XLINKS' MOROCCO-UK POWER PROJECT

Environmental Statement

Volume 2, Chapter 4: Geology, Hydrogeology and Ground Conditions

Document Number: 6.2.4

PINS Reference: EN010164/APP/6.2

APFP Regulations: 5(2)(a)

November 2024

For Issue

Document status					
Version	**Purpose of document**	**Authored by**	**Reviewed by**	**Approved by**	**Review date**
For Issue	Application	RPS	Xlinks 1 Ltd	Xlinks 1 Ltd	November 2024

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Prepared for:

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Contents

Tables

Figures (See Volume 2, Figures)

Figure Number	Figure Title
4.1	Geology, Hydrogeology and Ground Conditions Study Area
4.2	Location of Cumulative Applications - Geology, Hydrogeology and Ground Conditions

Appendices (See Volume 2, Appendices)

Appendix Number	Appendix Title
4.1	Desk Top Study, Preliminary Risk Assessment and Site Reconnaissance (also referred to in this report as 'DTS, PRA and Site Reconnaissance')
4.2	Private Water Supply Desk Based Assessment

Glossary

Term	Meaning
Alverdiscott Substation	The existing National Grid Electricity Transmission substation at Alverdiscott, Devon, which comprises 400 kV and 132 kV electrical substation equipment.
Alverdiscott Substation Connection Development	The development required at the existing Alverdiscott Substation Site, which is envisaged to include development of a new 400 kV substation, and other extension modification works to be carried out by National Grid Electricity Transmission. This does not form part of the Proposed Development, however, it is considered cumulatively within the Environmental Impact Assessment as it is necessary to facilitate connection to the national grid.
Alverdiscott Substation Site	The National Grid Electricity Transmission site within which the Alverdiscott Substation sits.
Aquifer	A subsurface layer or layers of rock or other geological strata of sufficient porosity and permeability to allow either a significant flow of groundwater or the abstraction of significant quantities of groundwater.
Applicant	Xlinks 1 Limited.
Baseline	The status of the environment without the Proposed Development in place.
Bipole	A Bipole system is an electrical transmission system that comprises two Direct Current conductors of opposite polarity (one conductor with positive voltage and one with negative voltage).
Climate change	A change in global or regional climate patterns, in particular a change apparent from the mid to late 20th century onwards and attributed largely to the increased levels of atmospheric carbon dioxide produced by the use of fossil fuels.
Converter Site	The Converter Site is proposed to be located to the immediate west of the existing Alverdiscott Substation Site in north Devon. The Converter Site would contain two converter stations (known as Bipole 1 and Bipole 2) and associated infrastructure, buildings and landscaping.
Converter station	Part of an electrical transmission and distribution system. Converter stations convert electricity from Direct Current to Alternating Current, or vice versa.
Horizontal Directional Drilling	Horizontal Directional Drilling (HDD) is a method of installing underground pipelines, cables and service conduit (or ducts) through trenchless methods to avoid obstacles and sensitive features (e.g. roads, watercourses, woodlands, etc.). The term HDD is used here interchangeably with other similar trenchless techniques but excluding micro tunnelling or direct pipe methods.
Cumulative Effects	The combined effect of the Proposed Development in combination with the effects from other planning applications, on the same receptor or resource.
Development Consent Order	An order made under the Planning Act 2008, as amended, granting development consent.
Development High Risk Area	Part of the coal mining reporting area which contains one or more recorded coal mining related features at surface or shallow depth.
Duration (of impact)	The time over which an impact occurs. An impact may be described as short, medium or long-term and permanent or temporary.
Effect	The term used to express the consequence of an impact. The significance of effect is determined by correlating magnitude of the impact with the importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria.
Environmental Impact Assessment	The process of identifying and assessing the significant effects likely to arise from a project. This requires consideration of the likely changes to the environment, where these arise as a consequence of a project, through comparison with the existing and projected future baseline conditions.

Term	Meaning
Environmental Statement	The document presenting the results of the Environmental Impact Assessment process.
HVAC Cables	The High Voltage Alternating Current cables which would bring electricity from the converter stations to the new Alverdiscott Substation Connection Development.
HVDC Cables	The High Voltage Direct Current cables which would bring electricity to the UK converter stations from the Moroccan converter stations.
Impact	Change that is caused by an action/proposed development, e.g., land clearing (action) during construction which results in habitat loss (impact).
Landfall	The proposed area in which the offshore cables make landfall in the United Kingdom (come on shore) and the transitional area between the offshore cabling and the onshore cabling. This term applies to the entire landfall area at Cornborough Range, Devon, between Mean Low Water Springs and the transition joint bays inclusive of all construction works, including the offshore and onshore cable routes, and landfall compound(s).
Made Ground	Land where natural and undisturbed soils have largely been replaced by man-made or artificial materials.
Maximum design scenario	The realistic worst case scenario, selected on a topic-specific and impact specific basis, from a range of potential parameters for the Proposed Development.
Mean High Water Springs	The height of mean high water during spring tides in a year.
Mineral Consultation Area	Areas where consultation with the Mineral Planning Authority (Devon County Council) and the minerals industry is required to ensure that future extraction of resources or operation of infrastructure is not sterilised or constrained
Mineral Safeguarding Area	Areas which reflect the surface extent of the mineral resource, quarrying planning permission, processing facility or transport infrastructure.
National Policy Statement(s)	The current national policy statements published by the Department for Energy Security and Net Zero in 2023 and adopted in 2024.
Onshore HVDC Cable Corridor	The proposed corridor within which the onshore High Voltage Direct Current cables would be located.
Onshore Infrastructure Area	The proposed infrastructure area within the Order Limits landward of Mean High Water Springs. The Onshore Infrastructure Area comprises the transition joint bays, onshore HVDC Cables, converter stations, HVAC Cables, highways improvements, utility diversions and associated temporary and permanent infrastructure including temporary compound areas and permanent accesses.
Order Limits	The area within which all offshore and onshore components of the Proposed Development are proposed to be located, including areas required on a temporary basis during construction (such as construction compounds).
Preliminary Environmental Information Report	A report that provides preliminary environmental information in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. This is information that enables consultees to understand the likely significant environmental effects of a project, and which helps to inform consultation responses.
Principal Aquifer	A strategically important aquifer unit, which is designated by the Environment Agency.
Proposed Development	The element of the Xlinks Morocco-UK Power Project within the UK. The Proposed Development covers all works required to construct and operate the offshore cables (from the UK Exclusive Economic Zone to Landfall), Landfall, onshore Direct Current and Alternating Current cables, converter stations, and highways improvements.
Secondary Aquifer	A locally important aquifer unit.

Term	Meaning
Site of Special Scientific Interest	A site designation specified and protected in the Wildlife and Countryside Act 1981. These sites are of particular scientific interest due to important biological (e.g. a rare species of fauna or flora), geological or physiological features.
Study area	This is an area which is defined for each environmental topic which includes the Order Limits as well as potential spatial and temporal considerations of the impacts on relevant receptors. The study area for each topic is intended to cover the area within which an impact can be reasonably expected.
Toolbox talk	A short presentation to the workforce of a single aspect of health and safety.
Transboundary effects	Effects from a project within one state that affect the environment of another state(s).
Xlinks' Morocco UK Power Project	The overall scheme from Morocco to the national grid, including all onshore and offshore elements of the transmission network and the generation site in Morocco (referred to as the 'Project').

Acronyms

Acronym	Meaning
bgl	Below Ground Level
BGS	British Geological Survey
CEA	Cumulative Effects Assessment
CEMP	Construction Environmental Management Plan
CIRIA	Construction Industry Research and Information Association
CSM	Conceptual Site Model
DCO	Development Consent Order
Defra	Department for Environment, Food & Rural Affairs
DMRB	Design Manual for Roads and Bridges
DTS	Desk Top Study
EA	Environment Agency
EIA	Environmental Impact Assessment
ES	Environmental Statement
HDD	Horizontal Directional Drilling
LNR	Local Nature Reserve
MCA	Mineral Consultation Area
MHWS	Mean High Water Springs
MSA	Mineral Safeguarding Area
NPPF	National Planning Policy Framework
NPS	National Policy Statement
On-CEMP	Onshore Construction Environmental Management Plan
PEIR	Preliminary Environmental Information Report
PPG	Planning Practice Guidance
PPP	Pollution Prevention Plan
PRA	Preliminary Risk Assessment
SPZ	Source Protection Zones
SSSI	Site of Special Scientific Interest

Acronym	Meaning
TFD	Tidal Flat Deposits
UXO	Unexploded Ordnance
WFD	Water Framework Directive

Units

Units	Definition
km	Kilometre
ha	Hectares
m	Metre
m^2	Square metre
m^3	Cubic metre

4 GEOLOGY, HYDROGEOLOGY AND GROUND CONDITIONS

4.1 Introduction

4.1.1 This chapter of the Environmental Statement (ES) presents the findings of the Environmental Impact Assessment (EIA) undertaken for the United Kingdom (UK) elements of the Xlinks' Morocco-UK Power Project (the Project). For ease of reference, the UK elements of the Project are referred to in this chapter as the 'Proposed Development'. The ES accompanies the application to the Planning Inspectorate for development consent for the Proposed Development.

4.1.2 This chapter considers the likely impacts and effects of the Proposed Development on geology, hydrogeology and ground conditions during the construction, operation and maintenance and decommissioning phases. Specifically, it relates to the onshore elements of the Proposed Development landward of Mean High Water Springs (MHWS).

4.1.3 In particular, this ES chapter:

- identifies the key legislation, policy and guidance relevant to geology, hydrogeology and ground conditions;
- details the EIA scoping and consultation process undertaken to date for geology, hydrogeology and ground conditions;
- confirms the study area for the assessment, the methodology used to identify baseline environmental conditions, the impact assessment methodology, and identifies any assumptions and limitations encountered in compiling the environmental information;
- sets out the existing and future environmental baseline conditions, established from desk studies, surveys and consultation;
- details the mitigation and/or monitoring measures that are proposed to prevent, minimise, reduce or offset the possible environmental effects identified in the EIA process;
- defines the project design parameters used to inform for the impact assessment;
- presents an assessment of the likely impacts and effects in relation to the construction, operation and maintenance and decommissioning phases of the Proposed Development on geology, hydrogeology and ground conditions; and
- identifies any cumulative, transboundary and/or inter-related effects in relation to the construction, operation and maintenance and decommissioning phases of the Proposed Development on geology, hydrogeology and ground conditions.

4.1.4 The assessment presented is informed by the following technical chapter and should be read in conjunction with:

- Volume 2, Chapter 3: Hydrology and Flood Risk of the ES.

4.1.5 This chapter draws upon additional information to support the assessment contained within Volume 2, Appendix 4.1: Desk Top Study, Preliminary Risk Assessment and Site Reconnaissance (DTS, PRA and Site Reconnaissance) and Volume 2, Appendix 4.2: Private Water Supply Desk Based Assessment of the ES.

4.2 Legislative and Policy Context

Legislation

Water Resources Act 1991

4.2.1 The Water Resources Act 1991 Chapter 57 Part III principally relates to the protection of controlled water (i.e., rivers, lakes, canals and groundwater) from pollution. It sets out the responsibilities of the Environment Agency (EA) in relation to water pollution, resource management, flood defence, fisheries and, in some areas, navigation. It also regulates discharges to controlled waters, namely rivers, estuaries, coastal waters, lakes and groundwater.

The Environmental Protection Act 1990

4.2.2 The Environmental Protection Act 1990, set out a regime for prescribing limits on the release of substances to the environment. The Environmental Protection Act 1990 was amended by the Environment Act 1995 making provision for a risk-based framework for the identification, assessment and management of contaminated land within the UK. These provisions came into effect in April 2000.

4.2.3 Part IIA (Contaminated Land) of the Environmental Protection Act was added by the Environment Act 1995 and defines a means of identifying contaminated land for its remediation. Part IIA is implemented through the Contaminated Land (England) Regulations 2006 (as amended).

4.2.4 The Part IIA regime is aimed at ensuring that actions taken with respect to contaminated land are directed by a technically well-founded assessment of risk that considers the 'source-pathway-receptor' scenario (contaminant linkage). Under Part IIA, contaminated land is defined as:

'…any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that:

(a) significant harm is being caused or there is a significant possibility of such harm being caused; or

(b) significant pollution of controlled waters is being caused, or there is a significant possibility of such pollution being caused.' (section 78A, Part IIA, Environmental Pollution Act).

4.2.5 'Significant harm' is defined according to risk-based criteria and must be the result of pollutant linkages.

4.2.6 A contaminant source, pathway and receptor must be present to complete the pollutant linkage and for a potentially significant risk to exist. As such, the presence of contamination in itself does not necessarily indicate a need for remedial action. Accordingly, a site can only be considered 'contaminated' when a risk to the environment or human health is present due to the presence of a

'source-pathway-receptor' linkage. In such circumstances and where there is a significant risk posed to human health and/or the environment, the Environmental Protection Act 1990 states that local planning authorities must *'ensure that remediation achieves a standard sufficient to ensure that the land no longer poses sufficient risk to qualify as contaminated land'*. This means that the approach to remediating a site is dictated by the site's proposed end use.

The Contaminated Land (England) Regulations 2006

4.2.7 As set out above, these regulations make provisions for a contaminated land regime, in accordance with Part IIA of the Environmental Protection Act 1990, which includes actions for the remediation of such land. These regulations (and the accompanying Part 2A Contaminated Land Statutory Guidance (Department for Environment, Food and Rural Affairs (Defra), 2012)) introduced four possible grounds under which land can be classified as contaminated. These grounds are:

- significant harm is being caused to a human, or relevant non-human, receptor;
- there is a significant possibility of significant harm being caused to a human, or relevant non-human, receptor;
- significant pollution of controlled waters is being caused; and/or
- there is a significant possibility of significant pollution of controlled waters being caused.

The Environment Act 2021

4.2.8 The Environment Act 2021 gives a legal framework for environmental governance in the UK and brings in measures for improvement of the environment in relation to waste, resource efficiency, air quality, water, nature and biodiversity, and conservation.

4.2.9 Part 5 - Water, of the Environment Act 2021 includes provision for regulations to be made about the substances that should be taken into account when assessing the chemical status of surface or groundwater and specifying standards in relation to water quality.

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

4.2.10 The aim of the Environmental Damage Regulations 2015 is to prevent and remedy damage to land, water and biodiversity.

Groundwater (England and Wales) Regulations 2009

4.2.11 The Groundwater Regulations 2009 transpose the provisions of the EU Groundwater Directive 2006/118/EC into law in England. Although the Directive no longer has effect in the UK, the regulations remain in place to provide a comprehensive and risk-based approach to pollution prevention, in relation to groundwater contamination.

The Water Supply (Water Quality) Regulations 2016 and 2018

4.2.12 The quality of public drinking water supplies in England is regulated by the Water Supply (Water Quality) Regulations 2016 and the Water Supply (Water Quality) Regulations 2018. These regulations set standards for drinking water quality. Although standards are not specified for all chemical compounds in existence, the regulations do require that, in order to be regarded as 'wholesome', drinking water must not contain any substance at a level which would constitute a potential danger to human health (as well as meeting the other requirements of the regulations).

Environmental Permitting (England and Wales) Regulations 2016

4.2.13 These regulations revoke and replace the Environmental Permitting (England and Wales) Regulations 2010 and the Groundwater (England and Wales) Regulations 2009. These regulations control groundwater pollution, including from contaminated land sources.

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

4.2.14 These regulations implement the EU Water Framework Directive (WFD) 2000/60/EC in England. Although the Directive no longer has effect in the UK, the regulations remain in place with the following environmental objectives:

- Prevention of deterioration of the status of surface water and groundwater.
- Achievement of objectives and standards for protected areas.
- Protect, enhance and restore each body of surface water with the aim of achieving good status for all water bodies by 2021. Where this is not possible and subject to the criteria set out in the Water Environment (WFD) (England and Wales) Regulations 2017 (WFD Regulations), aim to achieve good status by 2027 or set an objective less stringent than good status.
- Protect and enhance each artificial or heavily modified water body with the aim of achieving good ecological potential and good surface water chemical status for heavily modified water bodies and artificial water bodies. Where this is not possible and subject to the criteria set out in the WFD Regulations, aim to achieve good status or potential by 2027 or set an objective less stringent than good status or potential.
- Reversal of any significant and sustained upward trends in pollutant concentrations in groundwater.
- Aim progressively to reduce pollution from priority substances and aim to cease or phase out discharges of priority hazardous substances into surface waters.
- Progressively reduce the pollution of groundwater, prevent the input of hazardous substances and limit the entry of non-hazardous pollutants to groundwater.

The Construction (Design and Management) Regulations 2015

4.2.15 These regulations cover the management of health, safety and welfare when carrying out construction projects.

Control of Substances Hazardous to Health (COSHH) Regulations 2002

4.2.16 The COSHH regulations require the risks that arise from the use of hazardous substances to be assessed. This includes any arrangements to deal with accidents, incidents or emergencies e.g. as a results of significant spillages.

Planning Policy Context

4.2.17 The Proposed Development would be located within the UK Exclusive Economic Zone (EEZ) offshore waters (beyond 12 nautical miles (nm) from the English coast) and inshore waters, with the onshore infrastructure proposed to be located wholly within Devon, England. As set out in Volume 1, Chapter 1: Introduction of the ES, the Secretary of State for the Department for Energy Security and Net Zero (DESNZ) has directed that elements of the Proposed Development are to be treated as development for which development consent is required under the Planning Act 2008, as amended.

National Policy Statements

4.2.18 There are currently six energy National Policy Statements (NPSs), three of which contain policy relevant to the Proposed Development, specifically:

- Overarching NPS for Energy (NPS EN-1) which sets out the UK Government's policy for the delivery of major energy infrastructure (Department for Energy Security & Net Zero 2023a);
- NPS for Renewable Energy Infrastructure (NPS EN-3) (Department for Energy Security & Net Zero 2023b); and
- NPS for Electricity Networks Infrastructure (NPS EN-5) (Department for Energy Security & Net Zero 2023c).

4.2.19 **Table 4.1** sets out key aspects from the NPSs relevant to the Proposed Development, with particular reference to the need for and approach to consenting such infrastructure.

4.2.20 The policies within the current NPSs relevant to all topics in the ES can be viewed in the NPS Compliance Tracker within the Planning Statement (document reference 7.2), which forms part of the Development Consent Order (DCO) application.

Table 4.1: Summary of relevant NPS policy

Summary of NPS requirement	How and where considered in this ES
NPS EN-1 (DESNZ, 2023a)	
The ES should clearly set out any effects on internationally, nationally and locally designated sites of geological conservation importance (paragraph 5.4.17 of NPS EN-1).	The effects of the Proposed Development on sites of geological conservation importance are considered in **section 4.10** of this chapter.
'*The applicant should show how the project has taken advantage of opportunities to conserve and enhance geological conservation interests'* (paragraph 5.4.19 of NPS EN-1).	Mitigation measures relating to geology, hydrogeology and ground conditions are set out within **section 4.8** of this chapter and the Commitments Register (Volume 1, Appendix 3.1: Commitments Register of the ES).
Applicants should include appropriate avoidance, mitigation, compensation and enhancement measures as an integral part of the proposed development. In particular, the applicant should demonstrate that: • during construction, they will seek to ensure that activities will be confined to the minimum areas required for the works • the timing of construction has been planned to avoid or limit disturbance … (paragraph 5.4.35, NPS EN-1).	
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 of NPS EN-1).	Features of geological interest have largely been avoided through the site selection process and refinement and through the use of trenchless techniques. The potential impacts to the sites of geological interest are set out in **section 4.10** of this chapter. As detailed within **paragraphs 4.10.2** to **4.10.8**, there will be no significant adverse impacts on geodiversity. Therefore, no Geodiversity Management Strategy is required.
The benefits of nationally significant low carbon energy infrastructure development may include benefits for biodiversity and geological conservation interests and these benefits may outweigh harm to these interests. The Secretary of State may take account of any such net benefit in cases where it can be demonstrated (paragraph 5.4.41 of NPS EN-1).	Likely significant effects on designated sites have been taken into account in the site selection process and are considered in **section 4.10**. While no beneficial effects are considered likely, the assessment concludes that there would be no significant adverse effects to designated sites.
Development proposals provide many opportunities for building-in beneficial biodiversity or geological features as part of good design. The Secretary of State should give appropriate weight to environmental and biodiversity enhancements, although any weight given to gains provided to meet a legal requirement (for example under the Environment Act 2021) is likely to be limited. (paragraph 5.4.46 of NPS EN-1).	Geological enhancements have not been identified within this chapter however likely significant effects on designated sites have been taken into account in the site selection process and are considered in **section 4.10.** The assessment concludes that there would be no significant adverse effects to designated sites.
The Secretary of State should use requirements and/or planning obligations to mitigate the harmful aspects of the development and, where possible, to ensure the conservation and enhancement of the site's biodiversity or	There would be no significant adverse impacts on Sites of Special Scientific Interest (SSSIs) designated for geodiversity. Details of the assessment in relation to SSSIs are set out in **paragraphs 4.10.2** to **4.10.8**.

Summary of NPS requirement	How and where considered in this ES
geological interest (paragraph 5.4.50 of NPS EN-1).	
For developments on previously developed land, applicants should ensure that they have considered the risk posed by contamination (paragraph 5.11.8 of NPS EN-1).	The risks posed by land contamination are considered in the assessment summarised in **sections 4.10** to **4.12** of this chapter, with further details of baseline conditions provided in Volume 2, Appendix 4.1: DTS, PRA and Site Reconnaissance of the ES.
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 of NPS EN-1).	An Outline Soil Management Plan forms Appendix D of the Outline Onshore Construction Environmental Management Plan (On-CEMP) (document reference 7.7, Appendix D) and has been prepared as part of the application for development consent.. Prior to construction, a Soil Management Plan would be developed in accordance with the Outline Soil Management Plan (document reference 7.7, Appendix D).
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 of NPS EN-1).	A Preliminary Risk Assessment is provided in Volume 2, Appendix 4.1: DTS, PRA and Site Reconnaissance of the ES. Effects associated with existing contamination are considered in: • **Section 4.10** (see **paragraphs 4.10.9** to **4.10.22,** and **paragraphs 4.10.46** to **4.10.54**). • **Section 4.11 (**see **paragraphs 4.11.3** to **4.11.11,** and **paragraphs 4.11.12** to **4.11.22).** • **Section 4.12** (see **paragraph 4.12.23**).
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 of NPS EN-1).	A Preliminary Risk Assessment is provided in Volume 2, Appendix 4.1: DTS, PRA and Site Reconnaissance of the ES.
Development should aim to avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives; where significant harm cannot be avoided, then appropriate compensation measures should be sought (paragraph 5.4.42 of NPS EN-1).	Likely significant effects on designated sites have been taken into account in the site selection process and are considered in **section 4.10**. Mitigation and design measures are outlined in **Table** 4.21 of this ES chapter and in the Commitments Register (Volume 1, Appendix 3.1: Commitments Register of the ES). Biodiversity is considered in Volume 2, Chapter 1: Onshore Ecology and Nature Conservation of the ES.
Applicants should safeguard any mineral resources on the proposed site as far as possible, taking into account the long-term potential of the land use after any future decommissioning has taken place (paragraph 5.11.19 of NPS EN-1).	There are no MSAs or Mineral Consultation Areas (MCAs) within the study area and therefore this has been excluded from further assessment.
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 of NPS EN-1).	

Summary of NPS requirement	How and where considered in this ES
Where the project is likely to have effects on the water environment, the applicant should undertake an assessment of the existing status of, and impacts of the proposed project on, water quality, water resources and physical characteristics of the water environment, and how this might change due to the impact of climate change on rainfall patterns and consequently water availability across the water environment, as part of the ES or equivalent (see Section 4.3 and 4.10) (paragraph 5.16.3 of NPS EN-1).	Impacts in terms of groundwater are considered within **sections 4.10** to **4.12**. Impacts in terms of surface water are considered within Volume 2, Chapter 3: Hydrology and Flood Risk of the ES.
Applicants are encouraged to consider protective measures to control the risk of pollution to groundwater beyond those outlined in River Basin Management Plans and Groundwater Protection Zones – this could include, for example, the use of protective barriers (paragraph 5.16.6 of NPS EN-1).	Pollution prevention measures are provided within the Outline Pollution Prevention Plan (PPP), which is provided as part of the application for development consent and forms Appendix A of the Outline On-CEMP (document reference 7.7, Appendix A).
The ES should describe: • the existing quality of waters affected by the proposed project and the impacts of the proposed project on water quality, noting any relevant existing discharges, proposed new discharges and proposed changes to discharges; • existing water resources affected by the proposed project and the impacts of the proposed project on water resources, noting any relevant existing abstraction rates, proposed new abstraction rates and proposed changes to abstraction rates (including any impact on or use of mains supplies and reference to Catchment Abstraction Management Strategies); • existing physical characteristics of the water environment (including quantity and dynamics of flow) affected by the proposed project and any impact of physical modifications to these characteristics; and • any impacts of the proposed project on water bodies or protected areas under the Water Framework Directive and source protection zones (SPZs) around potable groundwater abstractions… (paragraph 5.16.7 of NPS EN-1).	Hydrogeological resources, groundwater abstractions and SPZs are identified in **section 4.7** of this chapter and in Volume 2, Appendix 4.1: DTS, PRA and Site Reconnaissance of the ES. Impacts in relation to WFD water bodies are assessed in detail within Volume 2, Chapter 3: Hydrology and Flood Risk of the ES and Volume 2, Appendix 3.2: Onshore WFD Assessment of the ES. Details of impacts on surface water receptors are set out in Volume 2, Chapter 3: Hydrology and Flood Risk of the ES. Discharges are assessed within Volume 2, Appendix 2.3: Surface Water Abstraction Licences, Discharge Consents and Pollution Incidents of the ES.
The Secretary of State should consider whether mitigation measures are needed over and above any which may form part of the project application. A construction management plan may help codify mitigation at that stage (paragraph 5.16.8 of NPS EN-1).	Mitigation measures relating to geology, hydrogeology and ground conditions are set out within **section 4.8** of this chapter and the Commitments Register (Volume 1, Appendix 3.1: Commitments Register of the ES). Details of impacts in terms of the WFD are set out in Volume 2, Appendix 3.2: Onshore WFD Assessment of the ES.
The Secretary of State will need to give impacts on the water environment more weight where a project would have an adverse effect on the achievement of the environmental objectives	

Summary of NPS requirement	How and where considered in this ES
established under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. Controlled waters include all watercourses, lakes, lochs, coastal waters, and water contained in underground strata (paragraph 5.16.12 of NPS EN-1).	
The risk of impacts on the water environment can be reduced through careful design to facilitate adherence to good pollution control practice. For example, designated areas for storage and unloading, with appropriate drainage facilities, should be clearly marked (paragraph 5.16.9 of NPS EN-1).	Measures related to the management of surface water are provided within the Outline On-CEMP provided as part of the application for development consent (document reference 7.7). Pollution prevention measures are provided within the Outline PPP which forms Appendix A of the Outline On-CEMP (document reference 7.7, Appendix A) and is provided as part of the application for development consent.
Where possible, applicants are encouraged to manage surface water during construction by treating surface water runoff from exposed topsoil prior to discharging and to limit the discharge of suspended solids e.g. from car parks or other areas of hard standing, during operation (paragraph 5.16.5).	
The Secretary of State must also consider duties under other legislation including duties under the Environment Act 2021 in relation to environmental targets and have regard to the policies set out in the Government's Environmental Improvement Plan 2023 (paragraph 5.16.13 of NPS-EN 1).	Legislation relevant to this Chapter is discussed in **section 4.2**. A key policy associated with Goal 10 Enhancing beauty, heritage and engagement with the natural environment is to reinforce the natural, geological and cultural heritage of our landscapes. Designated sites notified on the basis of geological and geomorphological interest are identified in **Table 4.12**. There will be no significant effects on geodiversity as discussed in **section 4.10**.
The Secretary of State should consider proposals to mitigate adverse effects on the water environment and any enhancement measures put forward by the applicant and whether appropriate requirements should be attached to any development consent and/or planning obligations are necessary (paragraph 5.16.16 of NPS EN-1).	Mitigation measures relating to geology, hydrogeology and ground conditions are set out within **section 4.8** of this chapter and the Commitments Register (Volume 1, Appendix 3.1: Commitments Register of the ES).
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 of NPS EN-1).	Features of geological interest have largely been avoided through the site selection process and refinement and through the use of trenchless techniques. Details of the assessment in relation to SSSIs are set out in **paragraphs 4.10.2** to **4.10.8**. No significant effects are predicted as any sites designated for their geological interest would be protected through the use of trenchless techniques. The Information to Support Appropriate Assessment (ISAA) and Habitats Regulations Assessment (HRA) screening report accompany the application for development consent (document reference 7.17).
The applicant should be particularly careful to identify any effects of physical changes on the integrity and special features of Marine Protected Areas (MPAs). These could include Marine Conservation Zones (MCZs), HRA Sites including Special Areas of Conservation and Special Protection Areas with marine features, Ramsar Sites, Sites of Community Importance, and SSSIs with marine features. Applicants should also identity any effects on the special character	

Summary of NPS requirement	How and where considered in this ES
of Heritage Coasts (paragraph 5.6.13 of NPS-EN-1).	
NPS EN-3	
No requirements specifically applicable to geology, hydrogeology and ground conditions chapter.	
NPS EN-5	
No requirements specifically applicable to geology, hydrogeology and ground conditions chapter.	

The National Planning Policy Framework

4.2.21 The National Planning Policy Framework (NPPF) was published in 2012 and updated in 2018, 2019, 2021, 2023 and 2024 (Ministry of Housing, Communities and Local Government, 2024). The NPPF sets out the Government's planning policies for England.

4.2.22 The NPPF has been updated and the draft version was published for consultation on 30 July 2024 with the consultation period ending on 24 September 2024 (Ministry of Housing, Communities and Local Government, 2024)

4.2.23 **Table 4.2** sets out a summary of the NPPF policies relevant to this chapter.

Table 4.2: Summary of NPPF requirements relevant to this chapter

Policy	Key provisions	How and where considered in this ES
15. Conserving and Enhancing the Natural Environment	*'Planning policies and decisions should contribute to and enhance the natural and local environment by:* • *protecting and enhancing sites of geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);* • *preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of pollution or land instability. Development should, wherever possible, help to improve local environmental conditions; and* • *remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.' (Paragraph 180)*	Designated sites notified on the basis of geological, geomorphological interest are identified in **Table 4.12**. Potential impacts on those features identified are assessed in **section 4.10** of this chapter. Mitigation and design measures are outlined in **Table 4.21** of this chapter.
	'Planning policies and decisions 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. 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);* • *after remediation, as a minimum, land should not be capable of being determined as*	Historical quarrying and mining activities and ground conditions are identified in **section 4.7** of this chapter. Effects on groundwater are considered in **sections 4.10** to **4.12** of this chapter. A preliminary risk assessment is provided in Volume 2, Appendix 4.1: DTS, PRA and Site Reconnaissance of the ES. An intrusive ground investigation was undertaken

Policy	Key provisions	How and where considered in this ES
	contaminated land under Part IIA of the Environmental Protection Act 1990; and • *adequate site investigation information, prepared by a competent person, is available to inform these assessments.' (Paragraph 189)*	on the Converter Site in February 2023. Additionally, an intrusive ground investigation is currently underway spanning the entirety of the Proposed Development (see **paragraphs 4.6.5** to **4.6.8**).
	'Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner.' (Paragraph 190)	Existing sources of contamination identified within the EIA process will be taken into account throughout the design process for the Development Proposal.
17. Facilitating the Sustainable Use of Minerals	Local planning authorities should not normally permit other development proposals in Mineral Safeguarding Areas if it might constrain potential future use for mineral working (Paragraph 218).	There are no MSAs within the study area and therefore this has been excluded from further assessment.

4.2.24 The draft NPPF includes similar provisions as the current designated NPPF. The draft NPPF has been reviewed and there are no material updates for Geology, Hydrogeology and Ground Conditions.

4.2.25 The Planning Practice Guidance (PPG) (Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government, 2023) supports the NPPF and provides guidance across a range of topic areas. The PPG includes guidance on the following topics relevant to this chapter:

- land affected by contamination;
- land Stability;
- minerals;
- natural Environment; and
- water supply, waste water and water quality.

4.2.26 Paragraph 002 of the PPG for 'Land affected by contamination' (Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government, 2019) identifies the role that planning plays in dealing with land that may be contaminated. Paragraph 005 establishes what sources of information can be used to determine whether land could be contaminated, including those listed in **Table 4.11**. Paragraph 007 confirms on the composition of a contamination risk assessment, particularly relating to use of the source-pathway-receptor pollutant linkage scenario as described in section 4.6.3.

4.2.27 Paragraph 004 of the PPG in the 'Land Stability' (Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government, 2019) identifies the potential sources for obtaining information on land instability, including the Coal Authority and British Geological Survey.

4.2.28 Paragraph 001 of the PPG in the section relating to 'Minerals' (Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government, 2014) confirms that minerals can only be worked where they naturally occur and therefore it is necessary to protect minerals from non-mineral development in identified mineral safeguarding areas.

4.2.29 Paragraph 018 of the PPG in the section in relation to the 'Natural environment' (Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government, 2016) sets out that information on geodiversity impacts and opportunities should inform all stages of development.

4.2.30 A draft revision of the NPPF 2024 is currently in consultation (Ministry of Housing, Communities & Local Government, 2024). The proposed changes do not affect this ES Chapter.

Local Planning Policy

4.2.31 The onshore elements of the Proposed Development are located within the administrative area of Torridge District Council (and Devon County Council at the County level). The relevant local planning policies applicable to geology, hydrogeology and ground conditions based on the extent of the study areas for this assessment are summarised in **Table 4.3**.

Table 4.3: Summary of local planning policy relevant to this chapter

Policy	Key provisions	How and where considered in this ES
North Devon and Torridge Local Plan 2011 - 2031		
Policy ST14: Enhancing Environmental Assets	*'The quality of northern Devon's natural environment will be protected and enhanced by ensuring that development contributes to:* • *(d) conserving northern Devon's geodiversity and its best and most versatile agricultural land;* • *(h) recognising the importance of the undeveloped coastal, estuarine and marine environments through supporting designations, plans and policies that aim to protect and enhance northern Devon's coastline;* • *(l) improving failing water bodies and preventing deterioration of water quality.'*	The design of the Proposed Development seeks to avoid harm to designated sites of geological interest. The approach to site selection and consideration of alternatives is set out in Volume 1, Chapter 4: Need and Alternatives of the ES. The location of nationally and regionally important sites is set out in **section 4.7** of this chapter. The potential impacts to these sites of geological interest are set out in **section 4.10** of this chapter.
Policy DM02: Environmental Protection	*'Hazards* • *Development will be supported where it does not cause an unacceptable risk to public health and safety due to:* – *(a) coastal erosion or land instability;* – *(b) its siting on known or suspected contaminated land which is unsuitable for the use proposed; or* – *(c) the storage or use of hazardous substance;* – *unless taking account of appropriate remedial, preventative or precautionary measures to remove, reduce or mitigate risk to an acceptable level.* *Pollution* • *(2) Development will be supported where it does not result in unacceptable impacts to:* – *(b) pollution of surface or ground water (fresh and salt) including rivers, canals, other watercourses, water bodies, wetlands, water gathering grounds including catchment areas,*	Details of ground conditions are provided in **section 4.7** of this chapter. Measures to protect land from contamination during construction are defined within **Table 4.21**.

Policy	Key provisions	How and where considered in this ES
	aquifers, groundwater protection areas, harbours, estuaries or the sea…'	
Policy DM08: Biodiversity and Geodiversity	*'(1) Development should conserve, protect and, where possible, enhance biodiversity and geodiversity interests and soils commensurate with their status and giving appropriate weight to their importance. All development must ensure that the importance of habitats and designated sites are taken into account and consider opportunities for the creation of a local and district-wide biodiversity network of wildlife corridors which link County Wildlife Sites and other areas of biodiversity importance.* *Local Sites* *(5) Development likely to affect adversely locally designated sites, their features or their function as part of the ecological network, including County Wildlife Sites, County Geological Sites and sites supporting Biodiversity Action Plan habitats and species,* *will only be permitted where the need for and benefits of the development clearly outweigh the loss, and the coherence of the local ecological network is maintained.* *Avoidance, Mitigation and Compensation for Biodiversity and Geodiversity Impacts* *(8) Development should avoid adverse impact on existing features as a first principle and enable net gains by designing in biodiversity features and enhancements and opportunities for geological conservation alongside new development. Where adverse impacts are unavoidable they must be adequately and proportionately mitigated, If full mitigation cannot be provided, compensation will be required as a last resort.'*	The location of nationally and regionally important geological sites are identified in Volume 2, Appendix 4.1: DTS, PRA and Site Reconnaissance of the ES. The potential impacts to these sites of geological interest are set out in **section 4.10** of this chapter.
Devon Minerals Plan 2011 – 2031		
Policy M2: Mineral Safeguarding Areas	*'Mineral resources and infrastructure within the Mineral Safeguarding Areas defined on the Policies Map will be protected from sterilisation or constraint by non-mineral development within* *or close to those Areas by permitting such development if:* • *(a) it can be demonstrated through a Mineral Resource Assessment and in consultation with the relevant mineral operators that the mineral resource or infrastructure concerned is not of current or potential economic or heritage value; or* • *(b) the mineral resource can be extracted satisfactorily prior to the non-mineral development taking place under the provisions of Policy M3; or* • *(c) the non-mineral development is of a temporary nature and can be completed and the site restored to a condition that does not inhibit extraction or operation within the timescale that the mineral resource or infrastructure is likely to be needed; or*	There are no MSAs or MCAs within the study area and therefore this has been excluded from further assessment.

Policy	Key provisions	How and where considered in this ES
	• *(d) there is an overriding strategic need for the non-mineral development; or* • *(e) it constitutes exempt development, as set out in the exemption criteria.'*	

4.3 Consultation and Engagement

Scoping

4.3.1 In January 2024, Xlinks 1 Limited ('the Applicant') submitted a Scoping Report to the Planning Inspectorate, which described the scope and methodology for the technical studies being undertaken to provide an assessment of any likely significant effects for the construction, operation and maintenance and decommissioning phases of the Proposed Development. It also described those topics or sub-topics which are proposed to be scoped out of the EIA process and provided justification as to why the Proposed Development would not have the potential to give rise to significant environmental effects in these areas.

4.3.2 Following consultation with the appropriate statutory bodies, the Planning Inspectorate (on behalf of the Secretary of State) provided a Scoping Opinion on 7 March 2024. Key issues raised during the scoping process specific to geology, hydrogeology and ground conditions are listed in **Table 4.4**, together with details of how these issues have been addressed within the ES.

Table 4.4: Summary of Scoping Responses

Comment	How and where considered in the ES
Planning Inspectorate	
'*No direct reference is made to the potential requirement for dewatering activities in Section 4 of the Scoping Report, although it is noted that dewatering is referenced as an example activity in Table 7.4.4 and at paragraph 7.5.54 in respect of potential inter-related effects between the hydrology and flood risk chapter and hydrogeology, geology and ground conditions chapter.* *The ES should provide a full description of any such activities and present an assessment of any resulting likely significant effects, where these could arise. The Applicant's attention is directed to the comments of the Environment Agency (EA) at Appendix 2 of this Opinion with regards to dewatering and permits.*' (Scoping Opinion ID 2.1.13)	The potential requirement of dewatering is described within Volume 1, Chapter 3: Project Description of the ES. The potential impact of dewatering activities on reduction of groundwater quantity or quality in aquifer units is considered within **section 4.10** of this chapter.
'*It is unclear from the Scoping Report what potential effects on statutory designated sites are to be included in the impact assessment. The Inspectorate notes the statement that the Proposed Development would not directly affect the Torridge Estuary SSSI/LNR and would avoid its primary estuarine habitats by drilling under using HDD. At present there is no information in the Scoping Report to confirm the likely proximity of construction activity to the designated sites and their interest features, such as the likely location of HDD exit/entry points, compounds, and haul roads.*	Deterioration of water quality is discussed within **section 4.10**, **section 4.11** and **section 4.12**, and groundwater dependent receptors are discussed within **section 4.10** and **section 4.12**.

Comment	How and where considered in the ES
The SSSI and LNR are designated for their important estuarine habitats, plants and bird species. The Inspectorate considers there is the potential for likely significant effects during construction (and decommissioning) to these sites and their features from potential changes to air quality, including dust deposition, changes to water quality, including proximity of HDD and accidental release of drilling fluids such as bentonite, and disturbance to species. The ES should include an assessment of such impacts to designated sites and features, where likely effects could occur.' (Scoping Opinion ID 3.1.8)	
'*The Inspectorate advises that, in addition to the receptors identified in the Scoping Report, the ES should identify, describe and assess any likely significant effects to the following receptors:* • *Westward Ho! designated bathing water;* • *Permitted sites, discharges and/ or abstractions, reflecting data available from the EA's public register;* • *Jennetts Reservoir and Gammaton Lower Reservoir, in terms of their designated nitrate vulnerable zones; and Torridge Estuary designated shellfish water (refer to the Inspectorate's comments at ID 3.10.7 of this Opinion). The Applicant's attention is drawn to the comments of the EA (Appendix 2 of this Scoping Opinion).*' (Scoping Opinion ID 3.3.20)	Data regarding permitted sites, discharges and abstractions are provided in **section 4.7**. Further consideration of impacts in relation to surface waters is provided in Volume 2, Chapter 3: Hydrology and Flood Risk of the ES. Details of effects on ecological receptors are considered in Volume 2, Chapter 1: Onshore Ecology and Nature Conservation of the ES.
'*The ES should describe the measures proposed to deal with UXO encountered during construction and confirm how the measures would be secured through the DCO.*' (Scoping Opinion ID 3.4.2)	Impact resulting from contact with Unexploded Ordnance (UXO) is discussed in **section 4.10.** Mitigation measures are presented in **Table 4.21**.
'*The study area should include the nearshore area and be of sufficient extent to enable an assessment of all likely significant effects arising from ground conditions and contamination, including where this extends into the offshore area. Effort should be made to agree the final study area with relevant consultation bodies.*' (Scoping Opinion ID 3.4.6)	The study area is provided within **sections 4.4.1** to **4.4.4**.
'*The Scoping Report states that additional surveys are proposed in 2024 to supplement an intrusive survey of the proposed converter station site in 2023. No information is presented about the proposed location and scope of the planned surveys.* *The Inspectorate advises that survey effort should be designed to provide sufficient information to inform an understanding of the baseline to enable assessment in the ES. Effort should be made to agree survey location and scope with relevant consultation bodies.* *The Inspectorate understands from information presented in Table 7.5.4 that a survey is to be undertaken where HDD is proposed at the landfall location within Mermaid's Pool to Rowden Gut SSSI to inform design/ construction techniques. The findings of the survey should be reported in the ES.*' (Scoping Opinion ID 3.4.7)	**Section 4.7** of this chapter provides a summary of the survey work undertaken to date. It also notes that an intrusive ground investigation is currently underway spanning the entirety of the Proposed Development. Further ground investigations as mitigation will be detailed within the On-CEMP, as stated within **Table 4.21**.
'*For the avoidance of doubt, the Inspectorate considers that reference to controlled water receptors to be considered in the assessment includes WFD groundwater bodies within the study area. The ES should consider whether the construction and/ or decommissioning of the Proposed Development could negatively*	The impact to controlled water receptors is provided in **section 4.10**, **section 4.11** and **section 4.12**. The WFD Assessment is provided in

Comment	How and where considered in the ES
impact the status of any groundwater bodies protected under the WFD. The results of the WFD Assessment should inform the ES.' (Scoping Opinion ID 3.4.8)	Volume 2, Appendix 3.2: Onshore WFD Assessment of the ES**.**
'*The Inspectorate notes the reference to the desk-based assessment, including a conceptual site model (CSM) and preliminary risk assessment (PRA). The Applicant should seek to agree the approach to the assessment, including the CSM and PRA with relevant consultation bodies, including the EA and Local Authority*.' (Scoping Opinion ID 3.4.9)	The CSM and PRA are provided within Volume 2, Appendix 4.1: DTS, PRA and Site Reconnaissance of the ES.
'The Scoping Report states that inter-related effects will be considered in this chapter of the ES, including in relation to potential for a reduction in groundwater levels to impact on flow of surface watercourses. It is not apparent from the Scoping Report where this would be considered and presented. The ES must include an assessment of any likely significant effects on groundwater flow arising from the Proposed Development. Any proposed mitigation and monitoring with regards to groundwater flow effects must be clearly described in the ES, including likely efficacy. Mitigation and monitoring measures should be appropriately secured.' (Scoping Opinion ID 3.4.10)	Assessment of reduced groundwater quantity in aquifer units is provided in **section 4.10**, **section 4.11** and **section 4.12**. Inter-related effects are presented within Volume 4, Chapter 5: Inter-related Effects of the ES. Mitigation measures are presented in **Table 4.21**.
'*Table 7.5.3 of the Scoping Report states that the British Geological Survey (BGS) ground stability hazard ratings identify a moderate landslide risk at the valley slides of River Torridge. Paragraph 7.5.30 states there is moderate [risk] rating for compressible ground and uneven settlement at the river crossing. It is unclear whether the Proposed Development would require activities that could result in ground stability hazard and potential likely significant effects. The ES should include an assessment of any likely significant effects and, where relevant, describe any mitigation required and how this would be secured*.' (Scoping Opinion ID 3.4.11)	Ground stability is discussed within Volume 2, Appendix 4.1: DTS, PRA and Site Reconnaissance of the ES. It is referenced within **section 4.7** and mitigation measures are provided in **Table 4.21**.
'*For the avoidance of doubt, the assessment should include consideration of any likely significant effects arising from exploratory cores into the rock on the foreshore as part of geological investigation prior to HDD, where such investigation is proposed*.' (Scoping Opinion ID 3.4.12)	The impact of potential damage to Mermaid's Pool to Rowden Gut SSSI is provided in **section 4.10**.
Environment Agency	
'*The River Basin Management Plan cites groundwater pollution as a concern; therefore the applicant should take particular care with regards to enacting pollution prevention measures*.'	An Outline PPP forms Appendix A of the Outline On-CEMP (document reference 7.7, Appendix A) and has been provided as part of the application for development consent. An Onshore Decommissioning Plan will be developed prior to decommissioning, as detailed within **Table 4.21**.
'*The scoping report confirms that the applicant will produce a Construction Environmental Management Plan (CEMP) to reduce the risk of potential effects on water quality during construction. Large construction sites often cause pollution due to the production of an insufficient CEMP or the failure of contractors to follow the CEMP. To reduce this risk, the EA recommends*	An On-CEMP would be developed in accordance with the Outline On-CEMP provided as part of the application for development consent (document reference 7.7). Additionally, an Outline PPP forms Appendix A of the Outline

Comment	How and where considered in the ES
ensuring that the CEMP includes pollution prevention measures that can withstand significant heavy rainfall events. Additionally, we recommend the inclusion of monitoring, reporting, and reviewing procedures to ensure the project team and principal contractor have sufficient oversight of the contractors that they employ.'	On-CEMP (document reference 7.7, Appendix A) and has been provided as part of the application for development consent.
'*Horizontal directional drilling (HDD) may be used to aid installation of the cables. This could involve the use of drilling muds and their use may require risk assessment to ensure they do not pose a risk to controlled waters. This is important within the Secondary A aquifer and any other groundwater receptors that may be identified during the next stage of assessment (for example, private water supplies). The proposed use of directional drilling techniques should therefore be included in the CEMP*.'	To be included within the On-CEMP as detailed within the **Table 4.21.**
Natural England	
'*The development site is within or may impact on the following Sites of Special Scientific Interest:* • *Mermaid's Pool to Rowden Gut Site of Special Scientific Interest (SSSI)* • *Taw Torridge Estuary SSSI* • *Lundy SSSI* *The Environmental Statement should include a full assessment of the direct and indirect effects of the development on the features of special interest within the SSSI and identify appropriate mitigation measures to avoid, minimise or reduce any adverse significant effects*.'	Mermaid's Pool to Rowden Gut Site of Special Scientific Interest (SSSI) falls within the study area of this Chapter. The potential for impact or damage to Mermaid's Pool to Rowden Gut SSSI is provided in **section 4.10**.

Preliminary Environmental Information Report

4.3.3 The preliminary findings of the EIA process were published in the Preliminary Environmental Information Report (PEIR) on 16 May 2024. The PEIR was prepared to provide the basis for statutory public consultation under the Planning Act 2008. This included consultation with statutory bodies under section 42 of the Planning Act 2008.

4.3.4 A summary of the key items raised specific to geology, hydrogeology and ground conditions is presented in **Table 4.5,** together with how these issues have been considered in the production of this ES chapter.

Further Engagement

4.3.5 Throughout the EIA process, consultation and engagement (in addition to scoping and section 42 consultation) with interested parties specific to geology, hydrogeology and ground conditions has been undertaken.

4.3.6 A summary of the key items raised specific to geology, hydrogeology and ground conditions is presented in **Table 4.5**, together with how these issues have been considered in the production of this ES chapter.

Table 4.5: Summary of consultation relevant to this chapter

Date	Consultee and type of response	Issues raised	How and where considered in the ES
June 2024	Environment Agency, section 42 response	The potential impact of dewatering from shallow groundwater has not been adequately identified.	The potential impact of dewatering activities on reduction of groundwater quantity or quality in aquifer units is considered within **section 4.10** of this chapter.
		The potential impact of heat on groundwater has not been adequately assessed. Potential impacts of heat should be adequately assessed once the engineering design is known	The potential impact of heat generated by cables on groundwater quality in aquifer units is considered within **paragraphs 4.11.23** to **4.11.26** this chapter.
		Measures to manage pollution risks have not been established.	A PPP is secured as part of the On-CEMP. This would be developed in accordance with the Outline PPP forms Appendix A of the Outline On-CEMP (document reference 7.7, Appendix A) and is included as part of the application for development consent.
		Paragraph 4.15.1 states that intrusive ground investigations will be undertaken, and the findings will be used to verify the levels of risk and inform the requirement for any site remediation required. It goes on to say, in paragraph 4.15.2 that work will be carried out to, "identify the location and extent of Private Water Supplies as part of the work for the ES with further assessment as necessary". We welcome both recommendations. We are likely to request that a requirement regarding how unsuspected contamination is managed should be included in the Development Consent Order.	A Discovery Strategy would be prepared forming part of the On-CEMP. This is detailed within **Table 4.21** of this ES chapter. A request to Torridge District Council for further details with respect to Private Water Supply data has identified a number of potential Private Water Supplies which are assessed within **section 4.10**.
	The Coal Authority, section 42 response	Our records indicate that a part of the site lies in an area of coal outcrops which may have been subject to workings at shallow depth. If shallow workings are present these may pose a potential risk to surface stability and public safety. There is also a mine entry recorded on the edge of this area, related to extraction of Mineral Black.	The baseline mining information is summarised within **paragraphs 4.7.23** to **4.7.32** and detailed within Volume 2, Appendix 4.1: DTS, PRA and Site Reconnaissance of the ES.
		The recorded coal features are located in the area of the connection points and convertor stations. Any built development in these areas will need to consider the potential risks posed by past coal mining activity, and any measures	The impact from historical mining activities has been scoped out as identified within **Table 4.7**. It is recommended that a visual inspection of the site should be undertaken due to the potential risk for small scale culm

Date	Consultee and type of response	Issues raised	How and where considered in the ES
		necessary to ensure the safety and stability of the development.	mining in the area of the converter stations. The conjectured location of the culm seam in this area will be targeted as part of the ongoing ground investigation and will be assessed when finalising the site layout. Consultation with the Coal Authority will be maintained on this matter.
	Local resident, section 42 response	Our lake site is situated at grid SS 488 246, the fishery relies on water supply generated by springs located in the field, which is the proposed route for the cable runs. Our concerns are the ground water we currently have would/could be diverted along the cable trunking/trenches thus diverting away from our fishery. This would have a catastrophic effect on our fishery and the eco system surrounding it. We have a bore hole currently supplying ground water to our lower lake. Could this become contaminated during works? The construction is also very close to our boundary, our concerns would be, contamination of the site as a whole resulting in stock and wildlife losses. What is the proposed start and duration date/time for works in this area, winter could generate run off creating environmental effects to the site? What reassurances could you give regarding these concerns?	The lake is located within an area where no potential contaminant sources have been identified and the potential for pollutant linkages to become active is low. Details are provided within Volume 2, Appendix 4.1: DTS, PRA and Site Reconnaissance of the ES. Run off will be controlled through the implementation of measures identified within the On-CEMP and PPP. Staged risk assessment and investigation will enable a detailed understanding of the hydrogeological regime and appropriate mitigation measures will be developed during detailed design stage.
	Devon County Council, section 42 response	The Minerals Planning Authority notes that the impacts of the proposed development on mineral resources will not be included in the Environmental Statement, given that the proposal is not located within any mineral safeguarding or consultation areas. The Minerals Planning Authority also notes that the application will consider the reuse of material between the different elements of the project and the quantities of material to be used as part of the construction planning. This is supported, and it is advised this takes place during the design stage, rather than construction planning to avoid missed opportunities.	Noted.

Date	Consultee and type of response	Issues raised	How and where considered in the ES
July 2024	Torridge District Council, section 42 response	Volume 2 Chapter 4 Ground Conditions does include land contamination although the majority of this section discusses ground water impacts which is an area that the Environment Agency would need to provide comment. As you may be aware, the Torridge district has no sites designated as contaminated land however, previous land use may have resulted in potentially contaminated ground conditions that have not been recorded. The proposed development site appears to include areas where there is the potential for land contamination, such as the coal mining seam identified within the PEIR. Whilst the proposed development is not introducing long term sensitive receptors (e.g. new dwellings) to the locality, the disturbance of potentially contaminated sites during construction and the mobilisation of such contamination (e.g. ground gas) must be considered. Suitable mitigation measures have been outlined in Table 4.20 however, until a better understanding of the ground conditions are available through intrusive ground works, these mitigation measures should not be considered as complete. Para 4.15 indicates that intrusive works will be undertaken for both engineering and environmental purposes which will better inform the mitigation measures and any remedial works required	Outline CSMs are provided within Volume 2, Appendix 4.1: DTS, PRA and Site Reconnaissance of the ES. The impact of existing ground contamination on construction workers and end site users is assessed in **section 4.10** and **4.11**.
September 2024	Torridge District Council, partial response to data request	A data request was made to Torridge District Council in relation to the identification and location of private water supplies. Torridge District Council identified that there may be approximately 73 private water supplies within a 1 km buffer of the Onshore Infrastructure Area. Further information provided from Torridge District Council identified the dataset source as the British Geological Survey borehole records.	The impact of changes in groundwater in terms of quality and quantity on private water supplies is considered in **section 4.10**. Inspection of the British Geological Survey dataset indicated nine boreholes are potentially used as water wells. These private water supplies are summarised within **paragraphs 4.7.17** to **4.7.19**.

4.4 Study Area

4.4.1 Where data was requested from third parties, this was requested for a 1 km buffer around the Onshore Infrastructure Area (landward of MHWS) at the time of the data request. For some data sets, data was provided within an area of up to 2 km (i.e., 1 km beyond the study area).

4.4.2 The data request was based on the Order Limits for the Proposed Development (landward of MHWS) at the time of the request. The 1 km buffer around the Order Limits was included to provide a study area that would take account of interests or constraints that may occur adjacent or close to the Proposed Development and to allow for subsequent evolution of the boundary.

4.4.3 As a result of the iterative site selection process, the Proposed Development that is subject to the EIA varies in some places from the Order Limits used to inform the desk study.

4.4.4 The area used for the desk study (and therefore the data available to inform the assessment) has formed the basis of the study area for the ES chapter which includes all elements of the Proposed Development above MHWS where construction, operation and maintenance and decommissioning activity will occur (i.e., all parts of the Onshore Infrastructure Area, as described in Volume 1, Chapter 3: Project description of the ES) with a 250 m buffer (excluding the Abnormal Indivisible Loads routes). This distance has been selected based upon professional judgement. A distance of 250 m is referenced in Guidance for the Safe Development of Housing on Land Affected by Contamination (NHBC, 2008) and is typical at the hazard identification stage of an assessment. It enables the identification on both on-site (within the Order Limits) and off-site sources (outside the Order Limits) of potential contamination and other factors which may influence ground conditions. The detailed study area of 250 m is extended to up to 1 km in relation of sensitive controlled water receptors only, which is considered appropriate for indirect effects. The study area for Geology, Hydrogeology and Ground Conditions is shown on Figure 4.1 (see Volume 2, Figures of the ES).

4.4.5 The cumulative study area used for cumulative effects assessment (CEA) is taken as a 1 km radius from the Proposed Development above MHWS.

4.5 Scope of the Assessment

4.5.1 The scope of this ES has been developed in consultation with relevant statutory and non-statutory consultees as detailed in **Table 4.4** and **Table 4.5**.

4.5.2 Taking into account the scoping and consultation process, **Table 4.6** summarises the impacts considered as part of this assessment.

4.5.3 Additional impacts associated with specific construction activities i.e. dewatering, foundations and construction techniques (namely Horizontal Directional Drilling (HDD)) are assessed in terms of their potential to reduce groundwater quantity or quality in aquifer units. Furthermore, changes in groundwater levels, flow or quality on groundwater dependent sites are referenced (includes both surface water and ecological receptors).

Table 4.6: Impacts considered within this assessment

Activity	Potential effects scoped into the assessment
Construction Phase	
Construction of the onshore and intertidal elements of the Proposed Development, including excavation of cable trenches, HDD or equivalent trenchless technique and construction of converter station and substation foundations.	The impact of partial or total loss of or damage to designated geological sites.
	The impact of mobilisation of existing areas of contamination causing a deterioration of groundwater quality in underlying aquifer units.
	The impact of reduced groundwater quantity or quality in aquifer units and change in groundwater resources status.
	The impact of existing ground contamination on human receptors.
	The impact of a deterioration in groundwater quality through the accidental spillage/release of potentially polluting substances.
	The impact of changes in groundwater levels, flow or quality on other sensitive groundwater dependent sites, including surface waters fed by groundwater.
	The impacts resulting from contact with UXO. Potential for injury to occur during construction activities if UXO is encountered.
Operation and Maintenance Phase	
Operation of the onshore and intertidal elements of the Proposed Development, including access for maintenance. Permanent management of drainage and runoff from the Converter Site.	The impact of mobilisation of existing areas of contamination causing a deterioration of groundwater quality in underlying aquifer units.
	The impact of existing contamination to human receptors.
	The impact of heat generated by the onshore HVDC Cables on groundwater quality, during the operation and maintenance phase.
Decommissioning Phase	
Decommissioning of the onshore and intertidal elements of the Proposed Development, including removal and decommissioning activity.	The impact of mobilisation of existing areas of contamination causing a deterioration of groundwater quality in underlying aquifer units.
	The impact of reduced groundwater quantity or quality in aquifer units and change in groundwater resources status.
	The impact of existing ground contamination to human receptors.
	The impact of a deterioration in groundwater quality through the accidental spillage/release of potentially polluting substances.
	The impact of changes in groundwater levels, flow or quality on other sensitive groundwater dependent sites, including surface waters fed by groundwater.

4.5.4 Impacts that are not likely to result in significant effects have been scoped out of the assessment. A summary of the impacts scoped out, together with justification for scoping them out and whether the approach has been agreed with key stakeholders through either scoping or consultation, is presented in **Table 4.7**.

4.5.5 For clarity, based on the findings of the desk study and preliminary risk assessment presented within Volume 2, Appendix 4.1: DTS, PRA and Site Reconnaissance of the ES, impacts associated with mining are scoped out in addition to the ground gas migration exposure pathway when considering the impact of ground contamination on human (end use) receptors.

Table 4.7: Issues scoped out of the assessment

Potential Impact	Potential effects scoped out of the assessment
Construction Phase	
Impact from historical mining activities.	The area of a construction compound is indicated to be at potential risk of underground mining, with a conjectured location of a coal (culm) seam present at outcrop. Whilst a detailed coal mining risk assessment is not considered a requirement with underground conditions not likely to be difficult, it is recommended that a visual inspection of the area around the identified outcrop is undertaken as part of the ground investigation by a suitably qualified and experienced person to identify any currently identifiable mining related settlement or subsidence effects. The north of the construction compound area, part of the converter station, and Alverdiscott Substation Site are classed as areas with potential for restricted sporadic non-coal mining, however there is no historical map evidence to indicate that any historical mining activities have occurred and the risk presented by non-coal mining is considered to be low.
The impact of ground contamination on construction workers.	It is expected that any relevant pollutant linkages will be managed by appropriate health and safety measures. As construction workers are protected under existing health and safety legislation, any potential effects will be avoided, prevented and reduced through the implementation of standard mitigation measures (including personal protective equipment, training and toolbox talks) as included in a On-CEMP. Work will be carried out in accordance with relevant Construction Design Management (CDM) Regulations 2015.*
The impact of Abnormal Indivisible Loads routes on ground conditions receptors.	The groundworks associated with the Abnormal Indivisible Loads routes are of limited extent entailing minimal ground disturbance. These works can be mitigated through adoption of the mitigation measures provided as part of this chapter, specifically implementation of the Discovery Strategy and On-CEMP.
Ground Instability in vicinity of River Torridge crossing.	It has been identified in baseline research that there is a 'moderate' landslide risk on the banks of the River Torridge relating to slope issues that may have occurred in the past and 'moderate' risk from compressible ground and running sand for the exposures of Alluvium and Tidal Flat Deposits (TFD) on either side of the river. Design for the cable crossing of the river will utilise HDD negating surface disturbance of any relict foundered strata and there are no proposed heavily loaded structures in this section of the of the Proposed Development that would result in possible settlement or instability from the superficial deposits anticipated to be present. Notwithstanding this mitigation adopted as part of the Proposed Development requiring slope stability assessments to be undertaken as necessary is detailed within **Table 4.21.**
Heat generation during construction.	The Planning Inspectorate confirmed in their Scoping Opinion (ID 3.26.1) that, as the cables would not be operational during the construction and decommissioning phases, an assessment of heat generation can be scoped out for these phases.
Operation and Maintenance	
The impact of ground contamination on human receptors (inhalation of ground gas exposure pathway).	Ground gas has the potential to be generated from areas of Made Ground/landfills on or off site as well as any peat and other organic materials within the Alluvium/Tidal Flat Deposits and accumulate within buildings. No significant ground gas sources have been identified in relation to the substations which will be unmanned (restricted to maintenance checks only).

Potential Impact	Potential effects scoped out of the assessment
The impact of the Proposed Development on Mineral Resources.	Sterilisation of safeguarded mineral resources. There are no MSAs or MCAs within the study area and therefore this has been scoped out from further assessment.
The impact of a deterioration in groundwater quality through the accidental spillage/release of potentially polluting substances.	The drainage strategy, which is detailed within Volume 2, Chapter 3: Hydrology and Flood Risk of the ES, will include pollution protection measures to avoid the deterioration of groundwater and surface water quality at the Converter Site. Therefore, this has been scoped out from further assessment.
Decommissioning	
Heat generation during decommissioning.	The Planning Inspectorate confirmed in their Scoping Opinion (ID 3.26.1) that, as the cables would not be operational during the construction and decommissioning phases, an assessment of heat generation can be scoped out for these phases.

Note *Though potential impacts of ground contamination on construction workers are scoped out, an assessment is presented within the EIA cross referencing applicable potential contamination sources.

4.6 Methodology

Relevant Guidance

4.6.1 Relevant guidance used to inform this chapter includes the following.

- The Environment Agency's approach to groundwater protection, version 1.2 (Environment Agency, 2018).
- Construction Industry Research and Information Association (CIRIA) Document C649: Control of water pollution from linear construction projects. Site guide (CIRIA, 2006a).
- CIRIA Document C648: Control of water pollution from linear construction projects. Technical guidance (CIRIA, 2006b).
- CIRIA Document C665: Assessing Risks Posed by Hazardous Ground Gases to Buildings (CIRIA, 2007).
- Defra Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance (Defra, 2012).
- CIRIA Document C552 – Contaminated Land Risk Assessment: A Guide to Good Practice (CIRIA, 2001a).
- CIRIA Document C532 – Control of Water Pollution from Construction Sites: Guidance for Consultants and Contractors (CIRIA, 2001b).
- Land Contamination: Risk Management (LCRM) (Environment Agency, 2023).

Methodology for Baseline Studies

Desk Studies

4.6.2 The baseline environment for geology, hydrogeology and ground conditions has been principally defined through a desk study that has considered the following.

- Publicly available data sources available from the following organisations:
  - BGS;
  - Environment Agency;
  - Coal Authority;
  - Devon County Council; and
  - Torridge District Council.
- Information contained in Groundsure Insights reports[1]. These reports include:
  - general information regarding geological, hydrogeological and hydrological setting;
  - groundwater abstraction licences;
  - current and historical landfill sites;
  - current and historical waste sites;
  - pollution incidents;
  - discharge consents;
  - current and historical land-use;
  - mining and ground working areas (coal and non-mining); and
  - geotechnical constraints.
- Spatial information regarding ground conditions within the study area taken from Groundsure Insights bespoke geographic information systems data.
- Historical Ordnance Survey mapping and aerial photography.

4.6.3 In terms of land contamination, a Preliminary Risk Assessment (PRA), within Volume 2, Appendix 4.1: DTS, PRA and Site Reconnaissance of the ES, has been undertaken using the above information, the Proposed Development having been subdivided into nine discreet areas (plus the converter stations location) for review purposes based upon the locations of proposed construction compounds . The PRA consists of an appraisal of the source-pathway-receptor 'contaminant linkages', which is central to the approach used to determine the existence of 'Contaminated Land' as defined in Part 2A of the Environmental Protection Act 1990. For a risk to exist (under Part 2A), all three of the following components must be present to facilitate a potential 'contaminant linkage'.

- Source of contamination (e.g., primary sources – leaking above ground storage tanks; secondary sources – free phase product (typically hydrocarbon

[1] The Groundsure Reports do not form an Appendix to this ES chapter, due to the Volume of reports provided. However, the relevant information from the Groundsure Reports have been extracted an included within Volume 2, Appendix 4.1 of the ES. The Groundsure Reports can be made available on request, if necessary.

contamination present as a discrete product rather than mixed with soil or water) within the ground or soil/groundwater migration).

- Receptor (living organisms, ecological systems or property which may be harmed, e.g., end users of site, groundwater, surface water and fauna and flora).
- Pathway (a route or means by which a receptor can be exposed to or affected by a contaminant) i.e., Target mechanism between the source and receptor (e.g., gas/liquid migration through permeable strata).

4.6.4 The mere presence of a contaminant source does not mean that there will necessarily be attendant risks requiring remedial action or that the site will be designated as 'Contaminated Land'.

Site-Specific Surveys

4.6.5 A targeted site walkover was undertaken in January 2023 by an RPS environmental consultant. The purpose of the walkover was to ground truth the historical information, identifying possible sources of contamination and to identify any additional existing sources of potential contamination. The findings of the walkover are presented within Volume 2, Appendix 4.1: DTS, PRA and Site Reconnaissance of the ES.

4.6.6 A targeted site walkover was also undertaken in March 2023 by an RPS hydrological consultant. The purpose of the walkover was to collect information from land owners within the Order Limits regarding private water supplies.

4.6.7 An intrusive ground investigation was undertaken by RPS on the Converter Site in February 2023 in order to provide information for geotechnical design purposes. The findings of this have also been considered in determining the baseline conditions for the Converter Site section of the Order Limits.

4.6.8 Additionally, an intrusive ground investigation is currently underway spanning the entirety of the Proposed Development.

Impact Assessment Methodology

Overview

4.6.9 The approach to determining the significance of effects is a two-stage process that involves defining the magnitude of the impact and the sensitivity of the receptor. This section describes the criteria applied in this chapter to assign values to the magnitude of impacts and the sensitivity of the receptors. The terms used to define magnitude and sensitivity are based on relevant guidance, including the Design Manual for Roads and Bridges (DMRB) methodology (Highways England et al., 2020) where appropriate as described in further detail in Volume 1, Chapter 5: EIA Methodology of the ES.

Receptor Sensitivity/Value

4.6.10 The criteria for defining sensitivity in this chapter are outlined in **Table 4.8**.

Table 4.8: Sensitivity criteria

Sensitivity	Definition
Very High	Very high importance and rarity, international scale and very limited potential for substitution. Geology UNESCO World Heritage Sites, UNESCO Global Geoparks and Geological Conservation Review where citations indicate features of international importance. Geology meeting international designation citation criteria which is not designated as such. Hydrogeology Principal aquifer providing a nationally important water resource and/or supporting a groundwater dependant site protected under international/EC legislation. Groundwater within an inner source protection zone (SPZ1). Contamination: Human health Very high sensitivity land use such as residential or allotments.
High	High importance and rarity, national scale and limited potential for substitution. Geology Geological site of national importance (e.g., Geological Conservation Review or SSSI or National Nature Reserve). Geology meeting national designation citation criteria which is not designated as such. Hydrogeology Principal aquifer providing locally important water resource and/or supporting a groundwater dependent site of national importance or a river ecosystem. Groundwater supports a Groundwater Dependent Terrestrial Ecosystem defined for the WFD. Groundwater within an outer source protection zone (SPZ2). Human health High sensitivity land use such as public open space.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution. Geology Geological site of regional importance (e.g., Local Geodiversity Site, Local Nature Reserve (LNR)). Geology meeting regional designation citation criteria which is not designated as such. Hydrogeology Secondary aquifer unit providing a locally important water resource and/or groundwater dependent features or sites of local importance. Groundwater within the total catchment source protection zone (SPZ3). Human health Medium sensitivity land use such as commercial or industrial.
Low	Low or medium importance and rarity, local scale. Geology Non-designated geological features of local interest (e.g., non-designated geological exposure, former quarries/mining sites, cuttings etc). Hydrogeology Secondary aquifer unit of providing water resource of limited local importance with little connection to surface water. Human health Low sensitivity land use such as highways and rail.
Negligible	Very low importance and rarity, local scale. Geology No geological exposures, little/no local interest. Hydrogeology Unproductive strata.

Sensitivity	Definition
	Human health Undeveloped surplus land/no sensitive land use proposed.

Magnitude of Impact

4.6.11 The criteria for defining magnitude in this chapter are outlined in **Table 4.9**.

Table 4.9: Impact magnitude criteria

Magnitude of impact		Definition
High	Adverse	Geology A large change from baseline conditions, that results in the large-scale loss or deterioration in condition of the geological feature, site or resource affected. The impact is typically of wide spatial extent, permanent duration and irreversible. Hydrogeology A large change from baseline conditions in an aquifer unit, that results in severe deterioration of groundwater quality, groundwater levels, groundwater flow and/or resource utility, for example. • A deterioration in overall WFD status for a groundwater body. • Rendering the groundwater in an aquifer unit non-potable through the introduction of hazardous substances into groundwater, failure against prescribed concentrations for pollutants (i.e., statutory Drinking Water Standards), or reduction in resource availability. • Rendering existing groundwater sources of supply (borehole, well or spring) non-viable. • Cause a large impact on groundwater dependent watercourse in terms of flow, overall WFD status of the water body or failure against statutory Environmental Quality Standards. • Cause statutory monitoring targets for ecological sites to be failed. • These impacts are likely to be of wide spatial extent, of permanent duration and of low reversibility. Human health Significant contamination identified. Contamination levels significantly exceed background levels and relevant screening with potential for significant harm to human health. Contamination heavily restricts future use of land.
	Beneficial	Geology A large change from baseline conditions, that results in major improvement in the condition of the geological feature or site affected. The impact will be of wide extent and permanent in nature. Hydrogeology A large change from baseline conditions in an aquifer unit, that results in significant improvement in groundwater quality, groundwater levels, groundwater flow and/or resource utility, for example. • An improvement in the overall WFD status for a groundwater body. • Rendering a previously contaminated aquifer potable or increasing resource availability. • Rendering existing groundwater sources of supply viable. • Cause a large beneficial impact on a groundwater dependent receptor (e.g., watercourse in terms of flow, or water quality, or WFD status; achieving statutory monitoring targets for ecological site) (Environment Agency, 2022). These impacts are likely to be of wide spatial extent and of permanent duration.

Magnitude of impact		Definition
Medium	Adverse	Geology A moderate change from baseline conditions, that results in the loss or deterioration in condition of part of the geological feature, site or resource affected. The impact is typically of local to wide spatial extent, moderate to long duration and of low reversibility. Hydrogeology A moderate change from baseline conditions in an aquifer unit, that results in the deterioration of groundwater quality, groundwater levels, groundwater flow and/or resource utility, for example. • A deterioration in WFD criteria for certain parameters, although the overall WFD status may not change. • A deterioration in groundwater quality in an aquifer and/or possible failure against certain prescribed concentrations (i.e., statutory Drinking Water Standards). • Deterioration in quality, quantity, or reliability of groundwater source of supply (borehole, well or spring). • Cause a moderate impact on groundwater dependent watercourse in terms of flows, or WFD status or failure relative to statutory Environmental Quality Standards. • Cause statutory monitoring targets for ecological site to be failed. These impacts are likely to be of local to wide spatial extent, or of moderate to long duration and/or of low reversibility. Human health Contaminant concentrations exceed background levels and are in line with limits of relevant screening criteria. Significant contamination can be present. Control/remediation measures are required to reduce risks to human health/make land suitable for intended use.
	Beneficial	Geology A moderate change from baseline conditions, that results in improvement in the condition of part of the geological feature or site affected. The impact is typically of local to wide spatial extent, moderate to long duration and of low reversibility. Hydrogeology A moderate change from baseline conditions in an aquifer unit, that results in the improvement in groundwater quality, groundwater levels, groundwater flow and/or resource utility. These impacts are likely to be of local to wide spatial extent, of moderate to long duration.
Low	Adverse	Geology Some measurable change from baseline conditions, that results in a small deterioration in condition of part of the geological feature, site or resource affected. The impact is typically of limited spatial extent and may be of short duration and/or reversible. Hydrogeology Some measurable change from baseline condition, that results in a small deterioration of groundwater quality, groundwater levels, groundwater flow and/or resource utility but does not change its regulatory status (e.g., overall WFD status) or utility of resource given the impacts are small, likely to be of limited spatial extent, or of short duration and/or reversible. Human health Contaminant concentrations are below relevant screening criteria, Significant contamination is unlikely with a low risk to human health. Best practice measures can be required to minimise risks to human health.
	Beneficial	Geology

Magnitude of impact		Definition
		Some measurable change from baseline conditions, that results in a small improvement in condition of part of the geological feature, site or resource affected. The impact is typically of limited spatial extent and may be of short duration and/or reversible. Hydrogeology Some measurable change from baseline condition, that results in a small improvement of groundwater quality, groundwater levels, groundwater flow and/or resource utility. This may result in measurable effects on groundwater dependent receptors. These impacts are likely to be of limited spatial extent, or short duration and/or reversible.
Negligible	Adverse	Geology A small measurable change from baseline conditions, but no material change to the status or condition of the geological feature, site or resource affected. Hydrogeology A small measurable change from baseline condition, but no change in the status of groundwater quality, quantity or flow within the aquifer unit affected or its utility. A small measurable change from baseline condition, but no change in the status of groundwater dependent receptor affected (e.g., river, stream, borehole, well, spring or wetland) and their utility. Very minor benefit to, or positive addition of one or more characteristics, features or elements. Human health Contaminant concentrations substantially below levels outlined in relevant screening criteria. No requirement for control measures to reduce risks to human health/make land suitable for intended use.
	Beneficial	No change from baseline conditions. No measurable impact either adverse or beneficial.
No Change		No loss or alteration of characteristics, features or elements; no observable impact in either direction.

4.6.12 The criteria for defining duration of impact magnitude in this chapter are as follows:

- short term: a period of months, up to one year;
- medium term: a period of more than one year, up to five years; or
- long term: a period of greater than five years.

Significance of Effect

4.6.13 The significance of the effect upon geology, hydrogeology and ground conditions has been determined by taking into account the sensitivity of the receptor and the magnitude of the impact. The method employed for this assessment is presented in **Table 4.10**. Where a range of significance levels is presented, the final assessment for each effect is based upon expert judgement.

4.6.14 In all cases, the evaluation of receptor sensitivity, impact magnitude and significance of effect has been informed by professional judgement and is underpinned by narrative to explain the conclusions reached.

4.6.15 For the purpose of this assessment, any effects with a significance level of minor or less are not considered to be significant in terms of the EIA Regulations.

Table 4.10: Assessment matrix

Sensitivity of Receptor	Magnitude of Impact			
	Negligible	Low	Medium	High
Negligible	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	Negligible or Minor	Minor	Moderate	Moderate or Major
High	Minor	Minor or Moderate	Moderate or Major	Major
Very High	Minor	Moderate or Major	Major	Major

4.6.16 Where the magnitude of impact is 'no change', no effect would arise.

4.6.17 The definitions for significance of effect levels are described as follows.

- Major: These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category. Effects upon human receptors may also be attributed this level of significance.
- Moderate: These beneficial or adverse effects have the potential to be important and may influence the key decision-making process. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse or beneficial effect on a particular resource or receptor.
- Minor: These beneficial or adverse effects are generally, but not exclusively, raised as local factors. They are unlikely to be critical in the decision-making process but are important in enhancing the subsequent design of the project.
- Negligible: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.
- No change: No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Assumptions and Limitations of the Assessment

4.6.18 The assessment of effects has been determined from a desk-based review of available information and site-specific surveys comprising preliminary ground investigation (partially completed at the time of writing and data received as draft status) These sources of information are discussed within **section 4.7**.

4.6.19 As with all types of assessment of geology and hydrogeology effects, the assessment depends in part on the accuracy of data provided by third parties. It has therefore been assumed that data provided by third parties is accurate. Historical maps and aerial photographs provide a snapshot in time and cannot be relied upon as indicators of events or activities that may have taken place at other times.

4.6.20 There may be ground conditions at the site that have not been disclosed by the information reviewed or by the investigative work undertaken. Such undisclosed conditions cannot be taken into account in any analysis and reporting.

4.6.21 The qualitative risk assessment, specific to private water supplies, is primarily based on a desk based assessment. This is augmented by limited site walkover information obtained for two identified private water supplies.

4.7 Baseline Environment

Desk Study

4.7.1 Information on geology, hydrogeology and ground conditions within the study area was collected through a detailed review of existing studies and datasets. These are summarised below in **Table 4.11**.

Table 4.11: Summary of desk study sources used

Title	Source	Year	Author
GeoIndex Onshore	BGS Map Viewers	-	BGS
Sheet 292 and part of 275, 276, 291 and 308: Bideford and Lundy Island (Bedrock and Superficial), 1:50,000 Scale.	BGS Map Viewers	1977	BGS
Geology of Bideford and Lundy Island. Memoir for 1:50,000 geological sheet, New Series, with sheets 275, 276, 291 and part of sheet 308	BGS Memoir Portal	1979	BGS (Edmonds *et al.* 1979)
Coal Mining in Devon	Open University Geological Society, South West Branch Website	2015	Open University
Interactive Map Viewer	Gov.uk	-	The Coal Authority
Protected Sites (Sites of Scientific Interest, Special Areas of Conservation)	Magic Maps; and Groundsure Enviro-Geo Insights Report	-	Defra and Groundsure
Geological Conservation Review sites	Geological Conservation Review. CSV Database	-	Joint Nature Conservation Committee
Aquifer designation – Bedrock and Superficial Deposits; Groundwater vulnerability; Groundwater safeguard zones Source Protection Zones.	Magic Maps	-	Defra
Source Protection Zones	Magic Maps and Data Services Portal	-	Defra
Mineral Safeguarding Areas	Devon Minerals Plan Policies Map[2]	-	Devon County Council
Mineral Consultation Areas	Devon County Council Open Data[3]	-	Devon County Council
WFD groundwater bodies (Cycle 3 – 2019)	Catchment Data Explorer	-	Environment Agency
Groundwater and surface water quality	Water Quality Archive	-	Defra

[2] http://map.devon.gov.uk/dccviewer/DevonMineralsPlanPoliciesMap/

[3] http://data-dcc.opendata.arcgis.com/datasets?t=mineral

Title	Source	Year	Author
Main Rivers in England	Statutory Main River Map	-	Environment Agency
Groundsure Insights Reports including historical maps	Groundsure	2023	Produced by Groundsure based on datasets relevant to the Environment and Ground Conditions.
UXO map of Devon	Online Risk Maps	-	ZETICA

Designated Sites

4.7.2 All designated sites within the study area and qualifying interest features that could be affected by the construction, operation and maintenance, and decommissioning phases of the Proposed Development are set out in **Table 4.12**.

Table 4.12: Designated sites and relevant qualifying interests

Designated Site	Distance to the Proposed Development (nearest point)	Relevant Qualifying Interest
Pixey Copse – Designated Ancient Woodland	215 m east	Ancient and Semi-Natural Woodland.
Kynoch's Foreshore – Local Nature Reserve	Within the Order Limits	Area of saltmarsh and mudflats managed for nature conservation, education, and research.
North Devon – Biosphere Reserve	Within the Order Limits	Centred at Braunton Burrows sand dune system (largest sand dune system in England).
Mermaids Pool to Rowden Gut SSSI	Within the Order Limits	Geology: Exposes the complete sequence available through the Bideford Formation, a localised development of fluvio-lacustrine (Coal Measure) type deposits.

Hydrology

4.7.3 There are multiple watercourses located within 500 m of the Proposed Development which are classified within a River Basin Management Plan published by the Environment Agency (EA) under the European WFD (2000). These include Horwood Stream, Gammaton Upper and Lower Reservoir, Lower River Yeo, River Torridge, Jennet's Reservoir and Kenwith Stream.

4.7.4 A coastal water body namely Barnstaple Bay is located adjacent to the landfall area.

4.7.5 Information provided by the EA indicates that there is one record of an active licensed surface water abstraction within 500 m of the Proposed Development. The details of this are as follows in **Table 4.13**.

Table 4.13: Licensed surface water abstractions

Licence Holder	Approximate Distance and Direction from the Proposed Development	Source	Volume (m^3)	Use
A C Withecombe & Son	179 m south	Surface Water, Fresh – Unnamed Pond at Bideford	Maximum daily: 137	General Farming & Domestic

Licence Holder	Approximate Distance and Direction from the Proposed Development	Source	Volume (m^3)	Use
(Licence no. SW/050/0007/024)			Annual: 50,000	

4.7.6 The above abstraction relates to an unnamed pond which is located on a small stream which flows northwards to Jennet's Reservoir and therefore upstream of the Proposed Development.

Geology

4.7.7 The geology of the study area is dominated by a thick sequence of Carboniferous bedrock. The regional geological bedrock sequence is summarised in **Table 4.14**.

Superficial Deposits

4.7.8 Surface superficial deposits within the Order Limits are limited to areas either side of the River Torridge and comprise:

- Alluvium;
- River (Torridge) Terrace Deposits (RTD) (overlain by Alluvium); and
- TFD.

4.7.9 The Alluvium consists of a variable assemblage of clay, silt, sand and gravel, the RTD predominantly silty clay with scattered rounded sandstone clasts and the TFD typically consists of unconsolidated clay, silt and sand deposits.

Bedrock Geology

4.7.10 The general stratigraphic sequence of bedrock beneath the Proposed Development is provided in **Table 4.14**.

Table 4.14: Description of geological strata

Strata	Description	Approximate Thickness (m)
Bude Formation – sandstone – (located along southern Order Limits)	Grey thick-bedded, somewhat argillaceous and silty sandstones, in laterally discontinuous internally massive beds 1 to 5 m thick and commonly amalgamated into units up to 10 m thick.	1,290
Bude Formation (mudstone and siltstone)	At the base of the formation there are approximately 100 m of grey mudstones and siltstones with two thin anthracitic coals (culm) above the cross-bedded thick-bedded Cornborough Sandstone that caps the underlying Bideford Formation.	100
Bideford Formation (sandstone)	Thick bedded sandstones.	1220 +
Bideford Formation (mudstone and siltstone)	Mudstones with thin/medium bedded sandstones and siltstones, with thick bedded sandstone.	1220 +
Crackington Formation (encompasses northern section of area 7 and southern sections of areas 3 and 4)	Bedded dark blue-grey mudstones and grey siltstones.	250

Hydrogeology

4.7.11 EA data including Groundwater Vulnerability mapping (1:100,000 scale) indicates the following Superficial aquifer classification for areas of the Proposed Development as follows in **Table 4.15**.

Table 4.15: Superficial aquifer classification

Aquifer Classification	Description
Secondary A – Alluvium Deposits and Torridge RTD	These formations are formed of permeable layers capable of supporting water supplies at a local scale, in some cases forming an important source of base flow to rivers.
Secondary Undifferentiated – TFD	Assigned where it is not possible to attribute either category A or B to a rock type. These layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

4.7.12 These superficial aquifers are described as having high or medium groundwater vulnerability.

- High: Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.
- Medium: Intermediate between high and low vulnerability.

4.7.13 The underlying bedrock formations are all designated as Secondary A Aquifers. These are rock layers with the ability to easily transmit pollution characterised by high permeability soils. This classification has a high vulnerability with localised area of medium vulnerability.

4.7.14 According to EA data, the Proposed Development is not located in a groundwater SPZ.

4.7.15 Information provided by the EA indicates that there are no records of active licensed groundwater abstractions within 1 km of the Proposed Development.

4.7.16 Information provided by the EA indicates that there is one record of a WFD Groundwater body within 250 m of the Proposed Development as follows in **Table 4.16.** This underlies the Converter Site Location.

Table 4.16: Nearby groundwater bodies

Groundwater Body	Water Body ID	Quality Classification
Torridge and Hartland Streams	GB40802G800600	Overall – Poor (2019) Chemical – Poor (2019) Quantitative – Good (2019)

4.7.17 BGS data indicates that a number of water wells are present within approximately 1 km of the Proposed Development.

4.7.18 Additionally, landowner evidence suggests that two private water supplies are located within the Order Limits. Both water supplies are indicated to be borehole abstractions, one of which is currently piped to the property and supplies water troughs for livestock. The other is not currently in use.

4.7.19 The above private water supplies are summarised as follows in **Table 4.17**

Table 4.17: Nearby private water supplies

Reference	BGS Water Well Reference	Owner	Grid Reference
PWS 01	SS42SE8	Tennacott Bideford	SS 47080 24990
PWS 02	SS42NE63	N Devon Isolation Hospital Bideford	SS 47100 26010
PWS 03	SS42NE62	Gas and Coke Co works Bideford	SS 45710 26080
PWS 04	SS42SE10	Unknown	SS 45560 24990
PWS 05	SS42SE7	Unknown	SS 45480 23750
PWS 06	SS42NW24	Buckleigh Laundry	SS 43580 28320
PWS 07	SS42NW1	Unknown	SS 43520 28320
PWS 08	SS42NW23	Buckleigh Laundry	SS 43520 28320
PWS 09	SS42NW2	Unknown	SS 41940 28010
PWS 10	N/A	P Pennington	SS 45408 24805
PWS 11	N/A	M Rose	SS 43911 24067

Groundwater Dependent Features

4.7.20 Groundwater dependent features can include surface watercourses, ponds and lakes, springs and wetlands that receive a component of groundwater discharge from underlying aquifers.

4.7.21 The study area contains a number of springs commonly associated with hillsides. Anecdotal evidence suggests that the Gammaton Reservoirs used as fisheries are in part spring water fed.

4.7.22 The Onshore HVDC Cable Corridor crosses the River Torridge, and Kynoch's Foreshore which comprises saltmarsh and mudflats. This river system is groundwater-fed with tributaries of the River Torridge being in continuity with the superficial aquifer and therefore may contribute significantly to surface water flow.

Quarrying and Mining

Coal (Culm) Mining

4.7.23 The Map Viewer on the Coal Authority website indicates large parts of the Proposed Development fall within Coal Mining Reporting Areas, however only the Converter Site location including the construction compounds area, are within a Development High Risk Area linked to the conjectured outcrop of a seam (culm). A CON29M Official Coal Mining Search has been obtained for this area to assess whether there is a risk presented by historical coal mining activities to the proposed converter stations construction activities. The remainder of the route is considered unlikely to be impacted by any historical mining activity comprising either temporary surface founded structures (compounds) or shallow trench excavations for cable routes given the information presented on the Coal Authority website. It is also apparent that there is no historical map evidence of any mining activity across the Study Area.

4.7.24 Reference to the BGS Sheet Memoir 'Geology of Bideford and Lundy Island. Memoir for 1:50 000 sheets 292, with 275, 276, 291 and part of 308' by Edmonds *et al*., (1979) indicates that near the base of the Bude Formation are two 'culm' seams, one of soft anthracite, about 1 m above the Cornborough Sandstone and identified at outcrop on the coast, the other, the 'paint' seam to the south of this and approximately 100 m higher in the succession. They are recorded as 'carbonaceous material' rather than coal and have been sporadically worked since the Middle Ages for burning of lime or collection of 'pigment'. The seams are recorded as being steeply dipping and worked in a similar way to metalliferous mining.

4.7.25 Further assessment of online information sourced from a presentation made to the Open University Geological Society on Coal Mining in Devon (2015) indicates that two east west aligned seams were identified near Bideford. The northerly was termed the 'coal seam' and is present as a series of sporadic coal lenses, it is understood that this is locally termed 'Bideford Black'. The southerly was named the 'paint seam' and is a carbonaceous shale also called carbargillite used as camouflage paint, pencils, car tyre filler and mascara. It is noted that working of these two seams has been limited by their sporadic nature and main areas of working were restricted to horizontal shafts at East-the-Water near Bideford into the Bideford Black and on the coast at Greencliff where the two exposed seams were worked from adits which intersected both seams.

4.7.26 The presentation concluded that there has been no commercial past for coal mining in Devon and there is unlikely to be any commercial future for mining.

4.7.27 The CON29M Report, included in Volume 2, Appendix 4.1: DTS, PRA and Site Reconnaissance of the ES, indicates the conjectured position of an east – west aligned seam at outcrop across the northern part of the construction compound area and extending through the centre of the Alverdiscott Substation Site. The outcrop is identified by the Coal Authority as the Development High Risk Area, assumed to be from the potential for historical unrecorded opencast/shallow workings of the outcropping seam.

4.7.28 The aforementioned area does not fall within the potential zone of influence of any recorded underground coal workings, although given the conjectured outcrop it is stated that the possibility of unrecorded mine workings cannot be discounted. There are no current underground coal workings within influencing distance of the

Proposed Development and is not within an area designated for any future workings.

4.7.29 The Converter Site including the construction compound, and Alverdiscott Substation Site are not within the boundaries of any former opencast workings, not within 200 m of any present opencast workings and are not within 800 m of any proposed opencast workings.

4.7.30 There are no recorded coal mine entries on or within 20 m of the Converter Site including the construction compound, and Alverdiscott Substation Site. Mine Entries recorded by the Coal Authority are located within 1 km of the Proposed Development Order Limits, the closest approximately 280 m north indicated to be associated with the Bideford Seam.

Non-Coal Mining

4.7.31 BGS data that assesses the potential for historical non-coal mining within 500 m of the Proposed Development Order Limits indicates potential restricted sporadic mining associated with vein mineral and Bideford Black along with potential localised small scale mining within the Bideford Black.

4.7.32 It should be noted that there is no evidence on historical maps of former non-coal mining activity in these areas (the Bideford Black is also the aforementioned 'Culm').

Ground Stability

4.7.33 The BGS ground stability hazard ratings identify a 'moderate' landslide risk on the banks of the River Torridge relating to slope issues that may have occurred in the past and 'moderate' risk from compressible ground and running sand for the exposures of Alluvium and TFD on either side of the river. As such compressibility should be considered for applied loading and constraints may apply to land uses involving excavation or the addition or removal of water.

Environmental Data

4.7.34 A preliminary assessment of ground conditions across the study area has been presented in Volume 2, Appendix 4.1: DTS, PRA and Site Reconnaissance of the ES. In addition to the quarrying and mining described above, other activities that may represent potential risks from contamination to land quality or groundwater quality have been assessed.

Landfills and Waste Sites

4.7.35 Information provided by a number of sources including the EA and BGS and referenced in the Groundsure reports shows that there are no recorded licensed or known historical landfill sites, recorded within the Proposed Development. There are two historical landfills recorded within the 250 m Study Area as detailed within **Table 4.18**.

Table 4.18: Landfill/Waste Transfer/Waste Treatment Sites

License Holder	Area(s) and Approx. Distance and Direction (m)	License Details	Waste Type and Details
Historical Landfills			
Bideford Borough Council	202 m west	None Provided	Commercial, Household 31/01/1971 to 31/12/1972
Devon County Council	85 m west	None Provided	Inert, Industrial, Commercial, Household

4.7.36 There are identified locations of waste exemptions immediately to the north west of the Alverdiscott Substation Site, relating to disposing or treatment of agricultural waste at Webbery Barton, Bideford including dredgings, waste wood by shredding/chipping/cutting etc, spreading of waste and incineration.

Environmental Permits

4.7.37 EA and Local Authority data indicates that there are two processes regulated by an Environmental Permit (under the Environmental Permitting Regulations 2016) within 250 m of the Proposed Development as detailed in **Table 4.19**.

Table 4.19: Environmental Permits

License Holder	Area(s) and Approx. Distance and Direction from Site	Permitted Activity
Q Plant & Haulage (Notts Contractors)	Area 9 – 9 m east	Historical Use of Bulk Cement
Evans Transport Ltd	Area 3 – 182 m north west	Use of Bulk Cement

List 2 Dangerous Substances

4.7.38 There are two records for discharge of substances identified on List II of European Directive E 2006/11/EC within 250 m of the Proposed Development. Each relating to a location 130 m north of the Landfall, Typo Electronics, authorised to discharge chromium, copper, cyanide, lead, nickel, and zinc, and Bideford (Cornborough) Sewage Treatment Works, authorised to discharge chromium, copper, iron, lead, nickel, and zinc, both have an active status, with the latter releasing discharge into the tidal River Torridge.

Historical Land Use

4.7.39 Historical land use features within the Proposed Development as identified from the review of historical mapping include:

- rifle range in the west (map editions of 1904 – 1905); and
- former lime kilns (map editions of 1884 – 1904).

4.7.40 Further historical land use features located within 250 m of the Proposed Development include smithies and landfill sites.

4.7.41 Additionally, anecdotal evidence has indicated that a suspected burial pit is located within the footprint of the Converter Site.

Unexploded Ordnance (UXO)

4.7.42 CIRIA Report C681 (Stone *et al*., 2009) outlines recommendations for dealing with the potential risk associated with the legacy of UXO Risk, largely relating to WWII bombing and military sites.

4.7.43 Reference to the Zetica Unexploded Bomb Risk mapping indicates that the Proposed Development is in an area of low potential risk from Unexploded Bombs. As the Proposed Development is not within an area of known military history, in general accordance with the CIRIA Report, no further consideration of UXO relating to wartime bombing is considered necessary, although given the historical presence of a rifle range within the area of the Landfall, the potential cannot be entirely discounted.

4.7.44 A detailed desk study for potential UXO covering much of the Proposed Development is presented in Annex D of Volume 2, Appendix 4.1: DTS, PRA and Site Reconnaissance of the ES. This report identified a negligible risk for Anti-Aircraft Artillery, Explosive Storage Areas, Military Airfield, Bombing Decoy Sites, Munitions Production, WWI Bombing and WWII Bombing. A low risk was identified for Defensive Positions and Military Training/Presence.

Site-Specific Surveys

Site Reconnaissance

4.7.45 A targeted site walkover survey was undertaken on 24 January 2023, the findings of which are presented in detail within Volume 2, Appendix 4.1: DTS, PRA and Site Reconnaissance of the ES. The inspection was limited to the Converter Site and Potential Areas of Concern identified from review of historical maps and aerial photographs. In summary, the findings were as follows:

- the Converter Site comprised predominantly grassed fields with gated access from adjoining minor roads;
- a small group of timber built structures were present in the west of the field for the proposed Bipole 2; and
- no evidence of current site contamination was observed in the areas inspected.

Converter Site Ground Conditions Ground Investigation

4.7.46 A preliminary ground investigation for the Converter Site was undertaken by RPS in February 2023, comprising eight machine excavated trial pits up to 3.05 m below ground level (bgl) and four rotary cored boreholes up to 9.00 m bgl.

4.7.47 The exploratory holes identified no evidence of Made Ground. A thin cover of topsoil was encountered overlying a profile of weathered mudstone and siltstone strata comprising gravelly clays and silts becoming intact rock. These strata are interpreted to be the Bude Formation.

4.7.48 Ten shallow soil samples from the investigation were selected for laboratory analysis for a range of organic and inorganic contaminants. An assessment of these results in relation to typical soil background concentrations and Generic Assessment Criteria (GAC) (primarily Suitable 4 Use Levels (LQM/CIEH, 2015)) for a commercial land use identified no exceedances of GAC and other than

nickel, metal concentrations in natural soils are below or in accords with the BGS typical background concentrations.

Site Wide Ground Investigation

4.7.49 Ground investigation is currently being undertaken across the Proposed Development. As part of the ground investigation chemical testing is being undertaken on selected soils samples. At the time of writing 16 boreholes and 74 trial pits have been completed.

4.7.50 The aforementioned exploratory holes encountered limited Made Ground. Made Ground was encountered within four locations ranging in thickness between 0.25 and 0.65 m. It generally comprised predominantly reworked natural materials with small amounts of man-made materials e.g. brick and ceramics. A thin layer of demolition rubble (brick, slate, tarmacadam and concrete) was encountered within a trial pit located in the western part of the Proposed Development.

Future Baseline Conditions

4.7.51 Schedule 4, paragraph 3 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 require that '*an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge'* is included within the ES. This section provides an outline of the likely future baseline conditions in the absence of the Proposed Development.

4.7.52 The baseline conditions associated with geology, hydrogeology and ground conditions are not subject to significant change should the Proposed Development not come forward. Little change is expected with regards to the following.

- Geology.
  - Designated and non-designated sites and features of geological or geomorphological significance.
- Hydrogeology.
  - Groundwater bodies/aquifer units;
  - Groundwater levels and groundwater flow patterns;
  - Groundwater recharge rates;
  - Groundwater quality and the level of groundwater abstraction; and
  - Groundwater discharge to groundwater dependent receptors.
- Ground conditions.
  - Areas of potentially contaminated land/groundwater relating to historical or recent land-use.
  - Operation of permitted landfill sites/waste facilities.

4.7.53 Climate change represents the most likely mechanism that could potentially result in measurable changes to hydrogeology, through changes to the amount and distribution of recharge to aquifers. The Meteorological Office provide UK Climate Projections (UKCP), the most recent being for 2018 (UKCP18). The projected climate change impacts on rainfall and river flow for this area of England could

involve decreasing summer rainfall and increasing winter rainfall resulting in more severe low flow events in rivers and high peak river flows.

Key Receptors

4.7.54 **Table 4.20** identifies the receptors taken forward into the assessment.

Table 4.20: Key receptors taken forward to assessment

Receptor	Description	Sensitivity/Value
Geology		
Geological or geomorphological features of national or international importance.	Geological or geomorphological sites that have been designated at a national level. This includes SSSIs such as Mermaids Pool to Rowden Gut.	High importance and rarity, national scale and limited potential for substitution.
Hydrogeology		
Groundwater in superficial deposits Secondary A aquifer unit.	A secondary aquifer unit providing a locally important water resource and/or groundwater dependent sites of local importance. This aquifer unit has been shown to extend further east than is shown on BGS mapping. A similar aquifer has also been identified In the western end of the study area.	Medium importance and rarity, regional scale, limited potential for substitution.
Groundwater in bedrock Secondary A aquifer unit.	A secondary aquifer unit providing a locally important water resource and/or groundwater dependent sites of local importance. This aquifer unit has been shown to extend further east than is shown on BGS mapping. A similar aquifer has also been identified in the western end of the study area.	Medium importance and rarity, regional scale, limited potential for substitution.
Groundwater dependent receptors.	Surface watercourses, lakes/ponds, springs and wetlands that are supported by discharge from an underlying aquifer unit. A protected ecological site that has designated features that are supported by discharge from an underlying aquifer unit.	Medium importance and rarity, regional scale, limited potential for substitution. High importance and rarity, national scale and limited potential for substitution or medium importance and rarity, regional scale, limited potential for substitution.
Human health		
Humans	Construction workers or others that may be affected by existing contamination or ground gas arising from natural sources.	High importance.

4.8 Mitigation Measures Adopted as Part of the Proposed Development

4.8.1 For the purposes of the EIA process, the term *'measures adopted as part of the Proposed Development'* is used to include the following types of mitigation measures (adapted from IEMA, 2016). These measures are set out in Volume 1, Appendix 3.1: Commitments Register of the ES.

- Embedded mitigation. This includes the following.
  - Primary (inherent) mitigation–- measures included as part of the Proposed Development design. IEMA describes these as '*modifications to the location or design of the development made during the pre-application phase that are an inherent part of the project and do not require additional action to be taken'*. This includes modifications arising through the iterative design process. These measures will be secured through the consent itself through the description of the project and the parameters secured in the DCO and/or marine licences. For example, a reduction in footprint or height.
  - Tertiary (inexorable) mitigation. IEMA describes these as '*actions that would occur with or without input from the EIA feeding into the design process. These include actions that will be undertaken to meet other existing legislative requirements, or actions that are considered to be standard practices used to manage commonly occurring environmental effects*'. It may be helpful to secure such measures through a CEMP or similar.
- Secondary (foreseeable) mitigation. IEMA describes these as '*actions that will require further activity in order to achieve the anticipated outcome'*. These include measures required to reduce the significance of environmental effects (such as lighting limits) and may be secured through an environmental management plan.

4.8.2 In addition, where relevant, measures have been identified that may result in enhancement of environmental conditions. Such measures are clearly identified within Volume 1, Appendix 3.1: Commitments Register of the ES. The measures relevant to this chapter are summarised in **Table 4.21**.

4.8.3 Embedded measures that will form part of the final design (and/or are established legislative requirements/good practice) have been taken into account as part of the initial assessment presented in **section 4.10** to **4.12** below (i.e., the initial determination of impact magnitude and significance of effects assumes implementation of these measures). This ensures that the measures to which the Applicant is committed are taken into account in the assessment of effects.

4.8.4 Where an assessment identifies likely significant adverse effects, further or secondary mitigation measures may be applied. These are measures that could further prevent, reduce and, where possible, offset these effects. They are defined by IEMA as actions that will require further activity in order to achieve the anticipated outcome and may be imposed as part of the planning consent, or through inclusion in the ES (referred to as secondary mitigation measures in IEMA, 2016). For further or secondary measures both pre-mitigation and residual effects are presented.

Table 4.21: Mitigation measures adopted as part of the Proposed Development

Commitment Number	Measure Adopted	How the Measure Will be Secured
Embedded Measures		
ONS02	The following infrastructure, sensitive sites/features and recreational resources are proposed to be crossed by Horizontal Directional Drilling (or other trenchless methodologies), as set out within the Onshore Crossing Schedule to be submitted as part of the application for development consent: • The Mermaid's Pool to Rowden Gut Site of Special Scientific Interest (SSSI), the beach and the South West Coastal Path, situated along the coastline at the landfall, Cornborough Range. • The following watercourses/woodland: – Kenwith Stream, situated just south of Rickard's Down and approximately 300 m north of Abbotsham. – A small stream, 290 m south of Jennetts reservoir and to the west of West Ashridge, which feeds into Jennetts reservoir. – River Torridge, to the south of Bideford (to note, one HDD will cross the River Torridge, A386 and the Tarka Trail). • The following major roads: – A39, at a section approximately 250 m south west from the Abbotsham Cross roundabout and north west from High Park Farm. – A386, to the south of Bideford (as stated above, one HDD will cross both the River Torridge and A386). • A site of suspected archaeological assets at Winscott Barton.	DCO Schedule 1, Work No. 9 and Associated Development
ONS04	An Outline Decommissioning Strategy has been submitted as part of the application for development consent (document reference 7.18), which details that onshore and offshore decommissioning plans will be prepared in accordance with the principles set out in the Outline Decommissioning Strategy, if decommissioning of the Proposed Development is required at the end of the Proposed Developmen''s operational life. The onshore decommissioning plan(s) will be developed in consultation with the relevant authority and in line with the latest available guidance, legislation and any new technologies available at the time of the Proposed Development's decommissioning. The onshore decommissioning plan(s) will include an assessment of the need to remove above ground infrastructure and the decommissioning of below ground infrastructure and include details relevant to flood risk (e.g. maintenance/reinstatement of existing land drainage), pollution prevention and avoidance of ground disturbance. The onshore decommissioning plan(s) will also include provision for the protection (during	DCO Schedule 2, Requirement 16 (Decommissioning Strategy)

Commitment Number	Measure Adopted	How the Measure Will be Secured
	decommissioning) of any significant archaeological remains within the Onshore Infrastructure Area which were identified and protected from harm during construction.	
ONS34	An Outline Onshore Construction Environmental Management Plan (On-CEMP) has been prepared as part of the application for development consent (document reference 7.7). On-CEMP(s) would be developed in accordance with the Outline On-CEMP. The Outline On-CEMP includes measures to manage environmental risks through the duration of the construction phase as far as reasonably practicable, including the following: • Storage of excavated materials (soils and arisings) to prevent run-off by means of temporary bunding • Storage of stockpiled materials on an impermeable surface to prevent leaching of contaminants and use of covers when not in use to prevent materials being dispersed and to protect from rain; • The implementation of dust suppression measures during construction to minimise nuisance dust emissions during the works; • A construction drainage strategy would be implemented to minimise surface water runoff and pollution; • Bulk storage areas to be secured and provided with secondary containment (in accordance with the Oil Storage Regulations and best practice); • Storage of oils and chemicals away from existing watercourses, including drainage ditches or ponds; • Use of a documented spill procedure and use of spill kits kept in the vicinity of chemical/oil storage; • The disposal of solid waste, including surplus spoil, would be managed to maximise the environmental and developmental benefits from the use of surplus material and to minimise any adverse effects of disposal. In general, the principles of the waste management hierarchy, reduce-reuse-recycle would be applied; • Potential waste arising from excavation would be sampled and analysed to determine the waste classification required to establish relevant waste streams, suitability for reuse/recycle and disposal/storage requirements; and • The Site Resource and Waste Management Plan will provide details of the broad types of waste produced during construction and will include good practice measures for managing waste generated during construction. All waste generated would be disposed of by a suitably licensed waste contractor.	DCO Schedule 2, Requirement 7 (Management plans)

Commitment Number	Measure Adopted	How the Measure Will be Secured
ONS07	An Outline Pollution Prevention Plan (PPP) forms an appendix to the Outline On-CEMP, which has been prepared as part of the application for development consent (document reference 7.7, Appendix A). Onshore PPP(s) would be developed in accordance with the Outline PPP and would include details of emergency spill response procedures. Good practice guidance detailed in the Environment Agency's Pollution Prevention Guidance notes, CIRIA guidance or the latest relevant available guidance would be followed, where appropriate and reasonably practicable.	DCO Schedule 2, Requirement 7 (Management plans)
ONS22	A Discovery Strategy will be prepared, prior to construction, to detail the procedure should any previously unknown contamination be discovered. The discovery strategy would detail the need for a watching brief that would be undertaken by suitably briefed personnel during construction activities such as ground clearance and earthworks.	DCO Schedule 2, Requirement 7 (Management plans)
ONS81	The design aims for any surplus excavated materials (soils and rocks) generated by the Proposed Development to be reused, where reasonably practicable. The reuse of these materials will require demonstration that they are both environmentally and geotechnically suitable.	DCO Schedule 2, Requirement 7 (Management plans)
ONS23	During construction, appropriate Personal Protective Equipment would be used and relevant good working practices applied to avoid potential risk to human health including from any potential ground contamination, in line with relevant available guidance.	DCO Schedule 2, Requirement 7 (Management plans)
ONS24	All construction personnel conducting intrusive works, in any part of the site, would attend a toolbox talk regarding explosives safety & awareness. This should comprise part of the standard site induction briefing and would form a component of the Health and Safety Plan for the site adhering to the requirements of CDM regulations 2015. All personnel working on site would be briefed on UXO recognition and made aware of the possible risks. They would be informed of the actions to take to alert the site manager and to keep people and equipment away from the hazard.	DCO Schedule 2, Requirement 7 (Management plans)
ONS73	A detailed dewatering strategy would be produced upon completion of the ground investigation and confirmation of final design parameters, prior to the commencement of construction.	DCO Schedule 2, Requirement 7 (Management plans)
ONS74	Prior to the commencement of construction works, a risk assessment would be undertaken for identified sensitive surface and groundwater receptors, including springs, private water supplies and ordinary watercourses to identify the need for further investigations such as a water features survey. The work would inform any mitigation measures required	DCO Schedule 2, Requirement 7 (Management plans)

Commitment Number	Measure Adopted	How the Measure Will be Secured
	to minimise potential impacts as far as reasonably practicable. Where a potential impact is identified concerning Gammaton Reservoirs, options to mitigate this impact will be developed based upon the findings of the risk assessment and in consultation with relevant stakeholders, incorporating feedback as far as reasonably practicable.	

4.9 Key Parameters for Assessment

Maximum Design Scenario

4.9.1 The maximum design scenarios identified in **Table 4.22** have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. These scenarios have been selected from the information provided in Chapter 3: Project Description of the ES. Effects of greater adverse significance are not predicted to arise should any other development scenario, based on details within the Project Design Envelope (e.g. different infrastructure layout), to that assessed here be taken forward in the final design. Therefore, this comprises a conservative assessment of a worst case scenario.

Table 4.22: Maximum design scenario considered for the assessment of potential impacts

Impact	Phase[1]			Maximum Design Scenario	Justification
	C	O	D		
Loss of, or damage to, designated SSSI geological site.	✓	×	×	**Construction phase: Landfall** • HDD: The maximum number of cable ducts will be six, with an HDD length of 2,110 m. The maximum number of entry and exit pits are six each. A Landfall temporary construction compound of 10,000 m^2. Duration of installation would be an initial 18 months of works, with a further six months following a gap in construction. • HDD will pass beneath Mermaid's Pool to Rowden Gut SSSI.	HDD will be used to install the Landfall cable ducts beneath the Mermaid's Pool to Rowden Gut SSSI.
The impact of mobilisation of any existing areas of contamination causing a deterioration of groundwater quality in underlying aquifer units.	✓	✓	✓	**Construction phase: Landfall** • HDD: The maximum number of cable ducts will be six, with an HDD length of 2,100 m. Duration of installation would be an initial 18 months of works, with a further six months following a gap in construction • The maximum number of transition joint bays will be two, with a total maximum permanent area of 150 m^2 associated with the ground level covers. • HDD: A Landfall working compound of 10,000 m^2. Duration of installation would be an initial 18 months of works, with a further six months following a gap in construction (for pulling through offshore HVDC cables for Bipole 2). **Construction phase: Onshore HVDC Cable Corridor** • The maximum number of trenches will be two, with an approximate trench depth of 1.4 m. • Construction corridor width 65 m, with a length of up to 14.5 km. There will be up to 34 joint bays and 34 link boxes, with 140 m^3 and 3.15 m^3 of material excavated for each joint bay and link box respectively. • Duration of installation of up to 36 months. • The maximum number of HDD locations is six (including HDD at Landfall). Each major HDD location will have two	HDD will also be used beneath three waterbodies, three major roads and a site of suspected archaeology. The maximum design scenario is represented by the largest permanent footprint for the converter stations, which represents the largest physical impact and greatest area of land disturbance and the greatest risk of impact to groundwater.
The impact of changes in groundwater levels, flow or quality on other sensitive groundwater dependent sites, including surface waters fed by groundwater.	✓	✓	✓		

Impact	Phase[1]			Maximum Design Scenario	Justification
	C	O	D		
				compounds, measuring up to 10,000 m^2. Drilling mud will be stored and used at these compounds. • HDD to be used beneath River Torridge, Kenwith Stream and unnamed stream south of Jennet's Reservoir. There is also a potential option to HDD beneath the unnamed watercourse and woodland to the immediate south of the Converter Site. **Construction phase: converter stations** • Maximum number of stations is two. The combined footprint of the converter station platforms would be 130,000 m^2. • Converter station foundations may be piled. • Temporary converter station compound footprint: 20,000 m^2 (additional to permanent footprint). • Duration: 72 months. **Construction phase: HVAC cables** • The maximum number of trenches will be four, with an approximate depth of 1.4 m. • The working area will include a construction corridor width of 65 m, with a length of up to 1.2 km. Duration of installation of up to 12 months. **Construction: Highways improvements** • Selective widening of Gammaton Road. • Widening of unnamed road between Gammaton Cross and Converter Site including a short section of private road to connect Gammaton Road and the unnamed road. • Creation of accesses to Onshore HVDC Cable Corridor construction sites including: – Creation of remodelled junction at A386 and unnamed road to Littleham. – Widening of junction at the Cornborough sewage treatment works access. – Access to other major compounds at A39 (north and south) and Gammaton Road.	

Impact	Phase[1]			Maximum Design Scenario	Justification
	C	O	D		
				Construction: all elements • Construction compounds will be prepared by removing and storing topsoil and subsoil and then constructing hardstanding areas using clean crushed stone. • Temporary dewatering of cable trenches, joint bays and link boxes will be required where shallow groundwater is encountered. **Operation and maintenance phase** • Maintenance to the onshore HVDC Cables and the HVAC cables will be undertaken only as required. Corrective activities will be limited. • The onshore HVDC Cables, the HVAC cables and the converter stations will be monitored remotely but will involve regular visits. • Permanent footprint of the converter stations would be 130,000 m^2. **Decommissioning phase** Decommissioning is likely to operate within the parameters identified for construction (i.e., any activities are likely to occur within construction working areas and to require no greater amount or duration of activity than assessed for construction).	
The impact of mobilisation of any existing contamination on human receptors.	✓	✓	✓	Construction parameters as defined above.	As above.
The impact of a deterioration in groundwater quality through the accidental spillage/release of potentially polluting substances.	✓	×	✓	Construction and decommissioning parameters as defined above.	As above.
The impact of heat generated by the onshore HVDC Cables on groundwater quality, during the operation and maintenance phase.	×	✓	×	**Onshore HVDC Cables** • Maximum number of cables: four. • Maximum number cable trenches: two. • Approximate trench depth: 1.4 m. • Maximum voltage: 525 kV.	Maximum number of cables will result in greatest potential for heat generation and larger permanent cable corridor width (and therefore larger area potentially impacted).

Impact	Phase[1]			Maximum Design Scenario	Justification
	C	O	D		
				• Permanent cable corridor width of 32 m. • A length of up to 14.5 km. **HVAC cables** • Maximum number of cables: 12. • Maximum number cable trenches: four. • Approximate trench depth: 1.4 m. • Maximum voltage: 400 kV. • Permanent corridor width of 30 m, with a length of up to 1.2 km.	

[1] C=construction, O=operational and maintenance, D=decommissioning

4.10 Assessment of Construction Effects

4.10.1 The impacts of the construction of the Proposed Development have been assessed further below.

Impact of Partial Loss or Damage to Designated Geological Site

4.10.2 A designated geological SSSI (Mermaid's Pool to Rowden Gut) is located along the coastline at the Landfall, Cornborough Range.

Sensitivity of the Receptor

4.10.3 The combination of a major lateral change from Crackington Formation to Bideford Formation facies and the associated biostratigraphical control makes the Abbotsham Coast a site of very major importance for regional and national palaeoenvironmental and palaeogeographical studies. Given the nature of the site, it cannot be readily restored or substituted. Therefore, the sensitivity of the receptor is **high**.

Magnitude of Impact

4.10.4 As set out in Volume 1, Chapter 3: Project description of the ES, the Landfall and associated offshore HVDC Cables will be installed by HDD. The drill will pass beneath the SSSI and the HDD launch pit will be set well back from the coastal path inland with drills emerging (punching out) at least 1,000 m beyond Mean Low Water Springs. There will be no open trenching through the designated geological SSSI and all construction compounds will be located outside of the designated site.

4.10.5 The magnitude is therefore considered to be **negligible**.

Significance of the Effect

4.10.6 Overall, the sensitivity of the receptor is **high** and the magnitude of the impact is **negligible**. The effect will, therefore, be of **minor adverse** significance, which is not significant.

Further (Secondary) Mitigation and Residual Effect

4.10.7 No significant effects have been identified in relation to geology, hydrogeology or ground conditions which would require further (secondary) mitigation during the construction stage. Therefore, no further measures are proposed.

Future Monitoring

4.10.8 No significant effects have been identified in relation to geology, hydrogeology or ground conditions which would require further monitoring during the construction stage. Therefore, no further measures are proposed.

Impact of Mobilisation of Existing Areas of Contamination Causing a Deterioration of Groundwater Quality

4.10.9 There is the potential for the presence of localised Made Ground that contains elevated concentrations of contaminants, particularly around any areas of reprofiled/infilled historical mineral workings, the lime kilns in the central and western sections of the onshore elements of the Proposed Development, the former rifle range in the west and suspected animal burial pit in the east. The existing pylons, farm buildings, Alverdiscott Substation and access road in the eastern section are not considered significant sources although there may be localised Made Ground associated with their construction. There is also a potential for agrochemicals to be present within shallow soils in areas of agricultural land usage. The identified kilns and former quarries to the west of the River Torridge coincide with the route option for temporary excavation and backfilling of trenches for the laying of the HVDC Cables, and the suspected burial pit within the Converter Site footprint.

4.10.10 Additionally off-site sources of potential contamination include two historical landfills located within 250 m of the proposed Onshore HVDC Cable Corridor from Gammaton Moor to the River Torridge.

4.10.11 Recent or historical land uses have the potential to result in localised areas of soil or groundwater contamination. That contamination is subject to potential mobilisation if disturbed. The mobilisation of contamination may result in an adverse impact on underlying aquifers, in terms of their WFD status.

4.10.12 These effects can be direct or may arise from the creation of new pathways, e.g. through piling or HDD (or equivalent trenchless technique).

4.10.13 The identified potential sources are considered to present a low potential contamination risk.

Sensitivity of the Receptor

4.10.14 The shallow, Secondary A aquifer associated with the superficial deposits of the River Torridge/River Yeo is a locally important groundwater resource that is currently of good quantitative status. The sensitivity of this receptor is **medium**.

4.10.15 The underlying bedrock across the Proposed Development is also a Secondary A aquifer and may also be considered **medium** sensitivity.

Magnitude of Impact

Onshore HVDC Cable Corridor – River Torridge Crossing

4.10.16 The use of HDD (or equivalent trenchless technique) should prevent the mobilisation of near surface soil contamination associated with current and historical land-use. HDD (or other trenchless technique) may; however, create a potential pathway that could allow the migration of contaminated groundwater outside of its current area of effect. The presence or severity of any contamination in this area is not known although the risk is qualitatively assessed as low based on the findings of the DTS. The use of trenchless technologies beneath any areas

of contamination will reduce the potential for a direct impact but further mitigation is required to ensure the methodology avoids the creation of new pathways.

4.10.17 The magnitude of impact will be **low**.

Other Areas

4.10.18 Piling may be used as the foundation solution for large structures subject to anticipated loadings, most notably the onshore converter stations. If piling is proposed, a risk assessment shall be undertaken to determine mitigation measures and design that will manage the risk associated with land and groundwater contamination (Note, no evidence of Made Ground or elevated ground contamination was identified during the Converter Site ground investigation, though a suspected animal burial pit is potentially present. Made Ground may be present locally associated with the construction of the existing Alverdiscott Substation).

4.10.19 The magnitude of impact is likely to be **low**.

Significance of Effect

4.10.20 Overall, the sensitivity of the receptor is **medium** and the magnitude of the impact on the Secondary A aquifers is **low**. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Further (Secondary) Mitigation and Residual Effect

4.10.21 No significant effects have been identified in relation to geology, hydrogeology or ground conditions which would require further (secondary) mitigation during the construction stage. Therefore, no further measures are proposed.

Future Monitoring

4.10.22 No significant effects have been identified in relation to geology, hydrogeology or ground conditions which would require further monitoring during the construction stage. Therefore, no further measures are proposed.

Impact of Reduced Groundwater Quantity or Quality in Aquifer Units: Secondary A Aquifers

4.10.23 The Onshore HVDC Cable Corridor crosses the shallow Secondary A superficial deposit aquifer associated with the River Torridge. The WFD status for this groundwater body has been shown to be good for quantitative quality and poor for chemical quality.

4.10.24 The Proposed Development is also underlain by Secondary A bedrock aquifers.

4.10.25 As detailed within **Table 4.5**, a request was made to Torridge District Council regarding known private water supplies A subsequent review of the dataset cited by Torridge District Council identified nine BGS water wells within the study area. Two private water supplies have also been identified by landowners within the Order Limits.

Dewatering

4.10.26 The construction of the transition joint bays, onshore HVDC Cables, HVAC Cables and associated joint bays or link boxes will require dry excavations. Groundwater dewatering of open trenches and excavations may therefore be required through pumping. The groundwater removed by dewatering will be discharged to local surface watercourses or across ground away from the excavations. This will be undertaken in accordance with measures agreed through the On-CEMP and PPP.

4.10.27 Dewatering in the vicinity of aquifer units will result in:

- groundwater levels being locally reduced within the trenches and excavations; and
- change in local groundwater flow directions, which will become oriented towards the dewatered excavations.

4.10.28 Dewatering has the potential to have a direct impact on private water supplies situated near or down hydraulic gradient from the Proposed Development.

4.10.29 Dewatering itself is unlikely to result in a significant change in groundwater quality. The effect of accidental release and or existing contamination sources on water quality are considered separately. Groundwater levels will recover after construction assuming that the excavated materials are used as backfill and are not subject to artificial compaction. This will be controlled through the On-CEMP.

Foundations

4.10.30 Construction of the Converter Site will require both a temporary construction compound and a permanent operational footprint for each converter station. The permanent footprint will include both permeable and non-permeable areas. The non-permeable parts of the Converter Site will introduce new areas of hardstanding which will affect the infiltration of rainwater to ground and hence recharge to underlying aquifer units.

4.10.31 Shallow foundations required for the Converter Site may also intercept groundwater causing impacts on quality, flow and levels. Piled foundations could create new pathways between previously unconnected groundwater bodies. The Converter Site is situated above the bedrock Secondary A aquifer. The effect of contamination on this aquifer is considered separately above.

Horizontal directional drilling

4.10.32 HDD (or equivalent trenchless technique) will be undertaken at the Landfall and where required to cross main roads and rivers. It will also be used, where necessary, to pass beneath existing areas of contamination as described above.

Sensitivity of the Receptor

4.10.33 Both Secondary A aquifers are considered a locally important groundwater resource. The sensitivity of this receptor is **medium**.

Magnitude of Impact

Dewatering

4.10.34 The dewatering of open cut trenches and excavations will have a direct impact on shallow groundwater levels and flow. Any potential impacts are anticipated to be short term and localised in nature. A qualitative risk assessment based of the potential impact upon the identified private water supplies has been undertaken and presented within Volume 2, Appendix 4.2: Private Water Supply Desk Based Assessment. The risk assessment methodology is derived from the characteristics of the pathway including length and likely travel time, and the nature of the impact e.g. likely magnitude of change on flow, levels and groundwater quality. A summary of the assigned risk levels and brief justification note are provided within **Table 4.23.**

Table 4.23: Qualitive risk assessment of PWS

Reference	Overall Risk Level	Justification Summary
PWS 01	Moderate	The Proposed Development are within the potential groundwater catchment of the borehole and up hydraulic gradient from the borehole.
PWS 02	Low to Moderate	There is no possible flow pathway from the Proposed Development to the borehole.
PWS 03	Low	Borehole is located significant distance lateral to the Proposed Development, in an area of groundwater discharge (i.e. the River Torridge). Low likelihood of a direct pathway and any effects would be mild if not negligible.
PWS 04	High	Given the borehole is within the Order Limits an impact from trenching or drilling cannot be precluded. Unless the borehole is directly impact by operations (i.e. destroyed) it is considered any impacts should be short term unless permanent dewatering occurs. Borehole could be directly impacted by construction activities if not at the property as indicated (see assessment for PWS10)
PWS 05	Low	Although a pathway between the borehole and the Proposed Development cannot be entirely discounted, the low elevation of the borehole relative to the Proposed Development and it position in an area of groundwater discharge means that shallow trenching at high elevation upgradient from the borehole is unlikely to have any measurable effect on the borehole supply.
PWS 06	Low to Moderate	There is no possible flow pathway from the Proposed Development to the borehole.
PWS 07	Low	There is no possible flow pathway from the Proposed Development to the borehole.
PWS 08	Low	There is no possible flow pathway from the Proposed Development to the borehole.
PWS 09	Low	Although continuity between the Proposed Development and the borehole cannot be entirely discounted, any consequences are considered mild.
PWS 10	High	Construction activities could destroy the borehole itself given it location with the Proposed Development. If not destroyed, shallow trenching or HDD operations in this area could have a significant effect on water quality of supply. Any impact is assessed as temporary, unless drilling results in permanent dewatering or fracture networks supplying borehole are compromised.

Reference	Overall Risk Level	Justification Summary
PWS 11	Moderate for well Very high risk for water distribution pipe work	Proximity of the well to the Proposed Development, its shallow nature and dependence on fracture flow in the aquifer. Further investigation will be required. Water distribution pipes will be crossed by cable trenches and would require replacement with arrangement made for temporary disruption to supply.

4.10.35 Abstraction details are not currently available for the identified private water supplies however, further information will be sought and those identified with an overall risk level of moderate or above will be subject to further assessment and investigation. This will be undertaken at the pre-construction stage as detailed within the Outline On-CEMP (document reference 7.7). The work will inform any mitigation measures required to minimise potential impacts which may comprise seasonal restriction for dewatering operations or provision of a replacement source of supply.

4.10.36 The magnitude of this impact on groundwater quantity with the mitigation measures in place will be **negligible**.

Foundations

4.10.37 The Converter Site location is on a Secondary A bedrock aquifer, and where excavations are significant there is potential for construction to affect recharge to the aquifer. The magnitude of this impact on the aquifer and on groundwater levels or flow is likely to be **low**.

Discharges to ground

4.10.38 The temporary discharge of surface water runoff to ground during construction could result in increased recharge to the shallow Secondary A aquifer. This could result in localised increase in recharge and groundwater levels. There should be no effect on groundwater quality. The magnitude of this impact is **low**.

Horizontal directional drilling

4.10.39 HDD (or equivalent trenchless technique) will be used to pass beneath key constraints (e.g., River Torridge). This will be developed in accordance with method statements to ensure that existing areas of contamination are avoided and that new pathways are not created. The magnitude of impact will therefore be **low**.

Significance of the Effect

Dewatering

4.10.40 Overall, the sensitivity of the receptor is **medium** and magnitude of the impact is **negligible**. The effect will, therefore, be of **negligible adverse** significance, which is not significant in EIA terms.

Foundations

4.10.41 Overall, the sensitivity of the receptor is **medium** and the magnitude of the impact is **low**. The effect will, therefore, be **minor adverse** significance, which is not significant in EIA terms.

Discharges to ground

4.10.42 Overall, the sensitivity of the receptor is **medium** and magnitude of impact of temporary discharge of runoff to ground is **low**. The effect will, therefore, be **minor adverse** significance, which is not significant in EIA terms.

Horizontal directional drilling

4.10.43 Overall, the sensitivity of the receptor is **medium** and the magnitude of impact of drilling works is **low**. The effect will, therefore, be **minor adverse** significance, which is not significant in EIA terms.

Further (Secondary) Mitigation and Residual Effect

4.10.44 No significant effects have been identified in relation to geology, hydrogeology or ground conditions which would require further (secondary) mitigation during the construction stage. Therefore, no further measures are proposed.

Future Monitoring

4.10.45 No significant effects have been identified in relation to geology, hydrogeology or ground conditions however dependent upon the findings of additional risk assessment / investigation of the private water supplies a network of groundwater assurance monitoring wells may be installed to monitor potential impacts and inform detailed mitigation measures.

Impact of Existing Areas of Contamination to Construction Workers

4.10.46 As set out in **paragraph 4.10.9**, areas of known potential areas of existing contamination are limited though there is potential for unexpected contamination to be encountered during construction.

Sensitivity of the Receptor

4.10.47 For this assessment the potential impact on human health of construction workers has been considered in relation to their exposure to potential contaminants within the soils/groundwater. The sensitivity of this receptor is **medium** given consideration of the applicable exposure pathways and the critical receptor.

Magnitude of Impact

4.10.48 In areas of known contamination, HDD (or other trenchless techniques) is proposed. Secondary mitigation measures are proposed to ensure that works near the River Torridge will avoid any release of existing contamination.

4.10.49 In terms of currently unknown contamination, all construction works will be undertaken in line with the On-CEMP, which will include details of protective measures for construction workers. Appropriate Personal Protective Equipment will be used and relevant good working practices applied to avoid potential risk to human health including from any potential ground contamination, in line with relevant available guidance.

4.10.50 In addition, a Discovery Strategy will be prepared to identify the construction protocol on discovery of any currently unknown contamination.

4.10.51 With effective good practice measures in place, the risks will be controlled and the magnitude of impact will be **negligible** for both the construction and decommissioning phase.

Significance of the Effect

4.10.52 Overall, the sensitivity of the receptor is **medium** and the magnitude of impact is **negligible**. The effect will, therefore, be of **minor adverse/negligible** significance, which is not significant in EIA terms.

Further (Secondary) Mitigation and Residual Effect

4.10.53 No significant effects have been identified in relation to geology, hydrogeology or ground conditions which would require further (secondary) mitigation during the construction stage. Therefore, no further measures are proposed.

Future Monitoring

4.10.54 No significant effects have been identified in relation to geology, hydrogeology or ground conditions which would require further monitoring during the construction stage. Therefore, no further measures are proposed.

Impact of Accidental Release or Spillage of Contaminants

4.10.55 Potentially polluting substances will be stored, handled and used during the construction phase and decommissioning phase. Notable substances include fuels, lubricants and hydraulic oils associated with plant and machinery. Other substances such as foul water generated from welfare facilities will also require appropriate management. As outlined in **Table 4.21**, measures will be included in the On-CEMP and PPP to ensure all controlled water receptors (including groundwater dependent features) are protected during the proposed construction and decommissioning works. The PPP shall identify how potentially polluting substances will be stored, handled and used appropriately by including the following elements.

- Reference to relevant regulatory guidance and industry best practice.
- Consideration of groundwater, surface water and environmental receptors during the design of compounds and the management of surface water runoff thereon.
- The design of material storage and refuelling areas.

- Production of method statements and emergency response plans for activities involving potentially polluting materials and associated training of the relevant personnel.

4.10.56 Impacts during decommissioning will be controlled through the Onshore Decommissioning Plan.

Sensitivity of the Receptor

4.10.57 The shallow, Secondary A aquifer associated with the superficial deposits of the River Torridge/River Yeo is a locally important groundwater resource that is currently of good quantitative status. The sensitivity of this receptor is medium.

4.10.58 The underlying bedrock across the Proposed Development is also a Secondary A aquifer and may be considered medium sensitivity.

Magnitude of Impact

4.10.59 Following adoption of the measures outlined in the On-CEMP, the likelihood of any accidental release will be minimised. The scale and duration of the release will also be reduced. The potential for the release to occur in the most sensitive area (e.g., excavation areas) would be minimised. The magnitude of the construction impact is **low**.

Significance of the Effect

4.10.60 Overall, the sensitivity of the receptor is **medium** and the magnitude of the impact the Secondary A aquifers is **low**. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Further (Secondary) Mitigation and Residual Effect

4.10.61 No significant effects have been identified in relation to geology, hydrogeology or ground conditions which would require further (secondary) mitigation during the construction stage. Therefore, no further measures are proposed.

Future Monitoring

4.10.62 No significant effects have been identified in relation to geology, hydrogeology or ground conditions which would require further monitoring during the construction stage. Therefore, no further measures are proposed.

Impact of Changes in Groundwater Levels, Flow, Quality on Groundwater Dependent Receptors

4.10.63 As set out in **paragraph 4.7.22**, groundwater dependent features comprise the River Torridge which supports a saltmarsh and mudflat foreshore and the Gammaton Reservoirs which are of local importance.

4.10.64 The River Torridge Crossing is to be crossed by HDD (or other trenchless techniques) which will be developed in accordance with method statements to ensure that existing areas of potential contamination are avoided and that new pathways are not created.

4.10.65 The cable corridor crosses the field in which lakes associated with Gammaton Reservoirs, which are used for fishing, are located. There is potential for the cables to intercept spring lines impacting upon the water levels within the lakes.

Sensitivity of the Receptor

4.10.66 The sensitivity of the shallow Secondary A superficial deposit aquifer, which is associated with the River Torridge, is **medium**. The spring fed lakes are also assessed as **medium** sensitivity.

Magnitude of Impact

4.10.67 As detailed within **paragraph 4.8.36**, magnitude of impact of drilling works is **low**.

4.10.68 A staged approach to risk assessment will be undertaken which will include a water features survey to establish the current hydrogeological regime and inform any mitigation required to ensure water supply to the lakes is not affected. The magnitude of impact of potential disruption to the water supply of the fishing lakes is therefore **negligible**.

Significance of the Effect

4.10.69 Overall, the sensitivity of the River Torridge is **medium** and the magnitude of the impact is **low**. The effect will, therefore, be **minor adverse** significance, which is not significant in EIA terms.

4.10.70 The sensitivity of the Gammaton Reservoirs is **medium** and the magnitude of the impact is **negligible**. The effect will therefore be **negligible adverse** significance, which is not significant in EIA terms.

4.10.71 Impacts on the flow and levels of groundwater aquifer units are assessed within **paragraphs 4.8.20** to **4.8.36**.

Further (Secondary) Mitigation and Residual Effect

4.10.72 Measures to ensure that existing potential contamination in this area is not mobilised are set out in **Table 4.21** and considered above. Further consideration of effects in relation to surface water is provided in Volume 2, Chapter 3: Hydrology and Flood Risk of the ES. Details of effects on ecological receptors are considered in Volume 2, Chapter 1: Onshore Ecology and Nature Conservation of the ES.

Future Monitoring

4.10.73 No significant effects have been identified in relation to geology, hydrogeology or ground conditions which would require further monitoring during the construction stage. Therefore, no further measures are proposed.

Impact Resulting from Contact with UXO

4.10.74 The detailed UXO Desk Study Report presented within Annex D of Volume 2, Appendix 4.1: DTS, PRA and Site Reconnaissance of the ES has identified a negligible and low risk for encountering UXO as discussed in **paragraph 4.7.44**.

Recommended mitigation measures contained therein will be detailed within the On-CEMP and include a UXO briefing of site personnel to be included within Toolbox Talks. On this basis, it is unlikely that there will be any impact from UXO and is therefore excluded from further consideration.

Further (Secondary) Mitigation and Residual Effect

4.10.75 No significant effects have been identified in relation to geology, hydrogeology or ground conditions which would require further mitigation during the construction stage. Therefore, no further measures are proposed.

Future Monitoring

4.10.76 No significant effects have been identified in relation to geology, hydrogeology or ground conditions which would require further monitoring during the construction stage. Therefore, no further measures are proposed.

4.11 Assessment of Operational Effects

4.11.1 The impacts of the operation and maintenance phase of the Proposed Development have been assessed. The impacts arising from the operation and maintenance phase of the Proposed Development are listed in **Table 4.22**, along with the maximum design scenario against which each impact has been assessed.

4.11.2 A description of the likely effect on receptors caused by each identified impact is given below.

Impact of Mobilisation of Existing Areas of Contamination Causing a Deterioration of Groundwater Quality

4.11.3 Existing areas of potential contamination are as described for the construction phase in **section 4.10**.

Sensitivity of the Receptor

4.11.4 Sensitivity of receptor is as described for the construction phase in **section 4.10**.

Magnitude of Impact

4.11.5 Activity at the Landfall and along the Onshore HVDC Cable Corridor and HVAC cable corridors during the operation and maintenance phase will be limited. The cables will be continuously monitored remotely.

4.11.6 The design includes an area for the access control building and car parking in addition to the converter station buildings. The presence of a significant quantity of hardstanding and suitable management of surface water runoff will minimise the potential for leaching of any soil contamination and migration of any shallow groundwater across this section of the Proposed Development.

4.11.7 Once constructed, no activities are likely during operation that have the potential to result in additional mobilisation of any existing contamination.

4.11.8 The magnitude of impact during the operation and maintenance phase and the decommissioning phase will therefore be **negligible** for all areas.

Significance of the Effect

4.11.9 Overall, the magnitude of the impact is **negligible** and the sensitivity of the receptor **medium**. The effect will be **negligible,** which is not significant in EIA terms.

Further (Secondary) Mitigation and Residual Effect

4.11.10 No significant effects have been identified in relation to geology, hydrogeology or ground conditions which would require further (secondary) mitigation during the operational stage. Therefore, no further measures are proposed.

Future Monitoring

4.11.11 No significant effects have been identified in relation to geology, hydrogeology or ground conditions which would require further monitoring during the operational stage. Therefore, no further measures are proposed.

Impact of Existing Areas of Contamination to End Site Users

4.11.12 Existing areas of contamination are as described for the construction phase in **section 4.10**.

Sensitivity of the Receptor

4.11.13 For this assessment the potential impact on the health of end users has been considered. The sensitivity of these end users is considered **medium** given the land use sensitivity aligns with a commercial or industrial scenario.

Magnitude of Impact

4.11.14 Mitigation measures implemented during the construction phase would ensure any contaminated and natural materials left *in situ*/reused within the Proposed Development would not pose unacceptable risk to human health or the environment during the operational phase. The ground investigation undertaken for the Converter Site included laboratory analysis of shallow soil samples. No Made Ground was encountered during the investigation and contaminant concentrations in this area do not pose an unacceptable risk to human health, though a suspected burial pit is present at this location.

4.11.15 Activity at the Landfall and along the Onshore HVDC Cable Corridor and HVAC cable corridors during the operation and maintenance phase will be limited. This will involve infrequent on-site inspections of the cables and corrective maintenance activities. The cables will be continuously monitored remotely.

4.11.16 The Converter Site would provide approximately 30 full time-equivalent (FTE) jobs, with up to 15 staff on-site at any one time in the day, reducing to approximately five overnight. There would also be operation and maintenance staff visiting the converter stations on a short-term basis to undertake preventative and corrective works.

4.11.17 Once constructed, any remediation of existing/residual contamination will have been implemented.

4.11.18 Trenches are to be backfilled on completion of cable installation using materials identified as suitable for purpose, therefore there is unlikely to be exposure of contaminated materials that could migrate via airborne pathways across the majority of the Proposed Development.

4.11.19 The magnitude of impact during the operation and maintenance phase will therefore be **negligible** for all areas.

Significance of the Effect

4.11.20 Overall, the sensitivity of the receptor is **medium** and the magnitude of the impact is **negligible**. The effect will be **negligible**, which is not significant in EIA terms.

Further (Secondary) Mitigation and Residual Effect

4.11.21 No significant effects have been identified in relation to geology, hydrogeology or ground conditions which would require further (secondary) mitigation during the operational stage. Therefore, no further measures are proposed.

Future Monitoring

4.11.22 No significant effects have been identified in relation to geology, hydrogeology or ground conditions which would require further monitoring during the operational stage. Therefore, no further measures are proposed.

Impact of Heat Generated by the Onshore HVDC Cables on Ground Conditions

4.11.23 Underground cables, such as the onshore HVDC Cables and HVAC cables, generate heat that dissipates naturally to the surrounding ground during power transmission.

4.11.24 The levels of heat loss and dissipation of heat through the soil can only be determined once further details of the cable voltage, soil structure (including its thermal properties) and the final engineering design are known, which would likely be during the detailed design stage. This will include consideration of the cable depth (in terms of the receptor that may be affected).

4.11.25 However, the onshore HVDC and HVAC Cables themselves will consist of copper conductors wrapped with various materials for insulation, protection, and sealing. Once installed, the electrical cables must be suitably spaced out in order to minimise the mutual heating effect of one cable circuit on another, this enables the cables to effectively carry the large power volumes required without overheating and damaging the cable. Furthermore, the cables trenches would be

backfilled with thermally suitable material (e.g. cement bound sand) which would contribute towards the dissipation of heat.

4.11.26 It is anticipated that any heat dissipation will be localised and confined to the areas immediately surrounding the onshore cables. On this basis, it is unlikely that there will be any impact on the quality or temperature of groundwater at its point of abstraction during operation. This impact is therefore excluded from further consideration.

Further (Secondary) Mitigation and Residual Effect

4.11.27 No significant effects have been identified in relation to geology, hydrogeology or ground conditions which would require further (secondary) mitigation during the operational stage. Therefore, no further measures are proposed.

Future Monitoring

4.11.28 No significant effects have been identified in relation to geology, hydrogeology or ground conditions which would require further monitoring during the operational stage. Therefore, no further measures are proposed.

4.12 Assessment of Decommissioning Effects

4.12.1 The impacts of the decommissioning phase of the Proposed Development have been assessed. The potential impacts arising from the operation and maintenance phase of the Proposed Development are listed in **Table 4.22**, along with the maximum design scenario against which each impact has been assessed.

4.12.2 A description of the potential effect on receptors caused by each identified impact is given below.

Impact of Accidental Release or Spillage of Contaminants

4.12.3 During decommissioning, it is expected that the onshore HVDC Cables will be left *in-situ* to minimise the environmental disturbance during decommissioning. The cable ends will be cut, sealed and securely buried as a precautionary measure. Cable ducts, joint bays and link boxes would be left in-situ, to minimise environmental disturbance.

4.12.4 The operation of the proposed converter stations are intended to form permanent elements of electrical infrastructure serving the national grid, however as stated above, the minimum operational lifetime is currently anticipated to be 50 years. It is likely that this operational lifetime could be extended through refurbishment and the replacement of equipment, rather than decommissioning.

4.12.5 If complete decommissioning is required, then all of the electrical infrastructure will be removed, and any waste arising disposed of in accordance with relevant regulations. Foundations will be broken up and the site reinstated to its original condition or for an alternative (separately agreed and consented) use.

4.12.6 An Onshore Decommissioning Plan would be developed in a timely manner in consultation with the relevant stakeholders and prior to commencement of decommissioning. The Onshore Decommissioning Plan will include provisions for

the removal of onshore above ground infrastructure and the decommissioning of below ground infrastructure and details relevant to flood risk, pollution prevention and avoidance of ground disturbance.

Sensitivity of the Receptor

4.12.7 The shallow, Secondary A aquifer associated with the superficial deposits of the River Torridge/River Yeo is a locally important groundwater resource that is currently of good quantitative status. The sensitivity of this receptor is **medium**.

4.12.8 The underlying bedrock across the Proposed Development is also a Secondary A aquifer and may be considered **medium** sensitivity.

Magnitude of Impact

4.12.9 Activity at the Landfall and along the Onshore HVDC Cable Corridor and HVAC cable corridors during the decommissioning phase will be less than that described for the construction phase. The Converter Site will require a greater level of decommissioning activity due to the scale and operation of the plant.

4.12.10 The magnitude of impact during the decommissioning phase will therefore be less than that reported for the construction phase. With the Onshore Decommissioning Plan in place, the magnitude of impact is anticipated to be **low**.

Significance of the Effect

4.12.11 Overall, the sensitivity of the receptor is **medium** and the magnitude of the impact is **low**. The effect will be of **minor adverse** significance, which is not significant in EIA terms.

Further (Secondary) Mitigation and Residual Effect

4.12.12 No significant effects have been identified in relation to geology, hydrogeology or ground conditions which would require further (secondary) mitigation during the decommissioning stage. Therefore, no further measures are proposed.

Future Monitoring

4.12.13 No significant effects have been identified in relation to geology, hydrogeology or ground conditions which would require further monitoring during the decommissioning stage. Therefore, no further measures are proposed.

Impact of Reduced Groundwater Quantity or Quality in Aquifer Units: Secondary A Aquifers

4.12.14 Decommissioning procedures are as above in **paragraphs 4.12.3** to **4.12.6**.

Sensitivity of the Receptor

4.12.15 The shallow, Secondary A aquifer associated with the superficial deposits of the River Torridge/River Yeo is a locally important groundwater resource that is currently of good quantitative status. The sensitivity of this receptor is **medium**.

4.12.16 The underlying bedrock across the Proposed Development is also a Secondary A aquifer and may be considered **medium** sensitivity.

Magnitude of Impact

4.12.17 Activity at the Landfall and along the Onshore HVDC Cable Corridor and HVAC cable corridors during the decommissioning phase will be less than that described for the construction phase. No dewatering will be required.

4.12.18 The converter stations will require a greater level of decommissioning activity.

4.12.19 The magnitude of impact during the decommissioning phase will therefore be less than that reported for the construction phase. With the Onshore Decommissioning Plan in place, the magnitude of impact is anticipated to be **low**.

Significance of the Effect

4.12.20 Overall, the sensitivity of the receptor is **medium** and the magnitude of the impact is **low**. The effect will be no greater than **minor adverse** significance, which is not significant in EIA terms.

Further (Secondary) Mitigation and Residual Effect

4.12.21 No significant effects have been identified in relation to geology, hydrogeology or ground conditions which would require further (secondary) mitigation during the operational stage. Therefore, no further measures are proposed.

Future Monitoring

4.12.22 No significant effects have been identified in relation to geology, hydrogeology or ground conditions which would require further monitoring during the operational stage. Therefore, no further measures are proposed.

Impact of Existing Areas of Contamination to Decommissioning Workers

4.12.23 The magnitude of impact on workers involved in decommissioning works will be similar/no worse than that described in **paragraph 4.10.51** for the construction phase.

Impact of Changes in Groundwater Levels, Flow, Quality on Groundwater Dependent Receptors

4.12.24 The magnitude of impact on groundwater dependent features will be similar to or less than that described in **paragraph 4.12.19**. Further consideration of effects in relation to surface water is provided in Volume 2, Chapter 3: Hydrology and Flood Risk of the ES. Details of effects on ecological receptors are considered in Volume 2, Chapter 1: Onshore Ecology and Nature Conservation of the ES.

Further (Secondary) Mitigation and Residual Effect

4.12.25 No significant effects that would require further mitigation during the operational stage have been identified in relation to geology, hydrogeology or ground conditions . Therefore, no further measures are proposed.

Future Monitoring

4.12.26 No significant effects have been identified in relation to hydrogeology, geology or ground conditions which would require further monitoring during the operational stage. Therefore, no further measures are proposed.

4.13 Cumulative Environmental Assessment

4.13.1 The Cumulative Effects Assessment (CEA) takes into account the impact associated with the Proposed Development together with other projects and plans. The projects and plans selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise (see Volume 1, Appendix 5.3: CEA Screening Matrix of the ES). Each project has been considered on a case-by-case basis for screening in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

4.13.2 The geology, hydrogeology and ground conditions CEA methodology has followed the methodology set out in Volume 1, Chapter 5: EIA methodology of the ES. As part of the assessment, all projects and plans considered alongside the Proposed Development have been allocated into 'tiers' reflecting their current stage within the planning and development process.

- Tier 1
  - Under construction
  - Permitted application
  - Submitted application
  - Those currently operational that were not operational when baseline data were collected, and/or those that are operational but have an ongoing impact
- Tier 2
  - Scoping report has been submitted
- Tier 3
  - Scoping report has not been submitted
  - Identified in the relevant Development Plan
  - Identified in other plans and programmes.

4.13.3 This tiered approach is adopted to provide a clear assessment of the Proposed Development alongside other projects, plans and activities.

4.13.4 The CEA also considers the Proposed Development and the anticipated Alverdiscott Substation Connection Development (which will be implemented by NGET and thus, does not form part of the Proposed Development) together. This

is because the Alverdiscott Substation Connection Development will be required for the connection of the Proposed Development to the national grid.

4.13.5 The specific projects, plans and activities scoped into the CEA, are outlined in **Table 4.26**. The locations of such projects, plans and activities are presented in Volume 2, Figure 4.2 of the ES.

Table 4.24: List of cumulative developments considered within the CEA

Project	Status	Distance from Proposed Development (nearest point, km)	Description	Dates of Construction (if available)	Dates of Operation (if available)	Overlap with the Proposed Development?
Tier 1						
Unknown	Unknown	Partially within the Order Limits	Development required at the existing Alverdiscott Substation Site, including a new 400 kV substation, and other extension modification works to be carried out by National Grid Electricity Transmission (NGET).	Unknown	Unknown	Yes
1/0359/2024/FULM	Permitted	Partially within the Order Limits	Reserved matters application for details of appearance, landscaping, layout and scale in respect of a proposal for 274 no. dwellings, associated infrastructure and open space pursuant outline planning permission 1/0039/2014/OUTM (Amended Plans)	Unknown	Unknown	Yes
1/1057/2021/FULM	Permitted	Partially within the Order Limits	Installation and operation of a Solar Farm together with all associated works, equipment and necessary infrastructure	Unknown	Unknown	Yes
1/1256/2021/REMM	Permitted	0.1	Reserved matters application for details of appearance, landscaping, layout and scale in respect of a proposal for 276 no. dwellings, associated infrastructure and open space pursuant outline planning permission	Unknown	Unknown	Yes
1/1266/2022/REMM	Pending	0.1	Reserved matters application for details of appearance, landscaping, layout and scale in respect of a proposal for 61 no. dwellings and associated works pursuant to Outline Planning Permission Local Planning Authority Ref; 1/1086/2017/OUTM.	Unknown	Unknown	Yes
1/0252/2022/OUTM	Permitted	0.25	Outline application for the erection of up to 400 dwellings, amenity open space, footpath links, associated landscaping and infrastructure	Unknown	Unknown	Yes

Project	Status	Distance from Proposed Development (nearest point, km)	Description	Dates of Construction (if available)	Dates of Operation (if available)	Overlap with the Proposed Development?
			works with all matters reserved except access (Affecting a Public Right of Way)			
1/0523/2021/REMM	Permitted	Adjacent to the Order Limits	300 dwellings with associated infrastructure and public open space (Variation of conditions 1 (the reserved matters), 11 (highways) and 18 (contamination)	Unknown	Unknown	Yes
1/0110/2023/REMM	Pending	0.25	Application for approval of Reserved Matters pursuant to 1/0947/2020/OUTM (layout, scale, appearance, and landscaping) for 200 dwellings and associated infrastructure.	Unknown	Unknown	Yes
1/0656/2020/OUTM	Permitted	0.7	Outline application for up to 211 dwellings - use classes B2, B8 and E(g), public open space and other associated infrastructure with all matters reserved except access	Unknown	Unknown	Yes
1/0880/2021/FULM	Permitted	0.5	Erection of 117 dwellings and associated works including site access	Unknown	Unknown	Yes
1/0682/2021/FULM	Under Construction	0.7	Reserved Matters (appearance, landscaping, layout and scale) application pursuant to 1/1084/2015/OUTM application for 145 dwellings, with associated public open space, play areas, landscaping and access from Cornborough Road following demolition of 2 existing dwellings (additional information)	Unknown	Unknown	Yes
1/0926/2020/OUTM	Permitted	0.4	Outline planning application for the erection of up to 290 dwellings, including affordable housing with public open space, landscaping and sustainable drainage system (SuDS) and two vehicular access points from Abbotsham Road. All matters reserved except access	Unknown	Unknown	Yes
1/0894/2021/FULM	Permitted	0.2	Reserved matters application for appearance, access, landscaping, layout & scale pursuant to planning approval 1/0111/2016/OUTM for the	Unknown	Unknown	Yes

Project	Status	Distance from Proposed Development (nearest point, km)	Description	Dates of Construction (if available)	Dates of Operation (if available)	Overlap with the Proposed Development?
			erection of 26 residential dwellings, associated infrastructure and open space.			
1/0896/2019/DIS	Permitted	Adjacent to the Order Limits	Business letting units, car parking lots, access, drainage and landscaping. This application forms plot 3 of the previous planning application 1/116/2007/FUL - Bideford Business Park.	Unknown	Unknown	Yes
1/1141/2022/LA	Permitted	Adjacent to the Order Limits	Erection of building for the processing of household recycling materials and food waste, provision of vehicle workshop, office and welfare and all ancillary facilities including access roadway.	Unknown	Unknown	Yes
1/0028/2012/EXTM	Permitted	0.05	Extension of time of Planning Permission 1/1140/2008/FUL - Industrial letting units for B1 B2 and B8 uses - Plot 6, within the Bideford Business Park Development area.	Unknown	Unknown	Yes
1/0380/2024/LA	Pending	0.05	Erection of building for the provision of vehicle workshop, office & welfare and all ancillary facilities, access and cycle/pedestrian improvements.	Unknown	Unknown	Yes
Tier 3						
Policy BID04	N/A	Adjacent to the Order Limits	A site of about 34 hectares south of East-the-Water, as defined on the Policies Map 2, is allocated to deliver a sustainable, high quality mixed use development that includes: (a) approximately 600 dwellings, providing a mix of housing types and size to reflect local need, including affordable housing, of which approximately 430 are expected to be delivered in the plan period; (b) a 420 place primary school, including a nursery and a children's centre delivery base;	Unknown	Unknown	Yes

Project	Status	Distance from Proposed Development (nearest point, km)	Description	Dates of Construction (if available)	Dates of Operation (if available)	Overlap with the Proposed Development?
			(c) a hill top park; and (d) strategic planting along the site's southern and eastern boundaries.			
Policy BID09	N/A	Adjacent to the Order Limits	Land at Adjavin Farm, south of Clovelly Road, extending to 41 hectares and as defined on Policies Map 2, is allocated for residential and associated development, that includes: (a) approximately 700 dwellings including affordable homes, with an emphasis on providing a mix of housing types and sizes that reflects local needs; (b) integrated social and community infrastructure, including a neighbourhood community centre; (c) on site provision of sport and recreation facilities, including sports pitches adjoining Clovelly Road/Atlantic Village; (d) a vehicular link forming part of a wider distributor link to the south of Clovelly Road connecting with the Caddsdown Industrial Park Extension, allocated by Policy BID05; and (e) strategic planting along the site's southern boundary and western boundaries.	Unknown	Unknown	Yes
Policy ABS01	N/A	0.12	Policy ABS01: Land at The Glebe Land at the Glebe, as shown on Policies Map 27, is allocated for residential development that includes: (a) approximately 23 dwellings, including affordable homes, with a focus on providing a mix of housing types and sizes to reflect local need.	Unknown	Unknown	Yes

Project	Status	Distance from Proposed Development (nearest point, km)	Description	Dates of Construction (if available)	Dates of Operation (if available)	Overlap with the Proposed Development?
Policy BID02	N/A	Adjacent to the Order Limits	Land at Cleave Wood, extending to about 13 hectares and as defined on Policies Map 2, is allocated as a mixed use development that includes: (a) approximately 250 dwellings including affordable homes, with an emphasis on providing a mix of housing types and sizes that reflects local needs; (b) health care facilities, including related car parking on a site of about 0.6 hectares; and (c) a neighbourhood community centre, including a Children's Centre base and satellite youth facilities.	Unknown	Unknown	Yes
Policy BID03	N/A	0.0	Land adjoining Manteo Way, extending to 17 hectares, as defined on Policies Map 2, is allocated for residential and associated development, that includes: (a) approximately 310 dwellings, providing a mix of housing types and size to reflect local need, including affordable housing; and (b) a 2.5 hectare site for open space and recreation facilities.	Unknown	Unknown	Yes
Policy NOR02	N/A	0.4	Policy NOR02: Site West of Buckleigh Road Land to the west of Buckleigh Road, extending to about 30 hectares and as defined on Policies Map 8A, will be comprehensively planned to deliver a sustainable, high quality mixed use development that includes: (a) approximately 740 dwellings, providing a mix of housing type and size to reflect local need, including those of the area's elderly population and affordable housing; and			

Project	Status	Distance from Proposed Development (nearest point, km)	Description	Dates of Construction (if available)	Dates of Operation (if available)	Overlap with the Proposed Development?
			(b) a local centre, including facilities to accommodate community and retail uses.			
Policy BID05	N/A	0.7	Land adjoining Caddsdown Business Park, extending to about 18 hectares and as defined on Policies Map 2, will be developed comprehensively to deliver a sustainable, high quality mixed use development that includes: (a) approximately 8 hectares of land for economic development focused on BI, B2 and B8 uses as appropriate to the site and its wider context, ensuring that there is a mix of unit sizes to enable business start up and expansion; (b) approximately 130 dwellings, including affordable homes, with an emphasis on providing a mix of housing types and sizes that reflects local needs; and (c) an integrated highway network that incorporates: (i) the formation of a new east-west aligned vehicular link, as part of a wider distributor road through BID09 and extending to the site's eastern boundary; (ii) the provision of an extended spinal estate road for Caddsdown Business Park to service the new economic development; and (iii) the formation of a new junction onto Clovelly Road, providing access to the site from its north-eastern boundary.	Unknown	Unknown	Yes
Policy BID07	N/A	0.0	Policy BID07: Bideford Regeneration Sites Regeneration and revitalisation of the town centre will be supported through schemes on	Unknown	Unknown	Yes

Project	Status	Distance from Proposed Development (nearest point, km)	Description	Dates of Construction (if available)	Dates of Operation (if available)	Overlap with the Proposed Development?
			the following sites, as defined on Policies Map 2, that will be delivered in a comprehensive manner: (a) East-the-Water Wharfs - a mix of housing, leisure and retail uses to improve connectivity with Bideford West and secure an active and attractive waterfront use; (b) the former Livestock Market – an extension to existing leisure and recreation facilities supported by an improved public car parking facilities; (c) the Pill – providing a range of commercial and leisure facilities supported by an at least maintained level of public car parking; bringing together a disparate range of uses to increase the areas use and attraction; (d) Bridge Street Car Parks – residential focused development with retail uses and maintained levels of public car parking, improving the intensity of site use and encouraging movement to the Pannier Market area of the town; (e) New Road (North) - development that results in an enhancement to the southern gateway to Bideford, and (f) New Road (South) - development that results in an enhancement to the southern gateway to Bideford.			
Policy BID01	N/A	0.8	A site of about 71 hectares West of Bideford, between Abbotsham Road and Clovelly Road, as defined on Policies Map 2, is allocated to deliver a sustainable, high quality mixed use	Unknown	Unknown	Yes

Project	Status	Distance from Proposed Development (nearest point, km)	Description	Dates of Construction (if available)	Dates of Operation (if available)	Overlap with the Proposed Development?
			development that will be developed in a comprehensive manner and includes: a. approximately 1,050 dwellings, providing a mix of housing types b. a mix of commercial and employment uses on about 5 hectares at Atlantic Park c. integrated social and community infrastructure, including a 420 place primary school with early years provision and a children's centre delivery base, with associated sports and play facilities and a mixed-use local centre providing a range of facilities.			
Policy NOR01	N/A	0.6	A site of about 32 hectares at Daddon Hill, as defined on Policies Map 8A, is allocated to deliver a sustainable, high quality mixed use development that includes: (a) approximately 500 dwellings, providing a mix of housing types and size to reflect local need, including affordable housing and an Extra Care facility; (b) a 420 place primary school with an associated nursery and children's centre delivery base, located to maximise accessibility to the resident catchment; and (c) a neighbourhood community centre.	Unknown	Unknown	Yes

Scope of Cumulative Effects Assessment

4.13.6 The cumulative effects presented and assessed in this section have been based on the Project Design Envelope set out in Volume 1, Chapter 3: Project Description of the ES as well as the information available on other projects and plans. The maximum design scenario as described for the Proposed Development (see **Table 4.22**) has been assessed cumulatively with the following other projects/plans listed above.

4.13.7 The CEA has considered the Proposed Development, alongside the NGET substation to be developed at the existing Alverdiscott Substation Site. The assessed design of NGET substation has been based upon a combination of reasonable worst case parameters, as detailed within Volume 1, Chapter 3: Project Description of the ES. The development area for the NGET substation would comprise up to 3.8 ha of land. Within that area it is assumed that the substation itself will occupy a footprint of approximately 2.8 ha, with a maximum height of 15 m, excluding connecting tower structures. If further information is available for the proposal before the Proposed Development receives development consent, the Applicant will review the information and provide any update needed to the CEA.

Cumulative Effects Assessment

4.13.8 A description of the significance of cumulative effects upon geology, hydrogeology and ground conditions, receptors arising from construction, operation and maintenance and decommissioning is given below.

4.13.9 For the CEA it is assumed that.

- Outcome of the CEA will be greatest when projects are constructed concurrently.
- The magnitude of effects expected for the construction phase of the Tier 1 and Tier 3 developments should not be significant in EIA terms given each respective planning permission will require:
  - consideration of potential impacts on groundwater quantity and quality through dewatering options, foundation design and discharges of runoff in the construction and operation phase; and
  - a full assessment of risk associated with ground conditions which will include remediation measures in order to manage those risks if required and the development of a land and groundwater contamination discovery strategy.

Construction

Change in Groundwater Quality or Quantity in Superficial Secondary A Aquifer Unit.

Dewatering

4.13.10 The cumulative impact is predicted to be of localised spatial extent and short term duration. The magnitude is likely, therefore, to be **low**.

4.13.11 Should the further assessment and investigation of private water supplies identify higher risk and dewatering works arising from cumulative development overlap in terms of spatial and temporal extents, this would inform the mitigation approach such that it would not increase the assigned magnitude. Details regarding the approach to further risk assessment and investigation at the pre-construction stage is provided within the Outline On-CEMP (document reference 7.7).

4.13.12 Any dewatering is not expected to have a direct impact on groundwater quality in the shallow aquifer except through accidental spillages which will likely be mitigated through the On-CEMP. The cumulative impact is predicted to have a magnitude that is **negligible**.

4.13.13 Overall, the magnitude of the cumulative impact is **negligible** or **low** and the sensitivity of the receptor is **medium**. The cumulative effect will, therefore, be of **minor adverse** or **negligible** significance, which is not significant.

Foundations

4.13.14 The Tier 1 and Tier 3 developments may require areas of temporary hardstanding during construction. These areas are unlikely to significantly affect the amount of recharge to the Secondary A aquifer, the cumulative impact is considered to have a magnitude that is **negligible**.

4.13.15 Overall, the magnitude of the cumulative impact is **negligible** and the sensitivity of the receptor is **medium**. The cumulative effect will, therefore, be of **negligible** significance, which is not significant.

Discharges to ground

4.13.16 The temporary discharge of surface water runoff to ground during construction could result in increased recharge to the shallow Secondary A aquifer. This could result in localised increase in recharge and groundwater levels, although there should be no impact on groundwater quality. The cumulative effect is predicted to be of localised spatial extent and short term duration. The magnitude is, therefore, **low**.

4.13.17 Where unaffected by existing sources of contamination, the magnitude of the cumulative impact is **low** and the sensitivity of the receptor is **medium**. The cumulative effect will, therefore, be of **minor adverse** significance, which is not significant.

Operation and Maintenance

Dewatering

4.13.18 No dewatering is required in the operation and maintenance phase.

Foundations

4.13.19 The completed Tier 1 and 3 developments will result in increased hardstanding over a wider area relative to baseline conditions, through the construction of roads and structures. That permanent hardstanding will locally reduce recharge in these areas, although will be mitigated by the use of Sustainable Urban Drainage (SUDs). The cumulative effect is considered to have a magnitude that is **low**.

4.13.20 Overall, the magnitude of the cumulative impact is **low** and the sensitivity of the receptor is **medium**. The cumulative effect will, therefore, be of **minor adverse** significance, which is not significant.

Discharges to ground

4.13.21 The permanent discharge of surface water runoff to ground from Tier 1 developments following construction could result in increased recharge to the shallow Secondary A aquifers. This could result in localised increase in recharge and groundwater levels, although there should be no effect on groundwater quality. The cumulative effect is predicted to be of localised spatial extent and short term duration. The magnitude is therefore, **low**.

4.13.22 Where unaffected by any existing source of contamination, the magnitude of the cumulative impact is **low** and the sensitivity of the receptor is **medium**. The cumulative effect will, therefore, be of **minor adverse** significance, which is not significant.

Decommissioning

4.13.23 There will be no decommissioning of the majority of Tier 1 and Tier 3 developments. For the purpose of decommissioning, it is therefore assumed that the cumulative effects will be same as for construction of the Proposed Development outlined in above.

4.13.24 Should decommissioning of the solar farm (reference 1/1057/2021/FULM) occur at the same time as the Proposed Development with the application of standard mitigation measures described in **Table 4.21** for the solar farm the magnitude of impacts will be no worse than the construction phase.

4.14 Transboundary Effects

4.14.1 A screening of transboundary impacts has been carried out and has identified that there was no potential for significant transboundary effects with regard to geology, hydrogeology and ground conditions from the Proposed Development upon the interests of other states.

4.15 Inter-related Effects

4.15.1 Inter-relationships are the impacts and associated effects of different aspects of the Proposed Development on the same receptor. These are as follows.

- Project lifetime effects: Assessment of the scope for effects that occur throughout more than one phase of the Proposed Development (construction, operation and maintenance, and decommissioning), to interact to potentially

create a more significant effect on a receptor than if just assessed in isolation in these three phases.

- Receptor led effects: Assessment of the scope for all relevant effects (including inter-relationships between environmental topics) to interact, spatially and temporally, to create inter-related effects on a receptor.

4.15.2 A description of the likely interactive effects arising from the Proposed Development on geology, hydrogeology and ground conditions is provided in Volume 4, Chapter 5: Inter-related Effects of the ES.

4.16 Summary of Impacts, Mitigation Measures and Monitoring

4.16.1 Information on Hydrogeology, Geology and Ground Conditions within the study area was collected through desktop review and consultation, supplemented by some limited ground investigation.

4.16.2 **Table 4.25** presents a summary of the impacts, measures adopted as part of the Proposed Development and residual effects in respect to geology, hydrogeology and ground conditions. The impacts assessed include:

- Possible damage to geological SSSI at Landfall;
- Mobilisation of any residual soil/groundwater contamination impacting on Secondary aquifers;
- Changes in groundwater levels/flow/quality;
- Mobilisation of any residual soil/groundwater contamination impacting on human health at the converter stations location (end users) and construction workers; and
- Deterioration in groundwater quality through the accidental spillage/release of pollutants during construction/decommissioning.

4.16.3 Overall, it is concluded that there will be no significant effects arising from the Proposed Development during the construction, operation and maintenance or decommissioning phases.

4.16.4 **Table 4.26** presents a summary of the cumulative impacts, mitigation measures and residual effects. The cumulative impacts assessed include:

- Change in groundwater quality or quantity in Secondary A aquifer units through dewatering.
- Change in groundwater quality or quantity in Secondary A aquifer units through foundation construction.
- Change in groundwater quality or quantity in Secondary A aquifer units through discharge to the ground.

4.16.5 Overall, it is concluded that there will be no significant cumulative effects from the Proposed Development alongside other projects/plans.

Table 4.25: Summary of environmental effects

Description of Impact	Phase[a]			Embedded Mitigation	Sensitivity of receptor	Magnitude of impact	Significance of Effect	Further Mitigation	Residual Effect	Proposed Monitoring
	C	O	D							
Partial loss or damage to designated geological site (SSSI)	✓	×	×	Use of HDD beneath SSSI to avoid damage (ONS02).	High	C:Negligible O: N/A D: N/A	C: Minor Adverse O: N/A D: N/A	None	C: Minor Adverse O: N/A D: N/A	None
Mobilisation of any existing areas of contamination impacting on groundwater quality in underlying aquifer units	✓	✓	✓	An Outline PPP and decommissioning plan will be developed as detailed within **Table 4.21** (ONS07, ONS34 and ONS04).	Medium	C: Low O: Negligible D: Low	C: Minor Adverse O: Negligible Adverse D: Minor Adverse	None	C: Minor Adverse O: Negligible Adverse D: Minor Adverse	None
Changes in groundwater levels, flow or quality on other sensitive groundwater dependent sites, including surface waters fed by groundwater	✓	×	✓	Trenchless methodologies (HDD) to be used in proximity to surface water courses to avoid dewatering (ONS02).	Medium	C: Low O: N/A D: Low	C: Minor Adverse O: N/A D: Minor Adverse	None	C: Minor Adverse O: N/A D: Minor Adverse	None
				Staged risk assessment and investigation to be undertaken which will inform appropriate mitigation (ONS74).	Medium	C: Negligible O: N/A D: Negligible	C: Negligible Adverse O: N/A D: Negligible Adverse	None	C: Negligible Adverse O: N/A D: Negligible Adverse	None
Mobilisation of any existing contamination impacting on human receptors (construction workers/site users)	✓	✓	✓	An Outline PPP and decommissioning plan will be developed as detailed within **Table 4.21** (ONS34, ONS07 and ONS04).	Medium	C: Negligible O: Negligible D: Negligible	C:Negligible/ Minor Adverse O: Negligible Adverse D:Negligible/ Minor Adverse	None	C:Negligible/ Minor Adverse O:Negligible Adverse	None

Description of Impact	Phase[a]			Embedded Mitigation	Sensitivity of receptor	Magnitude of impact	Significance of Effect	Further Mitigation	Residual Effect	Proposed Monitoring
	C	O	D							
									D:Negligible/ Minor Adverse	
Deterioration in groundwater quality through the accidental spillage/release of potentially polluting substances	✓	×	✓	An Outline PPP and decommissioning plan will be developed as detailed within **Table 4.21** (ONS04, ONS07 and ONS34).	Medium	C: Low O: N/A D: Low	C: Minor Adverse O: N/A D: Minor Adverse	None	C: Minor Adverse O: N/A D: Minor Adverse	None

Table 4.26: Summary of cumulative environmental effects

Description of Impact	Phase[a]			Embedded Mitigation	Sensitivity of receptor	Magnitude of impact	Significance of Effect	Further Mitigation	Residual Effect	Proposed Monitoring
	C	O	D							
Tier 1										
Change in groundwater quality or quantity in Secondary A aquifer units: Dewatering	✓	×	✓		Medium	C: Low/ Negligible O; N/A D: Low/ Negligible	C:Negligible/ Minor Adverse O: N/A D:Negligible/ Minor Adverse	None	C: Negligible/Minor Adverse O: N/A D: Negligible/Minor Adverse	None
Change in groundwater quality or quantity in Secondary A aquifer units: Foundations	✓	×	✓		Medium	C: Negligible O: N/A D: Negligible	C:Negligible/ Minor Adverse O: N/A D:Negligible/ Minor Adverse	None	C: Minor Adverse O: N/A D: Minor Adverse	None
Change in groundwater quality or quantity in Secondary A aquifer	✓	×	✓		Medium	C: Low O: N/A D: Low	C: Minor Adverse O: N/A D: Minor Adverse	None	C: Minor Adverse O: N/A D: Minor Adverse	None

Description of Impact	Phase[a]			Embedded Mitigation	Sensitivity of receptor	Magnitude of impact	Significance of Effect	Further Mitigation	Residual Effect	Proposed Monitoring
	C	O	D							
units: Discharge to ground										
Tier 2										
Not Applicable										
Tier 3										
As Tier 1										

4.17 References

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