contamination are not expected across the majority of the Onshore Development Area, there are areas where crossing potentially contaminated land may be unavoidable.

109. Direct impacts to the Principal Aquifers and SPZs (as illustrated on **Volume 7, Figure 19-8 (application ref: 7.19.1)**) may occur from deep ground workings related to trenchless crossing methodologies (e.g. HDD) operations for cable installation beneath surface infrastructure (e.g. railways) and watercourses. Trenchless crossing techniques will also be required at landfall as part of the works to connect onshore and offshore export cables, this may result in direct impacts to the Principal Aquifers associated with the chalk in this area.

110. Trenchless crossings along the Onshore Export Cable Corridor and at landfall have the potential to create preferential pathways and for drilling fluid (e.g. bentonite) / other contaminants to leak along the drill path, which could cause contamination of groundwater. The volume of drilling fluid that could be released during trenchless crossing works is dependent on a number of factors, including the size of the fracture, the permeability of the geological material, the viscosity of the drilling fluid and the pressure of the hydraulic drilling system.

111. Piling may be required for the foundations of the Onshore Converter Stations which is located within a SPZ 2 (as illustrated on **Volume 7, Figure 19-8 (application ref: 7.19.1)**). Piling activities (dependent on the method of piling chosen) have the potential to create preferential pathways through a low permeability area, allowing potential contamination to migrate into underlying Principal Aquifers and SPZ, impacting water quality and associated offsite groundwater abstractions.

112. If required, dewatering of perched water or groundwater within excavations could also affect groundwater flow and water quality. This may result in impacts to base flow of local watercourses or impacts to groundwater abstractions.

113. In addition, during construction there is the potential for the accidental release of lubricants, fuels and oils from construction machinery. This can occur as a result of spillages, leakage or storage. These can enter into the ground and subsequently into groundwater impacting groundwater quality and associated groundwater abstractions.

19.6.1.2.1 Sensitivity of Receptor

114. There are no recorded groundwater abstractions from the Secondary A, B or Undifferentiated Aquifers within the Onshore Development Area. Therefore, the sensitivity of these Secondary Aquifers is considered to be low.

115. There are no Environment Agency licensed or East Riding of Yorkshire Council registered potable groundwater abstractions within the Onshore Development Area. There are however two East Riding of Yorkshire registered potable groundwater abstractions located within 250m of the Onshore Development Area. An additional four Environment Agency and 14 East Riding of Yorkshire registered potable groundwater abstractions located between 250m and 1km of the Onshore Development Area. Although the strata from which the potable groundwater is abstracted from is not recorded, it is conservatively assumed that they abstract from the Principal Aquifer. **Table 19-7** indicates that the sensitivity of Principal Aquifers, SPZs 2 and 3 as well as private potable abstractions within 250m is medium.

116. The area of the Onshore Development Area located within the SPZ 1, where the Projects connect into the Proposed Birkhill Wood National Grid Substation is considered to be of high sensitivity.

19.6.1.2.2 Magnitude of Impact – DBS East or DBS West in Isolation

117. During the construction phase of either of the Projects In Isolation there would be the requirement for materials to be excavated to construct the Onshore Export Cable Corridor between landfall and the Proposed Birkhill Wood National Grid Substation, temporary haul and access roads, Jointing Bays and temporary compounds. Excavation of material would also be required at landfall and within the Onshore Substation Zone. Although the total volume of materials required to be excavated is not yet determined, the works would be required along the 35km length of the Onshore Export Cable Corridor between landfall and the Proposed Birkhill Wood National Grid Substation. The anticipated construction area for the Onshore Converter Station for this scenario is predicted to be 94,000m^2 (worst case).

118. A maximum construction period for the onshore elements of the Projects In Isolation is four years (as set out within section 19.3.3). Earthworks, however, would not be operating continuously or at the same location during the whole of the construction period.

119. Any changes to infiltration rates, surface runoff or dewatering occurring as a direct result of earthworks activities and direct impacts to the underlying Secondary Aquifers are predicted to be of local spatial extent within each aquifer unit. Impacts are predicted to be of short-term duration (related to the working areas only), of intermittent occurrence and high reversibility (occurring only during the works and returning to baseline conditions following completion of the works). The magnitude of effect associated with earthworks is therefore considered to be low.

120. Trenchless crossing methodologies (e.g. HDD) would be required as part of the construction works associated with either of the Projects In Isolation e.g., at landfall and where the Onshore Export Cable Corridor between landfall and the Proposed Birkhill Wood National Grid Substation intersects an obstacle, for example Main Rivers or railway lines (see **Volume 7, Appendix 5-2 Obstacle Crossing Register (application ref: 7.5.5.2)**). The foundation design of the Onshore Converter Stations, i.e. whether piling is required, and the total number of piles is yet to be determined.

121. The Principal Chalk Aquifers present within the Landfall Zone are not designated as SPZs, this is likely due to the saline intrusion from the sea interacting with the groundwater making it unsuitable for use as potable water. The magnitude of impact associated with trenchless crossing techniques at landfall is therefore considered to be low.

122. The potential impacts on Principal Aquifers and SPZs as a result of earthworks / excavations along the route of the Onshore Export Cable Corridor between landfall and the Proposed Birkhill Wood National Grid Substation are predicted to be of local spatial extent, short-term duration (relating to the working areas only) or intermittent occurrence and high reversibility. The magnitude of impact is therefore considered to be low.

123. The impacts of either trenchless crossings or piling on the underlying Principal Aquifers and SPZs are predicted to be of local spatial extent (occurring only at trenchless crossing locations and at the Onshore Converter Stations if piling is required) and of intermittent occurrence. With the implementation of embedded mitigation measures described in **Table 19-3**, specifically the production of Hydrogeological Risk Assessments and Piling Risk Assessments (see **OCoCP (Volume 8, application ref: 8.9)**), the magnitude of impact associated with trenchless crossings and piling activities is therefore considered to be low.

19.6.1.2.3 Magnitude of Impact – DBS East and DBS West Together (Concurrent and Sequential)

124. The construction of the Projects together (Concurrently or Sequentially) would require excavation of materials to construct the Onshore Export Cable Corridor between landfall and the Proposed Birkhill Wood National Grid Substation, temporary haul and access roads, joint bays and temporary compounds. Excavation of material would also be required at landfall and within the Onshore Substation Zone. The volumes of material required to be excavated are yet to be determined but would be required along the 32km of the Onshore Export Cable Corridor and the 2.5km Onward Cable Connection to the proposed Birkhill Wood National Grid Substation. The anticipated construction area for the Onshore Converter Stations is predicted (as a worst case) to be 129,000m^2. Excavation, however, may not be required across the entirety of the construction area.

125. Both of the two-project scenarios (Sequential or Concurrent) are expected to require an increased number of piles (if piling is required) for the construction of the Onshore Converter Stations. The two-project scenario will also lead to an increased number of drills at landfall and trenchless crossings when compared to the Projects In Isolation. Sequential construction of the Projects is considered to be the worst case scenario due to the longer period of time period over which impacts could be experienced.

126. As with the Projects In Isolation, the potential impacts to the Secondary Aquifers, Principal Aquifers and SPZs are predicted to be of local spatial extent within each aquifer unit. Impacts are predicted to be of short-term duration (related to the working areas only) of intermittent occurrence and high reversibility. The magnitude of impact is therefore considered to be low.

127. The magnitude of impact of either trenchless crossings or piling on the underlying Principal Aquifers and SPZs are predicted to be of local spatial extent (occurring only at trenchless crossing locations and at the Onshore Converter Stations if piling is required) and of intermittent occurrence. With the implementation of embedded mitigation measures described in **Table 19-3**, the magnitude of impact is considered to be low.

19.6.1.2.4 Significance of Effect – All Scenarios

128. Prior to the implementation of additional mitigation measures discussed below, the overall significance of disturbance causing impacts to groundwater quality or the resource potential of the Secondary Aquifers during construction is low magnitude on a low sensitivity receptor. The resultant significance of effect is considered **minor** adverse.

129. The overall significance on groundwater quality within the Principal Aquifers and SPZs, as a result of the trenchless crossing works at landfall and piling, is low magnitude on a medium to high sensitivity receptor, representing a **minor** to **moderate** adverse significance of effect.

19.6.1.2.5 Mitigation and Residual Significance of Effect – All Scenarios

130. As discussed in section 19.6.1.1.5, additional mitigation includes measures such as investigations to characterise ground conditions, a s part of the contaminated land and groundwater scheme described in the **OCoCP (Volume 8, application ref: 8.9)** and the **Commitments Register (Volume 8, application ref: 8.6)**. Should contamination be encountered that is considered to pose an unacceptable risk to groundwater and groundwater resources, a remediation strategy proportionate to the level of risk would be developed and agreed with the relevant bodies. Once agreed, any required remediation works, which will be dependent on the type and level of contamination encountered, would be undertaken to mitigate the potential risks posed. For all scenarios, aquifer units and SPZs, with the implementation of both embedded and additional mitigation measures, the magnitude of impact will be reduced to negligible therefore the residual effect is **minor** adverse, which is deemed to be not significant.

19.6.1.3 Impact 3 Impacts on Surface Water Quality and the Ecological Habitats they Support from Contamination

131. As described in **Table 19-12** and the PRA (**Volume 7, Appendix 19-2 Geo-Environmental Desk Study and Preliminary Risk Assessment Report (application ref: 7.19.19.2)**), potential sources of contamination have been identified within the Onshore Development Area. Installation of the Onshore Export Cables between landfall and the Proposed Birkhill Wood National Grid Substation and construction of the Onshore Converter Stations would require substantial earthworks, as well as the potential for piling. These activities have the potential to disturb potential contamination which could migrate and be released into surface water via the following pathways:

- Mobilisation and migration of free phase hydrocarbons, soil contaminants or dissolved phase contaminants in groundwater by construction activities with subsequent release into surface waters;
- Surface water runoff from contaminated Made Ground soils brought to surface during construction;
- Runoff from stockpiles of potentially contaminated soils;
- Migration of soil or groundwater contaminants into surface water drains during construction activities which then enter surface water;

- Accidental spillage whilst handling, storage or treatment of contaminated water or fuels or other chemicals used during construction; and
- The hydraulic regime of the local area could also be affected by the construction of the Projects for example backfilling excavated areas with less compacted soil / material could potentially create preferential flow paths into surface water receptors.

19.6.1.3.1 Sensitivity of Receptor

132. Any migration and discharge of contamination into surface waters could lead to a reduction in surface water quality and impact on the ecological habitats they support. The Onshore Development Area crosses the Greater Wash SPA, due to the route of the emergency access corridor along the beach. Although located within the Landfall Zone, surface water features from other areas of the Onshore Development Area may flow and discharge into the protected area. Therefore, the sensitivity of surface waters is considered to be high.

133. Additional impacts relating to surface water quality and ecological habitats are assessed in **Volume 7, Chapter 18 Terrestrial Ecology and Ornithology (application ref: 7.18)** and **Volume 7, Chapter 20 Flood Risk and Hydrology (application ref: 7.20)**.

19.6.1.3.2 Magnitude of Impact – All Scenarios

134. The PRA (**Volume 7, Appendix 19-2 Geo-Environmental Desk Study and Preliminary Risk Assessment Report (application ref: 7.19.19.2)**) has identified localised areas within the Onshore Development Area with a history of potentially contaminative uses (see **Table 19-11**). A potential range of contaminants of concern are associated with these activities (see **Table 19-12**) which may impact upon surface water receptors.

135. With the implementation of the embedded and standard mitigation measures outlined in **Table 19-3**, there would be very minor to no observable changes to surface water receptors. Therefore, the magnitude of impact is considered to be negligible.

19.6.1.3.3 Significance of Effect – All Scenarios

136. With the implementation of embedded mitigation measures, the significance of effect on surface water quality from contamination during the construction of the Projects In Isolation or together is considered **minor** adverse.

19.6.1.3.4 Mitigation and Residual Significance of Effect – All Scenarios

137. The significance of effect is minor adverse which is not considered to be a 'significant effect' under EIA regulations. Therefore, no additional mitigation is required.

19.6.1.4 Impact 4 Sterilisation of Future Mineral Resources

138. As described in **Table 19-11**, there are a number of MSAs, Areas of Search and Preferred Area are located as localised features throughout the Onshore Development Area (see **Volume 7, Figure 19-7 (application ref: 7.19.1)**). Construction activities and installation of cables within these areas would prevent the extraction of the identified resources.

19.6.1.4.1 Sensitivity of Receptor

139. Mineral Safeguarding Areas are considered to be of regional importance and therefore the sensitivity of the receptor is considered to be medium.

19.6.1.4.2 Magnitude of Impact – DBS East or DBS West in Isolation

140. The installation of up to two trenches for the Projects In Isolation within the Onshore Export Cable Corridor and the onward connection to Proposed Birkhill Wood National Grid Substation, which runs a length of 32km and 2.5km respectively and a width of 41m (increasing in width to 45m at trenchless crossings) has the potential to sterilise mineral resources present within the narrow linear route. The total area of MSAs within the Onshore Export Cable Corridor is approximately 30ha (approximately 0.03% of the total MSA within the ERYC boundary), these areas are spread along the route as isolated areas. In all cases, where the Onshore Export Cable Corridor intersects a MSA, Areas of Search or Preferred Area only part of each area is impacted and not the whole protected area.

141. Preferred Area Sand and Gravel are located within the Onshore Export Cable Corridor between Riston Road and A165, Catwick and is identified within the East Riding of Yorkshire and Kingston upon Hull Joint Minerals Local Plan 2016 – 2033 (East Riding of Yorkshire Council and Hull City Council, 2019) area as SG-A which covers 130 ha and is identified as containing 3,000,000 tonnes of extractable deposits. The Onshore Export Cable Corridor which overlaps SG-A is 2.77 ha (potentially containing 63,923 tonnes), 2.13% of the total extractable deposits of SG-A. The access road which will sterilise the relevant minerals during construction is 0.96 ha (potentially containing 22,154 tonnes) which is 0.74% of the total extractable deposit of SG-A. An area that would potentially be sterilised from mineral extraction during construction and operation is 2.54 ha (potentially containing 58,615 tonnes), which is 1.95% of the total extractable deposit of SG-A. This area is the small triangle of land to the south of the Onshore Export Cable Corridor, as shown on **Figure 19-7b (application ref: 7.19.1)**.

142. An additional four Preferred Areas, identified as SG-B to SG-E inclusive within the ERYC joint mineral plan, are located within the Onshore Export Cable Corridor. These additional four areas cover approximately 218 ha and is identified as containing 7,930,000 tonnes of extractable deposits. Preferred Areas SG-A to SG-E, inclusive, covers 1.27% of the total area of the Onshore Export Cable Corridor which is 0.81% of the total extractable deposits. The access road covers 0.44% of the total area which equates to 0.28% of the total extractable deposits and an area that would be potentially sterilised during construction due to severing covers 1.16% of the total area which amounts to 0.74% of the total extractable deposits.

143. It should be noted that, the areas for SG-A to SG-E described above have been calculated considering the total area within the Order Limits for construction however the permanent easement would be reduced from 75m wide to a 24m wide corridor during operation. Therefore, these numbers are precautionary and worst case.

144. The Onshore Converter Station(s) construction area would be 62,208m^2 and has the potential to temporarily sterilise mineral resources within its footprint during construction works. The total area of MSAs within the Onshore Converter Station construction area is approximately 2ha (approximately 0.002% of the total MRA within the ERYC boundary) which extends offsite to the south west.

145. The footprint required for construction works will be greater than that required for permanent infrastructure during the operational phase. Therefore, the potential impacts during the construction phase will temporarily sterilise a larger area than that which would be permanently sterilised during operation (see section 19.6.2.3).

146. Following completion of construction works, infrastructure associated with Haul Roads, construction compounds etc., that have effectively sterilised mineral resources present within the Onshore Development Area will be removed. This would then allow for the mineral resources to be available for extraction, where possible in relation to the permanent easement of the Projects. Therefore, the magnitude of impact during construction of the Projects In Isolation is considered to be low.

19.6.1.4.3 Magnitude of Impact – DBS East and DBS West Together (Sequential)

147. The construction of the Projects Sequentially is considered to be the worst case scenario as it has the potential to temporarily impact a greater proportion of any MSA, Areas of Search or Preferred Area present over the longest period of time. As such, there is the potential to temporarily sterilise a larger volume of mineral resources when compared to the Projects In Isolation.

148. However, as mentioned in section 19.6.1.4.2, the footprint required for construction works will be greater than that required for permanent infrastructure during the operational phase and therefore has the potential to temporarily sterilise a greater area (see section 19.6.2.3.3 for permanent impacts associated with the operational phase of the Projects together).

149. As the potential impacts of sterilisation are considered to be temporary during the construction phase, the magnitude of impact is considered to be low.

19.6.1.4.4 Significance of Effect – All Scenarios

150. Without additional mitigation, the potential impact on mineral resources associated with the construction of the Projects In Isolation or together is low magnitude on a medium sensitivity receptor. Therefore, the potential significance of effect is **minor** adverse.

19.6.1.5 Impact 5 Built Environment

151. The construction phase has the potential to impact the existing built environment. This may be through creating new preferential pathways for contaminants or gases to migrate that may lead to degradation of utilities (potable water supply pipes) and concrete from aggressive attack. This could potentially compromise the integrity of buildings or utilities, or the migration of ground gases into buildings could cause explosion.

152. Potential impacts associated with the Onshore Development Area on usage and disruption to the existing utilities, in relation to electricity cables, telecommunications and high pressure gas pipelines, are discussed in **Volume 7, Chapter 21 Land Use (application ref: 7.21)**. Potential impacts with regards to contamination on existing utilities during the construction phase of the Projects are discussed within section 19.6.1.5 of this ES chapter and are not assessed within **Volume 7, Chapter 21 Land Use (application ref: 7.21)**. Potential impacts associated with the operation of the Projects on utilities installed to support the Projects (e.g., water supply pipes) are discussed within section 19.6.2.4 of this ES chapter and are not assessed within **Volume 7, Chapter 21 Land Use (application ref: 7.21)**.

19.6.1.5.1 Sensitivity of Receptor

153. Although there are no buildings present within the Onshore Development Area, there are commercial, residential / holiday properties, a school and hospital within 250m. Therefore, the sensitivity of the built environment is considered to be medium due to the proximity of buildings within 250m of the Onshore Development Area.

19.6.1.5.2 Magnitude of Impact – DBS East or DBS West in Isolation

154. Commercial, residential and holiday properties, a school and hospital are located within 250m of the construction works. These features are not present along the entirety of the Onshore Development Area boundary but as isolated areas. The greatest concentration of buildings within 250m of the Onshore Development Area is around the settlement of Beverly.

155. The Onshore Export Cable Corridor from landfall to Proposed Birkhill Wood National Grid Substation also crosses multiple roads and other transport infrastructure.

156. When earthworks, excavations and trenchless crossing techniques are used as part of the construction of the Projects, these will be located within 250m of the previously identified receptors. Potential impacts to the built environment in these areas are considered to be localised to work areas and areas of contamination with any damage considered to be easily repairable. The magnitude of impact is therefore considered to be low.

19.6.1.5.3 Magnitude of Impact – DBS East and DBS West Together

157. Whilst the Concurrent and Sequential construction scenarios have the potential to impact a larger area of the built environment compared to the Projects In Isolation, the magnitude of impact is still considered to be low.

19.6.1.5.4 Significance of Effect – All Scenarios

158. Through the site selection process, as described in **Table 19-3**, the potential significance of effect on the built environment for all scenarios is considered **minor** adverse.

19.6.1.5.5 Mitigation and Residual Significance of Effect – All Scenarios

159. The potential significance of effect is **minor** adverse, which is deemed to be not significant. Therefore, no additional mitigation is required.

19.6.1.6 Impact 6 Impacts on Agricultural Land

160. The majority of the construction footprint is located within areas currently associated with agricultural production, with ALC Grades 2 and 3 present throughout the Onshore Development Area.

161. Due to the nature of the land use within the Onshore Development Area, it would not be possible to avoid agricultural land. As mentioned in section 19.6.1.1, the PRA identified localised areas within the Onshore Development Area with a history of potentially contaminative uses which could represent a contamination risk to agricultural land.

162. Construction activities therefore have the potential to mobilise pre-existing sources of contamination in identified areas or due to the invasive nature of construction actives, create new preferential pathways. There is also the potential for new sources of contamination to be introduced to the area which may have adverse impacts on agricultural land.

163. Discussions in relation to potential impacts associated with construction on agricultural land beyond the impacts related to contamination land can be found in **Volume 7, Chapter 21 Land Use (application ref: 7.21)**.

19.6.1.6.1 Sensitivity of Receptor

164. Due to the presence of ALC Grade 2 land, the sensitivity of the receptor is considered to be high (worst case).

19.6.1.6.2 Magnitude of Impact – DBS East or DBS West in Isolation

165. During the construction phase of the Projects In Isolation, there will be the requirement for materials to be excavated to construct the onshore elements of the Projects, inclusive of temporary Haul Roads and temporary construction compounds. Earthworks would not be operating continuously or at the same location during the whole construction phase.

166. With regards to the mobilisation of pre-existing contamination or the introduction of new sources, potential impacts to agricultural land during the construction phase are predicted to be of local spatial extent (localised to the work areas and areas where contamination may be present). Potential impacts are also anticipated to be of short-term duration, of intermittent occurrence and high reversibility (occurring only during the works).

167. With the implementation of embedded mitigation measures described in **Table 19-3**, the magnitude of impact is therefore considered to be low for the Projects In Isolation.

19.6.1.6.3 Magnitude of Impact – DBS East and DBS West Together (Concurrent and Sequential)

168. Whilst the Sequential and Concurrent construction scenarios have the potential to impact a larger area of agricultural land over a longer period of time, the magnitude of impact is still considered to be low for the Projects together following the implementation of embedded mitigation measures (**Table 19-3**).

19.6.1.6.4 Significance of Effect – All Scenarios

169. The significance of effect on agricultural land during construction for all scenarios is considered to be **moderate** adverse in the absence of additional mitigation.

19.6.1.6.5 Mitigation and Residual Significance of Effect – All Scenarios

170. Mitigation measures discussed in sections 19.6.1.1.5 and 19.6.1.2.5 would also serve to reduce the magnitude of impact on agricultural land as a result of construction activities. Implementation of the measures previously discussed would reduce the magnitude of impact to negligible, and therefore reduced the significance of effect to **minor** adverse, which is deemed to be not significant.

19.6.2 Potential Effects During Operation

19.6.2.1 Impact 7 Exposure of Workforce, Landowners, Land Users and Neighbouring Land Users to Contaminated Soils and Groundwater and Associated Health Impacts

171. During the operation of the Projects there would be no planned maintenance along the Onshore Export Cable Corridor between landfall and the Proposed Birkhill Wood National Grid Substation which would require the excavation of soils. In the unlikely event of a cable failure then that stretch of cable between two Jointing Bays may need to be replaced. This would require excavation at the two joint locations to expose the Jointing Bays and allow the cable to be pulled out and replaced. Maintenance works associated with the Onshore Converter Stations are anticipated to be undertaken during the operational life of the Projects, this may include the need for soils to be excavated.

172. If contaminated materials are brought to the surface through excavation during the operational phase and no mitigation measures are implemented, these materials would permanently be exposed at surface. This creates the potential for maintenance workers, landowners, land users and neighbouring land users to come into direct contact with contaminated soils left in-situ via direct contact pathways.

173. Materials excavated during the installation of the Onshore Export Cables between landfall and the Proposed Birkhill Wood National Grid Substation and construction of the Onshore Converter Stations would be re-instated following completion where possible. If however, a different source of material is used to backfill excavations Onshore Export Cable Corridor that is not of a similar porosity as the surrounding environment (e.g. a more porous material such as coarse hardcore is used), there is the potential for ground gases and / or vapours to migrate along the length of the corridor or from beneath the Onshore Converter Stations. This may lead to the accumulation of ground gas and vapours within the Onshore Converter Stations accessed by maintenance workers during the operational phase. Therefore, risks associated with asphyxia and explosion may be present.

174. If however, during site characterisation works areas considered to represent an unacceptable risk to human health are identified, remedial works proportionate to the level of risk would be undertaken. In addition, should areas of unexpected contamination be encountered during construction works, appropriate mitigation measures (including potential remediation) would also be undertaken to reduce the significance of effect to human health receptors.

175. In relation to risks posed by ground gases and vapours, should potential sources of ground gas / vapour generating materials be identified as part of site characterisation works or encountered unexpectedly during construction appropriate mitigation measures, including the removal of the source material, would be implemented prior to construction. Impacts associated with ground gas / vapours to the built environment are discussed in section 19.6.2.4.

19.6.2.1.1 Sensitivity of Receptor

176. The sensitivity of maintenance workers, landowners, land users and neighbouring land users located within 50m of the Projects In Isolation or together is considered to be high (see **Table 19-7**).

19.6.2.1.2 Magnitude of Impact – All Scenarios

177. There may be a need for ground excavations to be undertaken at Jointing Bay locations or at the Onshore Converter Station(s) as part of the maintenance for the Projects. The impacts are predicted to be of local spatial extent (localised to areas where contamination may be present and to areas where excavation works are required), of short-term duration, of intermittent occurrence and high reversibility (occurring only during the maintenance works). With the implementation of embedded mitigation measures, as described in **Table 19-3**, the magnitude of impact is considered to be negligible.

178. In areas where there is the potential for ground gas and / or vapours to accumulate (e.g. within the Onshore Converter Station(s)) the implementation of embedded mitigation measures (see **Table 19-3**) will result in a **negligible** magnitude of impact.

19.6.2.1.3 Significance of Effect – All Scenarios

179. With the implementation of the embedded mitigation measures the significance of effect is **minor** adverse which is deemed to not be significant.

19.6.2.1.4 Mitigation and Residual Significance of Effect – All Scenarios

180. No additional mitigation is required as the **minor** adverse significance is not deemed significant.

19.6.2.2 Impact 8 Impact on Controlled Waters (Groundwater and Surface Waters)

181. Maintenance activities at landfall, along the Onshore Export Cable Corridor between landfall and the Proposed Birkhill Wood National Grid Substation and at the Onshore Converter Stations have the potential to mobilise pre-existing contamination or create new contamination through the leakage or spillage of fuels, oils or other chemicals from machinery, vehicles or operational equipment. This could affect water quality within the aquifers underlying the site, surface water receptors and the water abstractions they support.

182. A shallow continuous groundwater table has not been identified on BGS borehole logs or during ground investigations undertaken to date where Glacial Till is present. Where the Onshore Export Cable Corridor is present and open cut trenching is undertaken it is unlikely to intercept a shallow water table and in turn disrupt flow pathways because there is an absence of groundwater. The Glacial Till is likely to be of low permeability so inflow of groundwater would be perched in nature and in the form of very slow seepage.

19.6.2.2.1 Sensitivity of Receptor

183. Any migration and discharge of contamination into surface waters through direct or indirect pathways (e.g. surface run-off, discharge of groundwater into surface water bodies) could lead to a reduction in surface water quality and impact on the ecological habitat they support. The Onshore Development Area crosses Greater Wash SPA. Although located within the Landfall Zone, surface water features from other areas of the Onshore Development Area may flow and discharge into the protected area. Therefore, the sensitivity of surface waters is considered to be high.

19.6.2.2.2 Magnitude of Impact – All Scenarios

184. Although excavation works will not form part of planned maintenance activities during the operational phase of the Projects In Isolation or together, there is the potential for excavations to be undertaken to conduct unplanned repairs. Should excavation works be required as part of unplanned works, these would be at joint bay locations for cable repairs or at the Onshore Converter Stations and not involve the entirety of the Projects infrastructure.

185. The impacts are predicated to be of local spatial extent (localised to areas of excavation / maintenance and where contamination may be present). With the implementation of embedded mitigation measures (see **Table 19-3**), the magnitude of impact is therefore considered to be negligible during the operational phase.

19.6.2.2.3 Significance of Effect – All Scenarios

186. With the implementation of embedded mitigation measures, the potential impacts to controlled waters resulting from the operation of the Projects is negligible magnitude on a high sensitivity receptor. Therefore, the significance of effect is considered **minor** adverse.

19.6.2.2.4 Mitigation and Residual Significance of Effect – All Scenarios

187. No additional mitigation is required as the **minor** adverse significance is not deemed significant.

19.6.2.3 Impact 9 Sterilisation of Future Mineral Resources

188. Future extraction of resources from within MSAs, Areas of Search or Preferred Areas would be prevented within the permanent easement for the Onshore Export Cables between landfall and the Proposed Birkhill Wood National Grid Substation, Onshore Converter Stations and permanent access roads. This would temporarily prevent extraction within these areas for the duration of the operational period (up to 32 years).

189. The impacts are predicted to be temporary in nature, present for the duration of the operational phase of the Projects (and reversable during the decommissioning phase) and could affect the receptor directly, however, the proportion of the total MSAs, Areas of Search or Preferred Areas that would be effectively sterilised is considered to be small (<0.1% of the total MSA within the ERYC boundary). Taking the easement width of 24m (for both Projects) and the triangular area into account, 3.46 – 5.31 ha which equates to 2.66 – 4.08% of the Preferred Area SG-A would be sterilised for the duration of the Projects operational life which equates to approximately between 85,231 – 122,538 tonnes, however based on the calculated average depth of the sand and gravel deposits, the likelihood is that the materials will be excavated during ducting installation. In relation to all the Preferred Areas SG-A to SG-E, inclusive, 1.59 – 2.43% of the total Preferred Areas would be sterilised which equates to a tonnage equivalent of between 1.07 – 1.55%.

19.6.2.3.1 Sensitivity of Receptor

190. MSAs are considered to be of regional importance and therefore, the sensitivity of future mineral resources is considered to be medium.

19.6.2.3.2 Magnitude of Impact – DBS East or DBS West in Isolation

191. If the Projects were to be constructed In Isolation, the realistic worst case scenario would result in the temporary prevention of future extraction along a 35km cable corridor between landfall and the Proposed Birkhill Wood National Grid Substation plus easement and one Onshore Converter Station.

192. Although the operational footprint of the Projects In Isolation will be smaller than that of the construction footprint, the impacts would be permanent during the operational lifetime rather than temporary. Following the decommissioning of the Projects, these areas will become available for mineral extraction once more and so the impacts are considered reversible. Therefore, the magnitude of impact is considered to be medium.

19.6.2.3.3 Magnitude of Impact – DBS East and DBS West Together

193. If the Projects were to be constructed together (either Sequentially or Concurrently), the realistic worst case scenario would involve the sterilisation of mineral resources along 35km cable corridors between landfall and the Proposed Birkhill Wood National Grid Substation plus easements and the two Onshore Converter Stations.

194. As with the operation of the Projects In Isolation, the operational footprint for the Projects together would be smaller than that of construction, with the impacts during the operational phase considered permanent but reversible following decommissioning. Therefore, the magnitude of impact is considered to be medium.

19.6.2.3.4 Significance of Effect – All Scenarios

195. Without mitigation, the potential impact to mineral resources resulting from the operation of the Projects In Isolation or together is of medium magnitude on a medium sensitivity receptor, representing a **moderate** adverse significance of effect.

19.6.2.3.5 Mitigation and Residual Significance of Effect – All Scenarios

196. The feasibility of extraction of mineral resources is unlikely based on it being a narrow corridor and any abstraction would need to include a much wider area. It would also leave an excavation which given the granular nature of the ground would need to be backfilled with a material of a similar nature. This would be unviable and not productive with respect to sustainability. Mineral resources excavated during the construction of the Projects would be reinstated within the vicinity of where they were excavated, wherever possible as part of the site's Materials Management Plan following completion of construction in that area. This would allow the minerals to remain in-situ and available for extraction by others post decommissioning. On this basis, the significance of effect would remain unchanged and would be **moderate** adverse during operation which is deemed to be significant.

19.6.2.4 Impact 10 Built Environment

197. Materials such as concrete used in the infrastructure associated with the Projects have the potential to undergo degradation, such as chemical attack, from aggressive ground conditions due to the presence of acids or sulphates. This has the potential to compromise the integrity of structures associated with the Onshore Converter Stations.

198. In addition, the presence of contaminants in soils could also result in a risk of corrosion and permeation of utilities such as plastic water supply pipes that may be installed at the Onshore Converter Stations.

199. Buildings built on or near sources of ground gas (such as infilled land) could also be at risk from the accumulation of gases potentially causing explosion.

19.6.2.4.1 Sensitivity of Receptor

200. Due to the presence of the Onshore Converter Stations and ancillary structures as well as the neighbouring commercial, residential and holiday properties, a school and hospital within 250m of the Onshore Development Area, the sensitivity of the built environment is considered to be high.

19.6.2.4.2 Magnitude of Impact – All Scenarios

201. Desk based information indicates that the Onshore Substation Zone is located in and near to (within 250m) potential sources of ground gases, such as landfills. Depending on the location of Jointing Bays and Link Boxes in relation to potential sources of ground gas generating contamination, there is the potential for the gases to migrate and accumulate in these underground structures at landfall and along the Onshore Export Cable Corridor between landfall and the Proposed Birkhill Wood National Grid Substation.

202. There is also the potential to encounter unexpected sources of ground gas during maintenance works. Therefore, the potential magnitude of impact on the surrounding built environment during the operation of all scenarios is medium.

19.6.2.4.3 Significance of Effect – All Scenarios

203. Without mitigation, the potential impacts to the built environment resulting from the operation of the Projects in isolation or together is medium magnitude on a high sensitivity receptor. Therefore, the significance of effect is considered **major** adverse.

19.6.2.4.4 Mitigation and Residual Significance of Effect – All Scenarios

204. Should unexpected sources of ground gas be identified prior to or during construction works, a ground investigation will be undertaken to characterise ground conditions and assess the potential risks. Depending on the outcome of the assessment, mitigation measures such as the use of gas protection measures within the design of the Onshore Converter Stations will be implemented.

205. If utilities corridors for the Projects are within land affected by contamination, construction of clean or lined service corridors will be installed to protect land users and utilities. The materials used within the clean or lined corridors would be dependent on the type and extent of contamination identified. For example, although unlikely, if landfilled materials were encountered a lined impermeable corridor would be designed to prevent ground gas using the Onshore Export Cable Corridor or Onward Cable Connection ducts as a preferential pathway.

206. Each instance of interaction between land affected by contamination and the Projects would require a bespoke solution. This would be dependent on the type of contamination identified during targeted ground investigation. However, it is considered unlikely that the Projects would be constructed through land affected by contamination that would require such mitigation.

207. The above measures would be implemented during the construction phase of all scenarios and form part of the embedded mitigation measures for the operational phase of all scenarios.

208. These mitigation measures will reduce the magnitude of impact to negligible, resulting in a **minor** adverse residual significance of effect.

19.6.2.5 Impact 11 Impacts on Agricultural Land

209. As mentioned previously, maintenance activities within the Onshore Development Area have the potential to mobilise pre-existing contamination or create new contamination through the leakage or spillage of fuels, oils or other chemicals from machinery, vehicles or operational equipment. This could impact on agricultural land quality.

19.6.2.5.1 Sensitivity of Receptor

210. Due to the presence of ALC Grade 2 land, the sensitivity of the receptor is considered to be high.

19.6.2.5.2 Magnitude of Impact – All Scenarios

211. Although excavation works will not form part of planned maintenance activities during the operational phase of the Projects In Isolation or together, there is the potential for excavations to be undertaken to conduct unplanned repairs. Should excavation works be required as part of unplanned works, these would be at joint bay locations for cable repairs or at the Onshore Converter Stations and not involve the entirety of the Projects infrastructure.

212. The impacts are predicted to be of local spatial extent (localised to areas of excavation / maintenance and where contamination may be present). With the implementation of embedded mitigation measures described in **Table 19-3**, the magnitude of impact is therefore considered to be negligible during the operational phase.

19.6.2.5.3 Significance of Effect – All Scenarios

213. The significance of effect on agricultural land during resulting from the operation of the Projects in isolation or together is considered **minor** adverse.

19.6.2.5.4 Mitigation and Residual Significance of Effect – All Scenarios

214. No additional mitigation is required as the **minor** adverse significance is not deemed significant.

19.6.3 Potential Effects During Decommissioning

215. No decision has been made regarding the final decommissioning policy for the Onshore Export Cables, as it is recognised that industry best practice, rules and legislation change over time. It is likely that the cables would be pulled through the ducts and removed, with the ducts themselves left in situ.

216. In relation to the Onshore Converter Stations, the programme for decommissioning is expected to be similar in duration to the construction phase. The detailed activities and methodology would be determined later within the lifetime of the Projects. Any such methodology and associated mitigation would be agreed with the relevant authorities and statutory consultees through a decommissioning plan in accordance with the requirements of the **draft DCO (Volume 3, application ref: 3.1)**. The detailed activities and methodology are expected to include:

- Dismantling and removal of outside electrical equipment from site located outside of the Onshore Converter Station(s) buildings;
- Removal of cabling from site;
- Dismantling and removal of electrical equipment from within the Onshore Converter Station(s) buildings;
- Removal of main Onshore Converter Station(s) building and minor services equipment;
- Demolition of support buildings and removal of fencing;
- Landscaping and reinstatement of the site (including land drainage); and
- Removal of areas of hard standing.

217. Whilst details regarding the decommissioning of the Onshore Converter Stations are currently unknown, considering a worst case scenario, which would be the removal and reinstatement of the current land use, it is anticipated that the impacts would be similar or less than those during construction. This is because areas of identified contamination would have been remediated during the construction phase.

218. The decommissioning methodology would need to be finalised nearer to the end of the lifetime of the Projects so as to be in line with current guidance, policy and legalisation at that point. Any such methodology would be agreed with the relevant authorities and statutory consultees. However, there will be a DCO Requirement to ensure that the Projects in isolation or together are decommissioned in accordance with an approved methodology.

19.7 Potential Monitoring Requirements

219. Onshore monitoring requirements, where required are described further in this chapter and would be further developed and agreed with stakeholders prior to construction taking account of the final detailed design of the Projects (see **OCoCP (Volume 8, application ref: 8.9)**) as secured through DCO Requirement 19 and 33.

220. Groundwater and ground gas monitoring may be required as part of any targeted ground investigations that may be required to determine site characteristics. The monitoring will aid in the identification of potential risks to human health, groundwater and surface water receptors identified within this chapter. Should hydrogeological risk assessments identify any areas that may be impacted by the Projects, additional groundwater monitoring may be required in localised areas, as secured in DCO Requirement 19 and 33.

19.8 Cumulative Effects Assessment

221. Cumulative effects can be defined as incremental effects on that same receptor from other proposed and reasonably foreseeable schemes and developments in combination with the Projects. This includes all schemes that result in a comparative effect that is not intrinsically considered as part of the existing environment and is not limited to offshore wind projects.

222. The overarching method followed in identifying and assessing potential cumulative effects in relation to the onshore environment is set out in **Volume 7, Chapter 6 EIA Methodology (application ref: 7.6)** and **Volume 7, Appendix 6-1 (application ref: 7.6.6.1).** The approach is based upon the Planning Inspectorate Advice Note Seventeen: Cumulative Effects Assessment (PINS 2017). The approach to the CEA is intended to be specific to DBS Projects and takes account of the available knowledge or the environment and other activities around the Onshore Development Area.

223. The CEA has followed a four-stage approach developed from the Planning Inspectorate Advice Note Seventeen. These stages are set out in Table 1-2 of **Volume 7, Appendix 6-1 (application ref: 7.6.6.1).** Stage four of this process, the CEA assessment is undertaken in two phases. The first step in the CEA is the identification of which residual impacts assessed for the Projects on their own have the potential for a cumulative impact with other schemes, plans, projects and activities. This information is set out in **Table 19-13** which sets out the potential impacts assessed in this chapter and identifies the potential for cumulative effects to arise, providing a rationale for such determinations. Only potential impacts assessed as negligible or above are included in the CEA. Those assessed as 'no impact' are not taken forward as there is no potential for them to contribute to a cumulative impact.

Table 19-13 Potential Cumulative Impacts

Potential Impact	Potential for Cumulative Effects	Data Confidence	Justification
Construction			
Impact 1 Exposure to contaminated soils (human health)	Yes	High	The residual effects to construction workers would be confined to the Onshore Development Area. Effects on landowners, land users and neighbouring land users may be exacerbated by other projects.

Potential Impact	Potential for Cumulative Effects	Data Confidence	Justification
Impact 2 Impacts on groundwater	Yes	High	Residual effects on Secondary and Principal Aquifers may be exacerbated by other projects which are located above the same aquifer and / or SPZ.
Impact 3 Impacts on surface waters	Yes	High	Residual effects on surface water and the ecological habitats they support may be exacerbated by other projects that are located within the same river catchment.
Impact 4 Sterilisation of future mineral resources	Yes	High	Residual effects on MSAs may be exacerbated by other projects if located within the same safeguarding area.
Impact 5 Built environment	Yes	High	Residual effects on the built environment may be exacerbated by other projects if located near to the same structures.

Potential Impact	Potential for Cumulative Effects	Data Confidence	Justification
Impact 6 Impacts on agricultural land	Yes	High	Residual effects on agricultural land may be exacerbated by other projects.
Operation			
Impact 7 Exposure to contaminated soils (human health)	Yes	High	The residual effects to maintenance workers would be confined to the Onshore Development Area. Residual effects on landowners, land users and neighbouring land users may be exacerbated by other projects.
Impact 8 Impact on groundwater and surface water	Yes	High	Residual effects on Secondary and Principal Aquifers may be exacerbated by other projects which are located within the same aquifer and /or SPZ.
Impact 9 Sterilisation of mineral resources	Yes	High	Residual effects on MSAs may be exacerbated by other projects if they are located within the same safeguarding area.

Potential Impact	Potential for Cumulative Effects	Data Confidence	Justification
Impact 10 Built environment (users of existing buildings)	Yes	High	Residual effects on the built environment may be exacerbated by other projects if located near the same buildings.
Impact 11 Impacts on agricultural land	Yes	High	Residual effects on agricultural land may be exacerbated by other projects if located near the same parcel of agricultural land.
Decommissioning			
The detail and scope of the decommissioning works would be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. As such, cumulative effects during the decommissioning phase are assumed to be the same as those identified during the construction phase.			

224. The second stage of the CEA is a project specific assessment of the potential for any significant cumulative effects to arise due to the construction and / or operation and maintenance of the Projects. To do this, a short list of schemes for CEA has been produced relevant to Geology and Land Quality following the approach outlined in **Volume 7, Appendix 6-1 (application ref: 7.6.6.1).** The second stage of this assessment is only undertaken if the first stage identifies that cumulative effects are possible.

225. The CEA has been based on information available on each potential scheme (e.g. as set out on the East Riding of Yorkshire Council and Hull City Council planning portals as well as the Planning Inspectorate website) as of January 2024. It is noted that the scheme details available may change in the period up to construction or may not be available in detail at all. The assessment presented here is therefore considered to be conservative, with the level of impacts expected to be reduced compared to those presented here.

226. A total of 19 schemes have been identified for inclusion on the short list of schemes to be assessed cumulatively for Geology and Land Quality. Projects that have not been considered as resulting in likely cumulative significant effects for Geology and Land Quality are as a result of being outside the Geology and Land Quality Zone of Influence (1km).

227. Summary information on the short list scheme progressing through this exercise (i.e. the short list of other schemes) for assessment on Geology and Land Quality is provided below in **Table 19-14.** This presents the scenarios whereby the Projects and the other schemes/developments that have been identified on the short list of schemes screened for Geology and Land Quality, as listed in **Table 19-14**, could potentially result in cumulative effects for onshore Geology and Land Quality.

Table 19-14 Short list of schemes considered within the Geology and Land Quality cumulative effects assessment

Scheme Name	Tier	Discussion	Likelihood and Significance of Cumulative Effects
Strawberry Fields - reorganisation and expansion of existing holiday park	3	Due to nature of the development, no cumulative effects on the receptors identified are considered likely. It is also assumed that should permission be granted, works associated with the reorganisation and expansion of the existing holiday park would be completed prior to the start of the construction works for the Projects. Therefore, no cumulative effects on any shared receptors identified are predicted.	No potential for significant cumulative effects.
JBM Peartree Hill Solar Farm	2	Due to the proximity of the development to the Projects, there is the potential for cumulative effects of a direct / indirect nature on the receptors identified. However, due to the nature of the development and the regulatory regime under which it will be constructed, it is assumed that appropriate mitigation measures will be incorporated into the design thus limiting the potential for cumulative effects to occur.	No potential for significant cumulative effects.
Carr Lane Tickton – solar farm development	3	Due to the nature of the development, no cumulative effects on the receptors identified are considered likely. It is also assumed that should permission be granted; appropriate mitigation measures will be incorporated into the design thus limiting the potential for cumulative effects to occur.	No potential for significant cumulative effects.
Heron Lakes – expansion of existing holiday park	3	Due to nature of the development, no cumulative effects on receptors identified are considered likely. It is also assumed that should permission be granted, works associated with the holiday park would be completed prior to the start of the construction works for the Projects. Therefore, no cumulative effects on any shared receptors identified are predicted.	No potential for significant cumulative effects.
Tickton Bridge POC Mast	3	Due to nature of the development, no cumulative effects on receptors identified are considered likely. It is also assumed that, as the application has been approved, the construction of Point of Connection mast and control room would be completed prior to the start of the construction works for the Projects. Therefore, no cumulative effects on any shared receptors identified are predicted.	No potential for significant cumulative effects.

Scheme Name	Tier	Discussion	Likelihood and Significance of Cumulative Effects
Tickton Bridge Solar – solar farm development	1	Due to the nature of the development, no cumulative effects on the receptors identified are considered likely. It is also assumed that should permission be granted; appropriate mitigation measures will be incorporated into the design thus limiting the potential for cumulative effects to occur.	No potential for significant cumulative effects.
Longcroft Lower – residential housing development	3	Due to nature of the development and distance from the Projects, no cumulative effects on the receptors identified are considered likely. It is also assumed that, should permission be granted, works associated with the construction of the housing development would be completed prior to the start of the construction works for the Projects. Therefore, no cumulative effects on any shared receptors identified.	No potential for significant cumulative effects.
A164 And Jocks Lodge Improvement Scheme	1	Due to the proximity of the development to the Projects, there is the potential for cumulative effects of a direct / indirect nature on the receptors identified. However, due to the nature of the development and the regulatory regime under which it will be constructed, it is assumed that appropriate mitigation measures will be incorporated into the design thus limiting the potential for cumulative effects to occur. There will be a temporal overlap during the first year of construction of the Projects and the final year of the junction improvements. It is anticipated that the junction improvement scheme will be operational during the remaining construction period of the Projects.	No potential for significant cumulative effects.
Creyke Beck Solar Farm	1	Due to the proximity of the development to the Projects, there is the potential for cumulative effects of a direct / indirect nature on the receptors identified. However, due to the nature of the development and the regulatory regime under which it will be constructed, it is assumed that appropriate mitigation measures will be incorporated into the design thus limiting the potential for cumulative effects to occur. There will be a temporal overlap during the first year of construction of the Projects and the final year of the solar farm. It is anticipated that the solar farm will be operational during the remaining construction period of the Projects.	No potential for significant cumulative effects.

Scheme Name	Tier	Discussion	Likelihood and Significance of Cumulative Effects
Grange Farm Solar	1	Due to the nature of the development, no cumulative effects on the receptors identified are considered likely. It is also assumed that, as the application has been approved, construction would be completed prior to the start of the construction works for the Projects. Therefore, no cumulative effects on any shared receptors identified.	No potential for significant cumulative effects.
Proposed Beverley Household Recycling Centre[1]	3	Due to the nature of the development, no cumulative effects on the receptors identified are considered likely. It is also assumed that should permission be granted, works associated with the development of a household recycling centre and associated works would be completed prior to the start of the construction works for the Projects. Therefore, no cumulative effects on any shared receptors identified.	No potential for significant cumulative effects.
White Hall – solar farm development	3	Due to the nature of the development, no cumulative effects on the receptors identified are considered likely. It is also assumed that should permission be granted, works associated with the construction of ground mounted photovoltaic development, battery storage development and associated works would be completed prior to the start if the construction works for the Projects. Therefore, no cumulative effects on any shared receptors identified.	No potential for significant cumulative effects.
Tickton Bridge Solar	1	Due to the proximity of the development to the Projects, there is the potential for cumulative effects of a direct / indirect nature on the receptors identified. However, due to the nature of the development and the regulatory regime under which it will be constructed, it is assumed that appropriate mitigation measures will be incorporated into the design thus limiting the potential for cumulative effects to occur. It is anticipated that the proposed solar farm would be operational prior to the start of constructions works for the Projects.	No potential for significant cumulative effects.
Skipsea Caravan Park	1	Due to nature of the development, no cumulative effects on receptors identified are considered likely. It is also assumed that, as the application has been approved, works associated with the holiday park would be completed prior to the start of the construction works for the Projects. Therefore, no cumulative effects on any shared receptors identified are predicted.	No potential for significant cumulative effects.

[1] The Applicants are aware that the Proposed Beverley Household Recycling Centre application has been refused however kept in CEA longlist due to professional judgement and stakeholder request.

Scheme Name	Tier	Discussion	Likelihood and Significance of Cumulative Effects
Manor Farm Dunnington – erection of a 4.2MW wind turbine	1	Due to nature of the development, no cumulative effects on receptors identified are considered likely. It is also assumed that, as the application has been approved, works associated with the erection of a wind turbine and any associated works would be completed prior to the start of the construction works for the Projects. Therefore, no cumulative effects on any shared receptors identified are predicted.	No potential for significant cumulative effects.
Dogger Bank A and B – offshore windfarm	1	Both Dogger Bank A and B will be operational during the construction phase of the Projects. Therefore, no cumulative impacts on any shared receptors are predicted.	No potential for significant cumulative effects.
Creyke Beck Substation Extension	2	Due to the proximity of the development to the Projects and potential temporal overlap of construction phases, there is the potential for cumulative effects of a direct / indirect nature on the receptors identified. However, due to the nature of the development and the regulatory regime under which it will be constructed, it is assumed that appropriate mitigation measures will be incorporated into the design thus limiting the potential for cumulative effects to occur.	No potential for significant cumulative effects.
Proposed Birkhill Wood National Grid Substation	2		
Hornsea 4 Offshore Wind Farm	1	Due to the proximity of the development to the Projects, there is the potential for cumulative effects of a direct / indirect nature on the receptors identified. However, due to the nature of the development and the regulatory regime under which it will be constructed, it is assumed that appropriate mitigation measures will be incorporated into the design thus limiting the potential for cumulative effects to occur. Construction of Hornsea 4 Offshore Wind Farm is anticipated to start in 2024, overlapping with the construction of the Projects between 2026 and 2028. It is anticipated that Hornsea 4 Offshore Wind Farm will be operational during the remaining construction period of the Projects.	No potential for significant cumulative effects.

228. The CEA for Geology and Land Quality has not identified any schemes where significant cumulative effects could arise.

19.9 Transboundary Effects

229. There are no transboundary effects with regards to Geology and Land Quality as the Onshore Development Area would not be sited in proximity to any international boundaries. Transboundary effects are therefore scoped out of this assessment and not considered further.

19.10 Interactions

230. The effects identified and assessed in this chapter have the potential to interact with each other. The areas of potential interaction between effects are presented in **Table 19-15**. This provides a screening tool for which effects have the potential to interact. **Table 19-16** provides an assessment for each receptor (or receptor group) as related to these impacts.

231. Within **Table 19-16** the effects are assessed relative to each development phase to see if multiple effects could increase the significance of the effect upon a receptor. Following this a lifetime assessment is undertaken which considers the potential for the effects to affect receptors across all development phases.

Table 19-15 Interactions Between Impacts - Screening

Potential Interactions between Impacts						
Construction						
	Impact 1 Exposure to contaminated soils (human health)	Impact 2 Impacts on groundwater	Impact 3 Impacts on surface waters	Impact 4 Sterilisation of mineral resources	Impact 5 Built environment (users of existing buildings)	Impact 6 Impacts on agricultural land
Impact 1 Exposure to contaminated soils (human health)		Yes	No	No	No	Yes
Impact 2 Impacts on groundwater	Yes		Yes	No	No	Yes
Impact 3 Impacts on surface waters	No	Yes		No	No	Yes
Impact 4 Sterilisation of future mineral resources	No	No	No		No	No
Impact 5 Built environment	No	No	No	No		No
Impact 6 Impacts on agricultural land	Yes	Yes	Yes	No	No	
Operation						
	Impact 7 Exposure to contaminated soils (human health)	Impact 8 Impact on groundwater and surface water	Impact 9 Sterilisation of mineral resources	Impact 10 Built environment (users of existing buildings)	Impact 11 Impacts on agricultural land	
Impact 7 Exposure to contaminated soils (human health)		Yes	No	No	Yes	
Impact 8 Impact on groundwater and surface water	Yes		No	No	Yes	
Impact 9 Sterilisation of mineral resources	No	No		No	No	

Potential Interactions between Impacts					
Impact 10 Built environment (users of existing buildings)	No	No	No		No
Impact 11 Impacts on agricultural land	Yes	Yes	No	No	
Decommissioning					
As per construction phase.					

Table 19-16 Interaction Between Impacts - Phase and Lifetime Assessment

Receptor	Highest Significance Level				
	Construction	**Operation**	**Decommissioning**	**Phase Assessment**	**Lifetime Assessment**
Human health	Minor adverse	Minor adverse	Minor adverse	**No greater than individually assessed impact** The potential impacts to human health are assessed as **minor** adverse on receptors deemed to be of high sensitivity, with the most sensitive receptors deidentified as construction workers. Impacts to human health during construction, operation and decommissioning phases will be managed through standard and best practice methodologies. Given the proposed mitigation measures, and the **minor** adverse significance, it is considered that there would either be no interactions between impacts during each phase or that interactions would be no greater than when assessed individually.	**No greater than individually assessed impact** The impacts to human health are considered a potential risk during the construction, operation and decommissioning phases. Risks associated with each of the phases of the Projects will be managed through best practice and adoption of appropriate mitigation measures discussed within this chapter. Therefore, no lifetime effects for receptors are anticipated.
Groundwater	Minor adverse	Minor adverse	Minor adverse	**No greater than individually assessed impact** The impacts to groundwater are assessed as **minor** adverse significance on receptors of low to high sensitivity. Impacts to groundwater during construction, operation and decommissioning phases will be managed through standard and best practice methodologies. Given the proposed mitigation measures, and the **minor** adverse significance of effect, it is considered that there would either be no interactions during each of the phases, or that interactions would be no greater than individually assessed.	**No greater than individually assessed impact** The impacts to groundwater quality in the superficial aquifers during earthworks are only considered a potential risk during the construction and decommissioning phases. It is considered unlikely that earthwork activities would be required during the operational phase of the Projects. If earthworks are required during the operational phase, they are anticipated to be managed in line with best practice with appropriate risk assessments conducted and submitted to the relevant agency. The impacts to groundwater quality in the bedrock aquifers, and by extension SPZs, during trenchless crossing activities or piling (if required) are only considered a potential risk during the construction and decommissioning phases. Risks associated with the decommissioning phase are associated with the complete or partial removal of piles (if present) associated with the Onshore Converter Stations. If these works are required, they are anticipated to be managed in line with best practice with appropriate risk assessments conducted and submitted to the relevant agency. Therefore, no lifetime effects for receptors are anticipated.

Receptor	Highest Significance Level				
	Construction	Operation	Decommissioning	Phase Assessment	Lifetime Assessment
Surface water	Minor adverse	Minor adverse	Minor adverse	**No greater than individually assessed impact** The impacts to surface waters are assessed as **minor** adverse significance on receptors of high sensitivity. Impacts to surface waters during construction, operation and decommissioning phases will be managed through standard and best practice methodologies. Given the proposed mitigation measures and **minor** adverse significance, it is considered that there would either be no interactions between impacts during each of the phases or that interactions would be no greater than when individually assessed.	**No greater than individually assessed impact** The impacts to surface water quality from contamination of groundwater are only considered a potential risk during the construction and decommissioning phases. Risks associated with the operational phase of the Projects will be managed through best practice. Therefore, no lifetime effects are anticipated for surface water receptors.
Mineral resources	Minor adverse	Moderate adverse	Minor adverse	**Greater than individually assessed impact.** It is considered unlikely that prior extraction of mineral resources would be possible or economically viable due to the narrow linear nature of the Projects. This would result in a moderate adverse impact on receptors of medium sensitivity during the operational phase of the Projects.	**Greater than individually assessed impact** Impacts to mineral resources are considered a potential risk during construction, operation or decommissioning phases of the Projects. However, it may not be possible to mitigate the impacts associated with the operational phase should viable mineral resources be present within the Onshore Development Area. Therefore, there is the potential for lifetime effects to occur as a result of the Projects.
Built environment	Minor adverse	Minor adverse	Minor adverse	**No greater than individually assessed impact** The impacts to the built environment are assessed as **minor** adverse on receptors of medium sensitivity. Impacts to the built environment during construction, operation and decommissioning phases will be managed through standard and best practice methodologies. Given the proposed mitigation measures and **minor** adverse significance, it is considered that there would either be no interactions between impacts during each of the phases or that interactions would be no greater than when individually assessed.	**No greater than individually assessed impact** The impacts to the built environment are considered a potential risk during the construction, operation and decommissioning phases. Risks associated with each of the phases of the Projects will be managed through best practice and adoption of appropriate mitigation measures discussed within this chapter. Therefore, no lifetime effects for receptors are anticipated.

Receptor	Highest Significance Level				
	Construction	Operation	Decommissioning	Phase Assessment	Lifetime Assessment
Agricultural land	Minor adverse	Minor adverse	Minor adverse	**No greater than individually assessed impact** The potential impacts to agricultural land are assessed as **minor** adverse on receptors deemed to be of high sensitivity, with the most sensitive receptor identified as ALC Grade 2 land. Impacts to agricultural land during construction, operation and decommissioning phases will be managed through standard and best practice methodologies. Given the proposed mitigation measures, and the **minor** adverse significance of effect, it is considered that there would either be no interactions during each of the phases, or that interactions would be no greater than individually assessed.	**No greater than individually assessed impact** The impacts to agricultural land are considered a potential risk during the construction, operation and decommissioning phases. Risks associated with each of the phases of the Projects will be managed through best practice and adoption of appropriate mitigation measures discussed within this chapter. Therefore, no lifetime effects for receptors are anticipated.

19.11 Inter-relationships

232. For Geology and Land Quality potential inter-relationships between other topics assessed within the ES including:

- **Volume 7, Chapter 18 Terrestrial Ecology and Ornithology (application ref: 7.18)**;
- **Volume 7, Chapter 20 Flood Risk and Hydrology (application ref: 7.20)**;
- **Volume 7, Chapter 21 Land Use (application ref: 7.21)**; and
- **Volume 7, Chapter 27 Human Health (application ref: 7.27)**.

233. A summary of the potential inter-relationships between human health, controlled waters, the built environment, mineral resources and ecological habitats is provided in **Table 19-17**.

Table 19-17 Geology and Land Quality Inter-relationships

Topic and Description	Related Chapter	Where Addressed in this Chapter	Rationale
Construction			
Impact 1: Exposure of workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts	N/A	Section 19.6.1.1	No additional inter-related impacts to human health have been identified for these receptors during construction which would increase the standalone assessment from **minor** adverse (and not significant in EIA terms).
Impact 2: Direct impacts on groundwater quality and groundwater resources	**Volume 7, Chapter 20 Flood Risk and Hydrology (application ref: 7.20)**	Section 19.6.1.2	Any project-related changes to Geology and Land Quality (both physically and chemically) during construction could impact on the quantity and quality of groundwater resources and hydrologically connected surface water

Topic and Description	Related Chapter	Where Addressed in this Chapter	Rationale
			receptors. This is assessed in section 19.6.1.2.
Impact 3: Impacts on surface water quality and the ecological habitats they support from contamination	**Volume 7, Chapter 18 Terrestrial Ecology and Ornithology (application ref: 7.18)**	Section 19.6.1.3	Potential changes to the quantity and quality of groundwater resources and any hydrologically connected surface water during construction could impact upon water dependent biological features, inclusive of designated sites. This is assessed in section 19.6.1.3.
Impact 4: Sterilisation of future mineral resources	N/A	Section 19.6.1.4	No additional inter-related impacts on mineral resources have been identified.
Impact 5: Built environment	N/A	Section 19.6.1.5	No additional inter-related impacts on the existing built environment have been identified.
Impact 6: Impacts on agricultural land	**Volume 7, Chapter 21 Land Use (application ref: 7.21)**	Section 19.6.1.6	Potential contamination of agricultural land during the construction phase could impact on the ALC grade and productivity of agricultural land. This is assessed in section 19.6.1.6.
Operation			
Impact 7: Exposure of workforce, landowners, land users and neighbouring land	N/A	Section 19.6.2.1	No additional inter-related impacts on human health have been identified for these receptors during operation which would

Topic and Description	Related Chapter	Where Addressed in this Chapter	Rationale
users to contaminated soils and groundwater and associated health impacts			increase the standalone assessment from **minor** adverse (and not significant in EIA terms).
Impact 8: Impact on controlled waters (groundwater and surface waters)	**Volume 7, Chapter 18 Terrestrial Ecology and Ornithology (application ref: 7.18)** **Volume 7, Chapter 20 Flood Risk and Hydrology (application ref: 7.20)**	Section 19.6.2.2	Potential changes to the quality of groundwater or hydraulically connected surface water bodies have the potential to also impact on water dependent biological features. However, no additional inter-related impacts on controlled waters have been identified.
Impact 9: Sterilisation of future mineral resources	N/A	Section 19.6.2.3	No additional inter-related impacts on mineral resources have been identified.
Impact 10: Built environment	N/A	Section 19.6.2.4	No additional inter-related impacts on the built environment have been identified.
Impact 11: Impacts on agricultural land	**Volume 7, Chapter 21 Land Use (application ref: 7.21)**	Section 19.6.2.5	Potential contamination of agricultural land during the operational phase could impact on the ALC grade and productivity of agricultural land.
Decommissioning			
Effects associated with the decommissioning phase would be no greater than those identified for the construction phase.			

19.12 Summary

234. This chapter has provided a characterisation of the existing environment for Geology and Land Quality based on existing data which has established that there will be some **minor** adverse residual effects on the receptors associated with Geology and Land Quality during the construction, operation and decommissioning phases of the Projects.

235. The assessment has established that the receptors relating to Geology and Land Quality could be impacted as a result of direct disturbance and mobilisation of existing contamination and; introduction of new sources of contamination during each of the phases of the Projects. The residual effects on the receptors following implementation of mitigation measures are however, considered not to be significant in EIA terms.

236. With regards to sterilisation of mineral resources, potential impacts during the construction phase are considered to be **minor** adverse due to the temporary nature of the impact. The assessment established that there is the possibility of impacts of a **moderate** adverse significance to occur during the operational phase. However, mineral resources excavated during the construction of the Projects would be reinstated within the vicinity of where they were excavated, wherever possible as part of the site's Materials Management Plan following completion of construction in that area. This would allow the minerals to remain in-situ and available for extraction by others post decommissioning. Therefore, the potential impacts in relation to mineral sterilisation are considered to be temporary in nature.

237. The assessment has demonstrated that although the scenarios involving the Projects together (sequentially or concurrently) have a larger land area and would lead to greater ground disturbance when compared to the Projects in isolation, there is no difference in the residual impacts on the receptors for each of the scenarios assessed.

Table 19-18 Summary of Potential Likely Significant Effects on Geology and Land Quality

Potential Impact	Receptor	Sensitivity	Magnitude of Impact	Pre-mitigation Effect	Mitigation Measures Proposed	Residual Effect
Construction						
Impact 1: Exposure of workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts	Human health	High	Low	Moderate adverse	Targeted pre-construction ground investigations in areas of potential sources of contamination.	**Minor** adverse
Impact 2: Direct impacts on groundwater quality and groundwater resources	Secondary A, Secondary B, Secondary Undifferentiated and Principal Aquifers; SPZs	Low to high	Low	Minor to moderate adverse	Targeted pre-construction ground investigations in areas of potential sources of contamination.	**Minor** adverse
Impact 3: Impacts on surface water quality and the ecological habitats they support from contamination	Controlled waters	High	Negligible	Minor adverse	No additional mitigation measures required.	**Minor** adverse
Impact 4: Sterilisation of future mineral resources	Mineral Safeguarding Areas	Medium	Low	Minor adverse	No additional mitigation measures required.	**Minor** adverse
Impact 5: Built environment	Buildings and utilities	Medium	Low	Minor adverse	No additional mitigation measures required.	**Minor** adverse
Impact 6: Impacts on agricultural land	Agricultural land	High	Low	Moderate adverse	Targeted pre-construction ground investigations in areas of potential sources of contamination.	**Minor** adverse
Operation						
Impact 7: Exposure of workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts	Human health	High	Negligible	Minor adverse	No additional mitigation measures required.	**Minor** adverse
Impact 8: Impact on controlled waters (groundwater and surface waters)	Controlled waters	High	Negligible	Minor adverse	No additional mitigation measures required.	**Minor** adverse
Impact 9: Sterilisation of future mineral resources	Mineral Safeguarding Areas	Medium	Medium	Moderate adverse	No additional mitigation measures available.	**Moderate** adverse

Potential Impact	Receptor	Sensitivity	Magnitude of Impact	Pre-mitigation Effect	Mitigation Measures Proposed	Residual Effect
Impact 10: Built environment	Buildings and utilities	Medium	Low	Minor adverse	No additional mitigation measures required.	**Minor** adverse
Impact 11: Impacts on agricultural land	Agricultural land	High	Negligible	Moderate adverse	No additional mitigation measures required.	**Minor** adverse
Decommissioning						
The detail and scope of the decommissioning works would be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A Decommissioning Plan would be provided prior to any decommissioning commencing onshore.						

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