WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Chapter 12: Ground Conditions and Contamination

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Glossary of Acronyms

Acronym	Definition
AC	Alternating Current
ALC	Agricultural Land Classification
AONB	Area of Outstanding Natural Beauty
BGS	British Geological Society
CDM	Construction Design Management
CEMP	Construction Environmental Management Plan
CEA	Cumulative Effect Assessment
CLR11	Contaminated Land Report 11
CoCP	Code of Construction Practice
COMAH	Control of Major Accident Hazard
COSHH	Control of Substances Hazardous to Health
DC	Direct Current
Defra	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EIA	Environmental Impact Assessment
ERP	Emergency Response Plan
ES	Environmental Statement
EU	European Union
GIS	Geographical Information System
GPCL	Guiding Principles for Contaminated Land
HDD	Horizontal Directional Drilling
IDB	Internal Drainage Board
IEMA	Institute of Environmental Management and Assessment
IPC	Infrastructure Planning Commission
km	Kilometre
Km2	Square kilometre
LCRM	Land Contamination Risk Management
LPA	Local Planning Authority
m	Metre
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MMP	Materials Management Plan
MMO	Marine Management Organisation
MNR	Marine Nature Reserve
MoD	Ministry of Defence
MPS1	Minerals Policy Statement 1
MW	Megawatts

Acronym	Definition
NDC	North Devon Council
NG	National Grid
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Projects
NVZ	Nitrate Vulnerable Zone
Ofgem	Office of Gas and Electricity Markets
OFTO	Offshore Transmission Owner
OS	Ordnance Survey
WCOWL	White Cross Offshore Windfarm Limited
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PCOC	Potential Contaminants of Concern
PDE	Project Design Envelope
PFAS	Perfluoroalkyl and Polyfluoroalkyl Substances
PPE	Personal Protective Equipment
PPG	Pollution Prevention Guidance
PRA	Preliminary Risk Assessment
PRoW	Public Rights of Way
SAC	Special Area of Conservation
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
TJB	Transition Joint Bay
UK	United Kingdom
UXO	Unexploded Ordnance
WFD	Water Framework Directive
WTG	Wind Turbine Generator

Glossary of Terminology

Defined Term	Description
Applicant	White Cross Offshore Windfarm Limited.
Cumulative effects	The effect of the Project taken together with similar effects from a number of different projects, on the same single receptor/resource. Cumulative Effects are those that result from changes caused by other past, present or reasonably foreseeable actions together with the Project.
Environmental Impact Assessment (EIA)	Assessment of the potential impact of the proposed Project on the physical, biological and human environment during construction, operation and decommissioning.
Export Cable Corridor	The area in which the export cables will be laid, either from the Offshore Substation or the inter-array cable junction box (if no offshore substation), to the NG Onshore Substation comprising both the Offshore Export Cable Corridor and Onshore Export Cable Corridor.
High Voltage Alternating Current	High voltage alternating current is the bulk transmission of electricity by alternating current (AC), whereby the flow of electric charge periodically reverses direction.
High Voltage Direct Current	High voltage direct current is the bulk transmission of electricity by direct current (DC), whereby the flow of electric charge is in one direction.
In-combination effects	In-combination effects are those effects that may arise from the development proposed in combination with other plans and projects proposed/consented but not yet built and operational.
Jointing bay	Underground structures constructed at regular intervals along the Onshore Export Cable Corridor to join sections of cable and facilitate installation of the cables into the buried ducts.
Landfall (to MLWS)	Where the offshore export cables come ashore.
Link boxes	Underground chambers or above ground cabinets next to the cable trench housing electrical earthing links.
Mean high water springs	The average tidal height throughout the year of two successive high waters during those periods of 24 hours when the range of the tide is at its greatest.
Mean low water springs	The average tidal height throughout a year of two successive low waters during those periods of 24 hours when the range of the tide is at its greatest.
Mean sea level	The average tidal height over a long period of time.
Mitigation	Mitigation measures have been proposed where the assessment identifies that an aspect of the development is likely to give rise to significant environmental effects, and discussed with the relevant authorities and stakeholders in order to avoid, prevent or reduce impacts to acceptable levels. For the purposes of the EIA, two types of mitigation are defined:

Defined Term	Description
	• Embedded mitigation: consisting of mitigation measures that are identified and adopted as part of the evolution of the project design, and form part of the project design that is assessed in the EIA • Additional mitigation: consisting of mitigation measures that are identified during the EIA process specifically to reduce or eliminate any predicted significant effects. Additional mitigation is therefore subsequently adopted by OWL as the EIA process progresses.
National Grid Onshore Substation	Part of an electrical transmission and distribution system. Substations transform voltage from high to low, or the reverse by means of the electrical transformers.
National Grid Connection Point	The point at which the White Cross Offshore Windfarm connects into the distribution network at East Yelland substation and the distributed electricity network. From East Yelland substation electricity is transmitted to Alverdiscott where it enters the national transmission network.
Offshore Export Cables	The cables which bring electricity from the Offshore Substation Platform or the inter-array cables junction box to the Landfall.
Offshore Transmission Owner	An OFTO, appointed in UK by Ofgem (Office of Gas and Electricity Markets), has ownership and responsibility for the transmission assets of an offshore windfarm.
Onshore Development Area	The onshore area above MLWS including the underground onshore export cables connecting to the White Cross Onshore Substation and onward to the NG grid connection point at East Yelland. The onshore development area will form part of a separate Planning application to the Local Planning Authority (LPA) under the Town and Country Planning Act 1990.
Onshore Export Cables	The cables which bring electricity from MLWS at the Landfall to the White Cross Onshore Substation and onward to the NG grid connection point at East Yelland.
Onshore Export Cable Corridor	The proposed onshore area in which the export cables will be laid, from MLWS at the Landfall to the White Cross Onshore Substation and onward to the NG grid connection point at East Yelland.
Onshore Infrastructure	The combined name for all infrastructure associated with the Project from MLWS at the Landfall to the NG grid connection point at East Yelland. The onshore infrastructure will form part of a separate planning application to the Local Planning Authority (LPA) under the Town and Country Planning Act 1990
Onshore Transmission Assets	The aspects of the project related to the transmission of electricity from MLWS at the Landfall to the NG grid connection point at East Yelland including the Onshore Export Cable, the White Cross Onshore Substation and onward connection to the NG grid connection point at East Yelland.
the Onshore Project	The Onshore Project for the onshore TCPA application includes all elements onshore of MLWS. This includes the infrastructure associated with the offshore export cable (from MLWS), landfall, onshore export cable and associated infrastructure and new onshore substation (if required).
White Cross Offshore Windfarm Ltd	White Cross Offshore Windfarm Ltd (WCOWL) is a joint venture between Cobra Instalaciones Servicios, S.A., and Flotation Energy Ltd.

Defined Term	Description
the Project	The Project is a proposed floating offshore windfarm called White Cross located in the Celtic Sea with a capacity of up to 100MW. It encompasses the project as a whole, i.e. all onshore and offshore infrastructure and activities associated with the Project.
Project Design Envelope	A description of the range of possible elements that make up the Project design options under consideration. The Project Design Envelope, or 'Rochdale Envelope' is used to define the Project for Environmental Impact Assessment (EIA) purposes when the exact parameters are not yet known but a bounded range of parameters are known for each key project aspect.
Transition Joint Bay	Underground structures at the Landfall (to MLWS) that house the joints between the offshore export cables and the Onshore Export Cables.
White Cross Offshore Windfarm	Up to 100MW capacity offshore windfarm including associated onshore and offshore infrastructure
White Cross Onshore Substation	A new substation built specifically for the White Cross project. It is required to ensure electrical power produced by the offshore windfarm is compliant with NG electrical requirements at the grid connection point at East Yelland.
Wind Turbine Generators (WTG)	The wind turbine generators convert wind energy into electrical power. Key components include the rotor blades, nacelle (housing for electrical generator and other electrical and control equipment) and tower. The final selection of project wind turbine model will be made post-consent application.
Windfarm Site	The area within which the wind turbines, Offshore Substation Platform and inter-array cables will be present.
Works completion date	Date at which construction works are deemed to be complete and the windfarm is handed to the operations team. In reality, this may take place over a period of time.

12. Ground Conditions and Contamination

12.1 Introduction

1. This chapter of the Environmental Statement (ES) presents the potential impacts on Ground Conditions and Contamination of the White Cross Offshore Windfarm Project (the Onshore Project). Specifically, it considers impacts landward of Mean Low Water Springs (MLWS) during its construction, operation and maintenance, and decommissioning phases.

2. The ES has been finalised with due consideration of pre-application consultation to date (see **Chapter 7: Consultation**) and the ES will accompany the application to North Devon Council (NDC) for planning permission under the Town and Country Planning Act 1990.

3. The elements of the White Cross Offshore Windfarm Project seaward of MHWS ('the Offshore Project') are subject to a separate application for consent under Section 36 of the Electricity Act 1989, and for Marine Licences under the Marine and Coastal Access Act 2009. These applications are supported by a separate ES covering all potential impacts seaward of MHWS.

4. This assessment has been undertaken with specific reference to the relevant policy, legislation and guidance, which are summarised in **Section 12.2** of this chapter. Further information on the international, national and local planning policy and legislation relevant to the Onshore Project is provided in **Chapter 3: Policy and Legislative Context**.

5. Details of the methodology used for the Environmental Impact Assessment (EIA) and Cumulative Effect Assessment (CEA), are presented in **Section 12.3** of this chapter and **Chapter 6: EIA Methodology**.

6. This assessment has been informed by impacts assessed in ground conditions and contamination and impacts assessed in this chapter informs the following linked ES chapters:

   - Chapter 14: Water Resources and Flood Risk
   - Chapter 15: Land Use
   - Chapter 16: Onshore Ecology and Ornithology.

7. Inter-relationships with these chapters are further described in **Section 12.10**.

8. Additional information to support the ground conditions and contamination assessment includes a Geo-Environmental Desk Study and Preliminary Risk

Assessment (PRA) undertaken for the Onshore Project, as presented in **Appendix 12.A**.

9. This ES chapter:

- Presents the existing environmental baseline established from desk studies, and consultation
- Presents the potential environmental effects on ground conditions and contamination arising from the Onshore Project, based on the information gathered and the analysis and assessments undertaken
- Identifies any assumptions and limitations encountered in compiling the environmental information
- Highlights any necessary monitoring and/or mitigation measures which could prevent, minimise, reduce or offset the possible environmental effects identified in the EIA process.

12.2 Policy, Legislation and Guidance

10. **Chapter 3: Policy and Legislative Context** describes the wider policy and legislative context for the Onshore Project. The principal policy and legislation used to inform the assessment of potential impacts on ground conditions and contamination for the Onshore Project are outlined in this section.

12.2.1 National Planning Policy Framework

11. The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, updated July 2021) is the primary source of national planning guidance in England. Sections relevant to this aspect of the ES are summarised below in **Table 12.1**.

Table 12.1 Summary of NPPF Policy relevant to ground conditions and contamination

Summary	How and where this is considered in the ES
"Planning policies and decisions should contribute to and enhance the natural and local environment by: (a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan); (b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;	Existing environment in relation to sensitive sites is discussed in **Section 12.4.4**. Impacts and mitigation measures aimed at minimising the potential impacts to the receptors identified, including remediation, are set out in **Sections 12.5** and **12.6**. As no geological designated sites have been identified within the Study

Summary	How and where this is considered in the ES
(c) maintaining the character of the undeveloped coast, while improving public access to it where appropriate; (d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures; (e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and (f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate." – **NPPF 15, paragraph 174.**	Area, an assessment of the potential impacts to these features has not been undertaken. Potential impacts in relation to air, water, biodiversity and noise are discussed in: **Chapter 13: Air Quality** **Chapter 14: Water Resources and Flood Risk** **Chapter 16: Onshore Ecology and Ornithology** **Chapter 18: Noise and Vibration.**
"Planning policies and decisions should ensure that: (a) a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation); (b) after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and (c) adequate site investigation information, prepared by a competent person, is available to inform these assessments." – **NPPF 15, paragraph 183**.	Existing ground conditions and potential sources of contamination are discussed within **Section 12.4**. The impacts of the Onshore Project and mitigation measures (including site investigation works), are set out in **Sections 12.5** and **12.6**.
"Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:	Existing ground conditions and potential sources of contamination are discussed within **Section 12.4**. The impacts of the Onshore Project and mitigation measures (including site investigation works), are set out in **Sections 12.5** and **12.6**. Potential interactions and inter-relationships between each of the identified impacts are discussed in **Section 12.8**.

Summary	How and where this is considered in the ES
(a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life; (b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and (c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation." – **NPPF 15, paragraph 184-185.**	
"The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities." – **NPPF 15, paragraph 188.**	Existing environment is discussed in **Section 12.4**. Impacts are set out in **Sections 12.5** and **12.6**.
"It is essential that there is a sufficient supply of minerals to provide the infrastructure, buildings, energy and goods that the country needs. Since minerals are a finite natural resource, and can only be worked where they are found, best use needs to be made of them to secure their long-term conservation. Planning policies should: (a) provide for the extraction of mineral resources of local and national importance, but not identify new sites or extensions to existing sites for peat extraction; (b) so far as practicable, take account of the contribution that substitute or secondary and recycled materials and minerals waste would make to the supply of materials, before considering extraction of primary materials, whilst aiming to source minerals supplies indigenously; (c) safeguard mineral resources by defining Mineral Safeguarding Areas and Mineral Consultation Areas; and adopt appropriate policies so that known locations of specific minerals resources of local and national importance are not sterilised by non-mineral development where this should be avoided (whilst not	A review of mineral safeguarding areas listed on the Devon County Council Environment Viewer has identified that there are no mineral safeguarding areas located within the footprint of the Landfall to MLWS area, Onshore Export Cable Corridor or the White Cross Onshore Substation (hereafter referred to as the 'Onshore Substation'). As no mineral safeguarding areas have been identified, an assessment of the potential impacts to these features has not been undertaken.

Summary	How and where this is considered in the ES
creating a presumption that the resources defined will be worked); (d) set out policies to encourage the prior extraction of minerals, where practical and environmentally feasible, if it is necessary for non-mineral development to take place; (e) safeguard existing, planned and potential sites for: the bulk transport, handling and processing of minerals; the manufacture of concrete and concrete products; and the handling, processing and distribution of substitute, recycled and secondary aggregate material; (f) set out criteria or requirements to ensure that permitted and proposed operations do not have unacceptable adverse impacts on the natural and historic environment or human health, taking into account the cumulative effects of multiple impacts from individual sites and/or a number of sites in a locality; (g) when developing noise limits, recognise that some noisy short-term activities, which may otherwise be regarded as unacceptable, are unavoidable to facilitate minerals extraction; and (h) ensure that worked land is reclaimed at the earliest opportunity, taking account of aviation safety, and that high quality restoration and aftercare of mineral sites takes place." **NPPF 17, paragraph 209-210**.	

12.2.2 Local Policies

12. This section considers local policies and their relevance to the ground conditions and contamination assessment. A summary of the local policies is provided in **Table 12.2**.

Table 12.2 Summary of Local Policies relevant to ground conditions and contamination

Policy Name	Summary	How and where this is considered in the ES
Policy ST14: Enhancing Environmental Assets	The quality of northern Devon's natural environment will be protected and enhanced by ensuring that development contributes to: … (b) protecting the hierarchy of designated sites in accordance with their status;	Existing environment is discussed in **Section 12.4**. Impacts are set out in **Sections 12.5** and **12.6**. Potential impacts in relation to air, water, biodiversity and noise are discussed in: **Chapter 13 Air Quality**

Policy Name	Summary	How and where this is considered in the ES
	(c) conserving European protected species and the habitats on which they depend; (d) conserving northern Devon's geodiversity and its best and most versatile agricultural land; (e) conserving the setting and special character and qualities of the North Devon Coast Areas of Outstanding Natural Beauty whilst fostering the social and economic well being of the area; … (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; (i) conserving and enhancing the robustness of northern Devon's ecosystems and the range of ecosystem services they provide;	**Chapter 14: Water Resources and Flood Risk** **Chapter 16: Onshore Ecology and Ornithology** **Chapter 18 Noise and Vibration.**
Policy DM02: Environmental Protection	Hazards (1) 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,	Existing environment is discussed in **Section 12.4**. Impacts are set out in **Sections 12.5** and **12.6**.

Policy Name	Summary	How and where this is considered in the ES
	wetlands, water gathering grounds including catchment areas, aquifers, groundwater protection areas, harbours, estuaries or the sea.	
Braunton Parish Neighbourhood Plan 2018 - 2031		
Policy NE6: Protection of Landscape Character	The landscapes identified within the Parish Character Assessment as being of particular significance will be protected from any adverse impact of new development that would detract from or obstruct them. Development proposals will need to demonstrate that their design, scale, height and mass does not adversely impact these landscapes, and positively enhances them where possible.	Impacts affecting sensitive land use sites are discussed in **Sections 12.5.3** and **12.6.2**. Further discussion is provided in: **Chapter 15: Land Use** **Chapter 16: Onshore Ecology and Ornithology.**
Policy NE8: Water Courses and Drainage	All new development should, where possible and appropriate, aim to protect and improve water (fluvial and groundwater table) quality across the Parish Catchment Basin.	Impacts affecting both groundwater and surface water are discussed in **Sections 12.5.2**, **12.5.3** and **12.6.2**. Further discussion is provided in: **Chapter 14: Water Resources and Flood Risk**.

12.2.3 National Policy Statement

13. The assessment of potential impacts upon ground conditions and contamination has been made with specific reference to the relevant National Policy Statement (NPS). NPSs are statutory documents which set out the government's policy on specific types of Nationally Significant Infrastructure Projects (NSIPs) and are published in accordance with the Planning Act 2008.

14. The assessment requirements for ground conditions and contamination are set out within the overarching NPS for Energy (EN-1) (Department for Energy Security and Net Zero (DESNZ), 2023) and are summarised in **Table 12.3**. The contents of EN-3 and EN-5 have been deemed not to be relevant to this chapter and as such have not been considered further.

15. Although the Offshore Project is not an NSIP, it is recognised that due to its size of up to 100MW and its location in English waters, certain NPS are considered relevant to the Offshore Project and decision-making and are referred to in this ES.

Therefore, to align with the approach to the assessment of the Offshore Project, certain NPS are will also be considered as part of the Onshore Project.

Table 12.3 Summary of NPS EN-1 provisions relevant to ground conditions and contamination

Summary	How and where this is considered in the ES
EN-1 NPS for Energy	
"Where the development is subject to EIA the applicant should ensure that the ES clearly sets out any effects on internationally, nationally, and locally designated sites of ecological or geological conservation importance (including those outside England), on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity, including irreplaceable habitats." – **EN-1**, **paragraph 5.4.17**.	A review of geologically designated sites, including those listed on the Devon County Council Environment Viewer has identified that there are no nationally or locally important geological designated sites located within the Study Area. As no geological designated sites have been identified within the Study Area, an assessment of the potential impacts to these features has not been undertaken. Ecological designated sites are addressed in **Section 12.4.4** with additional detail provided in **Appendix 12.A**. Impacts on ecological SSSIs are discussed in **Sections 12.5** and **12.6** with further information given in **Chapter 16: Onshore Ecology and Ornithology**.
"The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests." - **EN-1**, **paragraph 5.4.19**.	Existing environment is discussed in **Section 12.4**. Impacts are set out in **Sections 12.5** and **12.6**. Impacts to ecological receptors are also discussed in **Chapter 16: Onshore Ecology and Ornithology**.
"The government's policy for biodiversity in England is set out in the Environmental Improvement Plan, Biodiversity, the National Pollinator Strategy and the UK Marine Strategy. The aim is to halt overall biodiversity loss, support healthy well-functioning ecosystems and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people. This aim needs to be viewed in the context of the challenge presented by climate change. Healthy, naturally functioning ecosystems and coherent ecological networks will be more resilient and adaptable to climate change effects. Failure to address this challenge will	Impacts relating to climate change are discussed in **Section 12.4.8**. As no geological designated sites have been identified within the Study Area, an assessment of the potential impacts to these features has not been undertaken. Ecological designated sites are addressed in **Section 12.4.4** with additional detail provided in **Appendix 12.A**. Impacts on ecological SSSIs are discussed in **Sections 12.5** and **12.6** with further information given in **Chapter 16: Onshore Ecology and Ornithology**.

Summary	How and where this is considered in the ES
result in significant adverse impact on biodiversity and the ecosystem services it provides." - **EN-1**, **paragraph 5.4.2**.	
"As a general principle, and subject to the specific policies below, development should, in line with the mitigation hierarchy, aim to avoid significant harm to biodiversity and geological conservation interests, including through consideration of reasonable alternatives (as set out in Section 4.2 above). Where significant harm cannot be avoided, impacts should be mitigated and as a last resort, appropriate compensation measures should be sought.." - **EN-1**, **paragraph 5.4.42.**	Designated sites are addressed in **Section 12.4.4**. Impacts on ecological SSSIs are discussed in **Sections 12.5** and **12.6** with further information given in **Chapter 16: Onshore Ecology and Ornithology**.
"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." - **EN-1**, **paragraph 5.3.8**.	Designated sites are addressed in **Section 12.4.4**. Impacts on ecological SSSIs are discussed in **Sections 12.5** and **12.6** with further information given in **Chapter 16: Onshore Ecology and Ornithology**.
"Applicants should seek to minimise impacts on the best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification) and preferably use land in areas of poorer quality (grades 3b, 4 and 5)." - **EN-1**, **paragraph 5.11.12.**	Potential impacts in relation to contamination that may occur during construction and operation are discussed in **Sections 12.5.5** and **12.6.4**. Impacts associated with potential loss of agricultural land and disruption to farming practices are discussed in **Chapter 15: Land Use**.
"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." – **EN-1, paragraph 5.11.18**.	Risks posed by potential contaminated land have been identified and assessed as part of a Preliminary Risk Assessment (**Appendix 12.A**). Potential impacts associated with contamination to identified receptors (and mitigation measures) are discussed in **Sections 12.5** and **12.6**.
"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	A review of mineral safeguarding areas listed on the Devon County Council Environment Viewer has identified that there are no mineral safeguarding areas located within the footprint

Summary	How and where this is considered in the ES
decommissioning has taken place." - **EN-1**, **paragraph 5.11.19.**	of the Landfall to MLWS area, Onshore Export Cable Corridor or the Onshore Substation area. As no mineral safeguarding areas have been identified, an assessment of the potential impacts to these features has not been undertaken.

12.2.4 Guidance and Legislation

16. In demonstrating adherence to industry good practice, this chapter has been compiled in accordance with the following relevant standards and guidance:

12.2.4.1 Legislation

12.2.4.1.1 The Contaminated Land (England) Regulations 2006 (as amended)

17. These regulations consolidate the provisions of the provisions of the Contaminated Land (England) Regulations 2000 and the contaminated Land (England) (Amendment) Regulations 2001 with amendments. They also set out provisions relating to the identification and remediation of contaminated land under Part 2A of the Environmental Protection Act 1990.

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

18. The Environmental Protection Act 1990 makes provision for the improved control of pollution arising from certain industrial and other processes. Part 2A of the Act provides the statutory definition of contaminated land: "*Contaminated Land is any land which appears to the Local Authority in whose area it is situated to be in such a condition, by reasons of substances in, on, or under the land that:*

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

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

12.2.4.1.3 Environmental Permitting (England and Wales) Regulations 2016

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

    - Exclusions (lower risk activities which may be undertaken without any permit), standard rules permit (standard requirements and conditions for the relevant activities are set out so applicants can determine in advance where the permit is applicable to their proposals) and bespoke permits (permits written specifically for activities which are unique or higher risk).

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

21. The aim of the directive is for all water bodies to achieve Good Status by 2027 (which is comprised of scoring of both Ecological and Chemical Status) and to ensure no deterioration from current status. This legislation is relevant to ground conditions and contamination as it assists in determining the sensitivity of water bodies within the Onshore Project Area. Water quality is assessed in **Chapter 14: Water Resources and Flood Risk**.

12.2.4.1.5 Groundwater (Water Framework Directive) (England) Directive 2016

22. The aim of the direction is to set out instructions and obligations for the Environment Agency to protect groundwater, including monitoring and setting threshold values for both existing and new pollutants in groundwater. This legislation is relevant to ground conditions and contamination as it assists in determining the sensitivity of groundwater resources within the Onshore Project Area.

12.2.4.1.6 Water Resources Act. The Water Resources Act 1991, as amended by the Water Act 2003

23. The Act provides the definition of and regulatory controls for the protection of water resources including the quality standards expected for controlled waters. This legislation is relevant to ground conditions and contamination as it assists in determining the sensitivity of controlled waters within the Onshore Project Area, particularly when assessing the effects during construction and operational activities.

12.2.4.1.7 Environment Act 1995

24. The Act established the Environment Agency and gave it responsibility for environmental protection of controlled waters. This legislation is relevant to ground conditions and contamination as it helps to assess the sensitivity and potential effects of the construction and operational phases of the Onshore Project. It also aids the identification of suitable mitigation measures to provide protection to the controlled waters present.

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

25. The regulations transpose into domestic law the EU Directive 2004/35/EC on environmental liability with regards to the prevention and remedying of environmental damage. This legislation is relevant to ground conditions and contamination as it aids the identification of suitable preventative measures and mitigation techniques for the construction and operational phases of the Onshore Project.

12.2.4.1.9 Construction (Design and Management) Regulations 2015

26. The regulations are the main set of regulations used to manage the health, safety and welfare of construction projects. The legislation is relevant to ground conditions and contamination as it ensures the safety of human receptors involved in the construction phase.

12.2.4.2 Guidance

12.2.4.2.1 Environment Agency. Land Contamination Risk Management Framework 2021

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

12.2.4.2.2 Environment Agency. Guiding Principles for Contaminated Land 2016

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

land, encourage good practice, promote compliance with regulatory requirements and to provide reference to applicable guidance.

12.2.4.2.3 The Environment Agency's Approach to Groundwater Protection Position Statements 2018

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

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

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

31. As no Mineral Safeguarding Areas have been identified within the development footprint of the Landfall to MLWS area, Onshore Export Cable Corridor or the Onshore Substation area, this guidance has not been considered further.

12.3 Assessment Methodology

12.3.1 Study Area

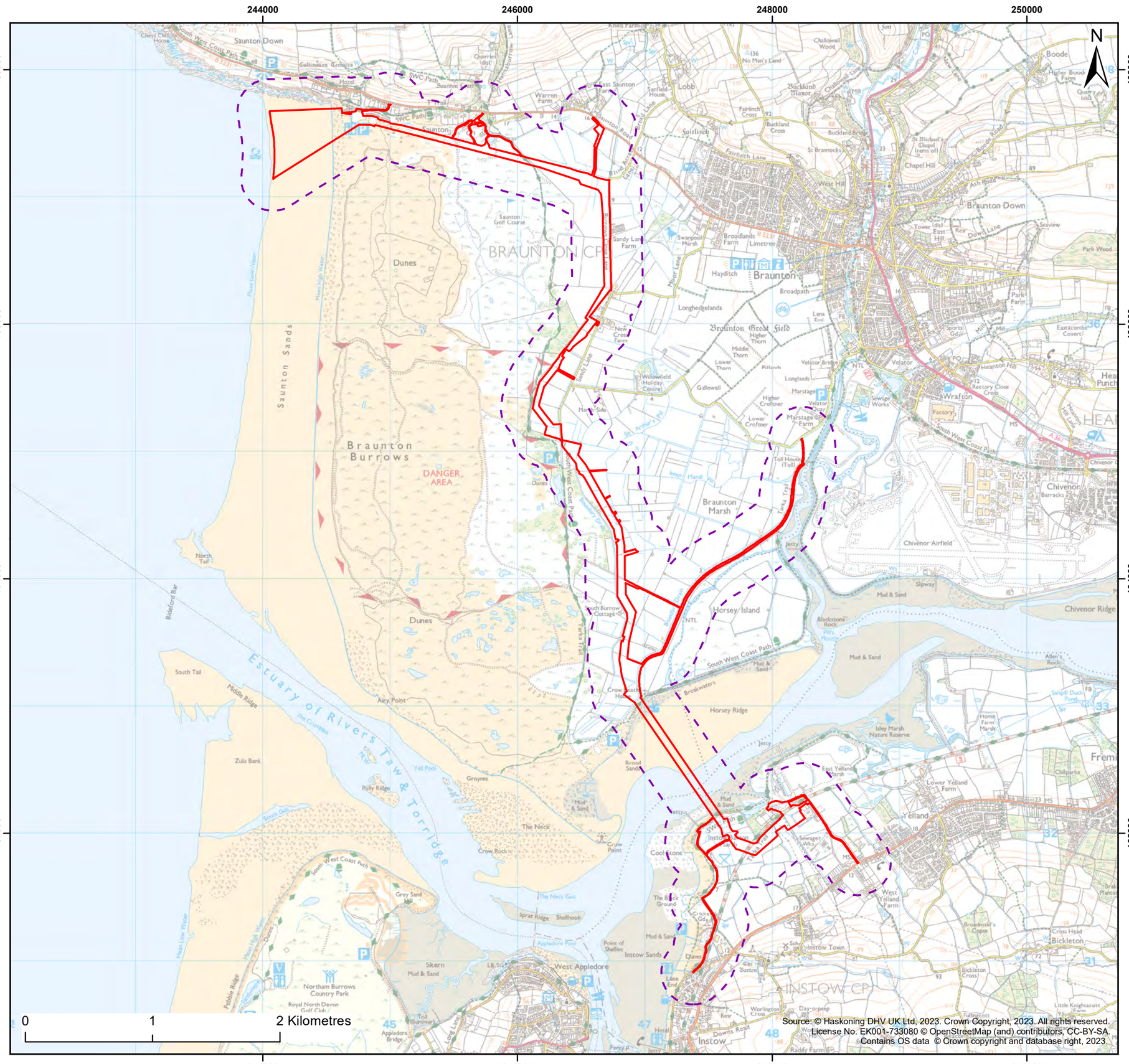
32. Details of the location of the Onshore Project and the onshore elements are set out within **Chapter 5: Project Description**.

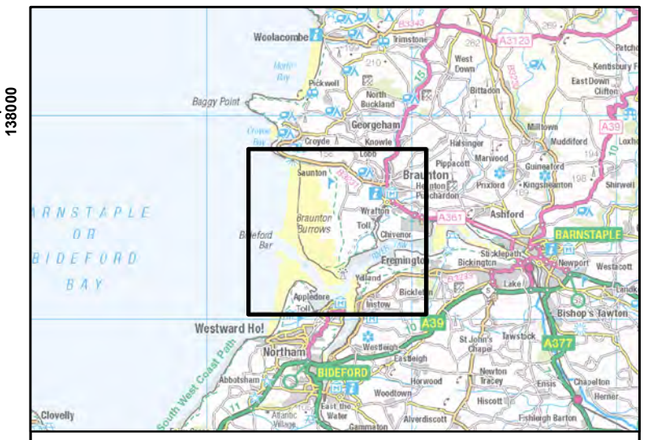
33. The ground conditions and contamination study area is defined by the distance over which impacts on geology and ground conditions from all the onshore project infrastructure (i.e. Landfall to MLWS, Onshore Export Cable Corridor, compounds, access routes and Onshore Substation) may occur and by the location of any receptors that may be affected by those potential impacts.

34. The study area is based on the Onshore Export Cable Corridor, Onshore Substation area and Early Enabling Work Access areas with a further buffer of 250m for potential sources of contamination and receptors. A 250m buffer has been chosen as the potential risks associated with current and historic contamination sources at distances within 250m are likely to have greatest impact on on-site conditions with potential risk diminishing with distance. A further buffer zone of 1km from the Onshore Export Cable Corridor and Onshore Substation areas has been considered for risks posed by Control of Major Accident Hazard (COMAH) sites due to the high

risk and for the risk posed to potable water abstraction sites due to their heightened sensitivity.

35. This has been established using professional judgement and is shown in **Figure 12.1**.





Legend:

- Onshore Development Area
- Onshore Development Area (250m Buffer)

Client: Offshore Wind Ltd.	Project: White Cross Offshore Windfarm

Title: Onshore Project Area

Figure: 12.1 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0612

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	09/06/2023	AB	DF	A3	1:30,000

Co-ordinate system: British National Grid

WHITE CROSS

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12.3.2 Approach to Assessment

36. **Chapter 6: EIA Methodology** provides a summary of the general impact assessment methodology applied to the Onshore Project. The following sections outline the methodology used to assess the potential effects on ground conditions and contamination.

12.3.2.1 Definitions of magnitude of impact

37. For each of the impacts assessed in this Environmental Statement, a magnitude has been assigned. In doing so the spatial extent, duration, frequency and reversibility of the impact from the construction, operation and maintenance, or decommissioning phase of the Onshore Project have been considered, where applicable.

38. The terms used to define magnitude of impact are outlined in **Table 12.4.**

39. Where the assessment identifies that there is no loss or alteration of characteristics, features or elements, or no observable impact in either direction upon a given receptor or group of receptors from an Impact, for example due to implication of embedded mitigation or through an assessment of the potential pathway, then the assessment for that Impact upon those receptor(s) will be **No Change**.

40. Impacts assessed as **No Change** have no potential for a significance of effect and therefore are not assessed further.

Table 12.4 Definition of terms relating to magnitude of an impact

Magnitude	Definition
High - Fundamental, permanent or irreversible changes, over the whole receptor, and/or fundamental alteration to key characteristics or features of the particular receptor's character or distinctiveness.	**Human Health** • Permanent or major change to existing risk exposure (adverse or beneficial) • Unacceptable risks or severe harm to one or more receptors with a long-term or permanent effect (adverse) • Remediation and complete source removal (beneficial).
	Controlled Waters • Permanent, long-term or wide scale effects on water quality or availability (adverse or beneficial) • Permanent loss or long-term derogation of a water supply source resulting in prosecution (adverse) • Change in Water Framework Directive (WFD) water body status or potential, or its ability to achieve WFD objectives in the future (adverse or beneficial)

Magnitude	Definition
	• Complete loss of habitat or permanent habitat creation (adverse or beneficial) • Measurable habitat change that is sustainable or recoverable over the long-term (adverse or beneficial).
	Geological Sites and Mineral Resources • Complete loss of designated sites • Complete sterilisation of mineral resource.
	Built Environment • Catastrophic damage to buildings or structures.
	Agricultural Land • Permanent or major change to existing Agricultural Land Classification (ALC) grade as a result of contamination.
Medium - Considerable, permanent/irreversible changes, over the majority of the receptor, and/or discernible alteration to key characteristics or features of the particular receptor's character or distinctiveness.	**Human Health** • Medium-term or moderate change to existing risk of exposure (adverse or beneficial) • Unacceptable risks to one or more of the receptors with a medium-term effect (adverse) • Serious concerns or opposition from Statutory Consultees (adverse).
	Controlled Waters • Medium-term or local scale effects on water quality or availability (adverse or beneficial) • Medium-term derogation of a water supply source, possibly resulting in prosecution (adverse) • Observable habitat change that is sustainable or recoverable over the medium-term (adverse or beneficial) • Temporary changes in WFD water body status or potential, or its ability to meet future WFD objectives (adverse or beneficial).
	Geological Sites and Mineral Resources • Partial loss of designated sites • Medium-term or local scale loss of mineral resource.
	Built Environment • Damage to buildings or structures.
	Agricultural Land • Medium-term or local scale effects on ALC grade as a result of contamination.

Magnitude	Definition
Low - Discernible, short term/temporary (events over part of the project duration) change, over a minority of the receptor, and/or limited but discernible alteration to key characteristics or features of the particular receptor's character or distinctiveness.	**Human Health** • Short-term, temporary or minor change to existing risk exposure (adverse or beneficial) • Unacceptable risks to one or more receptors with a short-term effect (adverse).
	Controlled Waters • Short-term or very localised effects on water quality or availability (adverse or beneficial) • Short-term derogation of a water supply source (adverse) • Measurable permanent effects on a water supply source that do not impact on its operations (adverse) • Observable habitat change that is sustainable or recoverable over the short-term (adverse or beneficial) • No changes in WFD water body status or potential, or its ability to meet future WFD objectives (neutral).
	Geological Sites and Mineral Resources • Temporary change in status of designated geological sites • Short-term or very localised effects on mineral resources.
	Built Environment • Easily repairable damage to buildings or structures.
	Agricultural Land • Short-term or very localised effects on ALC grade as a result of contamination.
Negligible – Discernible, short term/temporary (events over part of the project duration) change, or barely discernible change for any length of time, over a small area of the receptor, and/or slight alteration to key characteristics or features of the particular receptor's character or distinctiveness.	**Human Health** • Negligible change to existing risk of exposure • Activity is unlikely to result in unacceptable risks to receptors (neutral).
	Controlled Waters • Very minor or intermittent impact on local water quality or availability (adverse or beneficial) • Usability of a water supply source will be unaffected (neutral) • Very slight local changes that have no observable impact on dependent receptors (neutral) • No change in WFD water body status or potential, or its ability to meet future WFD objectives (neutral).
	Geological Sites and Mineral Resources • No change in status of in status of designated geological site • Very minor impact on mineral resources.
	Built Environment

Magnitude	Definition
	• Very slight non-structural damage or cosmetic harm to buildings or structures.
	Agricultural Land • Very minor effect on ALC grade as a result of contamination.

12.3.2.2 Definitions of receptor sensitivity/value

41. The sensitivity level to each impact is justified within the assessment and is dependent on the following factors:

- Adaptability – The degree to which a receptor can avoid or adapt to an effect
- Tolerance – The ability of a receptor to accommodate temporary or permanent change without a significant adverse effect
- Recoverability – The temporal scale over and extent to which a receptor will recover
- Value – A measure of the receptor importance and rarity.

42. The terms used to define sensitivity/value are outlined in **Table 12.5**.

Table 12.5 Definition of terms relating to receptor sensitivity/value

Sensitivity	Definition
High - Individual receptor has very limited or no capacity to avoid, adapt to, accommodate or recover from the anticipated impact.	**General** • Receptor is internationally or nationally important or rare with limited potential for compensation.
	Human Health • Construction workers involved in below ground construction works or ground breaking activities • Public, local residence and children (on and off site within 50m). • Future site users.
	Controlled Waters and Ecology • Groundwater source protection zones (SPZ) 1 • Public water supplies or licenced surface water and groundwater abstractions for potable use • Private water supplies for potable use (on and off site within 50m) • Habitats or species that are highly sensitive to change in surface hydrology or water quality • Surface waters and groundwaters supporting internationally designated sites (e.g. Sites of Special Scientific Interest or Ramsar sites).

Sensitivity	Definition
	Geological Sites and Mineral Resources • Mineral Safeguarding Area – nationally important resource • Designated geological sites of international importance.
	Built Environment • Sites of international importance, World Heritage Sites and Scheduled Monuments.
	Agricultural Land • Land at ALC Grade 1 or 2.
Medium - Individual receptor has limited capacity to avoid, adapt to, accommodate or recover from the anticipated impact.	**General** • Receptor is regionally important or rare with limited potential for compensation.
	Human Health • Future end users • Public, local residents and children (off site at distances >50m but less than 250m) • Commercial and industrial workers (off site within 50m) • Construction workers (above ground).
	Controlled Waters and Ecology • Groundwater SPZ 2 and SPZ 3 • Principal Aquifers • Secondary A and B Aquifers with private potable groundwater abstractions • Private water supplies for potable groundwater abstraction (off site within 250m) • Surface and groundwaters supporting nationally designated sites (SSSI).
	Geological Sites and Mineral Resources • Mineral Safeguarding Areas – regionally important resource • Designated geological site of national importance (SSSI).
	Built Environment • Commercial or residential buildings.
	Agricultural Land • Land at ALC Grade 3.
Low - Individual receptor has some tolerance to accommodate, adapt or recover	**General** • Receptor is locally important or rare.
	Human Health • Future end users (car parks or highways) • Public, local residents and children (off site >250m)

Sensitivity	Definition
from the anticipated impact.	• Commercial and industrial workers (off site at distances >50m but <250m).
	Controlled Waters and Ecology • Secondary A and B Aquifers without groundwater abstractions • Groundwater or surface waters supporting locally important sites (e.g. local nature reserves).
	Geological Sites and Mineral Resources • Adjacent to a Mineral Safeguarding Area • Low economically viable mineral resource.
	Built Environment • Car parks, highways, transport infrastructure and utilities.
	Agricultural Land • Land at ALC Grade 4.
Negligible - Individual receptor is generally tolerant to and can accommodate or recover from the anticipated impact.	**General** • Receptor is not considered to be particularly important or rare.
	Human Health • Commercial and industrial workers (off site >250m).
	Controlled Waters • Unproductive strata • Supports or contributes to habitats that are not sensitive to changes in surface hydrology or water quality.
	Geological Sites and Mineral Resources • No economically viable minerals.
	Built Environment • Locally important roads and footpaths.
	Agricultural Land • Land at ALC Grade 5.

12.3.2.1 Significance of effect

43. The potential significance of effect for a given impact, is a function of the sensitivity of the receptor and the magnitude of the impact (see **Chapter 6 EIA Methodology** for further details). A matrix is used (**Table 12.6**) as a framework to determine the significance of an effect. Definitions of each level of significance are provided in **Table 12.7**. Impacts and effects may be deemed as being either positive (beneficial) or negative (adverse).

Table 12.6 Significance of an effect - resulting from each combination of receptor sensitivity and the magnitude of the impact upon it

		Negative Magnitude				Beneficial Magnitude			
		High	Medium	Low	Negligible	Negligible	Low	Medium	High
Sensitivity	High	Major	Major	Moderate	Minor	Minor	Moderate	Major	Major
	Medium	Major	Moderate	Minor	Minor	Minor	Minor	Moderate	Major
	Low	Moderate	Minor	Minor	Negligible	Negligible	Minor	Minor	Moderate
	Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

Table 12.7 Example definitions of Effect Significance

Magnitude	Definition
High	A significant, very large or large change in receptor condition, both adverse or beneficial, which are likely to be important considerations at a national or population level because they contribute to achieving national, objectives or could result in exceedance of statutory objectives and/or breaches of legislation.
Medium	A noticeable and significant change in receptor condition, which are likely to be important considerations at a regional level.
Low	Small change in receptor condition, which may be raised as localised issues but are unlikely to be important in the decision making process.
Negligible	No discernible change in receptor condition.
No change	No impact, therefore, no change in receptor condition.

44. 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.

45. Potential effects are described, followed by a statement of whether the effect is significant in terms of the EIA regulations. Potential effects identified within the assessment as major or moderate are regarded as significant in terms of the EIA regulations. Whilst minor effects (or below) are not significant in EIA terms in their own right, it is important to distinguish these, as they may contribute to significant effects cumulatively or through interactions.

46. Following initial assessment, if the effect does not require additional mitigation (or none is possible), the residual effect will remain the same. If, however, additional mitigation is proposed, there will be an assessment of the post-mitigation residual effect.

12.3.3 Worst-Case Scenario

47. In accordance with the assessment approach to the 'Rochdale Envelope' set out in **Chapter 6: EIA Methodology**, the impact assessment for ground conditions and contamination has been undertaken based on a realistic worst-case scenario of predicted impacts. The Project Design Envelope for the Onshore Project is detailed in **Chapter 5: Project Description**.

48. Using the project design envelope approach means that receptor-specific potential effects draw on the options from within the wider envelope that represent the most realistic worst-case-scenario. It is also worth noting that under this approach the combination of project options constituting the realistic worst-case scenario may differ from one receptor to another and from one effect to another.

49. **Table 12.8** presents the realistic worst-case scenario elements considered for the assessment of ground conditions and contamination.

Table 12.8 Definition of realistic worst-case scenario details relevant to the assessment of impacts in relation to ground conditions and contamination

Impact	Realistic worst-case scenario	Rationale
Construction		
Landfall (to MLWS)	• Horizontal Directional Drill (HDD) horizontal length: 680m • Number of HDDs: 1 • HDD compound works area: 4,500m^2 • Indicative HDD depth: 1.2m • Number of transition joint bays (TJB): 1 • TJB area: 20m (l) x 8m (w) x 2m (h) • Duration: 4.5 months	These parameters represent the maximum footprint and duration of disturbance within the Onshore Development Area, in which has the potential to impact on land use receptors. The potential impacts identified are discussed in **Section 12.5**.
Onshore Export Cable Corridor	• Construction corridor width: 30m • Construction corridor width at pinch points: 12m • Construction corridor width at trenchless crossings: 15m • Corridor length: 6km • Number of trenches: 2 • Cable trench width: 3m	

Impact	Realistic worst-case scenario	Rationale
	• Cable trench approximate depth: 1.9m • Approximate depth to top of duct/tile: 1.2m • Number of jointing bays: 30 • Jointing bay construction dimensions: 12m (l) x 4m (w) x 1.5m (h) • No. of link box locations: 30 • Link box construction dimensions: 2(h) x 3(w) x 3m (l) • Indicative HDD depth: 1.2m • HDD compound dimensions: 2,500m^2 • Total onshore cable corridor works area: yet to be determined • Access routes: 1 main access • Haul road: 6.5km in length, 5m width • Main construction compound: 2,500m^2 (50 x 50m) • Secondary construction compounds: 1,800m^2 (three compounds each 20m x 30m) • Material storage areas: yet to be determined • Duration: 18 months	
Onshore Substation	• Access road length: 250m • Access road width: 7.5m • Construction compound area: 5,000m^2 • Total construction area: yet to be determined • Duration: 16 months.	
Operation		
Onshore Export Cable Corridor	• Operational corridor width: 14m • Number of trenches: 2 • Route length: 6km.	These parameters represent the maximum footprint of White Cross that would

Impact	Realistic worst-case scenario	Rationale
Onshore Substation	• Operational compound area: 4,880m^2 • Permanent land take associated with access roads, drainage solutions and landscaping: yet to be determined • Duration: Project Lifetime.	interact with the baseline environment. Potential impacts to land use receptors during the operational phase of the Onshore Project are discussed in **Section 12.6**.
Decommissioning		
Landfall (to MLWS) **Onshore Export Cable Corridor** **Onshore Substation**	The decommissioning policy for the Onshore Project infrastructure is not yet defined however it is anticipated that some infrastructure would be removed, reused or recycled; other infrastructure could be left in situ. The following infrastructure is likely be removed, reused, or recycled where practicable: • Onshore Substation • Onshore Export Cables. The following infrastructure is likely to be decommissioned and could be left in situ depending on available information at the time of decommissioning: • Transition joint bays • Cable joint bays • Cable ducting. The maximum project lifespan is expected to be 50 years.	The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time. Decommissioning arrangements will be detailed in a Decommissioning Plan, which will be drawn up and agreed with the relevant consenting body / stakeholder prior to decommissioning. For the purposes of the worst-case scenario, it is anticipated that the impacts will be comparable to those identified for the construction phase.

12.3.4 Summary of Mitigation

50. This section outlines the mitigation relevant to the ground conditions and contamination assessment, which has been incorporated into the design of the Onshore Project. Further information is detailed in **Chapter 5: Project Description**.

12.3.4.1 Embedded Mitigation

51. The embedded mitigation measures are those defined in the IEMA guidance as either primary or tertiary mitigation. Those measures relevant to the ground conditions and contamination assessment are summarised in **Table 12.9**.

52. As these measures have been embedded the assessment of effects is undertaken on the basis that these forms of mitigation will definitely be delivered. Therefore, any effects that might have arisen without these forms of mitigation do not need to be identified as 'potential effects', as there should be no potential for them to arise.

Table 12.9 Embedded mitigation measures relevant to the ground conditions and contamination assessment

Component/Activity /Impact Contaminated Land	Mitigation embedded into the design of the Onshore Project
All onshore elements of the project	The Development and adherence to a Code of Construction Practice (CoCP). The CoCP would be regularly reviewed and updated both prior to and during the construction works. The CoCP would be informed by the findings of any pre-construction ground investigations and include an assessment of the potential risks to human health and controlled waters receptors. Based on that risk assessment, appropriate working methods would be developed to avoid, minimise or mitigate impacts relating to construction. The risk mitigation strategies incorporated into the CoCP would include: • Use of Personal Protective Equipment (PPE) • Provision of welfare facilities • Monitoring of works including air quality and odour • Implementation of relevant good working practices including stockpile management and dust suppression activities to reduce the risk relating to the creation and inhalation of wind-blown dusts. The CoCP would incorporate legislation requirements including the Construction Design Management (CDM) Regulations (2015), Health and Safety at Work Act (1974) and COSHH Regulations. In addition, a plan for dealing with unexpected contamination would be developed as part of the CoCP. This plan would also incorporate the Environment Agency best practice guidelines for pollution prevention which have been withdrawn from use but still provide a useful best practice guide and include: • Environment Agency Pollution Prevention Guidance (PPG) 01 – Understanding your environmental responsibilities • Environment Agency PPG 05 – Works and maintenance near water

Component/Activity /Impact	Mitigation embedded into the design of the Onshore Project
	• Environment Agency PPG 06 – Working at construction and demolition: preventing pollution guidance • Environment Agency PPG 08 – Safe storage and disposal of used oils • Environment Agency PPG 21 – Pollution incident response planning • Environment Agency PPG 22 – Dealing with spills. In areas that have been identified as potential areas of contamination within the PRA or encountered during construction works, perched waters within Made Ground or groundwater from dewatering activities would be collected within a tank or lagoon prior to any treatment or discharge. This wastewater shall either be: • Discharged to foul sewer under a trade effluent consent agreed with the local water company or supplier; and/or, • Discharged to surface water under an environmental permit issued by the Environment Agency. On site treatment plant may be required to treat the wastewater prior to disposal in order to meet discharge limits set by either the Environment Agency or local water company.
	The CoCP discussed above would include specific measures that are protective of controlled waters in relation to the storage of fuels, oils, lubricants, wastewater, and other chemicals during the works. This would include: • Storing all fuels, oils, lubricants, wastewater and other chemicals in suitable containers with impermeable bunds and at least 110% of the stored capacity. With any damaged containers being removed from site • Refuelling would take place in a dedicated impermeable area, using a bunded bowser. Biodegradable oils are to be used where possible. Ensuring that spill kits are available on the site at all times as well as sand bags and stop logs for deployment in case of accidental spillages.
Cable Routing	The route of the Onshore Export Cable Corridor has been determined as part of a detailed site selection process (see **Chapter 4: Site Selection and Assessment of Alternatives**). The route of the Onshore Export Cable Corridor has been designed to avoid potential sources of contamination where possible.
Groundwater Quality	
Cable Routing	Ground investigations and hydrogeological risk assessments meeting the requirements of the Environment Agency's approach to groundwater protection (Environment Agency, 2018) would be undertaken at each trenchless crossing location.

Component/Activity /Impact	Mitigation embedded into the design of the Onshore Project
Onshore Substation	Oil water sumps will be utilised within the Onshore Substations to reduce the potential for leaks and spills impacting groundwater quality.

12.3.4.1 Additional Mitigation

53. In addition to the embedded mitigation measures as outlined above, the Applicant has also committed to the following further mitigation measures summarised in **Table 12.10**. These are those identified within the IEMA guidance as secondary mitigation, and includes measures identified where potentially significant effects have been assessed.

Table 12.10 Further mitigation measures relevant to the ground conditions and contamination assessment

Component/ Activity/Impact	Additional Mitigation
All onshore elements of the project	Adoption of a CL:AIRE Industry Code of Practice to manage the re-use and disposal of excavated soils within the Onshore Project Area would also be incorporated as an additional mitigation measure in the CoCP, this would aid in maximising sustainability and provide an audit trail to demonstrate the appropriate use of materials. A Materials Management Plan (MMP) would be drafted in advance of any construction works, this would include chemical screening criteria in order to ensure that imported and/or reused materials are chemically suitable for use. If materials identified as containing asbestos are identified, then a specialist contractor would be employed to aid in its removal from Onshore Project Area, in line with current legislation. The MMP would form part of the final CoCP to be submitted post consent. A Site Waste Management Plan will be developed post-consent to ensure the proper handling and protocols are in place to deal with any generated wastes.

12.3.5 Baseline Data Sources

12.3.5.1 Desktop Study

54. A desk study was undertaken to obtain information on ground conditions and contamination. Data was acquired within the study area through a detailed desktop review of existing studies and datasets.

55. The sources of information presented in **Table 12.11** were consulted to inform the ground conditions and contamination assessment.

Table 12.11 Data sources used to inform the ground conditions and contamination assessment

Source	Summary
British Geological Society (BGS)	Geological Map for Bideford and Lundy, Solid and Drift (Sheet number 292 and parts of 275, 276, 291 and 308), 1977, 1:50,000.
	Hydrogeological Map of England and Wales (Sheet number 1), 1977, 1:625,000.
	Onshore GeoIndex Web Portal, accessed 21st April 2022.
Department for Environment, Food and Rural Affairs (DEFRA)	MAGiC map (www.magic.defra.gov.uk), accessed 21st April 2022.
Devon County Council	Environment Viewer, accessed 21st April 2022.
	Devon Minerals Plan, 2017.
Envirocheck Geographical Information System (GIS) Data	Historical maps, environmental sensitivity data and permitting records
Google Earth	Publicly available aerial imagery, accessed 21st April 2022.
Zetica	Unexploded ordnance (UXO) risk maps (www.zeticauxo.com), accessed 21st April 2022.

12.3.6 Data Limitations

56. The desk-based PRA (**Appendix 12.A**) is based on a range of publicly available information. No ground investigation data has been used to inform PRA or the impact assessment presented in this chapter. The assessments therefore adopt a precautionary approach i.e., if a potential pollutant linkage has been identified it is assumed to be present until further site-specific information is available to clarify whether the linkage exists.

57. The impact assessment presented in this chapter is therefore limited by the finite data on which it is based. There is a level of uncertainty associated with the extrapolation of site-specific data or non-site data to other locations within the Study Area.

12.3.7 Scope

58. Upon consideration of the baseline environment, the project description outlined in **Chapter 5: Project Description**, and Scoping Opinion (Case reference: EIA/2022/00002), potential impacts upon ground conditions and contamination have been scoped in or out. These impacts are outlined, together with a justification

for why they are or are not considered further, in **Table 12.12** and **Table 12.13** respectively. In scoping potential impacts in or out reference is made to the embedded mitigation measures outlined above in **Table 12.9**.

Table 12.12 Summary of impacts scoped in relating to ground conditions and contamination

Potential Impact	Justification
Human health – exposure to contaminated soils and groundwater	The Onshore Project has the potential to disturb contaminated soil having an impact on human health.
Direct impacts on groundwater quality and resources	The Onshore Project has the potential to disturb contaminated soil having an impact on groundwater.
Impacts on surface water quality and the ecological habitats they support	The Onshore Project has the potential to disturb contaminated soil having an impact on surface water receptors and ecological habitats.
Impacts on the built environment	The Onshore Project has the potential to impact the existing built environment.
Impacts on agricultural land	The Onshore Project has the potential to disturb existing contaminated soils and groundwater (as well as introducing new sources) which may impact existing agricultural land.

Table 12.13 Summary of impacts scoped out relating to ground conditions and contamination

Potential Impact	Justification
Physical impacts to designated geological sites during the operations phase.	Physical impacts to designated geological sites have not been considered further as no designated geological sites have been identified within the study area.
Sterilisation of future mineral resources.	The Onshore Export Cable Corridor and Onshore Substation footprint do not cross any Mineral Safeguarding Areas and as such this impact has not been considered further.
Transboundary effects	There are no transboundary effects with regards to ground conditions and contamination as the Onshore Project would not be sited in proximity to any international boundaries. Transboundary effects are therefore scoped out of this assessment and are not considered further.
Unexploded Ordnance	Impacts associated with the uncovering of UXO are covered in **Chapter 24: Accidents and Disasters**.

12.3.8 Consultation

59. Consultation has been a key part of the development of the Onshore Project. Consultation regarding ground conditions and contamination has been conducted throughout the EIA. An overview of the project consultation process is presented within **Chapter 7: Consultation**.

60. **Table 12.14** provides a summary of how the consultation responses received to date have influenced the approach that has been taken.

Table 12.14 Consultation Responses

Comment	Project Response
Environment Agency Responses	
With regard to the objectives of the Water Framework Directive (WFD), any new development must not cause deterioration from the present status. We would expect the Environmental Statement to demonstrate that the proposal will not cause deterioration in WFD waterbody status. When the proposals detailed locations are decided, we can provide further advice.	Consideration to potential impacts to the present WFD status as a result of both construction and operation activities is given in **Sections 12.5** and **12.6**.
At this stage we require the Environment Statement to scope in how the proposed development would affect the River Taw (& wider estuary), River Torridge (& wider estuary), Sir Arthurs Pill (main river) and other minor watercourse along with any relevant bathing waters and shellfish waters.	Consideration to potential impacts on inland surface water features is given in **Sections 12.5.3** and **12.6.2**.
All fuel, hydraulic and lubricating oils associated with onshore and offshore works should be stored in suitable double skinned or integrally bunded storage systems with leakage control alarm mechanisms. A pollution contingency plan should be in place in the event of a leak or spill of oil from onshore or offshore operations. Our relevant Pollution Prevention Guidelines (PPGs) should be referred to. These are available on our website.	Consideration to appropriate mitigation measures is given in **Section 12.3.4**. Further consideration to mitigation in relation to specific impacts identified during construction and operation is given in **Sections 12.5** and **12.6**.
The ES should address any potential contamination issues from past uses at this site. We would expect a Phase 1 desk based study to be undertaken. This should contain sufficient information to identify any potential risks posed to controlled waters and must include a detailed conceptual site model. Should further intrusive ground investigation be required, we would	Existing potential sources of contamination are detailed in the baseline (see **Section 12.4** with further detail in the Geo-Environmental Desk Top Study and Preliminary Risk Assessment - **Appendix 12.A**). Recommendations for ground investigation have been provided in **Appendix 12.A**. Impacts resulting from

Comment	Project Response
anticipate that this would be provided in the form of a Phase 2 report, outlining any mitigation measures / remedial options which may be required in order to minimise the risk of contamination to surface water and groundwater receptors.	ground contamination during both construction and operation are considered in **Sections 12.5** and **12.6**.
Marine Management Organisation Responses	
With regard to the objectives of the Water Framework Directive (WFD), any new development must not cause deterioration from the present status. The MMO would expect the ES to demonstrate that the proposal will not cause deterioration in WFD waterbody status.	Consideration to potential impacts to the present WFD status as a result of both construction and operation activities is given in **Sections 12.5** and **12.6**.
The MMO require the potential impact of the development on groundwater resources and groundwater quality to be assessed. This should include the appropriate measures to identify private water supplies along the corridor of the proposed cable route.	Current groundwater conditions beneath the Onshore Project Area are detailed in the baseline (see **Section 12.4** with further detail in **Appendix 12.A**). Impacts to groundwater resources and quality during both construction and operation are considered in **Sections 12.5** and **12.6**.
The ES should address any potential contamination issues from past uses at this site. The MMO would expect a Phase 1 desk based study to be undertaken. This should contain sufficient information to identify any potential risks posed to controlled waters and must include a detailed conceptual site model. Should further intrusive ground investigation be required, we would anticipate that this would be provided in the form of a Phase 2 report, outlining any mitigation measures / remedial options which may be required in order to minimise the risk of contamination to surface water and groundwater receptors. Further guidance with regard to dealing with contaminated land is provided in CLR11 - Model Procedures for the Management of Land Contamination. The MMO recommend that developers should: • Follow the risk management framework provided in Land Contamination: Risk Management, when dealing with land affected by contamination	Existing potential sources of contamination are detailed in the baseline (see **Section 12.4** with further detail in **Appendix 12.A**). Impacts resulting from ground contamination during both construction and operation are considered in **Sections 12.5** and **12.6**. CLR11 guidance was withdrawn in 2020, reference instead has been made to LCRM guidance 2021 which is now considered to be the approved approach to land contamination assessment.

Comment	Project Response
• Refer to our Guiding principles for land contamination for the type of information that we require in order to assess risks to controlled waters from the site - the local authority can advise on risk to other receptors, such as human health • Consider using the National Quality Mark Scheme for Land Contamination Management which involves the use of competent persons to ensure that land contamination risks are appropriately managed Refer to the contaminated land pages on gov.uk for more information.	
To help manage risks (i.e., any increased silt loads) to the water environment, the Environment Agency recommends that a Construction Environment Management Plan (CEMP) is developed. The CEMP should pull together and manage the pollution control and waste management requirements during the construction phase. It should ensure that adequate pollution prevention measures are included to protect controlled waters during construction. It is recommended that the CEMP is drafted using guidance in the Environment Agency's Pollution Prevention Guidelines (PPGs), in particular PPG5 - Works and maintenance in or near water and PPG6 - Working at construction and demolition sites.	Consideration to appropriate mitigation measures is given in **Section 12.3.4**. Further consideration to mitigation in relation to specific impacts identified during construction and operation is given in **Sections 12.5** and **12.6**.
All fuel, hydraulic and lubricating oils associated with onshore and offshore works should be stored in suitable double skinned or integrally bunded storage systems with leakage control alarm mechanisms. A pollution contingency plan should be in place in the event of a leak or spill of oil from onshore or offshore operations. Relevant PPGs should be referred to.	
Method statements and risk assessments should be produced for all watercourse crossing points along the cable corridor. In particular suitable methods should be employed (bunds, settlement lagoons/tanks, irrigation etc) to minimise soil run-off into watercourse at these sites. Stockpiles of sub-soil and top soil should be located and stored appropriately to minimise	

Comment	Project Response
discoloured run-off. Downstream water quality monitoring should be put in place at these sites during operations.	
An appropriate method statement and risk assessment should be prepared for the management of run-off from the sub-station construction area. Water quality monitoring of any adjacent watercourse should take place during the construction process. A sustainable urban drainage system should be put in place to deal with surface water flows from the site in the longer term, not just to manage flood risk but also to protect water quality.	
If the Applicant intends to impound a watercourse then it is likely an impounding licence from the Environment Agency is required. An impoundment is any dam, weir or other structure that can raise the water level of a water body above its natural level. 'On-line' impoundments hold back water in rivers, stream, wetlands and estuaries, and consequently affect downstream flows, sediment transport and migration of fish.	It is not thought that impoundment will be necessary as part of this project.
North Devon Council	
In conversation with North Devon Council, they stated their preference for the Onshore Substation to be sited in a brownfield location if possible, rather than occupying greenfield land.	Consideration to the risks of potential contamination associated with brownfield land is given in **Sections 12.5** and **12.6**.

61. It is considered likely that further consultation in relation to issues arisings from identified ground conditions and contaminated land will take place post submission. Entities to contact for potential further consultation include: North Devon Council, Devon County Council, the Environment Agency, Natural England and the Ministry of Defence.

12.4 Existing Environment

62. This section describes the existing environment in relation to ground conditions and contamination associated with the White Cross study area. It has been informed by a review of the sources listed in **Section 12.3.5**.

12.4.1 Geology

63. Information on the geological conditions within the study area has been collated from BGS datasets including 1:50,000 scale geological mapping. The anticipated

geological sequence within the study area as shown on the BGS geological mapping is outlined in **Table 12.15**.

Table 12.15 Geological sequence for the ground conditions and contamination study area

Strata	Unit	Description and location
Superficial Deposits	Blown Sands	Sand, located in the east of the Landfall to MLWS area and the north and centre of the Onshore Export Cable Corridor.
	Marine Beach Deposits	Sand and gravel, located in the west of the Landfall to MLWS Area.
	Tidal Flat Deposits	Clay, silt and sand, located in the centre and south of the Onshore Export Cable Corridor.
	Alluvium	Clay, silt, sand and gravel, located in the south of the Onshore Export Cable Corridor and the Onshore Substation area.
	Glacial Till	Diamicton. Located to the southeast of the Onshore Export Cable Corridor.
Bedrock	Ashton Mudstone Member	Mudstones, siltstones and sandstones, located in the south of the Onshore Export Cable Corridor and the Onshore Substation Area.
	Crackington Formation	Sandstone. Located approximately 200m south of the Onshore Export Cable Corridor.
	Doddiscombe Formation	Mudstones, siltstones and chert, located in the centre of the Onshore Export Cable Corridor.
	Pilton Mudstone Formation	Mudstones and siltstones, located in the Landfall to MLWS area and the north of the Onshore Export Cable Corridor.

64. Although it has not been recorded, Made Ground may still be present within the study area.

12.4.2 Hydrogeology

65. The baseline presented in the PRA (**Appendix 12.A**) indicates that the Blown Sands, Marine Beach Deposits and Alluvium Superficial Deposits as well as the Ashton Mudstone Member, Doddiscombe Formation, Pilton Mudstone Formation and Crackington Formation are Secondary A Aquifers.

66. Secondary A Aquifers are defined as permeable strata capable of supporting water supplies at a local rather than strategic level and in some cases forming an important source of base flows to rivers.

67. The Tidal Flat Superficial Deposits and Glacial Till are Secondary Undifferentiated Aquifers.

68. Secondary Undifferentiated Aquifers are layers where it has not been possible to attribute either Secondary A or B aquifer to the soil type due to variable characteristics. In most cases, this means that the type of layer in question has previously been designated as both minor and non-aquifer in different locations due to its variable characteristics.

69. The PRA indicates that the study area has been assigned, by the Environment Agency (EA), a medium to high groundwater vulnerability designation. A high groundwater vulnerability designation indicates that the soil is easily able to transmit pollution to groundwater, which is characterised by high leaching potential in soils and the absence of low permeability superficial deposits.

70. One groundwater abstraction well (stated to be for non-potable use) has been identified within the Onshore Export Cable Corridor with one further located within 350m of the corridor boundary.

71. No Source Protection Zones (SPZs) are located within the Onshore Export Cable Corridor or Onshore Substation area, the nearest being an SPZ 3 located 920m to the north.

72. The Onshore Project is located within the River Taw and North Devon Streams Water Framework Directive (WFD) Groundwater Body. Further comment on WFD water bodies is included in **Chapter 9: Marine Water and Sediment Quality**.

12.4.3 Hydrology and surface drainage

73. Information within the PRA indicates that the Onshore Export Cable Corridor crosses the River Taw in addition to a number of smaller watercourses, with further watercourses, agricultural drains and ponds located within the study area. Ordinary Watercourses that drain Braunton Marsh are managed by Braunton Marsh Internal Drainage Board (IDB). Further information with regards to hydrology is located within **Chapter 14: Water Resources and Flood Risk**.

12.4.4 Sensitive Land Use

74. Sensitive land use sites are considered, by statutory agencies, to be of special importance due to their intrinsic qualities that are unique to those areas. The following designated sites are located within the Onshore Export Cable Corridor:

- Braunton Burrows which are designated as a Site of Special Scientific Interest (SSSI) and a Special Area of Conservation (SAC)
- Taw-Torridge Estuary SSSI
- The North Devon Area of Natural Beauty (AONB).

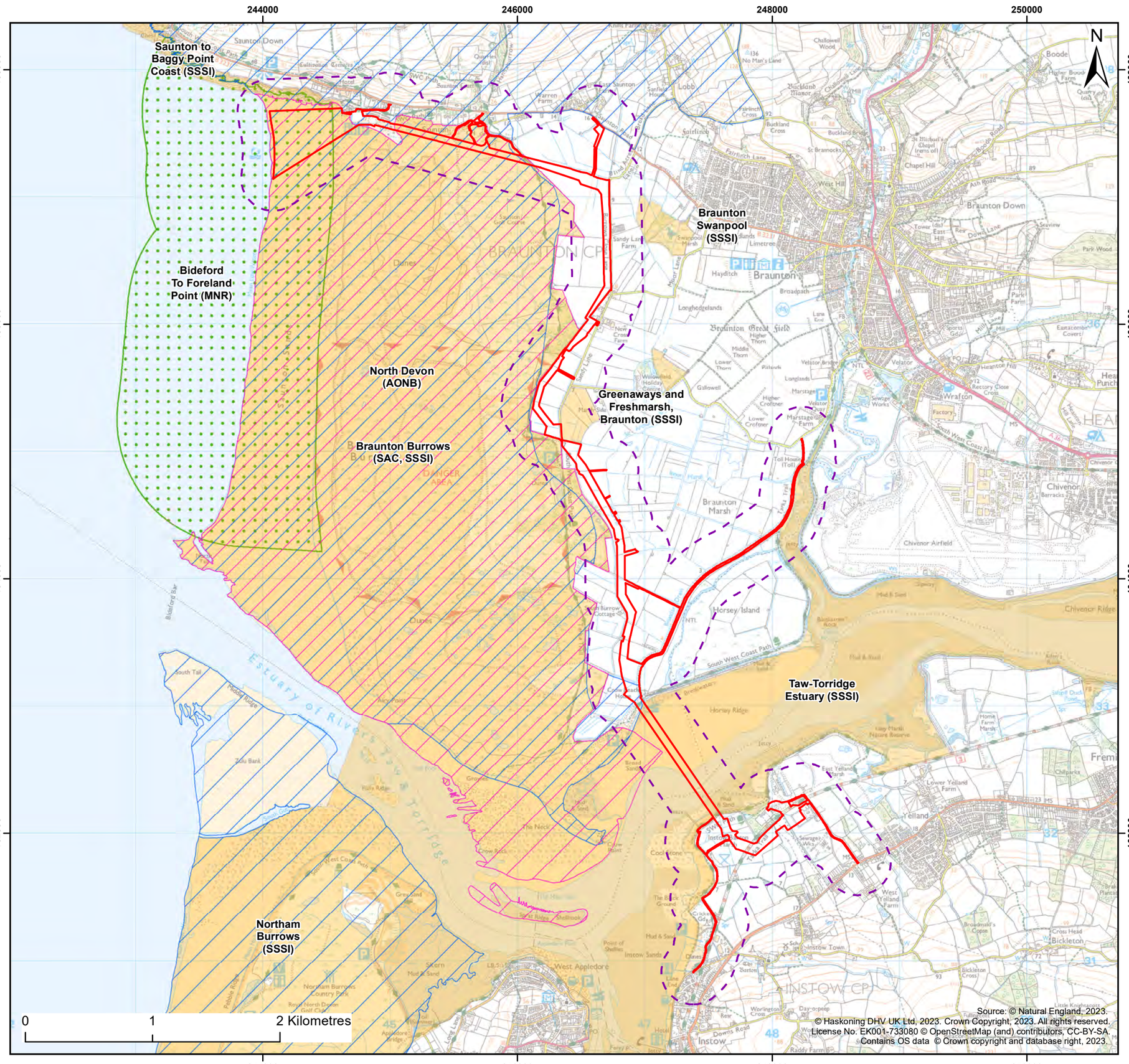
75. The following designated sites are located within 250m of the Onshore Export Cable Corridor:

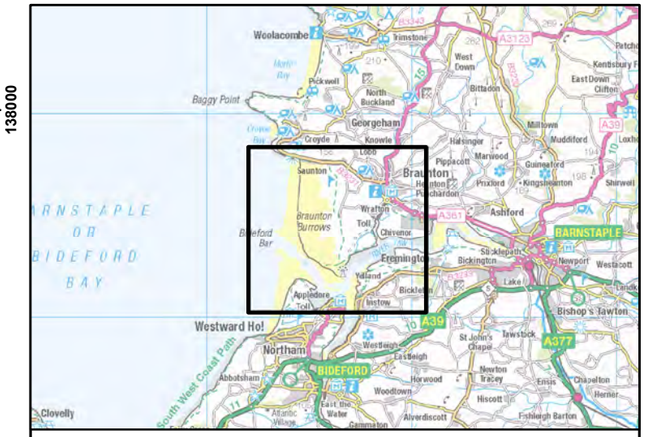
    - Saunton to Baggy Point Coast SSSI
    - Bideford to Foreland Point Marine Nature Reserve (MNR)
    - Greenaways and Freshmarsh SSSI
    - Braunton Swanpool SSSI.

76. The locations of identified designated sites are shown on **Figure 12.2**.

77. Parts of the study area including the Onshore Export Cable Corridor east of Saunton Golf Course and the Onshore Substation area are located within the Taw Estuary Eutrophic Nitrate Vulnerable Zone (NVZ).

78. Further information regarding ecological designated sites can be found in **Chapter 16: Onshore Ecology and Ornithology**.





Legend:

- Onshore Development Area
- Onshore Development Area (250m Buffer)
- Special Area of Conservation (SAC)
- Site of Special Scientific Interest (SSSI)
- Area of Outstanding National Beauty (AONB)
- Marine Nature Reserve (MNR)

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title: Identified Environmentally Sensitive Areas

Figure: 12.2 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0614

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12.4.5 Mineral Safeguarding Areas

79. No Mineral Safeguarding Areas are located within the footprint of the Landfall to MLWS area, Onshore Export Cable Corridor and Onshore Substation area. One Mineral Safeguarding Area is located adjacent to the north of the Onshore Substation area. These are areas of known deposits of minerals designated by a Mineral Planning Authority for safeguarding against unnecessary sterilisation by non-mineral development.

80. An assessment of BGS recorded mineral sites conducted during the production of the PRA identified one record of ceased mineral extraction, Down House opencast quarry, located 160m to the north of the Onshore Export Cable Corridor.

12.4.6 Human Health

81. The required onshore infrastructure comprises of the Onshore Export Cable Corridor and the Onshore Substation as set out in **Chapter 5 Project Description**. Haul roads, access roads and construction compounds will also be required during the construction period.

82. During the installation of the onshore infrastructure, human health receptors effected would be those involved with construction activities, adjacent off-site residents and nearby workers (e.g., agricultural workers) and visitors (e.g. where Public Rights of Way (PRoW) might be in use). During the operational phase, the human health receptors will be site users, workers at the Onshore Substation and maintenance workers accessing the Onshore Export Cable and the Onshore Substation.

83. Impacts on human health as a result of the construction and operational phases, other than those associated with contamination are discussed in **Chapter 22 Human Health**.

12.4.7 Historical Setting

84. The research undertaken to inform the PRA (**Appendix 12.A**) indicates that the majority of the study area comprised agricultural land from the earliest available Ordnance Survey (OS) maps (1887).

85. The onshore export cable crosses a section of Braunton Burrows, an area of sand dunes understood to have been used for military training since 1943 and is still in use by the Ministry of Defence (MoD) in present day.

86. A large system of drains, also sometimes recorded as a sewage site, are shown on historical mapping between 1958 and 1994 to be present across the north of the

Onshore Export Cable Corridor, approximately 160m east of Saunton Sands car park.

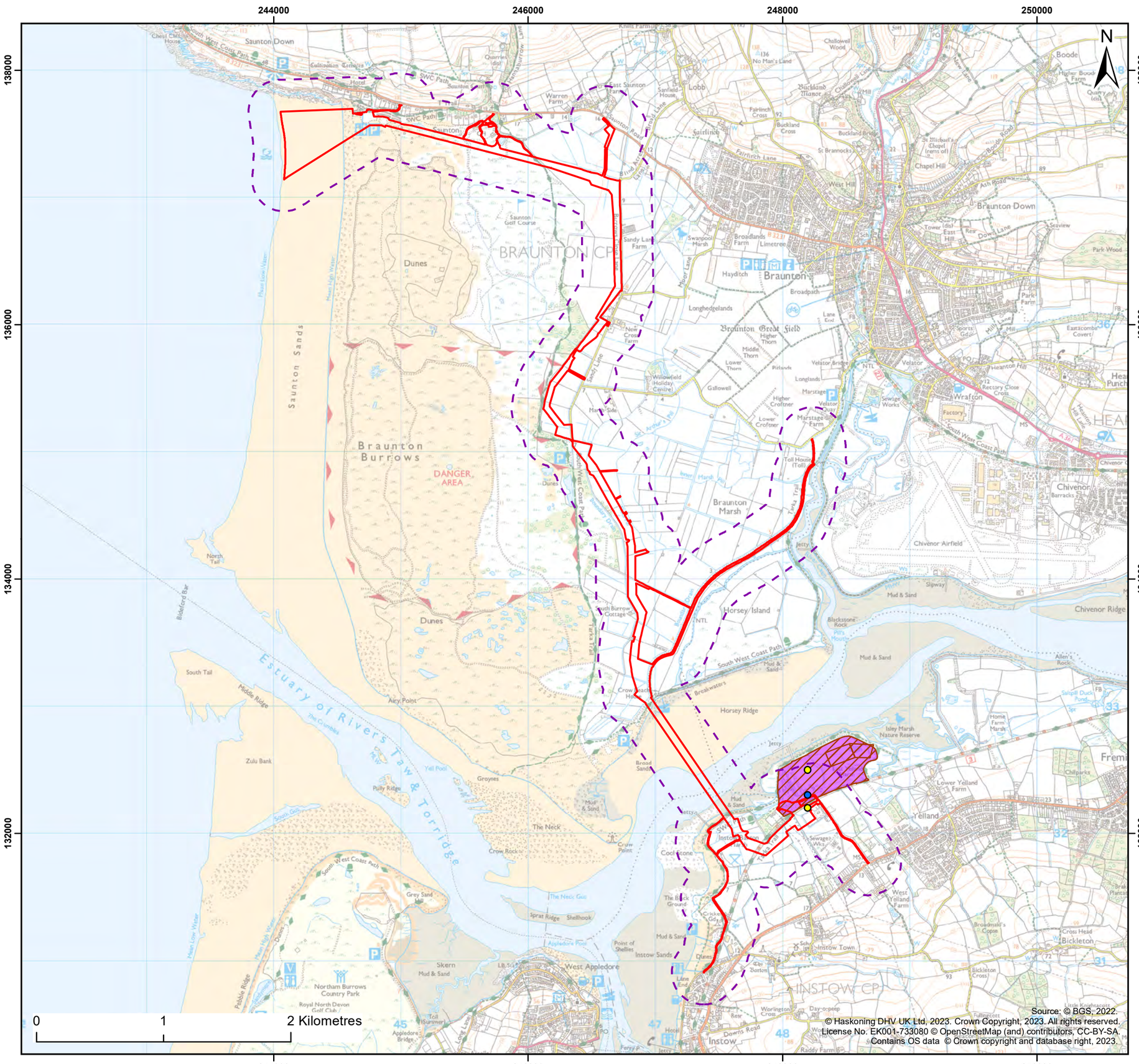
87. A large works consisting of multiple buildings and railway sidings were present in the south of the Onshore Export Cable Corridor between the years 1958 and 1994 with the area later designated as landfill (see **Figure 12.3**). A depot containing fuel tanks is shown to the south of this works from 1958 onwards and is still there at present day, although the fuel tanks are shown to have been removed.

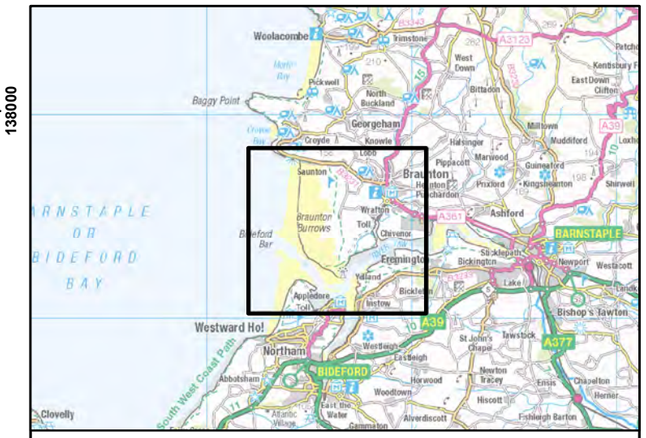
88. A summary of the historical features that may give rise to potential sources of contamination is provided in in **Table 12.16** and are shown on **Figure 12.4.**

Table 12.16 Potential Sources of Contamination

Potential Source	Potential Contaminants of Concern	Landfall (to MLWS)	Onshore Export Cable Corridor	Onshore Substation
Onsite				
Made Ground associated with existing developments and land uses within the Onshore Export Cable Corridor including Saunton Golf Club, the drain/sewage site located to the north and the works/power plant, landfill and railway located to the south.	Asbestos, polycyclic aromatic hydrocarbons (PAHs), phenols, fuel/oil hydrocarbons heavy metals, perfluoroalkyl and polyfluoroalkyl substances (PFAS).	X	√	√
Made Ground associated with the identified drain/sewage site.	Pathogens such as Salmonella and Typhus	X	√	X
Made Ground associated with historical landfill activities.	Heavy metals, cyanides, sulphates, phenols, PAHs, fuel/oil hydrocarbons, polychlorinated biphenyls (PCBs), PFAS, asbestos and ground gas.	X	√	X
Contamination associated with historical and current military use of Braunton Burrows.	Heavy metals, explosive residues, UXO.	X	√	X
Present and historical agricultural activities	Pesticides and herbicides	X	√	X

Potential Source	Potential Contaminants of Concern	Landfall (to MLWS)	Onshore Export Cable Corridor	Onshore Substation
Offsite				
Made Ground associated with existing developments and land uses including the works/power plant located adjacent to the Onshore Export Cable Corridor.	Asbestos, PAHs, phenols, fuel/oil hydrocarbons heavy metals and PFAS.	X	√	√
Contamination associated with historical and current military use of Braunton Burrows.	Heavy metals, explosive residues, UXO.	X	√	X
Made Ground associated with historical landfill activities and infilled land	Heavy metals, cyanides, sulphates, phenols, PAHs, fuel/oil hydrocarbons, PCBs, PFAS, asbestos and ground gas.	X	√	X
Contamination associated with historical and present nearby oil/ fuel distributor	PAHs, fuel/oil hydrocarbons.	X	√	√
Present and historical agricultural activities	Pesticides and herbicides	X	√	X





Legend:

- Onshore Development Area
- Onshore Development Area (250m Buffer)
- BGS Recorded Landfills
- Historic Landfills
- Registered Waste Transfer Sites
- Licensed Waste Management Facilities

Client: Offshore Wind Ltd.	Project: White Cross Offshore Windfarm

Title: Identified Waste Facilities

Figure: 12.3 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0613

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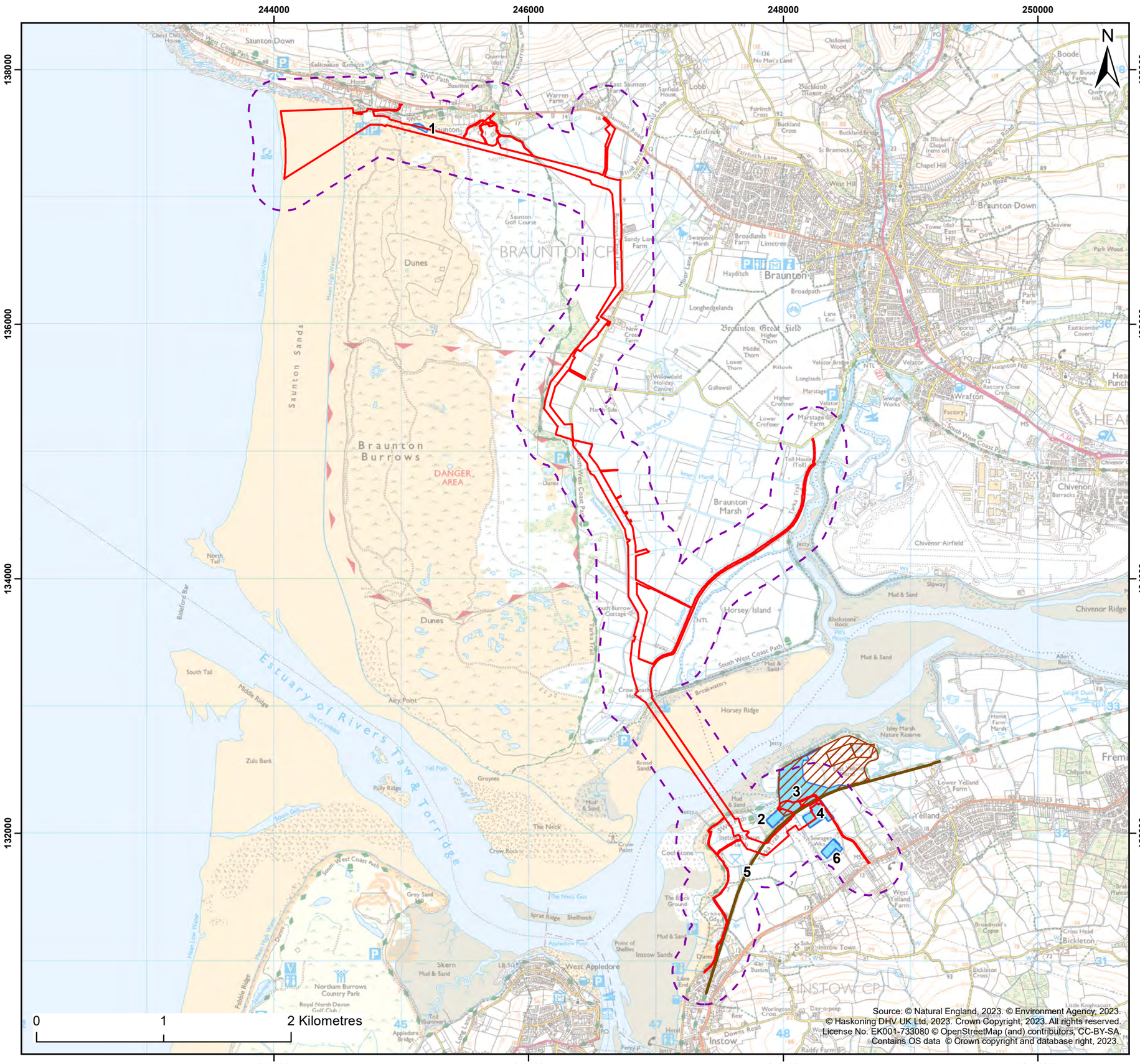

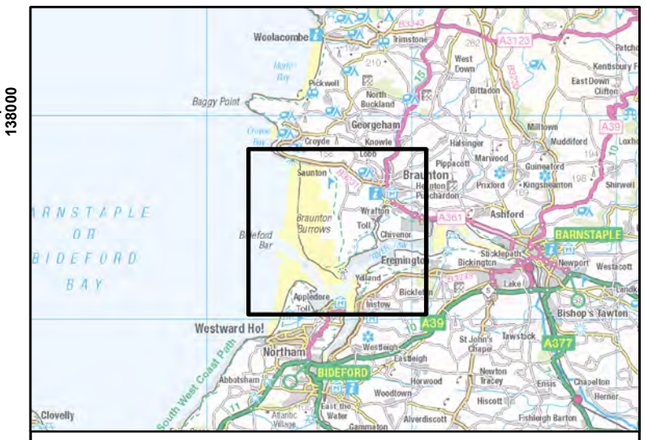

Legend:

- Onshore Development Area
- Onshore Development Area (250m Buffer)
- Historic Landfills
- Contaminated Land Use (Polygon)
- Contaminated Land Use (Line)

Note: Features reference tables 5.1 and 5.2 of Appendix 12.A

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title: Identified Potential Sources of Ground Contamination

Figure:	Drawing No:
12.4	PC2978-RHD-ZZ-XX-DR-Z-0616

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12.4.8 Do Nothing Scenario

89. The Town and Country 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 (EIA Regulations, Schedule 4, Paragraph 3). From the point of assessment, over the course of the development and operational lifetime of the Onshore Project (operational lifetime anticipated to be 50 years), long-term trends mean that the condition of the baseline environment is expected to evolve. This section provides a qualitative description of the evolution of the baseline environment, on the assumption that the Onshore Project is not constructed, using available information and scientific knowledge.

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

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

92. The natural degradation of contaminants over time may result in a general improved in ground conditions.

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

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

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

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

12.5 Potential Impacts During Construction

97. The potential impacts during construction of the Onshore Project have been assessed for ground conditions and contamination. A description of the potential effect on identified receptors caused by each identified impact is given in this section.

12.5.1 Impact 1: Exposure of construction workers, maintenance workers, neighbouring site users and future site users to contaminated soils and groundwater and associated health impacts

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

99. A PRA (**Appendix 12.A**) has been undertaken for the study area to identify plausible contaminant linkages as a result of the potential presence of contaminants within the soil and groundwater. The PRA identified that the majority of the land within the study area has an agricultural use where unacceptable risks from contamination are not anticipated.

100. The PRA also identified localised areas within the study area with a history of potential contaminative uses. This includes a sewage site, a historical works, a landfill and a historic railway line (as detailed in **Section 12.4.7**).

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

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

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

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

12.5.1.1 Magnitude of impact

105. The realistic worst-case scenario for the construction of the Onshore Project would involve the excavation of up to 91,000m^3 of material within the Onshore Export Cable Corridor over a distance of 6km and a width of 30m. Earthworks would also be required to construct the jointing bays (3,888m^3), transition bays (1,344m^3) and to facilitate trenchless crossings (6,250m^3). There will be a requirement for further excavation within the Landfall to MLWS and Onshore Substation areas, as well as to facilitate the installation of access roads and temporary construction compounds.

106. A maximum construction period for the Onshore Project is 3.5 years. However, earthworks would not be operating continuously or at the same location during the whole construction phase. At the time of writing, the anticipated Onshore Export

Cable Corridor construction rate and extent of open cut trenches per front are yet to be determined.

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

108. In relation to risks associated with the migration of ground gases and/or vapours along the onshore export for the duration of the works and represent acute or chronic health risk to workers. The magnitude of impact is therefore considered to be **high** in relation to ground gas and vapours. However, this is subject to the plausibility of a ground gas/vapour source of contamination and receptor linkage.

12.5.1.2 Sensitivity of the receptor

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

12.5.1.3 Significance of effect

110. The effect on human health associated with excavation works is considered to be low on a high sensitivity receptor. This therefore results in **moderate adverse** significance of effect in the absence of mitigation.

111. In relation to the potential effects associated with the migration of ground gases and/or vapours to human health, the magnitude of impact is high on a high sensitivity receptor. This therefore results in a **major adverse** significance in the absence of mitigation.

12.5.1.4 Further Mitigation

112. Where areas of potential contamination cannot be avoided, targeted ground investigations are required prior to construction to determine the extent and source of any contamination and mitigation required. The ground investigations may include, but would not be limited to, the collection of soil, soil leachate, groundwater and surface water samples for laboratory analysis. The range of contaminants tested for may vary between locations and sample type, examples of contaminants that may be tested for include, but are not limited to, metals, PAHs, PCBs and PFAS. Ground gas monitoring wells will be installed in areas identified as potentially containing ground gas generating materials. Groundwater monitoring wells would also be required as part of any ground investigations in order to establish the groundwater regime and to identify, for example, whether contamination is from onsite or offsite sources.

113. This would characterise the site conditions, identify unacceptable risks and determine whether remediation is required. If areas of potential concern are identified, then a remediation strategy would be developed and agreed with the relevant bodies prior to the commencement of remedial works and construction activity. The ground investigations, risk assessments and remediation works would follow guidance provided within the 2021 Environment Agency Land Contamination Risk Management Framework.

114. A plan for dealing with unexpected contamination would be developed as part of the CoCP. This plan would also incorporate the Environment Agency best practice guidelines for pollution prevention which have been withdrawn from use but still provide a useful best practice guide and include:

- Environment Agency Pollution Prevention Guidance (PPG) 01 – Understanding your environmental responsibilities
- Environment Agency PPG 05 – Works and maintenance near water
- Environment Agency PPG 06 – Working at construction and demolition: preventing pollution guidance
- Environment Agency PPG 08 – Safe storage and disposal of used oils
- Environment Agency PPG 21 – Pollution incident response planning
- Environment Agency PPG 22 – Dealing with spills.

115. Adoption of CL:AIRE Industry Code of Practice to manage the re-use and disposal of excavated soils on site would also be incorporated as an additional mitigation measure to protect human health, this would aid in maximising sustainability and providing an audit trail to demonstrate the appropriate use of materials.

116. An MMP would be drafted in advance of any construction works, this would include chemical screening criteria to ensure that imported and/or reused materials are chemically suitable for use. If materials identified as containing asbestos are identified, then a specialist contractor should be employed to aid in its removal from site, in line with current legislation.

117. The MMP would form part of the final CoCP to be submitted for approval with the relevant bodies in advance of implementation.

118. Risks associated with the creation of a preferential pathway for ground gas and vapours via the Onshore Export Cable Corridor can be mitigated via re-instating excavated materials following the installation of the onshore cables. If however, a different source of material is required to backfill excavations (i.e. because the excavated material was deemed to pose an unacceptable risk), the risks associated

with the creation of preferential pathways can be mitigated via ensuring that the material has the same porosity as that of the excavated material. This would help reduce the risks posed to human health receptors as it would provide continuity with the surrounding environment and not introduce areas of lower porosity soils which could act as preferential pathways.

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

12.5.1.5 Residual Effect

120. With the incorporate of outlined mitigation measures, the risk to human health from exposure to potentially contaminated soils, groundwater, ground gas and vapours during construction would minimised as far as is reasonably possible. This would effectively reduce the magnitude from **high** to **negligible** on a **high** sensitivity receptor, representing a residual effect of **minor adverse** significance, which is **not significant** in EIA terms. For contaminants other than ground gases and vapours, the risk would also be reduced from **low** to **negligible** on a **high** sensitivity receptor, representing a residual effect of **minor adverse** significance which is considered **not significant** in EIA terms.

12.5.2 Impact 2: Direct impacts on groundwater quality and groundwater resources

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

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

123. Direct impacts to the Secondary A Aquifers of the Pilton Mudstone Formation, Doddiscombe Formation, Ashton Mudstone Member and Crackington Formation bedrock may occur from deep ground workings related to trenchless crossing (e.g.

HDD) operations for cable installation beneath surface infrastructure and watercourses. Trenchless techniques may also be required at Landfall to MLWS as part of the works to connect onshore and offshore export cables.

124. Trenchless crossings have the potential for creating preferential pathways for drilling fluid, mud or other contaminants to leak along the drill path, which could cause contamination of groundwater. The volume of drilling fluid that could be released during trenchless crossing works is dependent on a number of factors including the size of the fracture, the permeability of the geological strata, the viscosity of the drilling fluid and the pressure of the hydraulic drilling system.

125. Piling may be required for the foundations of the Onshore Substation which has the potential to create preferential pathways through a low permeability layer, allowing contamination to migrate into underlying Secondary A Aquifers, impacting water quality and associated groundwater abstractions.

126. If required, dewatering of perched groundwater within excavations could also affect groundwater flow and water quality, resulting in impacts to base flow of local watercourses or impact on groundwater abstractions.

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

12.5.2.1 Magnitude of impact

128. The realistic worst-case scenario for the construction of the Onshore Project would involve the excavation of up to 91,000m^3 of material within the Onshore Export Cable Corridor over a distance of 6km and a width of 30m. Earthworks would also be required to construct the jointing bays (3,888m^3), transition bays (1,344m^3) and to facilitate trenchless crossings (6,250m^3). There will be a requirement for further excavation within the Landfall to MLWS and Onshore Substation areas, as well as to facilitate the installation of access roads and temporary construction compounds.

129. A maximum construction period for the Onshore Project is 3.5 years. Earthworks would not be operating continuously and in the same location during the whole construction phase.

130. Any changes to infiltration rates, surface runoff or dewatering that may occur as a direct result of earthworks activities and direct impacts to the underlying superficial aquifers is predicted to be of local spatial extent within the aquifer unit, short-term

duration (related to the working areas only), of intermittent occurrence and high reversibility (occurring only during the works and returning to baseline conditions following completion of the works). The magnitude of impact associated with the earthworks is therefore considered to be **low**.

131. The maximum number of trenchless crossings required as part of the construction works is 25. The foundation design of the Onshore Substation (i.e. whether piling is required and the total number of piles) is yet to be determined. The impacts of either trenchless crossings or piling on the underlying Secondary A bedrock Aquifers is predicted to be of local spatial extent (occurring only at trenchless crossing locations and at the substation if piling is required), and of intermittent occurrence. The magnitude of the impact associated with trenchless crossings and piling activities is therefore considered to be **low**.

132. Dependent on the depth and thickness of the superficial aquifer units, there is the potential for them to also be affected by trenchless crossing techniques and piling (if required). As mentioned previously, the potential effects are predicted to be of local spatial extent (occurring only at trenchless crossings and the substation should piling be required) and of intermittent occurrence. Therefore, in relation to impacts to superficial aquifers from these activities, the magnitude of impact is considered to be **low**.

12.5.2.2 Sensitivity of the receptor

133. Two active groundwater abstractions (recorded as non-potable) have been identified within the study area however, it is not known whether these abstract water from superficial or bedrock deposits. It is recorded that the abstractions are for non-potable purposes and therefore the sensitivity is considered to be **medium**.

12.5.2.3 Significance of effect

134. Prior to mitigation, the overall significance of disturbance having an effect on groundwater quality or the resource potential of the Secondary Aquifers during the construction is low magnitude and on a low sensitivity receptor, representing an effect of **minor adverse** significance. The significance of effect is inclusive of the potential impacted associated with trenchless crossings and piling (if required).

12.5.2.4 Further Mitigation

135. As discussed in **Section 12.5.1.4**, mitigation includes measures such as ground investigations to characterise the ground conditions. Should contamination be encountered that is considered to pose an unacceptable risk to groundwater and groundwater resources, a remediation strategy proportionate to the level of risk

would be developed and agreed with the relevant bodies. Once agreed, any required remediation works, which will be dependent on the type and level of contamination encountered, would be undertaken to mitigate the potential risks posed.

136. In addition, the CoCP would include specific measures relevant to the storage of fuels, oils, lubricants, wastewater and other chemicals during the works. This will include:

- Storing all fuels, oils, lubricants, wastewater and other chemicals in suitable containers with impermeable bunds and at least 110% of the stored capacity, with any damaged containers being removed from site
- Refuelling would take place in a dedicated impermeable area, using a bunded bowser. Biodegradable oils are to be used where possible
- Ensuring that spill kits are available on the site at all times as well as sand bags and stop logs for deployment in case of accidental spillages.

137. Hydrogeological risk assessments would also be developed in areas where trenchless crossing techniques are utilised to assess the potential impacts to groundwater from bentonite breakout during drilling.

138. The production of a hydrogeological risk assessment would be undertaken prior to the commencement of construction works (should one be deemed necessary) and would meet the requirements of the Environment Agency's Approach to Groundwater Protection 2018 Framework.

139. Furthermore, a piling risk assessment would be undertaken if piles are to be used in areas of potential contamination for the Onshore Substation area. This would be completed in line with 'Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention' (Environment Agency, 2001). The mitigation measures and monitoring requirements recommended by these assessments, would be implemented during construction works.

12.5.2.5 Residual Effect

140. Following the implementation of the mitigation measures described, the overall risk to groundwaters withing the superficial Secondary Aquifers during construction would be minimised as far as is reasonably possible. This would reduce the magnitude of impact to **negligible** on a **high** sensitivity receptor, representing a residual effect of **minor adverse** significance.

141. For groundwaters within the bedrock Secondary A Aquifers, following adoption of mitigation measures, the magnitude of impact would be **negligible** on a **high**

sensitivity receptor, representing a residual effect of **minor adverse** significance. An effect of minor adverse significance is considered **not significant** in EIA terms.

12.5.3 Impact 3: Impacts from contamination on surface water quality and the ecological habitats

142. The study area crosses one main river being the river Taw in addition to many smaller watercourses, agricultural drains, drainage channels and ponds.

143. As described in **Section 12.4** and the PRA (**Appendix 12.A**), potential sources of contamination have been identified within the Onshore Project Area. Earthworks activities across the whole Onshore Project Area and potential piling of the Onshore Substation area during construction have the potential to disturb potential sources of contamination which could migrate and be released into surface water via the following pathways:

- Mobilisation and migration of free phase hydrocarbons, soil contaminants or dissolved phase contaminants in groundwater by construction activities with subsequent release into surface waters
- Surface water runoff from contaminated Made Ground soils brought to the surface during construction
- Runoff from stockpiles of potentially contaminated soils
- Migration of soil or groundwater contaminants into surface water drains during construction activities which then enter surface water
- Accidental spillage during the handling, storage or treatment of contaminated water, fuels or other chemicals used during construction
- The hydraulic regime of the local area could also be affected by the construction works, for example backfilling excavated areas with less compacted material could potentially create preferential flow paths into surface water receptors.

12.5.3.1 Magnitude of impact

144. It is possible that there would be multiple sources of contamination within a river catchment, as such, the magnitude of impact is considered to be **medium**.

12.5.3.2 Sensitivity of the receptor

145. Any migration and discharge of contamination into surface waters could lead to a reduction in surface water quality and have an impact on the ecological habitats they support. Several statutory designated sites exist within the study area including SSSIs, SACs, an AONB and a MNR, as such, the sensitivity of surface waters is considered to be **high**.

146. Additional impacts relating to surface water quality and ecological habitats are provided in **Chapter 14: Water Resources and Flood Risk** and **Chapter 16: Onshore Ecology and Ornithology**.

12.5.3.3 Significance of effect

147. Prior to mitigation the overall effect on surface water quality from contamination during construction works is medium magnitude on a high sensitivity receptor, representing an effect of **major adverse** significance.

12.5.3.4 Further Mitigation

148. The mitigation measures set out in **Sections 12.5.1.4** and **12.5.2.4** would also serve to prevent the migration of contamination into surface water bodies.

149. In addition, in areas that have been identified as potential areas of contamination within the PRA or encountered during construction works, perched water within Made Ground or groundwater from dewatering activities would be collected within a tank or lagoon prior to any treatment or discharge. This waste water shall either be:

- Discharged to foul sewer under a trade effluent consent agreed with the local water company, and/or
- Discharged to surface water under an environmental permit issued from the Environment Agency.

150. Dewatering points have been identified to areas of sensitive land use such as the Taw-Torridge Estuary SSSI. A Flood Risk Activity Environmental Permit will be required for dewatering activities, and this will include further mitigation measures.

151. On site plant may be required to treat the wastewater prior to disposal in order to meet discharge limits set by either the Environment Agency or local water company.

12.5.3.5 Residual Effect

152. Following the adoption of the mitigation measures outlined, the risk to surface water bodies during the construction phase would be minimised as far as reasonably possible. This would effectively reduce the magnitude of impact to **negligible**, on a **high** sensitivity receptor, representing a residual effect of **minor adverse** significance, which is **not significant** in EIA terms.

12.5.4 Impact 4: Built Environment

153. The construction phase has the potential to impact the existing built environment. This may be through creating new preferential pathways for contaminants or gases

to migrate that may lead to degradation of utilities (potable water supply pipes) and concrete from aggressive attack. This could potentially compromise the integrity of buildings or utilities, or the migration of ground gases into buildings could cause explosion.

154. Potential impacts associated with the Onshore Project on existing utilities, in relation to electricity cables, telecommunications and high-pressure gas pipelines, are discussed in **Chapter 15: Land Use**.

12.5.4.1 Magnitude of impact

155. Commercial and residential properties are located in isolated areas within 250m of the proposed construction works. Potential impacts to the built environment are considered to be localised to work areas and areas of contamination. The magnitude of impact is therefore considered to be **medium**.

12.5.4.2 Sensitivity of the receptor

156. Although there are no buildings present within the Landfall to MLWS area, Onshore Export Cable Corridor or Onshore Substation area, there are commercial and residential properties located within 250m. Therefore, the sensitivity of the built environment is considered to be **medium**.

12.5.4.3 Significance of effect

157. Without mitigation, the potential effect on the built environment during the construction phase is medium magnitude on a medium sensitivity receptor, representing an effect of **moderate adverse** significance.

12.5.4.4 Further Mitigation

158. Mitigation includes the reduction of construction activities in proximity to commercial and residential properties. , Construction compounds are to be located away from residential properties. However, where this isn't possible pre-construction site characterisation works in areas identified as potential sources of contamination (see **Section 12.4** and **Appendix 12.A**) may be required. This would allow for the identification of potential contamination and the risks these may present to the built environment during construction works. Should it be determined that risks to the built environment are present, appropriate remediation works would be undertaken to mitigate the potential impacts.

12.5.4.5 Residual Effect

159. Following the mitigation described above, it is considered that the magnitude of the impact would be reduced to **low** on a **medium** sensitivity receptor. Therefore, the

residual effect would be of **minor adverse** significance, which is **not significant** in EIA terms.

12.5.5 Impact 5: Impacts on Agricultural Land

160. A significant portion of the construction footprint is located within areas currently associated with agricultural production, with ALC grades 2, 3 and 4 present throughout the Landfall to MLWS area, Onshore Export Cable Corridor and Onshore Substation area.

161. Due to the nature of the land use within the Onshore Development Area, it would not be possible to avoid agricultural land. As mentioned in **Section 12.4**, the PRA identified localised areas within the Onshore Development Area with a history of potentially contaminative uses which could represent a contamination risk to agricultural land.

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

163. Discussions in relation to potential impacts associated with construction on agricultural land beyond the impacts related to contamination land can be found in **Chapter 15: Land Use**.

12.5.5.1 Magnitude of impact

164. Potential impacts to agricultural land during the construction phase are predicted to be of local spatial extent (localised to the work areas and areas where contamination may be present). Potential impacts are also anticipated to be of short-term duration, of intermittent occurrence and high reversibility (occurring only during the works). The magnitude of impact is considered be **low**.

12.5.5.2 Sensitivity of the receptor

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

12.5.5.3 Significance of effect

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

12.5.5.4 Further Mitigation

167. Mitigation measures discussed in **Section 12.5.1.4** would also serve to reduce the magnitude of impact on agricultural land as a result of construction activities.

12.5.5.5 Residual Effect

168. Implementation of the measures previously discussed would reduce the magnitude of impact to **negligible**, and therefore reduced the significance of effect to **minor adverse**, which is deemed to be **not significant** in EIA terms.

12.6 Potential Impacts During Operation and Maintenance

169. The potential impacts of the operation and maintenance of the Onshore Project have been assessed relating to ground conditions and contamination. A description of the potential effect caused by each identified impact is given in this section.

12.6.1 Impact 6: Exposure of maintenance workers and future site users to contaminated soils and groundwater and associated health impacts

170. During the operation of the Onshore Project there would be no planned maintenance along the Onshore Export Cable Corridor which would require the excavation of soils. However, in the unlikely event of a cable failure, a stretch of cable between two joint bay locations may need to be replaced. Maintenance works associated with the Onshore Substation are anticipated to be undertaken during the operational life of the Onshore Project, this may also include the need for soils to be excavated.

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

172. Materials excavated during the installation of the Onshore Export Cables and construction of the Onshore Substation would be re-instated following completion where possible. If a different source of material is used to backfill excavations within the Onshore Export Cable Corridor that is not of a similar porosity as the surrounding environment (e.g. a more porous material such as hardcore is used), there is the potential for ground gases and/or vapours to migrate along the length of the corridor or from beneath the Onshore Substation. This may lead to the accumulation of ground gas and vapours within the Onshore Substation accessed by maintenance

worker during the operational phase. Therefore, risks associated with asphyxia and explosion may be present.

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

174. In relation to risks posed by ground gases and vapours, should potential sources of ground gas/vapour generating materials be identified as part of site characterisation works or encountered unexpectedly during construction appropriate mitigation measures, including the removal of the source material would be implemented prior to construction. Impacts associated with ground gas/vapours to the built environment are discussed in **Section 12.5.4**.

12.6.1.1 Magnitude of impact

175. The effects are predicted to be of local spatial extent (localised to areas where contamination may be present and where excavation works are required), of short-term duration, of intermittent occurrence and high reversibility. The magnitude of impact is therefore considered to be **low**.

176. In areas where there is the potential for ground gases and/or vapours to accumulate (e.g. within the Onshore Substation building) mitigation measures implemented during the construction phase would form the embedded mitigation measures during operation. The incorporation of the embedded mitigation measures would reduce the magnitude of impact during operation. Therefore, the magnitude of impact is considered to be **low**.

12.6.1.2 Sensitivity of the receptor

177. The sensitivity of maintenance workers and site users is considered to be **high**.

12.6.1.3 Significance of effect

178. Without mitigation, the potential effect on human health is low magnitude on a high sensitivity receptor, representing an effect of **moderate adverse** significance.

12.6.1.4 Further Mitigation

179. Should remedial works be required in areas of contamination identified during the site characteristics works, these would be conducted prior to the commencement of construction works. If unexpected areas of contamination are identified during

construction, remedial works will be undertaken where these areas are considered to pose an unacceptable risk to human health. This would mean that contaminated soils would not be permanently left at the surface during the operational phase of the Onshore Project. Remedial works that take place prior to the construction of the Onshore Project would reduce the potential effect on human health.

180. Maintenance workers that are required to undertake ground excavations or enter confined spaces during the operational phase would be provided with information regarding the nature of the ground conditions so that they can develop site and task specific risk assessments and method statements and implement their recommendations to protect human health.

12.6.1.5 Residual Effect

181. With the incorporation of the mitigation measures described above, the risk to human health during the operational phase would be minimised as far as is reasonably practicable. The residual magnitude of impact is considered to be **negligible** on the **high** sensitivity receptor following mitigation. Therefore the residual effect is considered to be **minor adverse**, which is **not significant** in EIA terms.

12.6.2 Impact 7: Impact on Controlled Waters (groundwater and surface waters)

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

12.6.2.1 Magnitude of impact

183. Maintenance works could involve soils being exposed at surface during, for example, excavation of joint bay locations. However, it is not anticipated that the entirety of the Onshore Export Cable Corridor or Onshore Substation footprint would be subject to excavation during maintenance works.

184. The impacts are predicted to be of local spatial extent (localised to areas of excavation or maintenance where contamination may be present). The magnitude is therefore considered to be **low** during operation.

12.6.2.2 Sensitivity of the receptor

185. The sensitivity of controlled waters is considered to be **high**.

12.6.2.3 Significance of effect

186. Without mitigation, the potential effect on controlled waters resulting from the operation of the Onshore Project is low magnitude on a high sensitivity receptor representing an effect of **moderate adverse** significance.

12.6.2.4 Further Mitigation

187. Maintenance workers that are required to undertake ground excavations or maintenance works required during the operation of the Onshore Project would be provided with information regarding the nature of ground conditions within each area so that they can develop site and task specific risk assessments and method statements and implement their recommendation to protect controlled waters.

188. During cable repair or maintenance works and at the Onshore Substation, all fuels, oils, lubricants and other chemicals would be stored in an impermeable bund with sufficient excess capacity to prevent overfilling. Spill kits would be available on site at all times and an Emergency Response Plan (ERP) (or similar) would be developed as part of the final CoCP, outlining mitigation measures to be undertaken in the event of an uncontrolled release of hazardous materials.

189. An Outline Drainage Strategy will be produced including mitigation measures aimed at preventing contamination from the Onshore Substation entering surrounding water courses.

12.6.2.5 Residual Effect

190. Following the implementation of the mitigation measures described above, the risk to controlled waters during the operational phase of the Onshore Project would be minimised as far as is reasonably practicable. This would effectively reduce the magnitude of impact to **negligible** on the **high** sensitivity receptor. Therefore, the residual effect on controlled waters during operation would be of **minor adverse** significance, which is considered **not significant** in EIA terms.

12.6.3 Impact 8: Impacts on Built Environment

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

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

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

12.6.3.1 Magnitude of impact

194. Desk based information indicates that the Onshore Substation zones are located in and near to potential sources of ground gases. Depending on the location of jointing bays and link boxes in relation to potential sources of ground gas generating contamination, there is the potential for the gases to migrate and accumulate in these underground structures at Landfall to MLWS and along the Onshore Export Cable Corridor.

195. Potential impacts to the built environment are considered to be localised to work areas and areas of contamination. The magnitude of impact is therefore considered to be **medium**.

12.6.3.2 Sensitivity of the receptor

196. Although there are no buildings present within the Landfall to MLWS area, Onshore Export Cable Corridor or Onshore Substation area, there are commercial and residential properties located within 250m. Therefore, the sensitivity of the built environment is considered to be **medium**.

12.6.3.3 Significance of effect

197. Without mitigation, the potential effect on the built environment during the construction phase is medium magnitude on a medium sensitivity receptor, representing an effect of **moderate adverse** significance.

12.6.3.4 Further Mitigation

198. Mitigation includes the reduction of construction activities in proximity to commercial and residential properties where possible, for example locating construction compounds away from residential properties. However, where this isn't possible pre-construction site characterisation works in areas identified as potential sources of contamination (see **Section 12.4** and **Appendix 12.A**) may be required. This would allow for the identification of potential contamination and the risks these may present to the built environment during construction works. Should it be determined that risks to the built environment are present, appropriate remediation works would be undertaken to mitigate the potential impacts.

12.6.3.5 Residual Effect

199. Following the mitigation described above, it is considered that the magnitude of the effect would be reduced to **low** on a **medium** sensitivity receptor. Therefore, the residual effect would be of **minor adverse** significance, which is **not significant** in EIA terms.

12.6.4 Impact 9: Impacts on Agricultural Land

200. Maintenance activities have the potential to mobilise pre-existing contamination or create new contamination through the leakage or spillage of fuels, oils or other chemicals from machinery, vehicles or operational equipment. This could impact on agricultural land quality.

12.6.4.1 Magnitude of impact

201. Although excavation works will not form part of planned maintenance activities during the operational phase, there is the potential for excavations to be undertaken to conduct unplanned repairs. Should excavation works be required as part of unplanned works, these would be at joint bay locations for cable repairs or at the Onshore Substation and not involve the entity of the Onshore Project infrastructure.

202. The impacts are predicted to be of local spatial extent (localised to areas of excavation/maintenance and where contamination may be present). The magnitude of impact is therefore considered to be **low** during the operational phase.

12.6.4.2 Sensitivity of the receptor

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

12.6.4.3 Significance of effect

204. Without mitigation, the potential effect on agricultural land resulting from the operation of the Onshore Project is low magnitude on a high sensitivity receptor representing an effect of **moderate adverse** significance.

12.6.4.4 Further Mitigation

205. As mentioned in **Sections 12.5.1.4** and **12.6.1.4**, maintenance works will be undertaken in accordance with site and task specific risk assessments based on information regarding the nature of the ground conditions within the area.

206. All fuels, oils, lubricants and other chemicals will be stored in an impermeable bund with at least 110% of stored capacity. Spill kits will be available on site at all times and an ERP (or similar) will be developed and recorded within the health and safety

folder. The ERP will outline mitigation measures to undertaken in the event of an uncontrolled release of hazardous materials.

12.6.4.5 Residual Effect

207. Implementation of the measures previously discussed would reduce the magnitude of impact to **negligible**, and therefore reduced the significance of effect to **minor adverse**, which is deemed to be **not significant** in EIA terms.

12.7 Potential Impacts During Decommissioning

208. No decision has been made regarding the final decommissioning policy for the Onshore Project as it is recognised that industry best practice, rules and legislation change over time.

209. The anticipated decommissioning activities are outlined in **Section 12.3.3**. The potential impacts of the decommissioning of the Onshore Project have been assessed for ground conditions and contamination on the assumption that decommissioning methods will be similar or of a lesser scale than those deployed for construction. The types of impact would be comparable to those identified for the construction phase:

- Impact 1: Exposure of construction workers, maintenance workers, neighbouring site users and future site users to contaminated soils and groundwater and associated health impacts
- Impact 2: Direct impacts on groundwater quality and groundwater resources.

210. The magnitude of impacts would be comparable to or less than those identified for the construction phase. Accordingly, given the construction phase assessments concluded a "negligible adverse effect" for the identified receptors, it is anticipated that the same would be valid for the decommissioning phase regardless of the final decommissioning methodologies.

12.8 Potential Cumulative Effects

211. The approach to cumulative effect assessment (CEA) is set out in **Chapter 6: EIA Methodology**. Only projects which are reasonably well described and sufficiently advanced to provide information on which to base a meaningful and robust assessment have been included in the CEA. Projects which are sufficiently implemented during the site characterisation for the Onshore Project have been considered as part of the baseline for the EIA. Where possible the Applicant has sought to agree with stakeholders the use of as-built project parameter information (if available) as opposed to consented parameters to reduce over-precaution in the

cumulative assessment. The scope of the CEA was therefore be established on a topic-by-topic basis with the relevant consultees.

212. The cumulative effect assessment for ground conditions and contamination was undertaken in two stages. The first stage was to consider the potential for the effects assessed as part of the project to lead to cumulative effects in conjunction with other projects. The first stage of the assessment is detailed in **Table 12.17**.

213. Only potential impacts assessed in **Section 12.5, Section 12.6** and **Section 12.7** as negligible or above are included in the CEA (i.e. those assessed as 'no impact' are not taken forward as there is no potential for them to contribute to a cumulative effect).

Table 12.17 Potential cumulative effects considered for ground conditions and contamination

Impact	Potential for cumulative effect	Rationale
Construction		
Impact 1: Exposure of construction workers, maintenance workers, neighbouring site users and future site users to contaminated soils and groundwater and associated health impacts.	Yes	The residual effects to construction workers would be confined to the Onshore Project. Effects on landowners, land users and neighbouring land users may be exacerbated by other projects.
Impact 2: Direct impacts on groundwater quality and groundwater resources.	Yes	Residual effects on Secondary Aquifers may be exacerbated by other projects which are located within the same aquifer.
Impact 3: Impacts on surface water quality and the ecological habitats they support from contamination.	Yes	Residual effects on surface water and the ecological habitats they support may be exacerbated by other projects that are located within the same river catchment.
Impact 4: Built Environment.	Yes	Residual effects on the built environment may be exacerbated by other projects if located near to the same structures.
Impact 5: Impacts on Agricultural Land.	Yes	Residual effects on agricultural land may be exacerbated by other projects.

Impact	Potential for cumulative effect	Rationale
Operation		
Impact 6: Exposure of maintenance workers and future site users not involved with the project to contaminated soils and groundwater and associated health impacts.	Yes	The residual effects to maintenance workers would be confined to the Onshore Project Area. Residual effects on landowners, land users and neighbouring land users may be exacerbated by other projects.
Impact 7: Impact on Controlled Waters (groundwater and surface waters).	Yes	Residual effects on Secondary Aquifers may be exacerbated by other projects which are located within the same aquifer.
Impact 8: Impacts on Built Environment.	Yes	Residual effects on the built environment may be exacerbated by other projects if located near the same buildings.
Impact 9: Impacts on Agricultural Land.	Yes	Residual effects on agricultural land may be exacerbated by other projects if located near the same parcel of agricultural land.

214. The second stage of the CEA is to evaluate the projects considered for the CEA to determine whether a cumulative effect is likely to arise. The list of considered projects (identified in **Chapter 6: EIA Methodology**) and their anticipated potential for cumulative effects are summarised in **Table 12.18**.

Table 12.18 Projects considered in the cumulative effect assessment on ground conditions and contamination

Project	Status	Distance from Onshore Development Area (km)	Included in the CEA?	Rationale
White Cross Offshore Project	Consent application submitted	0.00	Yes	Overlap in spatial extent and timing of works.
Yelland Quay development (Transfer Station Yelland Barnstaple)	Appeal – Allowed	0.20	Yes	Proximity and overlap in timing of works.
Lower Yelland Farm, Yelland, Barnstaple	Approved	0.76	No	Not considered due to small size of development.

Project	Status	Distance from Onshore Development Area (km)	Included in the CEA?	Rationale
The Red Bunker Sandhills Instow, Bideford	Approved	0.00	No	Not considered due to small size of development.
Sandy Lane Farm Lane Over Swanpool Bridge	Approved	0.00	No	Not considered due to small size of development.
North Devon Cricket Club The Pavilion Sandhills Instow Bideford	Approved	0.07	No	Not considered due to small size of development.
The Stables South Hole Farm	Approved	0.00	No	Not considered due to small size of development.
Land at Yelland Road	Approved	0.60	Yes	Proximity and overlap in timing of works.
Orchard Lodges Lower Yelland Farm	Approved	0.00	Yes	Proximity and overlap in timing of works.
20 West Yelland Barnstaple	Pending	0.00	No	Not considered due to small size of development.
Yelland Quay West Yelland Devon	Pending	0.14	No	Not considered due to small size of development.
Saunton Heath Saunton	Pending	0.00	No	Not considered due to small size of development.
A T T U R M Instow Bideford Devon	Approved	0.12	No	Not considered due to small size of development.
Braunton Burrows Braunton	Approved	0.00	No	Not considered due to small size of development.
Long Overdune Lane to Saunton Sands Saunton	N/A	0.00	Yes	Proximity and overlap in timing of works.
Land at Barton Cross Instow Bideford Devon EX39 4JQ	Pending	0.24	No	Not considered due to small size of development.

Project	Status	Distance from Onshore Development Area (km)	Included in the CEA?	Rationale
Sandy Lane dwelling	Approved	0.00	No	Not considered due to small size of development.
Yelland Sewage Works, Yelland, Barnstaple, EX31 3HB	Approved	0.13	No	Not considered due to small size of development.

215. It is noted that the first project listed is the Section 36 consent application for the offshore elements of the White Cross OWF which are a separate element to the onshore Town and Country Planning Application for which this ES is prepared. The specific combined project elements are assessed cumulatively first and then cumulatively with all other projects.

12.8.1 Cumulative Impact 1: Exposure of construction workers, maintenance workers, neighbouring site users and future site users to contaminated soils and groundwater and associated health impacts

216. Following the proposed mitigation outlined in **Section 12.5.1**, the residual effect for the Onshore Project in relation to risks to human health from contaminated soils is assessed as minor adverse significance.

217. There is potential for direct cumulative effects with construction works overlapping the Onshore Development Area.

12.8.1.1 Significance of effect

218. It is assumed that the mitigation measures applicable to the Onshore Project would also be applied to other overlapping construction works and that any alterations to ground conditions would be highly localised, therefore the significance of effect in relation to potential for cumulative effects is considered **minor adverse**.

12.8.1.2 Further Mitigation

219. The cumulative effects are not considered to be greater than the minor adverse significance of effect for the Onshore Project alone. Therefore, this is considered **not significant** in EIA terms and so no further mitigation measures would be required.

12.8.2 Cumulative Impact 2: Direct impacts on groundwater quality and groundwater resources

220. The potential cumulative effects to superficial aquifers are likely to occur as a result of accidental spillages of fuels or chemicals during construction and mobilisation of existing contamination (if present). Given the proximity of the other developments to the Onshore Project there is the potential for multiple projects to be present in the same aquifer.

12.8.2.1 Significance of effect

221. It is assumed that the mitigation measures applicable to the Onshore Project would also be applied to other overlapping construction works, therefore the significance of effect in relation to potential for cumulative effects is considered **minor adverse**.

12.8.2.2 Further Mitigation

222. The cumulative effects are not considered to be greater than the minor adverse significance of effect for the Onshore Project alone. Therefore, this is considered **not significant** in EIA terms and so no further mitigation measures would be required.

12.8.3 Cumulative Impact 3: Impacts on surface water quality and the ecological habitats they support from contamination

223. Direct cumulative effects on surface waters could potentially to occur if there are spatial or temporal overlaps between the Onshore Project and other construction works. The cumulative direct effects to surface waters from accidental discharge would be likely to occur as a result of accidental spillages of fuel or chemicals, as well as mobilisation of existing contamination via large scale excavations (and piling if required) during construction and/or operation.

12.8.3.1 Significance of effect

224. It is assumed that the mitigation measures applicable to the Onshore Project would also be applied to other overlapping construction works, therefore the significance of effect in relation to potential for cumulative effects is considered **minor adverse**.

12.8.3.2 Further Mitigation

225. The cumulative effects are not considered to be greater than the minor adverse significance of effect for the Onshore Project alone. Therefore, this is considered **not significant** in EIA terms and so no further mitigation measures would be required.

12.8.4 Cumulative Impact 4: Impacts on built environment

226. Considering that any alteration to ground conditions would be highly localised it is considered that no cumulative effects are likely to occur during construction or operational phases.

12.8.4.1 Significance of effect

227. It is assumed that the mitigation measures applicable to the Onshore Project would also be applied to other overlapping construction works, therefore the significance of effect in relation to potential for cumulative effects is considered to remain **minor adverse**.

12.8.4.2 Further Mitigation

228. The cumulative effects are not considered to be greater than the minor adverse significance of effect for the Onshore Project alone. Therefore, this is considered **not significant** in EIA terms and so no further mitigation measures would be required.

12.8.5 Cumulative Impact 5: Impacts on agricultural land

229. Considering that any alteration to ground conditions would be highly localised it is considered that no cumulative effects are likely to occur during construction or operational phases.

12.8.5.1 Significance of effect

230. It is assumed that the mitigation measures applicable to the Onshore Project would also be applied to other overlapping construction works, therefore the significance of effect in relation to potential for cumulative effects is considered to remain **minor adverse**.

12.8.5.2 Further Mitigation

231. The cumulative effects are not considered to be greater than the minor adverse significance of effect for the Onshore Project alone. Therefore, this is considered **not significant** in EIA terms and so no further mitigation measures would be required.

12.8.6 Cumulative Impact 6: Exposure of maintenance workers and future site users to contaminated soils and groundwater and associated health impacts

232. There is potential for direct cumulative effects where other developments overlap the Onshore Development Area.

12.8.6.1 Significance of effect

233. It is assumed that the mitigation measures applicable to the Onshore Project would also be applied to other overlapping developments and that any alterations to ground conditions would be highly localised, therefore the significance of effect in relation to potential for cumulative effects is considered **minor adverse**.

12.8.6.2 Further Mitigation

234. The cumulative effects are not considered to be greater than the minor adverse significance of effect for the Onshore Project alone. Therefore, this is considered **not significant** in EIA terms and so no further mitigation measures would be required.

12.8.7 Cumulative Impact 7: Impact on Controlled Waters (groundwater and surface waters)

235. Potential cumulative effects to superficial aquifers are likely to occur as a result of accidental spillages of fuels or chemicals during maintenance works. Given the proximity of the other developments to the Onshore Project there is the potential for multiple projects to be present in the same aquifer.

12.8.7.1 Significance of effect

236. It is assumed that the mitigation measures applicable to the Onshore Project would also be applied to other overlapping developments, therefore the significance of effect in relation to potential for cumulative effects is considered **minor adverse**.

12.8.7.2 Further Mitigation

237. The cumulative effects are not considered to be greater than the minor adverse significance of effect for the Onshore Project alone. Therefore, this is considered **not significant** in EIA terms and so no further mitigation measures would be required.

12.8.8 Cumulative Impact 8: Impacts on built environment

238. Considering that any alteration to ground conditions would be highly localised it is considered that no cumulative effects are likely to occur during the operational phase.

12.8.8.1 Significance of effect

239. It is assumed that the mitigation measures applicable to the Onshore Project would also be applied to other overlapping developments, therefore the significance of effect in relation to potential for cumulative effects is considered to remain **minor adverse**.

12.8.8.2 Further Mitigation

240. The cumulative effects are not considered to be greater than the minor adverse significance of effect for the Onshore Project alone. Therefore, this is considered **not significant** in EIA terms and so no further mitigation measures would be required.

12.8.9 Cumulative Impact 9: Impacts on agricultural land

241. Considering that any alteration to ground conditions would be highly localised it is considered that no cumulative effects are likely to occur during operational phase.

12.8.9.1 Significance of effect

242. It is assumed that the mitigation measures applicable to the Onshore Project would also be applied to other overlapping developments, therefore the significance of effect in relation to potential for cumulative effects is considered to remain **minor adverse**.

12.8.9.2 Further Mitigation

243. The cumulative effects are not considered to be greater than the minor adverse significance of effect for the Onshore Project alone. Therefore, this is considered **not significant** in EIA terms and so no further mitigation measures would be required.

12.9 Potential Transboundary Impacts

244. The Scoping Report identified that there was no potential for significant transboundary effects regarding ground conditions and contamination from the Onshore Project upon the interests of other EEA States and this is not discussed further.

12.10 Inter-relationships

245. Inter-relationship impacts are covered as part of the assessment and consider impacts from the construction, operation or decommissioning of the Onshore Project on the same receptor (or group). A description of the process to identify and assess these effects is presented in **Chapter 6: EIA Methodology**. The potential inter-relationship effects that could arise in relation to ground conditions and contamination include both:

- **Project lifetime effects:** Effects arising throughout more than one phase of the Onshore Project (construction, operation, and decommissioning) to interact to potentially create a more significant effect on a receptor than if just one phase were assessed in isolation
- **Receptor led effects:** Assessment of the scope for all relevant effects to interact, spatially and temporally, to create inter-related effects on a receptor (or group). Receptor-led effects might be short term, temporary or transient effects, or incorporate longer term effects.

246. **Table 12.19** serves as a sign-posting for inter-relationships.

Table 12.19 Ground conditions and contamination inter-relationships

Topic and description	Related chapter	Where addressed in this Chapter	Rationale
Impact 1: Exposure of construction workers, maintenance workers, neighbouring site users and future site users to contaminated soils and groundwater and associated health impacts.	N/A	**Section12.5.1**	No additional inter-related impacts to human health have been identified for these receptors during construction which would increase the standalone assessment from minor adverse (and not significant in EIA terms).
Impact 2: Direct impacts on groundwater quality and groundwater resources.	**Chapter 14: Water Resources and Flood Risk**	**Section 12.5.2**	Any project-related changes to Ground Conditions and Contaminated Land (both physically and chemically) during construction could impact on the quantity and quality of groundwater

Topic and description	Related chapter	Where addressed in this Chapter	Rationale
			resources and hydrologically connected surface water receptors.
Impact 3: Impacts on surface water quality and the ecological habitats they support from contamination.	**Chapter 10: Benthic and Intertidal Ecology** **Chapter 16: Onshore Ecology and Ornithology**	**Section 12.5.3**	Potential changes to the quantity and quality of groundwater resources and any hydrologically connected surface water during construction could impact upon water dependent biological features, inclusive of designated sites.
Impact 4: Built Environment.	N/A	**Section 12.5.4**	No additional inter-related impacts on the existing built environment have been identified.
Impact 5: Impacts on Agricultural Land.	**Chapter 15: Land Use**	**Section 12.5.5**	Potential contamination of agricultural land during the construction phase could impact on the ALC grade and productivity of agricultural land.
Impact 6: Exposure of maintenance workers and future site users not involved with the project to contaminated soils and groundwater and associated health impacts.	N/A	**Section 12.6.1**	No additional inter-related impacts on human health have been identified for these receptors during operation which would increase the standalone assessment from minor adverse (and not significant in EIA terms).
Impact 7: Impact on Controlled Waters (groundwater and surface waters).	**Chapter 14: Water Resources and Flood Risk** **Chapter 16: Onshore Ecology and Ornithology**	**Section 12.6.2**	Potential changes to the quality of groundwater or hydraulically connected surface water bodies have the potential to also impact on water dependent biological features. However, no additional inter-related impacts on controlled waters have been identified.

Topic and description	Related chapter	Where addressed in this Chapter	Rationale
Impact 8: Impacts on Built Environment.	N/A	**Section 12.6.3**	No additional inter-related impacts on the built environment have been identified.
Impact 9: Impacts on Agricultural Land.	**Chapter 15: Land Use**	**Section 12.6.4**	Potential contamination of agricultural land during the operational phase could impact on the ALC grade and productivity of agricultural land.

12.11 Interactions

247. The impacts identified and assessed in this chapter have the potential to interact with each other, which could give rise to synergistic impacts as a result of that interaction. The areas of interaction between impacts are presented in **Table 12.20** and **Table 12.21**, along with an indication as to whether the interaction may give rise to synergistic impacts. This provides a screening tool for which impacts have the potential to interact.

248. **Table 12.22** then provides an assessment for each receptor (or receptor group) related to these impacts in two ways. Firstly, the impacts are considered within a development phase (i.e. construction, operation, maintenance or decommissioning) to see if, for example, multiple construction impacts could combine. Secondly, a lifetime assessment is undertaken which considers the potential for impacts to affect receptors across development phases. The significance of each individual impact is determined by the sensitivity of the receptor and the magnitude of effect; the sensitivity is constant whereas the magnitude may differ. Therefore, when considering the potential for impacts to be additive it is the magnitude of effect which is important – the magnitudes of the different effects are combined upon the same sensitivity receptor.

Table 12.20 Interaction between impacts during construction

Potential impact Construction	Impact 1: Exposure to contaminated soils (human health).	Impact 2: Impacts on groundwater.	Impact 3: Impacts on surface waters	Impact 4: Impacts on Built Environment	Impact 5: Impacts on agricultural land
Impact 1: Exposure to contaminated soils (human health).		No	No	No	No
Impact 2: Impacts on groundwater.	No		No	No	No
Impact 3: Impacts on surface waters	No	No		No	No
Impact 4: Impacts on Built Environment	No	No	No		No
Impact 5: Impact 5: Impacts on agricultural land	No	No	No	No	

Table 12.21 Interaction between impacts during operation and maintenance

Potential impact Operation and maintenance	Impact 6: Exposure to contaminated soils (human health).	Impact 7: Impact on groundwater and surface water.	Impact 8: Impact on built environment.	Impact 9: Impact on agricultural land.
Impact 6: Exposure to contaminated soils (human health).		No	No	No
Impact 7: Impact on groundwater and surface water.	No		No	No
Impact 8: Impact on built environment.	No	No		No
Impact 9: Impact on agricultural land.	No	No	No	

Table 12.22 Potential interactions between impacts on ground conditions and contamination

Highest level significance					
Receptor	**Construction**	**Operation and Maintenance**	**Decommissioning**	**Phase Assessment**	**Lifetime Assessment**
Human Health	Minor Adverse	Minor Adverse	Minor Adverse	**No greater than individually assessed impact**. The potential impacts to human health are assessed as minor adverse on receptors deemed to be of high sensitivity, with the most sensitive receptors deidentified as construction workers. Impacts to human health during construction, operation and decommissioning phases will be managed through standard and best practice methodologies. Given the proposed mitigation measures, and the minor adverse significance, it is considered that there would either by no interactions between impacts during each phase or that interactions would be no greater than when assessed individually.	**No greater than individually assessed impact**. The impacts to human health are considered a potential risk during the construction, operation and decommissioning phases. Risks associated with the Onshore Project will be managed through best practice and adoption of appropriate mitigation measures discussed within this chapter. Therefore, no lifetime effects for receptors are anticipated.
Groundwater	Minor Adverse	Minor Adverse	Minor Adverse	**No greater than individually assessed impact**. The impacts to groundwater are assessed as minor adverse significance on receptors of low to high sensitivity. Impacts to groundwater during construction, operation and decommissioning phases will be managed through standard and best practice methodologies. Given the proposed mitigation measures, and the minor adverse significance of effect, it is considered that there would either be no interactions during each of the	**No greater than individually assessed impact**. The impacts to groundwater quality in the superficial aquifers during earthworks are only considered a potential risk during the construction and decommissioning phases. It is considered unlikely that earthwork activities would be required during the operational phase of the Onshore Project. If earthworks are required during the operational phase, they are

Highest level significance					
				phases, or that interactions would be no greater than individually assessed.	anticipated to be managed in line with best practice with appropriate risk assessments conducted and submitted to the relevant agency. The impacts to groundwater quality in the bedrock aquifers, and by extension SPZs, during trenchless crossing activities or piling (if required) are only considered a potential risk during the construction and decommissioning phases. Risks associated with the decommissioning phase are associated with the complete or partial removal of piles (if present) associated with the Onshore Substation. If these works are required, they are anticipated to be managed in line with best practice with appropriate risk assessments conducted and submitted to the relevant agency. Therefore, no lifetime effects for receptors are anticipated.

Highest level significance					
Surface Water	Minor Adverse	Minor Adverse	Minor Adverse	**No greater than individually assessed impact**. The impacts to surface waters are assessed as minor adverse significance on receptors of high sensitivity. Impacts to surface waters during construction, operation and decommissioning phases will be managed through standard and best practice methodologies. Given the proposed mitigation measures and minor adverse significance, it is considered that there would either be no interactions between impacts during each of the phases or that interactions would be no greater than when individually assessed.	**No greater than individually assessed impact**. The impacts to surface water quality from contamination of groundwater are only considered a potential risk during the construction and decommissioning phases. Risks associated with the operational phase of the Onshore Project will be managed through best practice. Therefore, no lifetime effects are anticipated for surface water receptors.
Built Environment	Minor Adverse	Minor Adverse	Minor Adverse	**No greater than individually assessed impact**. The impacts to the built environment are assessed as minor adverse on receptors of medium sensitivity. Impacts to the built environment during construction, operation and decommissioning phases will be managed through standard and best practice methodologies. Given the proposed mitigation measures and minor adverse significance, it is considered that there would either be no interactions between impacts during each of the phases or that interactions would be no greater than when individually assessed.	**No greater than individually assessed impact** The impacts to the built environment are considered a potential risk during the construction, operation and decommissioning phases. Risks associated with each of the phases of the Onshore Project will be managed through best practice and adoption of appropriate mitigation measures discussed within this chapter. Therefore, no lifetime effects for receptors are anticipated.

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

12.12 Summary

249. This chapter has investigated the potential effects on ground conditions and contamination arising from the Onshore Project. The range of potential impacts and associated effects considered has been informed by the Scoping Opinion and consultation, as well as reference to existing policy and guidance. The impacts considered include those brought about directly as well as indirectly.

250. The assessment has established that the receptors relating to ground conditions and contamination could be impacted as a result of direct disturbance and mobilisation of existing contamination, introduction of new sources of contamination and sterilisation of mineral resources during each of the phases of the Onshore Project. The residual effects on the receptors following implementation of mitigation measures are however, considered not to be significant in EIA terms.

251. **Table 12.23** presents a summary of the impacts assessed within this ES chapter, any commitments made, and mitigation required and the residual effects.

252. The assessment of cumulative effects from the Onshore Project and other developments and activities concluded that the significance of effect would be no greater than those identified for the Onshore Project alone and further mitigation would not be required.

Table 12.23 Summary of potential impacts for ground conditions and contamination during construction, operation, maintenance and decommissioning of the Onshore Project

Potential impact Construction	Receptor	Sensitivity	Magnitude	Significance	Potential mitigation measure	Residual effects
Impact 1: Exposure of construction workers, maintenance workers, neighbouring site users and future site users to contaminated soils and groundwater and associated health impacts.	Human Health	High	High (from potential ground gases and vapours) Low (from potential sources of contamination other than ground gas)	**Major Adverse** (from potential ground gases and vapours) **Moderate Adverse** (from potential sources of contamination other than ground gas)	A pre-construction targeted ground investigation would be undertaken in areas identified as potential sources of contamination in order to assess site characteristics. This would then allow for the assessment of contaminated areas and appropriate remediation strategies to be produced should the identified contamination be deemed to represent an unacceptable risk to human health. The use of materials with a similar porosity in the backfilling of excavations for cable installation would mitigate the ground gas/vapour risks associated with creating preferential pathways. The implementation of a CoCP will help reduce the potential effects on human health receptors. The CoCP would include strategies for dealing with unexpected contamination if encountered during construction. Adoption of a CL:AIRE Industry Code of Practice to manage the re-use and disposal of excavated soils on site would also be incorporated as an additional mitigation measure protective of human health.	**Minor Adverse** (from all sources)
Impact 2: Direct impacts on groundwater quality and groundwater resources.	Secondary A and Secondary Undifferentiated Aquifers.	High	Low	**Moderate Adverse**	A pre-construction targeted ground investigation would be undertaken in areas identified as potential sources of contamination in order to assess site characteristics. This would then allow for the identification of contaminated areas and appropriate remediation strategies to be produced and implemented if necessary. Additional mitigation measures including a hydrogeological risk assessment and a piling risk assessment would be undertaken and the recommendations implemented in order to reduce the potential risks. A CoCP would also be developed which would include specific measures relevant to the storage of fuels, oils, lubricants, wastewater and other chemicals during the works.	**Minor Adverse**
Impact 3: Impacts on surface water quality and the ecological habitats they support.	Controlled waters	High	Medium	**Major Adverse**	A pre-construction targeted ground investigation would be undertaken in areas identified as potential sources of contamination in order to assess the site characteristics. This would then allow for the identification of contaminated areas and appropriate remediation strategies to be produced and implemented. A CoCP would also be produced outlining measures such as correct storage of fuels, oils and chemicals to further reduce the risk. Contaminated wastewater within Made Ground or groundwater from dewatering activities in areas of contamination shall be collected within a tank or lagoon prior to appropriate treating or discharge.	**Minor Adverse**
Impact 4: Impacts on Built Environment.	Buildings and utilities	Medium	Medium	**Moderate Adverse**	Reduction of construction activities in proximity to existing buildings; targeted pre-construction ground investigations in areas of potential sources of contamination.	**Minor Adverse**
Impact 5: Impacts on agricultural land.	Agricultural land	High	Low	**Moderate Adverse**	Targeted pre-construction ground investigations in areas of potential sources of contamination and implementation of a CoCP.	**Minor Adverse**

Potential impact	Receptor	Sensitivity	Magnitude	Significance	Potential mitigation measure	Residual effects
Operation and Maintenance						
Impact 6: Exposure of maintenance workers and future site users not involved with the project to contaminated soils and groundwater and associated health impacts.	Human Health	High	Negligible	**Minor Adverse**	A programme of remedial works would be undertaken if areas of contamination are identified on site that are deemed to present an unacceptable risk to human health. Maintenance workers that are required to undertake ground excavations or work within enclosed spaces during the operational phase of the Onshore Project would be provided with information regarding the nature of the ground conditions within each area so that appropriate risk assessments and method statements can be produced and implemented.	**Minor Adverse**
Impact 7: Impact on Controlled Waters (groundwater and surface waters).	Controlled Waters	High	Low	**Moderate Adverse**	Maintenance workers that are required to undertake ground excavations or maintenance works during the operational phase of the Onshore Project would be provided with information regarding the nature of the ground conditions within each area so that they can develop and implement site and task specific risk assessments and method statements. At the Onshore Substation, all fuels, oils, lubricants and other chemicals will be stored in suitable, impermeable bunded containers with sufficient excess capacity to prevent overfilling. Spill kits will be available at all times and an ERP will be developed which outlines mitigation measures to be undertaken in the event of an uncontrolled release of hazardous materials.	**Minor Adverse**
Impact 8: Impacts on Built Environment.	Buildings and utilities	Medium	Medium	**Moderate Adverse**	Design of built elements in accordance with BRE Special Digest 1; incorporation of ground gas protection measures (if required); clean or lined service corridors.	**Minor Adverse**
Impact 9: Impacts on agricultural land.	Agricultural Land	High	Low	**Moderate Adverse**	Implementation of task and site specific risk assessment prior to commencement of maintenance works to protect controlled waters; storage of fuels, oils, lubricants and other chemicals in an impermeable bund with at least 110% storage capacity; development of a ERP within the CoCP.	**Minor Adverse**
Decommissioning						
No decision has been made regarding the final decommissioning policies for the Onshore Project as it is recognised that industry best practice, rules and legislation change over time. The detail and scope of decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and will be agreed with the regulator with a Decommissioning Programme provided. It is considered likely that the impacts associated with the decommissioning phase would be no greater than those identified for the construction phase.						
Cumulative						
Cumulative Impact 1: Exposure of construction workers, maintenance workers, neighbouring site users and future site users to contaminated soils and groundwater and associated health impacts.	Human Health	High	Negligible	**Minor Adverse**	The cumulative effects are not considered to be greater than the minor adverse significance of effect for the Onshore Project alone. Therefore, this is considered not significant in EIA terms and so no further mitigation measures would be required.	**Minor Adverse**
Cumulative Impact 2: Direct impacts on groundwater quality and groundwater resources.	Controlled Waters	High	Negligible	**Minor Adverse**	The cumulative effects are not considered to be greater than the minor adverse significance of effect for the Onshore Project alone. Therefore, this is considered not significant in EIA terms and so no further mitigation measures would be required.	**Minor Adverse**
Cumulative Impact 3: Impacts on surface water quality and the ecological habitats they support from contamination.	Controlled Waters	High	Negligible	**Minor Adverse**	The cumulative effects are not considered to be greater than the minor adverse significance of effect for the Onshore Project alone. Therefore, this is considered not significant in EIA terms and so no further mitigation measures would be required.	**Minor Adverse**

Potential impact	Receptor	Sensitivity	Magnitude	Significance	Potential mitigation measure	Residual effects
Cumulative Impact 4: Impacts on built environment.	Built Environment	Medium	Negligible	**Minor Adverse**	The cumulative effects are not considered to be greater than the minor adverse significance of effect for the Onshore Project alone. Therefore, this is considered not significant in EIA terms and so no further mitigation measures would be required.	**Minor Adverse**
Cumulative Impact 5: Impacts on agricultural land.	Agricultural Land	High	Negligible	**Minor Adverse**	The cumulative effects are not considered to be greater than the minor adverse significance of effect for the Onshore Project alone. Therefore, this is considered not significant in EIA terms and so no further mitigation measures would be required.	**Minor Adverse**

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WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Appendix 12.A: Geo-Environmental Desk Top Study and Preliminary Risk Assessment

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Annexes

Glossary of Acronyms

Acronym	Definition
AONB	Area of Outstanding Natural Beauty
BGS	British Geological Society
CDM	Construction Design and Management
CIRIA	Construction Industry Research and Information Association
CoCP	Code of Construction Practice
COMAH	Control of Major Accident Hazard Sites
CSM	Conceptual Site Model
Defra	Department for Environment, Food and Rural Affairs
DIO	Defence Infrastructure Organisation
DTS	Desk Top Study
EA	Environment Agency
GIS	Geographical Information System
GQRA	Generic Quantitative Risk Assessment
km	Kilometre
LNR	Local Nature Reserve
LPA	Local Planning Authority
m	Metre
MAGiC	Multi-Agency Government Information for the Countryside
MLWS	Mean Low Water Springs
MNR	Marine Nature Reserve
MW	Megawatts
NIHHS	Notification of Installations Handling Hazardous Substances
NNR	National Nature Reserve
NVZ	Nitrate Vulnerable Zone
OS	Ordnance Survey
WCOWL	White Cross Offshore Windfarm Limited
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated biphenyl
PCL	Pollutant contaminant linkage
PFAS	Perfluoroalkyl and polyfluoroalkyl substances
PPE	Personal Protective Equipment
PRA	Preliminary Risk Assessment
SAC	Special Area of Conservation
SPA	Special Protection Area
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
UXB	Unexploded Bomb
UXO	Unexploded Ordnance
WFD	Water Framework Directive

Glossary of Terminology

Defined Terms	Description
Applicant	White Cross Offshore Windfarm Limited.
Development Area	The area comprising the Onshore Development Area and the Offshore Development Area.
Export Cable Corridor	The area in which the export cables will be laid, either from the Offshore Substation or the inter-array cable junction box (if no offshore substation), to the NG Onshore Substation comprising both the Offshore Export Cable Corridor and Onshore Export Cable Corridor.
Jointing bay	Underground structures constructed at regular intervals along the Onshore Export Cable Corridor to join sections of cable and facilitate installation of the cables into the buried ducts
Landfall to MLWS	Where the offshore export cables come ashore.
Link boxes	Underground chambers or above ground cabinets next to the cable trench housing electrical earthing links.
White Cross Offshore Windfarm	Up to 100MW capacity offshore windfarm including associated onshore and offshore infrastructure.
Onshore Development Area	The onshore area above MLWS including the underground onshore export cables connecting to the White Cross Onshore Substation and onward to the NG grid connection point at East Yelland. The onshore development area will form part of a separate Planning application to the Local Planning Authority (LPA) under the Town and Country Planning Act 1990.
Onshore Export Cables	The cables which bring electricity from MLWS at the Landfall to the White Cross Onshore Substation and onward to the NG grid connection point at East Yelland.
Onshore Export Cable Corridor	The proposed onshore area in which the export cables will be laid, from MLWS at the Landfall to the White Cross Onshore Substation and onward to the NG grid connection point at East Yelland.
Onshore infrastructure	The combined name for all infrastructure associated with the Project from MLWS at the Landfall to the NG grid connection point at East Yelland. The onshore infrastructure will form part of a separate planning application to the Local Planning Authority (LPA) under the Town and Country Planning Act 1990
White Cross Onshore Substation	A new substation built specifically for the White Cross project. It is required to ensure electrical power produced by the offshore windfarm is compliant with NG electrical requirements at the grid connection point at East Yelland.
Transition bay	Underground structures at the Landfall that house the joints between the offshore export cables and the onshore export cables.

12. Geo-Environmental Desk Top Study and Preliminary Risk Assessment Introduction

12.1 Introduction

1. Royal HaskoningDHV has been commissioned by White Cross Offshore Windfarm Ltd. (WCOWL) to carry out a Land Quality Desk Top Study (DTS) and Preliminary Risk Assessment (PRA) Report in support of an Environmental Impact Assessment for the White Cross Offshore Windfarm Project (herein referred to as 'the Onshore Project'). Specifically, this report considers the Onshore Export Cable Corridor and Onshore Substation area, comprising the area landward of Mean High-Water Springs during its construction, operation and maintenance, and decommissioning phases. This report has been prepared by Royal HaskoningDHV for the sole benefit of WCOWL.

12.1.1 Objectives

2. The overall objectives of the PRA are as follows:

   - Provide information on the current conditions of the Onshore Export Cable Corridor with respect to land contamination
   - Provide an initial Conceptual Site Model (CSM) to identify and assess potential contaminant linkages associated with the Onshore Export Cable Corridor and the surrounding area
   - Provide recommendations for further investigation and assessment if required, to quantify the potential risks and liabilities associated with the onshore export corridor.

12.1.2 Methodology

3. The PRA has been completed in general accordance with the Environment Agency (EA) 'Land Contamination: Risk Management Framework', 2021.

4. The PRA is a desk-based study and forms the initial step in the assessment of potentially contaminated land.

5. The main purpose of the PRA is to identify potential contamination sources along the Onshore Export Cable Corridor and assist WCOWL in identifying potential environmental liabilities that may be present which will have consequences for the Onshore Project.

6. The following desk-based information sources have been reviewed to inform the PRA:

- Envirocheck GIS database Information comprising historical maps, environmental sensitivity data and permitting records for a search area of up to 1km around the Onshore Export Cable Corridor boundary, obtained 21st July 2022
- British Geological Survey (BGS) Onshore GeoIndex web portal, accessed 21st April 2022
- BGS Geological Map for Bideford and Lundy, Solid and Drift (Sheet number 292 and parts of 275, 276, 291 and 308), 1977, 1:50,000;
- BGS Hydrogeological Map of England and Wales (Sheet number 1), 1977, 1:625,000
- Zetica UXO, Unexploded Bomb (UXB) Risk Map, accessed 21st April 2022;
- Google Earth, accessed 21st April 2022
- Multi-Agency Government Information for the Countryside (MAGiC) map application, accessed 21st April 2022
- Devon County Council Environment Viewer, accessed 21st April 2022
- Devon County Council, Devon Minerals Plan, 2017.

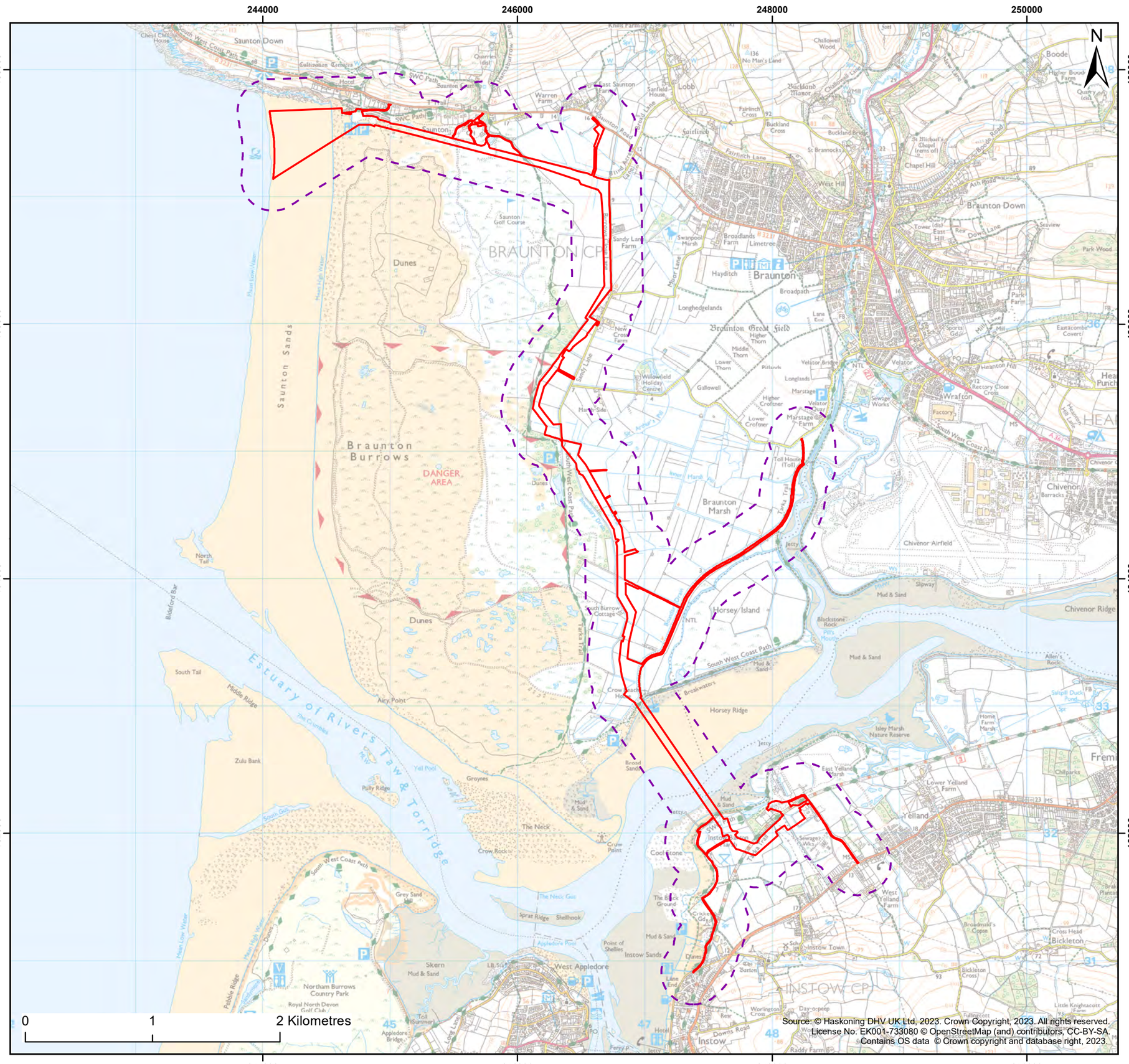
12.1.3 Limitations

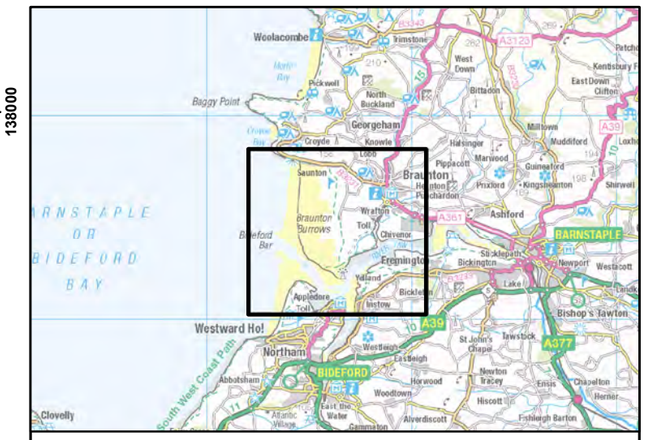
8. Limitations associated with this report are provided in **Annex A**.

12.1.4 Study Area

9. The site comprises a proposed Onshore Export Cable Corridor linking the designated landfall location of the Onshore Project at Saunton Sands, approximately 4.5km southwest of Braunton, Devon to Yelland Substation with an adjacent proposed Onshore Substation. The route is approximately 6.2km long. The Onshore Project Area is shown on **Figure 12.1**.

10. The study area is based on the Onshore Export Cable Corridor, Onshore Substation areas and Early Enabling Work Access areas with a further buffer of 250m for potential sources of contamination and receptors. A 250m buffer has been chosen as the potential risks associated with current and historic contamination sources at distances within 250m are likely to have greatest impact on on-site conditions with potential risk diminishing with distance. A further buffer zone of 1km from the Onshore Export Cable Corridor and Onshore Substation areas has been considered for risks posed by Control of Major Accident Hazard (COMAH) sites due to the high risk and for the risk posed to potable water abstraction sites due to their heightened sensitivity.





Legend:

- Onshore Development Area
- Onshore Development Area (250m Buffer)

Client: Offshore Wind Ltd.	Project: White Cross Offshore Windfarm

Title: Onshore Project Area

Figure: 12.1 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0612

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P01	09/06/2023	AB	DF	A3	1:30,000

Co-ordinate system: British National Grid

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12.1.5 Aerial imagery assessment

11. A review of available aerial imagery accessed from Google Earth on the 8th November 2022 has been completed to provide a description of the Onshore Export Cable Corridor.

12.1.5.1 Current surrounding land usage

12. The Onshore Export Cable Corridor makes landfall at the northern end of Saunton Sands beach before running east, crossing Saunton Sands Car Park and Saunton Golf Course, Saunton Sands, Saunton Golf Course and Braunton Burrows sand dunes are located to the south with Saunton Village located to the north. The corridor then runs south through arable and pastureland with the Defence Infrastructure Organisation (DIO) Braunton Burrows Training Area located to the west before reaching the River Taw estuary. The corridor crosses the estuary before running east to reach the onshore substation site.

12.2 Environmental Setting

12.2.1 Introduction

13. Regulatory authority information relevant to the site and its surroundings has been obtained from the undertaking of an environmental database search with the information summarised below. Distances stated are approximate and are taken from the boundary of the Onshore Export Cable Corridor and Onshore Substation to the database recorded entries.

14. The following summary is generally limited to locations within 250m of the Onshore Export Cable Corridor boundary unless it is considered that installations or activities beyond that range could potentially have an impact on or be affected by the development of the Onshore Project.

12.2.2 Pollution Control

15. The presence (or absence) of active pollution controls related to industrial processes at or within 250m of the Onshore Export Cable Corridor has been summarised in **Table 12.1** with further detail in **Table 12.2** and **Table 12.3**.

Table 12.1 Summary of Active Pollution Controls

Control Type	On Site	Off Site
Identified Contaminated Land Uses	Yes	Yes
Integrated Pollution Controls	No	No
Integrated Pollution Prevention Controls	No	No

Control Type	On Site	Off Site
Local Authority Integrated Pollution Prevention Controls	No	No
Local Authority Pollution Prevention Controls	No	No

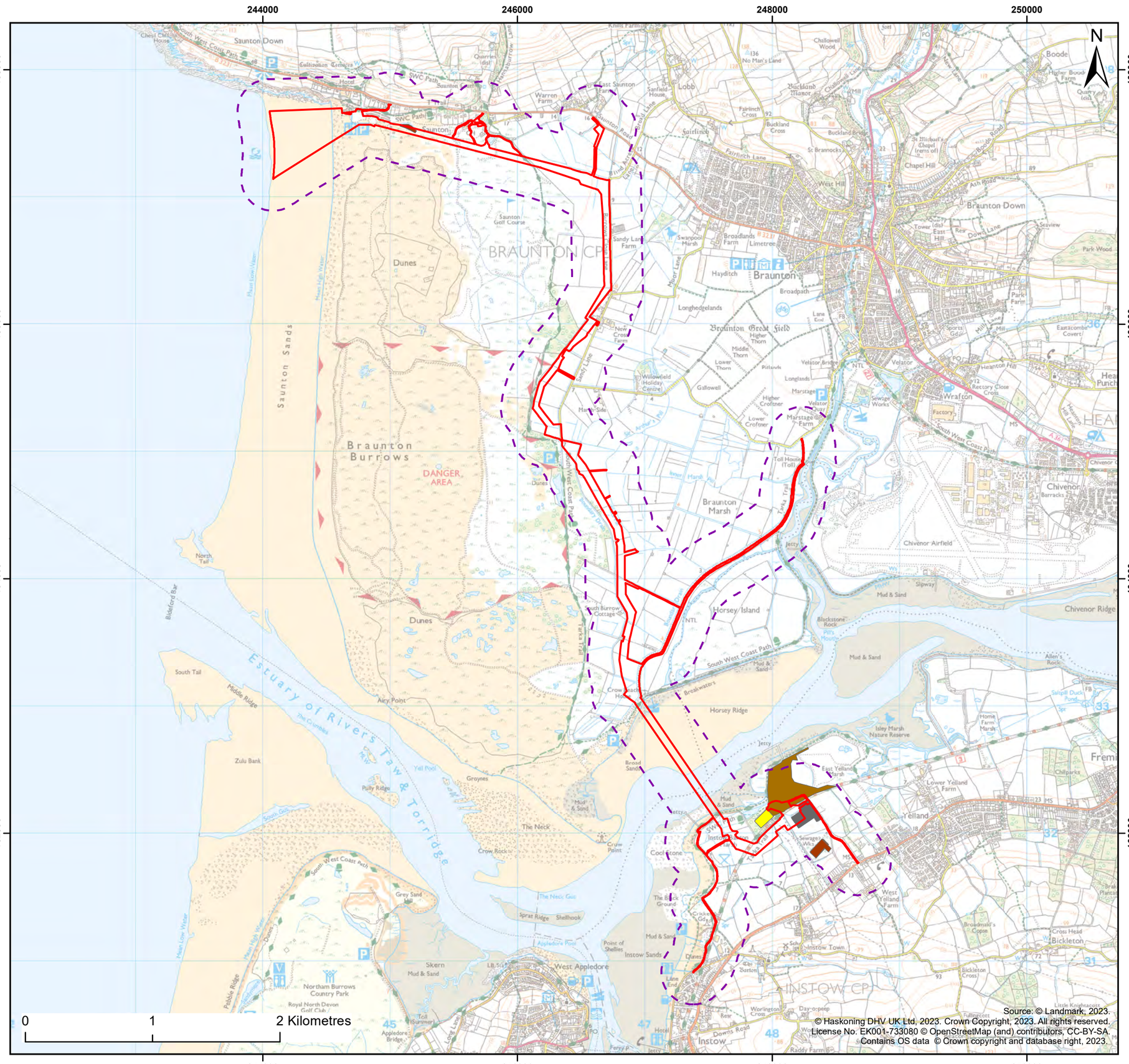
Table 12.2 Details of on site Active Pollution Controls

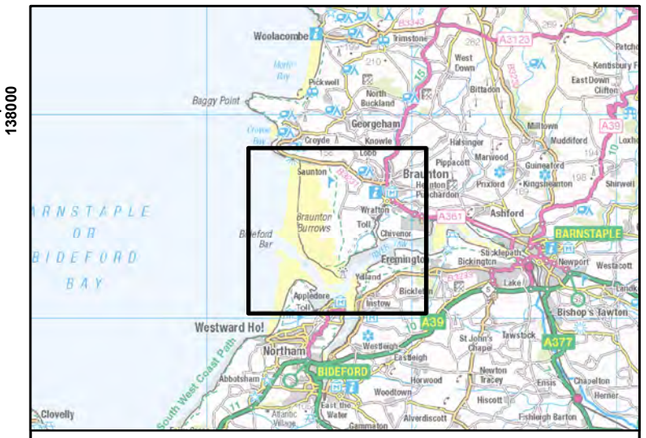
Control Type – on site	Name	Detail
Identified Contaminated Land Uses	Sewage site	Located in north of the Onshore Export Cable Corridor
	Factory or works – use not specified	Located in the south of the Onshore Export Cable Corridor, extends to the east
	Road Haulage site	Located in the south of the Onshore Export Cable Corridor

Table 12.3 Details of off site Active Pollution Controls

Control Type – off site	Name	Distance (direction)
Identified Contaminated Land Uses	Sewage site	70m (southeast)

16. Identified potential contaminated land uses are shown on **Figure 12.2**.





Legend:

- Onshore Development Area
- Onshore Development Area (250m Buffer)

Contaminated Land Use

- Electricity production & distribution [inc large transformers]
- Factory or works - use not specified
- Road haulage
- Sewage

Client: Offshore Wind Ltd.	Project: White Cross Offshore Windfarm

Title: Identified Potential Contaminated Land Uses

Figure: 12.2	Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0707

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P01	18/07/2023	ND	DF	A3	1:30,000

Co-ordinate system: British National Grid

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12.2.3 Waste

17. The presence (or absence) of waste facilities at or within 250m of the Onshore Export Cable Corridor has been summarised in **Table 12.4** with further detail in **Table 12.5** and **Table 12.6**.

Table 12.4 Summary of Waste Facilities

Facility Type	On Site	Off Site
BGS recorded Landfill Sites	Yes	Yes
Historical Landfills	Yes	Yes
Integrated Pollution Control Registered Waste Sites	No	No
Licensed Waste Management Facilities (Landfill Boundaries)	No	No
Licensed Waste Management Facilities (Locations)	Yes	No
Local Authority Recorded Landfill Sites	No	No
Registered Landfill Sites	No	No
Registered Waste Transfer Sites	Yes	No
Registered Waste Treatment or Disposal Sites	No	No

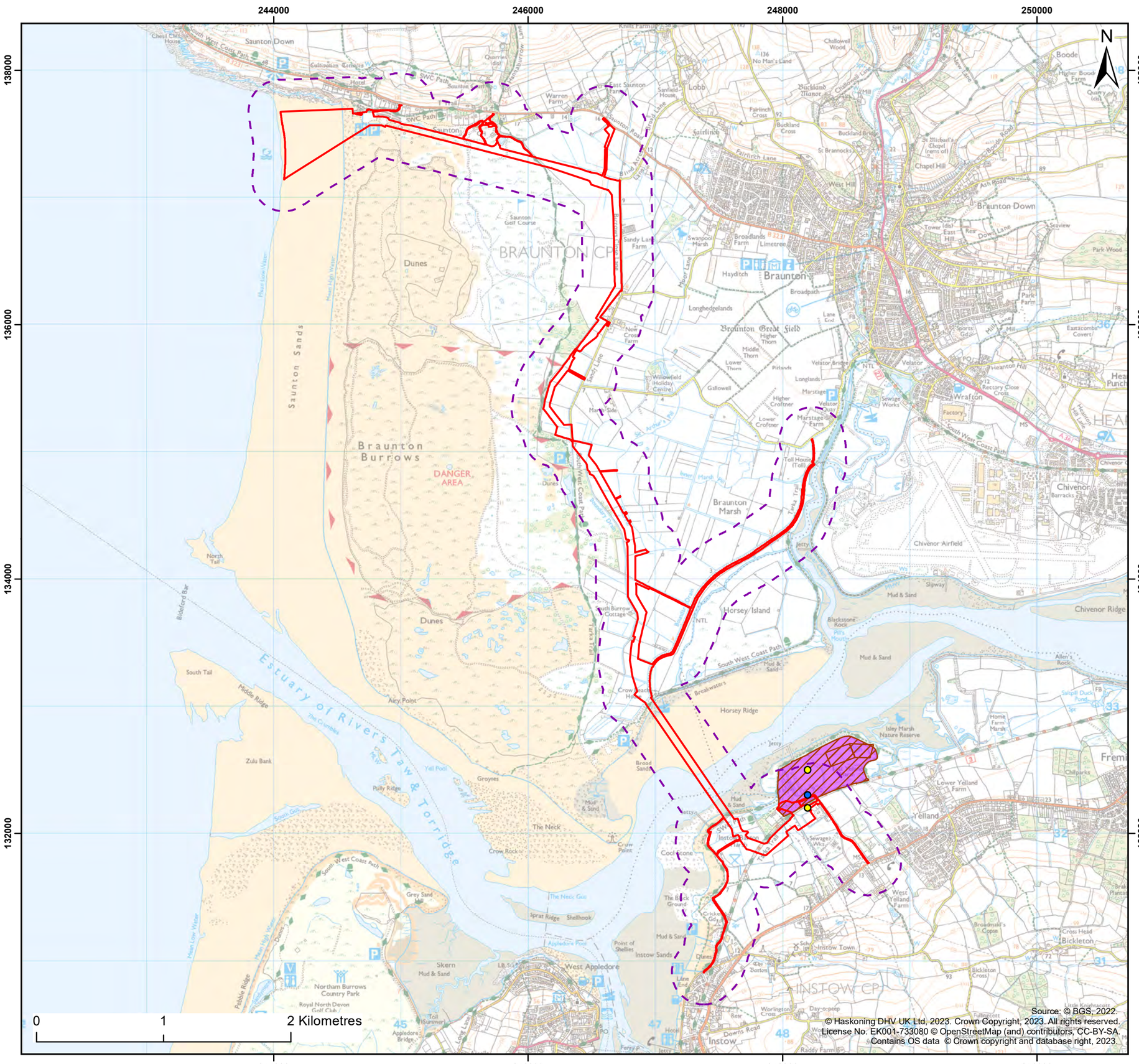
Table 12.5 Details of on site Waste Facilities

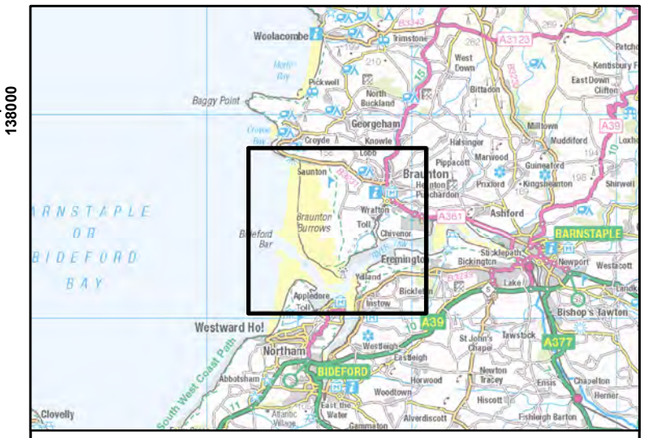
Facility Type – on site	Name	Detail
BGS recorded Landfill Site Historical Landfill	East Yelland Power Station, Barnstaple	Located at the southern end of the Onshore Export Cable Corridor. Reference: EAHLD32190. Type: Inert and industrial waste.
Licensed Waste Management Facility	Notts Contractors Ltd, Yelland Quay, Barnstaple	Located at the southern end of the Onshore Export Cable Corridor. Reference: 21728. Process: Household, commercial and industrial transfer stations.

Table 12.6 Details of off site Waste Facilities

Facility Type – off site	Name	Distance (Direction)	Detail
BGS recorded Landfill Site Historical Landfill	East Yelland Power Station, Barnstaple, Devon	Adjacent (southeast)	Reference: EAHLD32190. Type: Inert and industrial waste.
Registered Waste Transfer Site	Notts Contractors Ltd, Yelland Quay, Barnstaple	Adjacent (southeast)	Located at the southern end of the Onshore Export Cable Corridor. Reference: L/TS/N(125). Max input: >25,000 and <75,000 tonnes a year.

18. The locations of identified waste facilities are shown on **Figure 12.3**.





Legend:

- Onshore Development Area
- Onshore Development Area (250m Buffer)
- BGS Recorded Landfills
- Historic Landfills
- Registered Waste Transfer Sites
- Licensed Waste Management Facilities

Client: Offshore Wind Ltd.	Project: White Cross Offshore Windfarm

Title: Identified Waste Facilities

Figure: 12.3 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0613

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12.2.4 Hazardous substances and health and safety

19. The presence (or absence) of sites subject to restrictions in relation to Health & Safety at or within 250m of the Onshore Export Cable Corridor (and 1km specifically for COMAH sites) has been summarised in **Table 12.7** with further detail in **Table 12.8**.

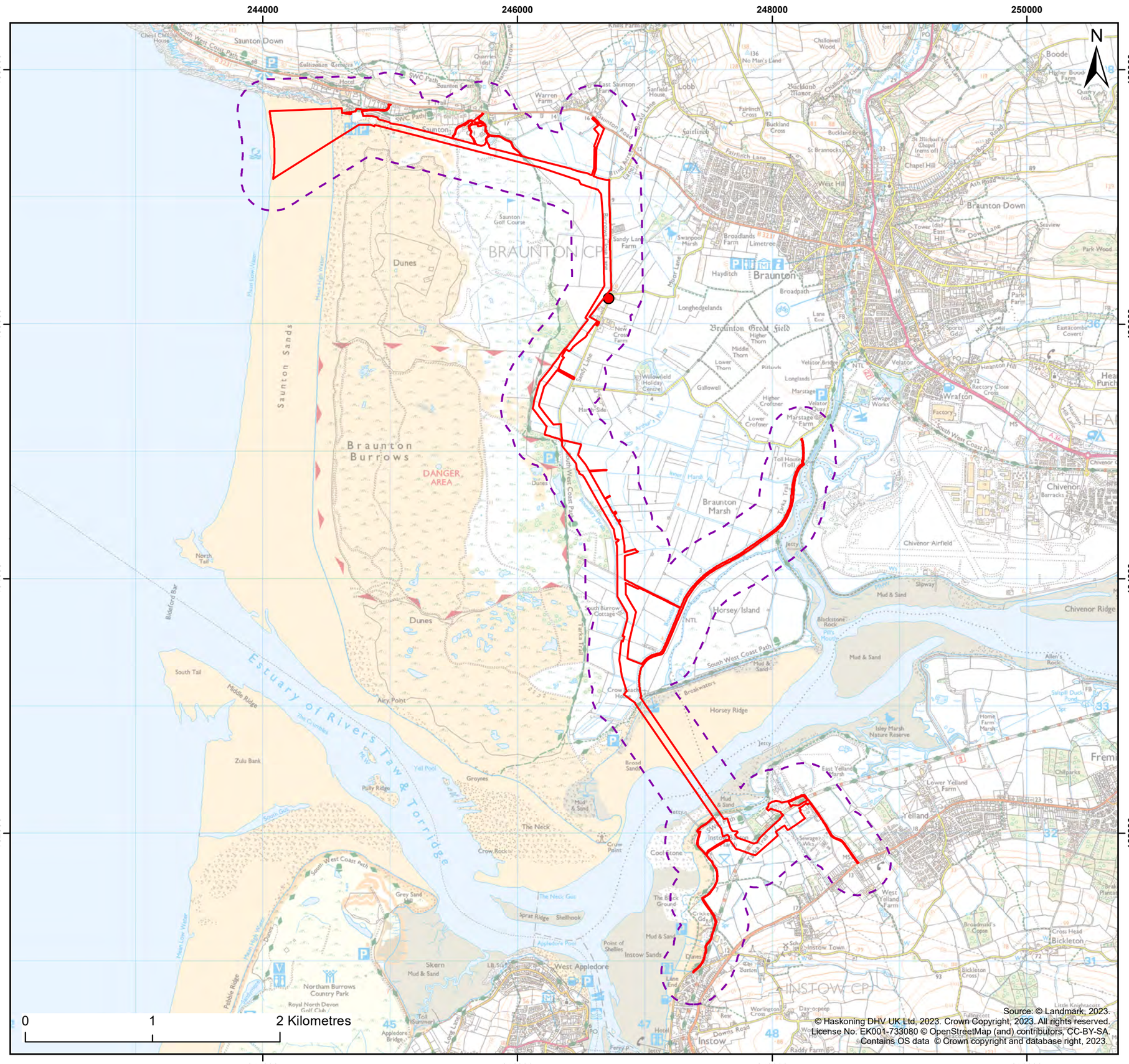
Table 12.7 Summary of facilities subject to active consents

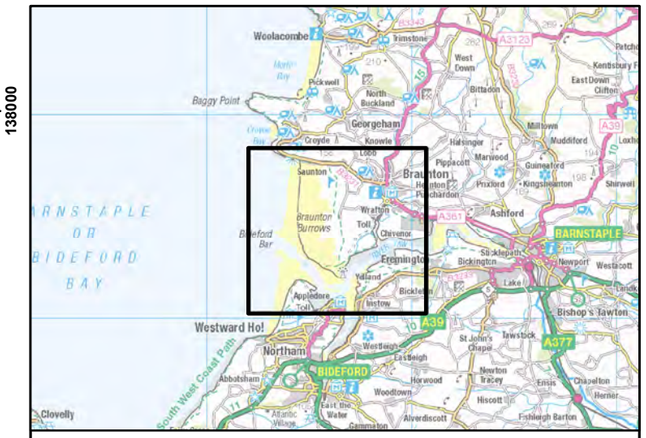
Facility Type	On Site	Off Site
Registered Radioactive Substances	No	No
COMAH	No	No
Explosive Sites	No	No
Notification of Installations Handling Hazardous Substances (NIHHS)	No	No
Planning Hazardous Substance Consents	No	Yes
Planning Hazardous Substance Enforcements	No	No

Table 12.8 Details of off site active consents

Facility Type – on site	Name	Distance (Direction)	Detail
Planning Hazardous Substance Consent	Handy Gas Ltd. Sandy Lane, Braunton, Devon	Adjacent (east)	Located in the north of the Onshore Export Cable Corridor Reference: 16331 Process: Liquefied extremely flammable gas and natural gas (whether liquefied or not)

20. Identified active consents are shown on **Figure 12.4**.





Legend:

- Onshore Development Area
- Onshore Development Area (250m Buffer)
- Planning Hazardous Substance Consents

Client: Offshore Wind Ltd.	Project: White Cross Offshore Windfarm

Title: Identified Active Consents

Figure: 12.4 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0708

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12.2.5 Environmentally sensitive areas

21. The presence (or absence) of environmentally sensitive areas at or within 250m of the Onshore Export Cable Corridor has been summarised in **Table 12.9** (and shown on **Figure 12.5**) with further detail in **Table 12.10** and **Table 12.11**.

Table 12.9 Summary of environmentally sensitive areas

Feature / Designation	On Site	Off Site
Ancient Woodland	No	No
Areas of Adopted Green Belt	No	No
Areas of Unadopted Green Belt	No	No
Areas of Outstanding Natural Beauty (AONB)	Yes	Yes
Environmentally Sensitive Areas	No	No
Forest Parks	No	No
Local Nature Reserves (LNR)	No	No
Marine Nature Reserves (MNR)	Yes	Yes
National Nature Reserves (NNR)	No	No
National Parks	No	No
Nitrate Sensitive Areas	No	No
Nitrate Vulnerable Zones (NVZ)	Yes	Yes
Ramsar Sites	No	No
Sites of Special Scientific Interest (SSSI)	Yes	Yes
Special Areas of Conservation (SAC)	Yes	Yes
Special Protection Areas (SPA)	No	No
World Heritage Sites	No	No

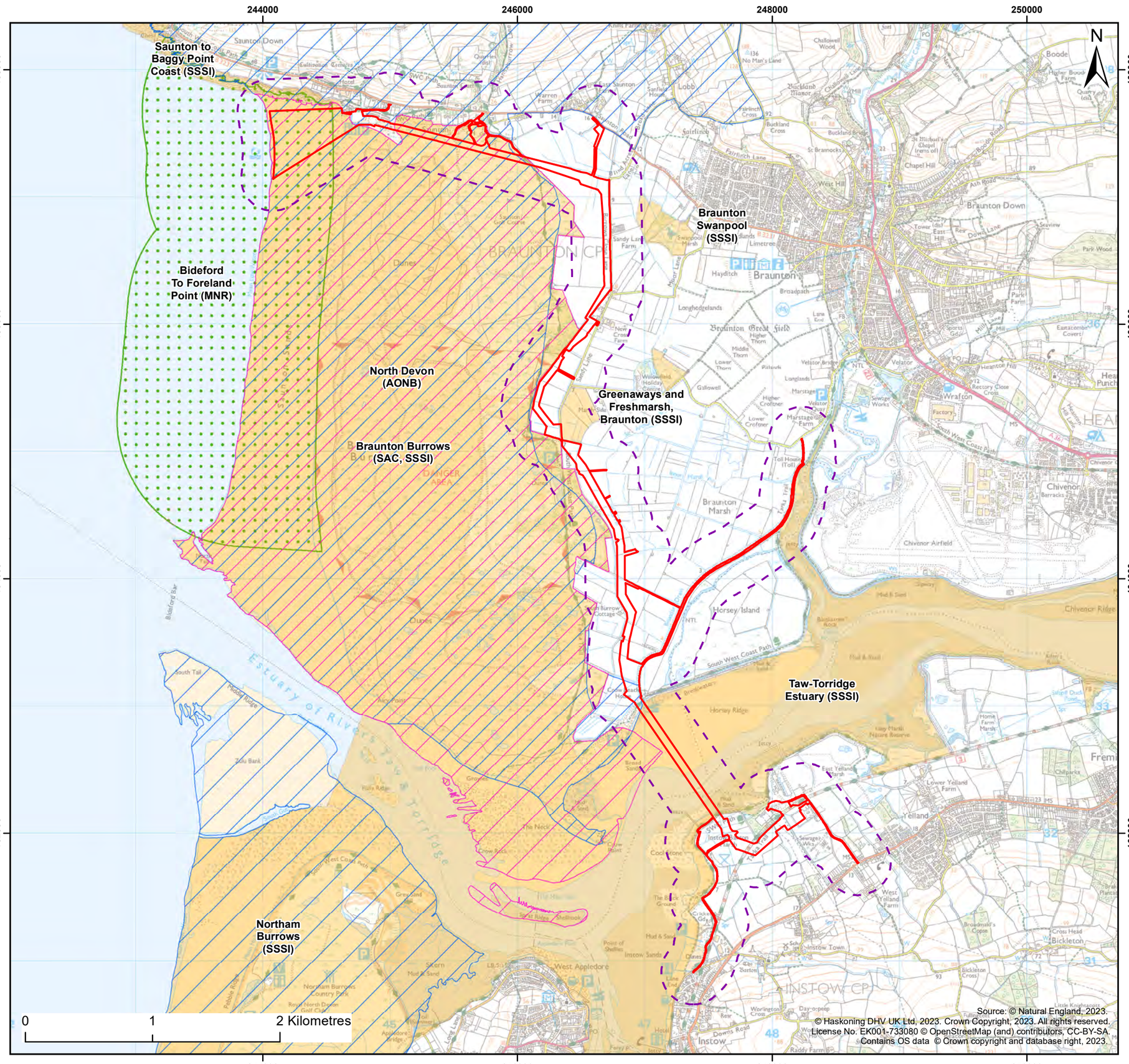
Table 12.10 Details of on site environmentally sensitive areas

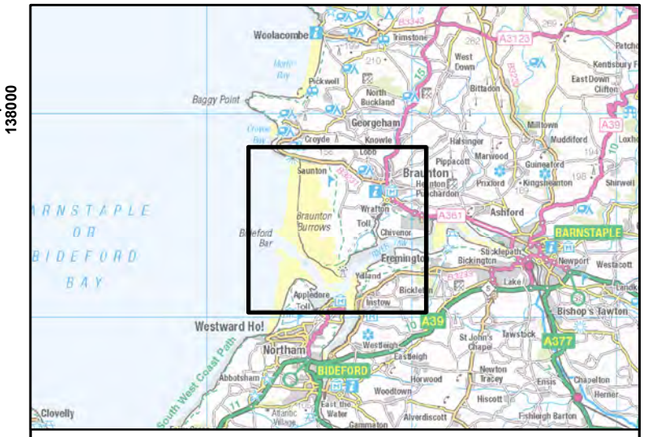
Feature / Designation	Name	Detail
SAC	Braunton Burrows	Located across the northern section of the Onshore Export Cable Corridor as well as running adjacent to the corridor's western boundary.
SSSI	Braunton Burrows	
	Taw-Torridge Estuary	Located in the south of the Onshore Export Cable Corridor where the corridor crosses the Taw estuary.
AONB	North Devon AONB	Located across the northwest section of the Onshore Export Cable Corridor as well as running adjacent to the corridor's western boundary, encroaching on the corridor on the northern bank of the River Taw
NVZ	Taw Estuary Eutrophic NVZ	Located across the middle of the Onshore Export Cable Corridor from the eastern boundary of Saunton Golf Course to the northern bank of the

Feature / Designation	Name	Detail
		River Taw as well as in the section of corridor south of the River Taw.

Table 12.11 Details of off site environmentally sensitive areas

Feature / Designation	Name	Distance (Direction)
SAC	Braunton Burrows	Adjacent (west)
SSSI	Braunton Burrows	
	Saunton to Baggy Point Coast	Adjacent (north)
	Greenaways and Freshmarsh, Braunton	Adjacent (east)
	Taw-Torridge Estuary	Adjacent
AONB	North Devon AONB	Adjacent (west and north)
MNR	Bideford to Foreland Point	Adjacent (west)
NVZ	Taw Estuary Eutrophic NVZ	Adjacent (east)
SSSI	Braunton Swanpool	200m (east)





Legend:

- Onshore Development Area
- Onshore Development Area (250m Buffer)
- Special Area of Conservation (SAC)
- Site of Special Scientific Interest (SSSI)
- Area of Outstanding National Beauty (AONB)
- Marine Nature Reserve (MNR)

Client: Offshore Wind Ltd.	Project: White Cross Offshore Windfarm

Title: Identified Environmentally Sensitive Areas

Figure: 12.5 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0614

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12.2.6 Current industrial land use

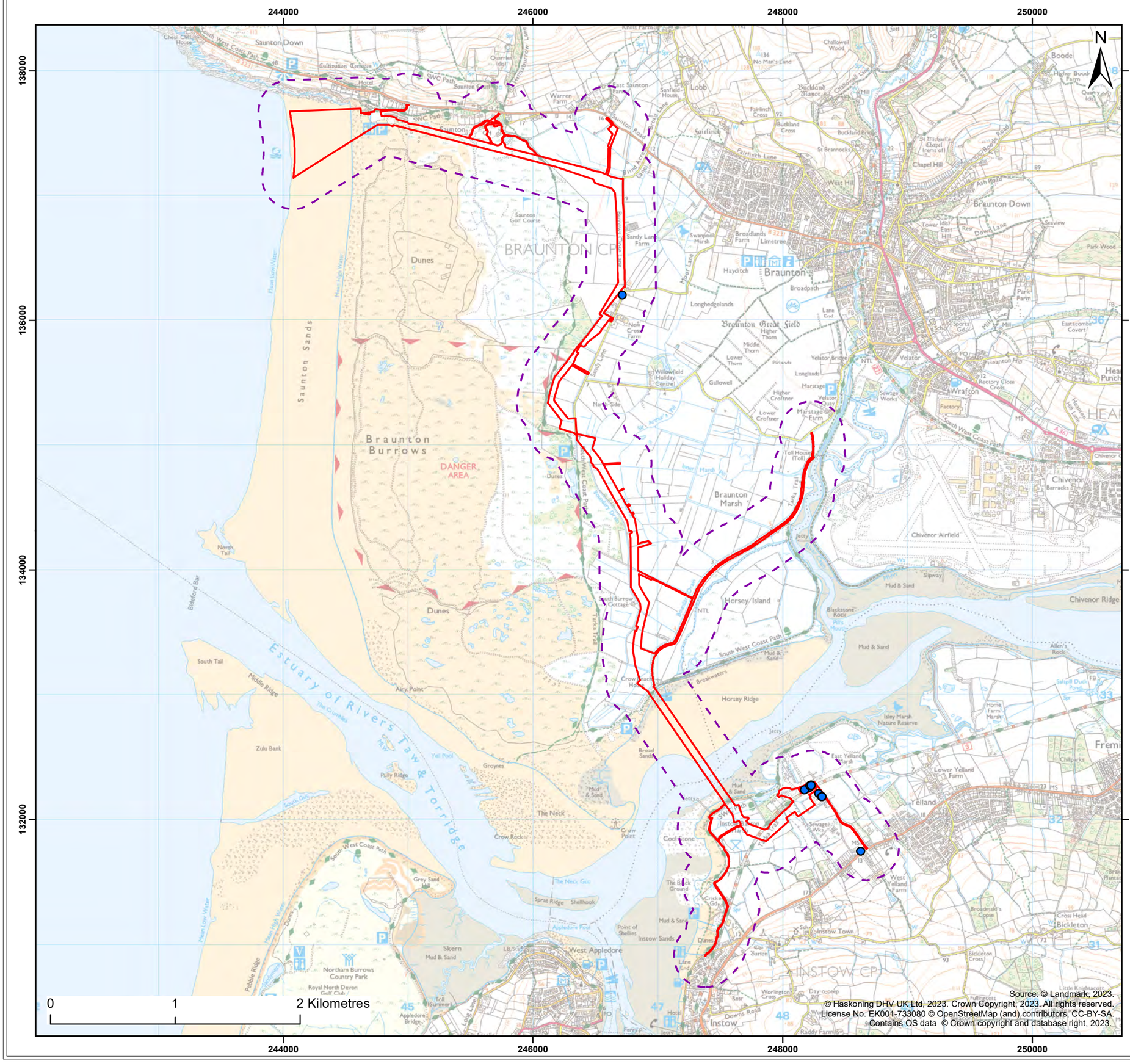
22. The presence (or absence) of current industrial land uses, petrol stations, electricity cables and gas pipelines at or within 250m of the Onshore Export Cable Corridor is shown on **Figure 12.6** and has been summarised in **Table 12.12** with further detail in **Table 12.13**.

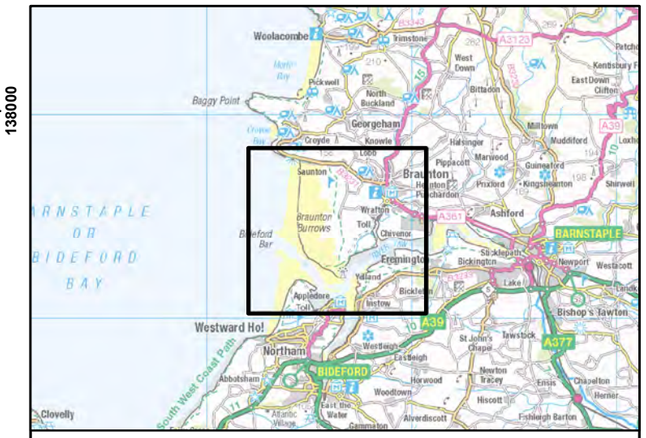
Table 12.12 Summary of current industrial land uses

Feature	On Site	Off Site
Contemporary Trade Directory Entries	No	Yes
Fuel Station Entries	No	No
Gas Pipelines	No	No
Underground Electrical Cables	No	No

Table 12.13 Details of off site current industrial land uses

Feature – off site	Name	Distance (Direction)	Detail
Contemporary Trade Directory Entry	Certas Ltd. Yelland Depot, Barnstaple	10m (east)	Type: Oil Fuel Distributors
	Alnwood Joinery North Devon Ltd. Unit 7-8, Estuary Business Park, Barnstaple	20m (south)	Type: Joinery Manufacturing
	Vicfibretech Unit 1, Estuary Business Park, Barnstaple	20m (south)	Type: Boatbuilders and Repairers
	Flo Gas Plc. Yelland Terminal, Barnstaple	20m (south)	Type: Gas Suppliers
	A S Car Sales	50m (west)	Type: Car Dealers





Legend:

- Onshore Development Area
- Onshore Development Area (250m Buffer)
- Trade Directories

Client: Offshore Wind Ltd.	Project: White Cross Offshore Windfarm

Title: Identified Industrial Land Uses

Figure: 12.6	Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0709

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Co-ordinate system: British National Grid

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12.3 Historical land uses

12.3.1 Introduction

23. The historical development of the site and surrounding area has been assessed using information available from historical Ordnance Survey (OS) maps within the Envirocheck GIS database.

24. In the context of the summary of historical development of the surrounding area, the descriptions are limited to within approximately 250m of the preferred Onshore Export Cable Corridor.

12.3.2 Site history

25. **Table 12.14** provides a detailed account of the review of available OS mapping coverage for the site dating back to 1887.

Table 12.14 Summary of on site historical data

Feature	Map years	Notes
Braunton Burrows	1887 – Present	Braunton Burrows is recorded as a nature reserve from 1992 onwards. Braunton Burrows is understood to have been used for military training purposes since 1943 although this has not been recorded on historical mapping.
Agricultural Land	1887 - Present	The Onshore Export Cable Corridor crosses agricultural land as it runs south towards the Taw estuary.
Railway Line	1887 – 1970	A railway runs east to west across the south of the onshore cable export corridor.
Golf Course	1905 - Present	A golf course is present in the north of the Onshore Export Cable Corridor.
Carpark	1958 - Present	A carpark is located to the north of Saunton Sands in the north of the Onshore Export Cable Corridor.
Drain	1958 - 1994	A large drainage system is shown as present in the north of the Onshore Export Cable Corridor. Also shown as a sewage site on some records.
Works	1958 - 1994	A large works (Yelland Power Plant) consisting of multiple buildings and railway sidings is shown as present in the south of the Onshore Export Cable Corridor. The buildings and railway sidings are no longer shown as present from 1994 onwards (though is then recorded as a landfill).
Depot	1958 - Present	An unspecified depot featuring several possible tanks is shown as present to the south of the Onshore Export Cable Corridor. The depot is still shown on

Feature	Map years	Notes
		present mapping however, it has been reduced in size and no tank like structures are still recorded.
Historic Tanks	1973	Two historic tanks are shown as present in the southeast of the Onshore Export Cable Corridor. No further details are given

12.3.3 Surrounding history

26. There are a number of potentially contaminative land uses near to the preferred onshore corridor; those within 250m of the Onshore Export Cable Corridor boundary are listed in **Table 12.15**.

Table 12.15 Summary of off site historical data

Feature	Map years	Distance and Direction	Notes
B3231 and Buildings	1905 - Present	Adjacent (north)	A road running east to west is present in the north of the Onshore Export Cable Corridor with several buildings including a hotel located on its southern side.
Sandy Lane Farm	1958 - Present	40m (east)	An unspecified tank is shown adjacent to the farm building until the year 1972.
Historic Tank	1970	40m (west)	A historic tank is shown as present to the west of the southern point of the Onshore Export Cable Corridor.
Quarries, reservoir and sand pit.	1905 – 1958	50m (north)	A number of small quarries, reservoirs and sand pits are now located to the north of the B3231 in the north of the Onshore Export Cable Corridor. All but one are no longer shown as being present from 1958 onwards and all are recorded as infilled from 1992.
Jetty	1958 - Present	120m (east)	A jetty is present to the east of the Onshore Export Cable Corridor.
Historic Tanks	1959 - 1972	120 m (east)	A historic tank is shown to the west of the northern section of the Onshore Export Cable Corridor.
	1973	140 m (north)	A historic tank is shown as present to the north of the southern point of the Onshore Export Cable Corridor.
Strip Lynchets	1887 – Present	160m (north)	The remains of a series of strip lynchets, a form of ancient agriculture, are shown as present in the north of the Onshore Export Cable Corridor.
Sewage Works	1958 - Present	170m (south)	An unspecified works is located to the south.
Old quarries	1905 - 1958	200m (north)	A number of small quarries are shown as present. All but one are no longer shown as being present from 1958 onwards and are recorded as infilled from 1992.

12.3.4 Unexploded Ordnance

27. Unexploded Bomb (UXB) risk maps have been obtained from Zetica and are presented as **Annex B**. The UXB risk maps identify the Onshore Export Cable Corridor as being within a low-risk area. As such no additional precautions are recommended however, it should be noted that a section of the corridor encroaches on the Braunton Burrows DIO training area. Braunton Burrows has been used for military training purposes since the second world war and anecdotal evidence exists of a large amount of Unexploded Ordnance (UXO) being recovered from the area. As such, it is recommended that further investigation into the risk posed by UXO is conducted if excavation is to take place within Braunton Burrows.

12.4 Geology, Groundwater and Hydrology

12.4.1 Geology

12.4.1.1 Geological Conditions

28. Information on geological conditions below the Study Area has been collated from the Envirocheck GIS database and BGS datasets, including the 1:50,000 scale geological mapping. Geological conditions are summarised in **Table 12.16**.

Table 12.16 Geology Summary

Stratum	Unit	Description
Superficial Deposits	Blown Sands	Sand.
Superficial Deposits	Marine Beach Deposits	Sand and gravel.
Superficial Deposits	Tidal Flat Deposits	Clay, silt and sand.
Superficial Deposits	Alluvium	Clay, silt, sand and gravel.
Superficial Deposits	Glacial Till	Diamicton.
Bedrock	Ashton Mudstone Member	Mudstones, siltstones and sandstones.
Bedrock	Doddiscombe Formation	Mudstones, siltstones and chert.
Bedrock	Pilton Mudstone Formation	Mudstones and siltstones.
Bedrock	Crackington Formation	Sandstone

29. Although Made Ground has not been recorded, it may still be present within the Onshore Export Cable Corridor relating to current and historical agricultural and industrial land uses.

30. BGS logs have been referred to for information only. The presence (or absence) of BGS logs at or within 100m of the Onshore Export Cable Corridor is shown on **Figure 12.7** and has been summarised in **Table 12.17** with further detail (where available) in **Table 12.18** and **Table 12.19**.

Table 12.17 Summary of BGS borehole logs

Feature	On site	Off site
BGS borehole logs	Yes	Yes

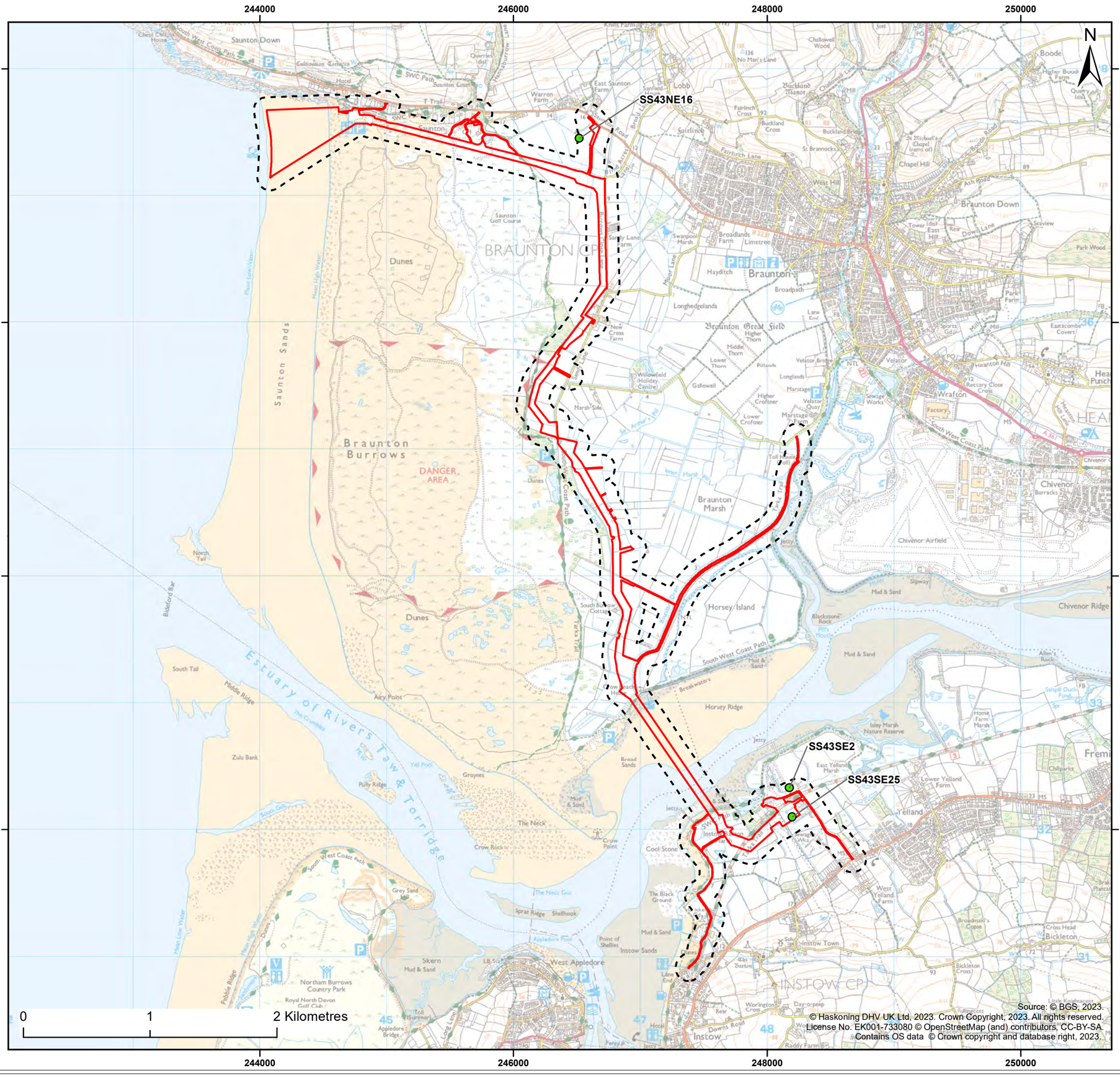
Table 12.18 Details of on site BGS borehole logs

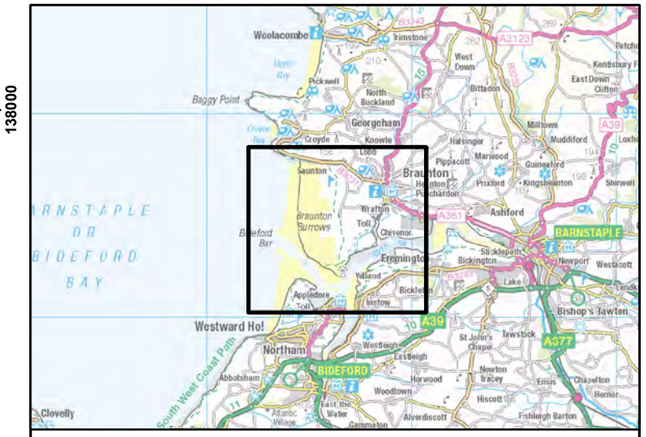
Reference Number (hole type and depth)	Details
SS43SE25 (Hole Type unknown, max depth 42.67m bgl)	• Made Ground: Clay and gravel 0.00 – 6.40m bgl. • Soft grey Shale 6.40 – 10.36m bgl. • Dark grey mud and stone layers 10.36 – 27.43m bgl. • Grey Sandstone 27.43 – 32.61m bgl. • Fine grey Sand 32.61 – 42.67m bgl.

Table 12.19 Details of off site BGS borehole logs

Reference Number (hole type and depth)	Distance (Direction)	Details
SS43NE16 (Hole Type unknown, max depth 11.00m bgl)	80m (northeast)	• Brown Clay 0.00 – 5.49m bgl. • Brown sandy Clay and Gravel 5.49 – 7.62m bgl. • Sand 7.62 – 8.23m bgl. • Mudstone 8.23 – 11.00m bgl. • *Artesian water was encountered in this borehole (water encountered at 8.23m bgl).

31. There is an additional boreholes within the Onshore Export Cable Corridor, the records for which are confidential (SS43ES2).





Legend:

- Onshore Development Area
- Onshore Development Area (100m Buffer)
- British Geological Survey Boreholes

Client: Offshore Wind Ltd.	Project: White Cross Offshore Windfarm

Title: BGS Borehole Records

Figure: 12.7 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0710

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	04/08/2023	AB	DF	A3	1:30,000

Co-ordinate system: British National Grid

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32. The potential ground stability hazards on site, as obtained from the environmental database have been summarised in **Table 12.20**.

Table 12.20 Ground stability hazards

Reference Number (hole type and depth)	Details
Potential for Collapsible Ground Stability Hazards	No Hazard across the majority of the Onshore Export Cable Corridor. Very low risk in the northern extremities and in the south of the corridor on the southern bank of the River Taw.
Potential for Compressible Ground Stability Hazards	No hazard across the west of the Onshore Export Cable Corridor. Moderate risk in the east and south of the corridor.
Potential for Ground Dissolution Stability Hazards	No hazard.
Potential for Landslide Ground Stability Hazards	Very low risk across the majority of the Onshore Export Cable Corridor and Onshore Substation with a low risk in the northern extremity of the Onshore Export Cable Corridor.
Potential for Running Sand Ground Stability Hazards	Low to moderate risk across the majority of the Onshore Export Cable Corridor and Onshore Substation with no risk in the northern extremity of the Onshore Export Cable Corridor.
Potential for Shrinking or Swelling Clay Ground Stability Hazards	No hazard in the west of the Onshore Export Cable Corridor with a very low risk in the north, east and south of the Onshore Export Cable Corridor and the Onshore Substation.

12.4.2 Mining and mineral extraction

33. The site is not located in an area which may be affected by coal mining.

34. The absence or presence of mining, ground workings and natural cavities at or within 250m of the site boundary has been summarised in **Table 12.21** with further detail in **Table 12.22** and **Table 12.23**.

Table 12.21 Summary of ground workings and natural cavities

Feature	On site	Off site
BGS Recorded Mineral Sites	No	Yes
Coal Mining Affected Areas	No	No
Mining Instability	No	No
Man-Made Mining Cavities	No	No
Natural Cavities	No	No
Non Coal Mining Areas of Great Britain	Yes	Yes

Table 12.22 Details of on site features / cavities

Feature – on site	Details
Non Coal Mining Areas of Great Britain	• Located across the majority of the Onshore Export Cable Corridor. • Class: Highly Unlikely – Localised small scale. underground mining may have occurred.
	• Located in the south of the Onshore Export Cable Corridor. • Class: Rare – Sporadic underground mining of restricted extent may have occurred.

Table 12.23 Details of on site features / cavities

Feature – off site	Distance (direction)	Details
BGS Recorded Mineral Sites	40m (east)	• Name: Yelland Wharf. • Type: Wharf (used as a mineral transfer site rather than site of excavation). • Commodity: Marine sand and gravel. • Status: Active.
	160m (north)	• Name: Down House, Staunton, Devon. • Type: Opencast. • Commodity: Common Clay and Shale. • Status: Operations Ceased.

35. The Devon County Council 'Devon Minerals Plan' has been consulted to confirm the absence or presence of minerals planning policies present at or within 250m of the Onshore Export Cable Corridor. This has been summarised in **Table 12.24** with further detail in **Table 12.25**.

Table 12.24 Summary of minerals planning policies

Feature	On site	Off site
Mineral Consultation Areas	No	Yes
Mineral Safeguarding Areas	No	Yes

Table 12.25 Details of on site minerals planning policies

Feature	Distance	Details
Mineral Consultation Area	Adjacent	• Located directly to the southeast of the Onshore Export Cable Corridor. • Commodity: Aggregates. • Extends to the southeast of the Onshore Export Cable Corridor.
Mineral Safeguarding Area	Adjacent	• Located directly to the southeast of the Onshore Export Cable Corridor. • Resource: Aggregate Minerals and Infrastructure. • Extends to the southeast of the Onshore Export Cable Corridor.

12.4.3 Groundwater

12.4.3.1 Hydrogeology

36. Hydrogeological information for the site has been collated from the Envirocheck GIS database and DEFRA MAGIC map application and comprises the following:

    - Superficial Deposits: Blown Sands, Marine Beach Deposits, Alluvium – Secondary A Aquifer
    - Superficial Deposits: Tidal Flat Deposits – Secondary Undifferentiated Aquifer
    - Bedrock: Pilton Mudstone Formation, Doddiscombe Formation and Ashton Mudstone Member – Secondary A Aquifer.

37. The Tidal Flat and Glacial Till superficial deposits are classified as a Secondary Undifferentiated Aquifer. This has been assigned in cases where it has not been possible to attribute either a Secondary A or B aquifer to the soil type due to the variable characteristics. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to its the variable characteristics.

38. The Blown Sands, Marine Beach Deposits, Alluvium superficial deposits and the Pilton Mudstone Formation, Doddiscombe Formation, Ashton Mudstone Member and Crackington Formation are designated as a Secondary A Aquifer. These are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

39. Information from the Envirocheck GIS database indicates the Onshore Export Cable Corridor is located within an area of medium to high groundwater vulnerability.

40. The Study Area is located within the River Taw and North Devon Streams Water Framework Directive (WFD) Groundwater Body.

12.4.3.2 Active groundwater abstractions

41. The absence or presence of active groundwater abstraction wells at or within 1km of the Onshore Export Cable Corridor has been summarised in **Table 12.26** with further detail in **Table 12.27** and **Table 12.28**.

Table 12.26 Summary of active groundwater abstraction wells

Feature	On site	Off site
Abstraction Wells	Yes	Yes

Table 12.27 Details of on site active abstraction wells

Feature – on site	Details
Saunton Golf Club (boreholes)	• Located in the north of the Onshore Export Cable Corridor. • <3.09m^3 per hour, 218.21m^3 per day with a total of 26,185.48m^3 during the period 1st March to 31st October each year. • Stated to be for non-potable use.

Table 12.28 Details of off site active abstraction wells

Feature – off site	Details (direction)	Details
Land of Braunton Great Field (spring fed excavation)	350m (east)	27.3m^3 per hour, 72.7m^3 per day, with a total of 1,031m^3 during the period of 1st April to 30th September each year.

12.4.3.3 Groundwater Source Protection Zones

42. Groundwater Source Protection Zones (SPZs) are defined around abstraction boreholes used for potable water supply to delineate the area where release of a contaminant into the aquifer could impact on the abstraction. The Onshore Export Cable Corridor is not located within an SPZ, the nearest being 960m to the northwest.

12.4.4 Hydrology

12.4.4.1 Surface waters and monitoring

43. The absence or presence of surface water features at or within 250m of the Onshore Export Cable Corridor has been summarised in **Table 12.29** with further detail in **Table 12.30** and **Table 12.31**.

Table 12.29 Summary of surface water features and monitoring

Feature	On site	Off site
Surface Water Feature	Yes	Yes
OS Water Network Lines	Yes	Yes

Table 12.30 Details of on site surface water features and monitoring

Feature – on site	Details
Surface Water Feature	Boundary Drain (watercourse)
	River Taw
	Instow Barton Marsh (watercourses)
OS Water Network Lines	Multiple entries relating to surface watercourses draining into Sir Arthur's Pill, Inner Marsh Pill, Boundary Drain and the Taw Estuary.

Table 12.31 Details of off site surface water features and monitoring

Feature – off site	Details (direction)	Details
Surface Water Feature	Adjacent	River Taw Estuary (main river)
Surface Water Feature	10m (east)	Sir Arthur's Pill (river)
Surface Water Feature	20m (east)	Inner Marsh Pill (watercourse)
OS Water Network Lines	Adjacent – 250m	Multiple entries relating surface watercourses draining into Sir Arthur's Pill, Inner Marsh Pill, Boundary Drain and the Taw Estuary

44. Further details regarding surface water features are included in **Chapter 14 Water Resources and Flood Risk** and shown on **Figure 14.1**.

12.4.4.2 Flooding

45. The absence or presence of flood potential and events at or within 250m of the Onshore Export Cable Corridor has been summarised in **Table 12.32** with further detail in **Table 12.33** and **Table 12.34**.

Table 12.32 Summary of flooding potential and events

Feature	On site	Off site
Flooding from Groundwater of Property Below Ground Level	Yes	Yes
Flooding from Groundwater of Property at Surface	Yes	Yes
Extreme Flooding from Rivers or Sea Without Defences	Yes	Yes
Flooding from Rivers or Sea Without Defences	Yes	Yes
Areas Benefiting from Flood Defences	Yes	Yes
Flood Water Storage Area	No	No

Table 12.33 Details of on site flooding potential and events

Feature – on site	Details
Flooding from Groundwater of Property Below Ground Level	Located in isolated areas in the northern section of the Onshore Export Cable Corridor, in the west of the cable corridor and on the northern and southern banks of the River Taw.
Flooding from Groundwater of Property at Surface	Located along the northern section of the Onshore Export Cable Corridor. Located in isolated areas along the western boundary of the Onshore Export Cable Corridor and the northern bank of the River Taw. Located along the southern section of the Onshore Export Cable Corridor to the south of the River Taw.
Extreme Flooding from Rivers or Sea Without Defences	Isolated areas identified along Saunton Sands Beach in the west, in the northeast with wider areas covering the east and southeast of the Onshore Export Cable Corridor.
Flooding from Rivers or Sea Without Defences	High risk identified along Saunton Sands Beach in the west as well as in the northeast of the Onshore Export Cable Corridor. A low to high risk is identified in the east of the corridor. A very low to high risk is identified in the southeast.
Areas Benefiting from Flood Defences	Areas present in the east and southeast of the Onshore Export Cable Corridor.

Table 12.34 Details of off site flooding potential and events

Feature – off site	Details	Details
Extreme Flooding from Rivers or Sea Without Defences	Adjacent	Areas identified to the north and south along Saunton Sands Beach and to the east of the Onshore Export Cable Corridor.
Flooding from Rivers or Sea Without Defences	Adjacent	High risk identified to the north and south along Saunton Sands Beach. Low to high risk identified directly to the east of the Onshore Export Cable Corridor. Very low to high risk identified directly to the south and southeast of the corridor.

Feature – off site	Details	Details
Areas Benefiting from Flood Defences	Adjacent	Areas adjacent to the east and to the southwest of the Onshore Export Cable Corridor.

12.4.4.3 Surface water abstractions

46. The absence or presence of surface water abstractions at or within 250m of the Onshore Export Cable Corridor has been summarised in **Table 12.35**.

Table 12.35 Summary of active surface water abstractions

Feature	On site	Off site
Surface water abstractions	No	No

12.4.4.4 Discharges to controlled waters

47. The absence or presence of discharges to controlled waters at or within 250m of the Onshore Export Cable Corridor boundary has been summarised in **Table 12.36** with further detail in **Table 12.37** and **Table 12.38**.

Table 12.36 Summary of discharges to controlled waters

Feature	On site	Off site
Licensed Discharges	Yes	Yes

Table 12.37 Details of active on site discharges to controlled waters

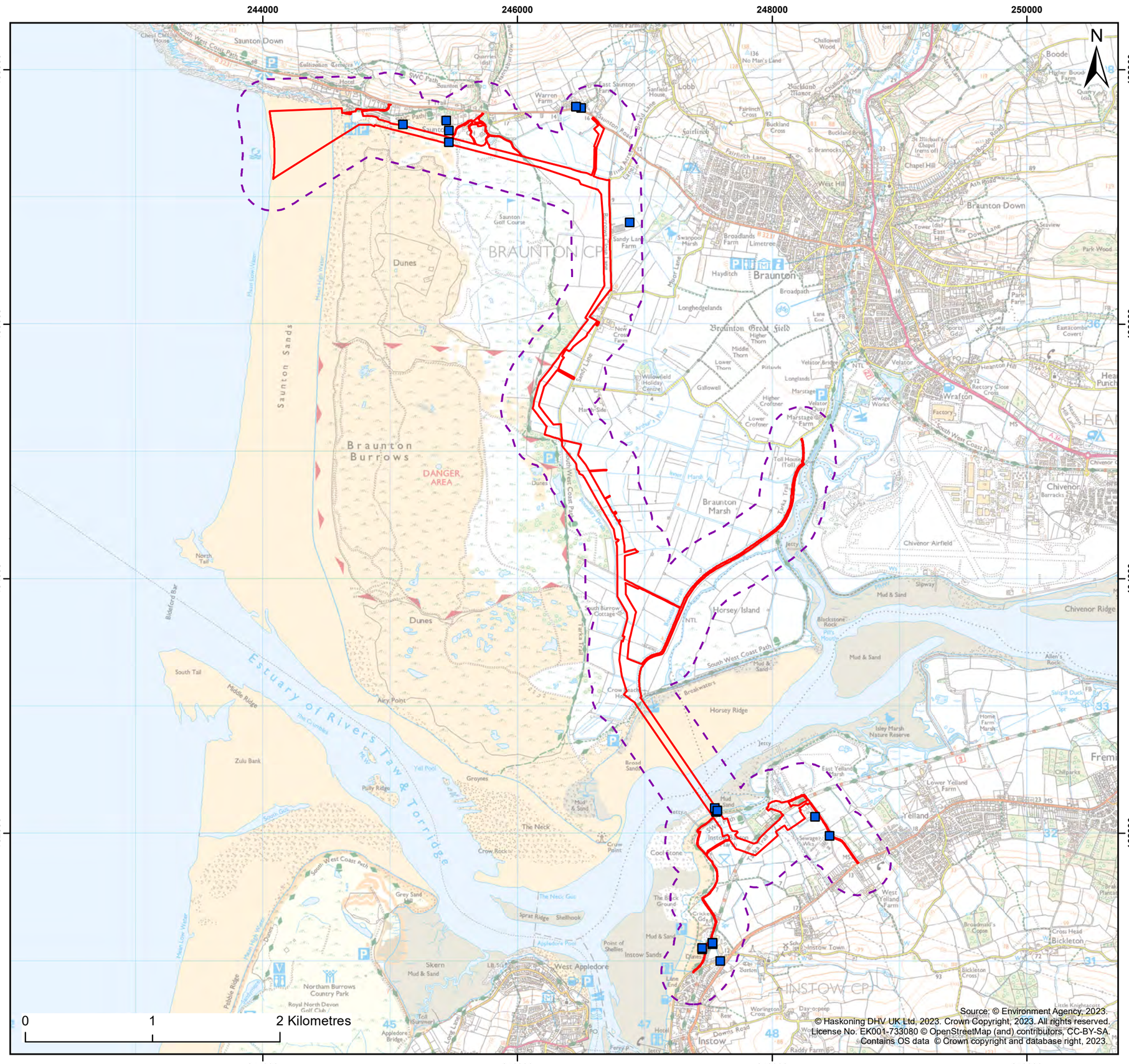
Feature – on site	Details
Licensed Discharge	• Located in the north of the Onshore Export Cable Corridor. • Class: Sewage Discharge. • Reference: Nra-Sw-3216. • Operator: The Saunton Golf Club.
	• Located in the north of the Onshore Export Cable Corridor. • Class: Sewage Discharge. • Reference: Eprdp3720gx. • Operator: The Saunton Golf Club.
	• Located in the south of the Onshore Export Cable Corridor. • Class: Sewage Discharge.

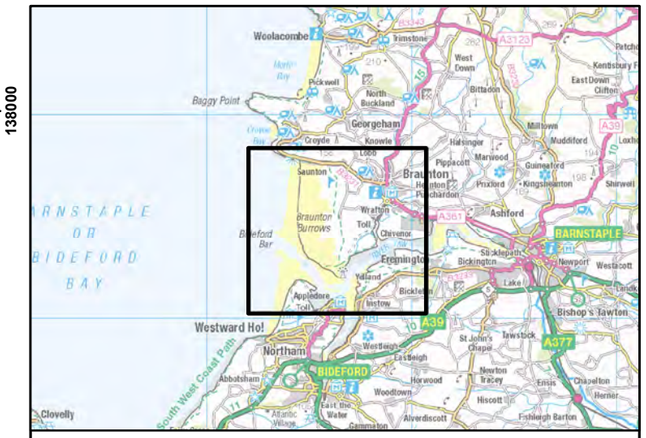
Feature – on site	Details
	• Reference: 203126. • Operator: South West Water.
	• Located in the south of the Onshore Export Cable Corridor. • Class: Sewage Discharge. • Reference: 002492. • Operator: South West Water

Table 12.38 Details of active off site discharges to controlled waters

Feature – off site	Details (direction)	Details
Licensed Discharge	Adjacent (north)	• Located in the northwest of the Onshore Export Cable Corridor. • Class: Sewage Discharge. • Reference: 200203/Pe/01. • Operator: South West Water.
	20m (east)	• Class: Sewage discharge. • Reference: Eprkb3395wh. • Operator: Are Investments Ltd.
	30m (north)	• Located in the north of the Onshore Export Cable Corridor. • Class: Sewage Discharge. • Reference: Nra-Sw-6143/R. • Operator: The Saunton Golf Club.
	110m (north)	• Located in the north of the Onshore Export Cable Corridor. • Class: Sewage Discharge. • Reference: 201476. • Operator: Mr C. White.
	110m (east)	• Class: Sewage Discharge. • Reference: Nra-Sw-6920. • Operator: Mr B. Fry.
	170m (north)	• Class: Sewage Discharge. • Reference: 200680. • Operator: Mr K. Old.
	250m (northeast)	• Class: Sewage Discharge. • Reference: 201461. • Operator: Mr M. Ashcroft.

48. The locations of identified active licenced discharges are shown on **Figure 12.8**.





Legend:

- Onshore Development Area
- Onshore Development Area (250m Buffer)
- Discharge Consents

Client: Offshore Wind Ltd.	Project: White Cross Offshore Windfarm

Title: Identified Licenced Discharges

Figure: 12.8 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0615

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	09/06/2023	AB	DF	A3	1:30,000

Co-ordinate system: British National Grid

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12.4.4.5 Pollution incidents and inventories

49. The absence or presence of pollution incidents at or within 250m of the Onshore Export Cable Corridor has been summarised in **Table 12.39** with further detail in **Table 12.40** and **Table 12.41**.

Table 12.39 Summary of incidents and inventories

Feature	On site	Off site
Prosecutions Relating to Controlled Waters	No	No
Prosecutions Relating to Authorised Processes	No	No
Enforcement and Prohibition Notices	No	No
Local Authority Pollution Prevention and Control Enforcements	No	No
Substantiated Pollution Incident Register	No	No
Water Industry Act Referrals	No	No
Pollution Incidents	Yes	Yes

Table 12.40 Details of on site incidents

Feature – on site	Details
Pollution Incident	• Located in the northwest of the Onshore Export Cable Corridor. • Class: Miscellaneous Pollutants. • Reference: 62011504. • Severity: Category 3 – Minor. • Date: 09/08/1995.
	• Located in the south of the proposed Onshore Substation. • Class: Not provided. • Reference: 1370596. • Severity: Category 3 – Minor (Air and Water) Category 2 – Significant (Land). • Date: 04/09/2015.

Table 12.41 Details of off site incidents

Feature – off site	Details (direction)	Details
Pollution Incident	Adjacent (north)	• Class: Sewage Pollutants – other sewage. • Reference: 62006231. • Severity: Category 3 – Minor. • Date: 29/06/1992.
	Adjacent (north)	• Class: Sewage Pollutants – crude sewage.

Feature – off site	Details (direction)	Details
		• Reference: 62006249. • Severity: Category 3 – Minor. • Date: 05/08/1992.
	40m (southwest)	• Class: Agricultural Pollutants – slurry / animal waste. • Reference: 62017519. • Severity: Category 3 – Minor. • Date: 05/08/1994.
	60m (east)	• Located in the south of the Onshore Export Cable Corridor. • Class: Oil Pollutants – diesel. • Reference: 62014046. • Severity: Category 3 – Minor. • Date: 29/09/1993.
	70m (southwest)	• Class: Sewage Pollutants. • Reference: 62017974.
	80m (southwest)	• Class: Miscellaneous Pollutants – foam. • Reference: 62014628. • Severity: Category 3 – Minor. • Date: 07/01/1993.
	130m (south)	• Class: Miscellaneous Pollutants – algae. • Reference: 62006516. • Severity: Category 3 – Minor. • Date: 03/05/1992.
	140m (northwest)	• Class: Miscellaneous Pollutants. • Reference: 62014808. • Severity: Category 3 – Minor. • Date: 06/08/1993.

12.5 Conceptual Site Model and Qualitative Risk Assessment

50. Land contamination is assessed through the identification of Potential Contaminative Linkages (PCLs). The assessment involves the development of a CSM which describes the relationship between on and offsite potential sources of contamination (and contaminants), potential receptors to such contamination and anticipated pathways between the two. Where all three (source-pathway-receptor linkage) are

present or considered to be present, they are described as a PCL which can be subject to the risk assessment process.

51. The following discusses the potential sources, pathways and receptors present.

12.5.1 Potential Sources

Table 12.42 Potential on site sources

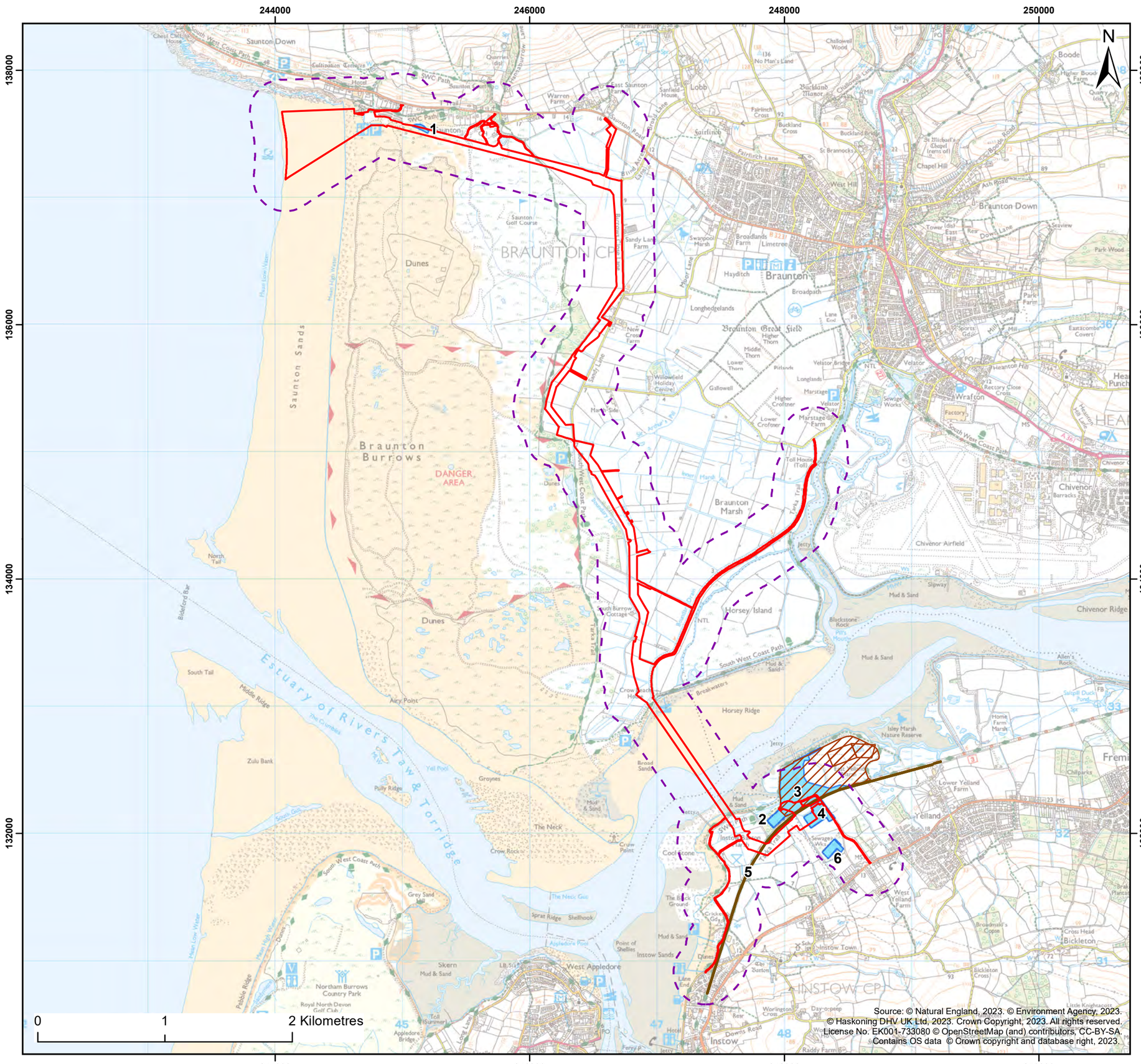
Potential Source	Associated Contaminants
Made Ground associated with existing developments and land uses within the Onshore Export Cable Corridor including the factory/works (2)*, road haulage site (4)* and railway located (5)* to the south.	Asbestos, polycyclic aromatic hydrocarbons (PAHs), phenols, fuel/oil hydrocarbons heavy metals and perfluoroalkyl and polyfluoroalkyl substances (PFAS).
Made Ground associated with historic landfill activities (3)*.	Heavy metals, cyanides, sulphates, phenols, PAHs, fuel/oil hydrocarbons, polychlorinated biphenyls (PCBs), PFAS, asbestos and ground gas.
Contamination associated with the identified drain/sewage site (1)*.	Pathogens such as Salmonella and Typhus (associated with the sewage site).
Contaminants associated with agricultural land.	Herbicides and pesticides.

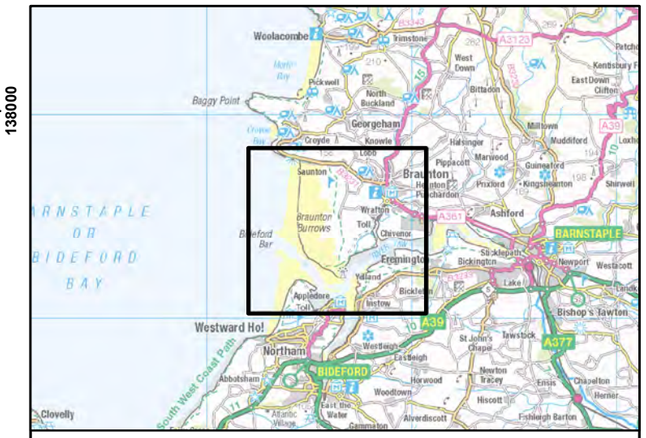
** See Figure 12.9 in Chapter 12: Ground Conditions and Contamination for annotated locations of potential sources.*

Table 12.43 Potential off site sources

Potential Source	Associated Contaminants
Contamination associated with historic and current military use of Braunton Burrows.	Heavy metals, explosive residues, UXO.
Made Ground associated with historic landfill activities and infilled land (3)*.	Heavy metals, cyanides, sulphates, phenols, PAHs, fuel/oil hydrocarbons, PCBs, PFAS, asbestos and ground gas.
Contamination associated with historic and present nearby Oil/ fuel distributor (6)*	PAHs, fuel/oil hydrocarbons.

52. Identified Potential Sources are shown on **Figure 12.9**.





Legend:

- Onshore Development Area
- Onshore Development Area (250m Buffer)
- Historic Landfills
- Contaminated Land Use (Polygon)
- Contaminated Land Use (Line)

Note: Features reference tables 5.1 and 5.2 of Appendix 12.A

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title: Identified Potential Sources of Ground Contamination

Figure:	Drawing No:
12.9	PC2978-RHD-ZZ-XX-DR-Z-0616

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

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12.6 Potential Receptors and Pathways

Table 12.44 Receptors and pathways

Receptors	Pathways
Human Health	
Future site users not involved with the Onshore Project during construction and operation	• Direct exposure through ingestion or inhalation of soils or dusts and asbestos fibres. • Inhalation of ground gas and volatile contaminants.
Neighbouring site users during construction	
Construction and Maintenance Workers	• Direct exposure through dermal contact, ingestion or inhalation of soils and dusts during ground breaking activities. • Inhalation of asbestos containing soils and dusts. • Inhalation of ground gas and volatile contaminants.
Controlled Waters	
Blown Sands, Marine Beach Deposits, Alluvium and bedrock – Secondary A Aquifers Tidal Flat Deposits – Secondary Undifferentiated Aquifer	• Leaching, dissolution and migration of contaminants from existing unsaturated soils. • Vertical migration through the creation of preferential pathways.
Surface Waters	• Lateral migration and discharge of groundwater and surface water runoff.
Buildings and utilities	
Future buildings (substation, jointing bays, transition boxes and link bays.)	• Direct contact with building foundations.
	• Migration of ground gas along service corridors.
Other	
Flora and fauna	• Migration of dissolved contaminants in groundwater and discharge to surface water.
Environmentally sensitive areas: AONB, SSSIs, SAC and MNR	

12.7 Preliminary Conceptual Site Model and Qualitative Risk Assessment

53. The CSM and Preliminary Risk Assessment are presented in **Table 12.45**. Definitions of probability and consequence have been based on guidance in CIRIA 552 and summarised in **Annex C**.

54. A combination of probability and consequences produces a risk level based on the risk evaluation and likely action required. The land contamination risk, which is a

function of the probability and the consequence, can be defined using the risk matrix. The limitations associated with the assessment are provided in **Annex C**.

Table 12.45 Preliminary Conceptual Site Model

Source	Pathway	Receptor	Associated hazard	Potential consequence of contaminant linkage	Likelihood of contaminant linkage	Risk classification	Justification
On site sources discussed in **Table 12.42.**	Dermal contact, ingestion and inhalation of soils, dust and asbestos fibres. Inhalation of volatile contaminants.	Future site users not involved with the Onshore Project during construction and operation.	Human Health	Medium	Low likelihood	Moderate to low	In areas where potential contamination has been identified it is possible that buried contaminants could be disturbed and brought to the surface during the construction works posing a risk to neighbouring site users during the construction phase and to future site users during the operational phase. The risk could be reduced to low through appropriate mitigation measures such as ground investigation to identify if buried contamination associated with previous historical uses is present. If present, the correct handling and reuse of soils during construction excavation work should include mitigation measures to either reduce or break the contaminant linkage.
		Neighbouring site users during construction.		Medium	Low likelihood	Moderate to low	
		Construction and Maintenance Workers.		Medium	Likely	Moderate	Without mitigation it is possible workers could encounter buried contaminants both during the construction phase and during maintenance activities carried out in the operation phase at the potential locations of concern. The risk could be reduced to low with the use of appropriate working methods incorporated into a Code of Construction Practice (CoCP) and use of personal protective equipment (PPE). There is also the risk of unforeseen contamination. Likewise, impacts to maintenance workers during the operational phase of the Onshore Project can be mitigated with the use of appropriate working methods and PPE. The mitigation will reduce the likelihood of a contaminant linkage.
	Leaching, dissolution and migration of contaminants from existing unsaturated soils.	Groundwater within superficial Secondary A Aquifers.	Controlled Waters	Medium	Low likelihood	Moderate to low	Potential sources of contamination including the identified sewage site, historic landfill, unspecified works and road haulage site are located above the superficial Secondary A Aquifer. Contaminants have the potential to be mobilised during construction and to migrate into groundwater bearing strata. Although the Secondary A Aquifer is located beneath large parts of the Onshore Export Cable Corridor, the identified sources of contamination are only present in isolated areas reducing the risk of contamination disturbance.
	Vertical migration of through the creation of preferential pathways.			Medium	Low likelihood	Moderate to low	
	Leaching, dissolution and migration of contaminants from existing unsaturated soils.	Groundwater within superficial Secondary Undifferentiated Aquifers.		Medium	Unlikely	Low	Limited potential sources of contamination have been identified above the superficial Secondary Undifferentiated Aquifer hence the 'unlikely' chance of a contaminant linkage occurring.
	Vertical migration of through the creation of preferential pathways.			Medium	Unlikely	Low	
	Leaching, dissolution and migration of contaminants from	Groundwater within bedrock Secondary A Aquifers.		Medium	Low likelihood	Moderate to low	All identified potential sources of contamination are located above the bedrock Secondary A Aquifer. Contaminants have the potential to be mobilised during construction and to migrate into groundwater bearing strata, reaching the bedrock through overlying permeable superficial deposits.

Source	Pathway	Receptor	Associated hazard	Potential consequence of contaminant linkage	Likelihood of contaminant linkage	Risk classification	Justification
	existing unsaturated soils.						Identified potential sources of contamination exist in isolated areas along the Onshore Export Cable Corridor and are not widespread, reducing the risk of contaminants being disturbed, hence the low likelihood.
	Vertical migration of through the creation of preferential pathways.			Medium	Low likelihood	Moderate to low	
	Lateral migration and discharge of groundwater and surface water runoff.	Surface waters, Environmentally Sensitive Areas, Flora and Fauna.		Medium	Likely	Moderate	Potential sources of contamination including the historical landfill and Yelland Power Station have been identified in proximity to watercourses. Contaminants present in soils have the potential to be mobilised during construction and leach into surrounding surface waters. Groundwater could be used as a potential pathway as it may provide a baseflow into surrounding watercourses.
			Pollution of ecologically sensitive sites (SSSIs, SAC, AONB, MNR)	Medium	Likely	Moderate	One potential source of contamination (sewage site) has been identified within the Braunton Burrows SSSI/ SAC/ AONB with further sources of contamination located in proximity to the Taw Estuary SSSI. It is possible that construction works in this area may mobilise contaminants present having an adverse effect on the ecologically sensitive areas.
	Direct contact	Future buildings.	Building foundation corrosion	Mild	Unlikely	Low	Potential contamination could impact on the integrity of concrete foundations (associated with jointing bays, link boxes and transition bays along the route and the proposed substation building) through creating aggressive ground conditions however, limited potential sources of contamination have been identified along the preferred cable route hence the low likelihood.
	Gas and vapour migration	Construction and ground workers whilst working in confined spaces.	Health risk (methane, carbon dioxide and volatiles)	Severe	Likely	High	Without mitigation it is possible that workers will be exposed to ground gas migrating through permeable superficial deposits located beneath the Onshore Export Cable Corridor and Onshore Substation (associated mainly with the identified historic landfill and other potential sources of Made Ground) whilst within confined spaces during the construction phase of works and subsequent maintenance works (i.e. within jointing bays, link boxes and transition bays along the cable corridor) or within enclosed spaces within the substation building. The risk classification could be reduced with the use of appropriate working methods incorporated into a CoCP and the correct use of PPE as well as through the implementation of ground gas mitigation measures within buildings if found to be necessary.
		Maintenance workers working within confined spaces (assumed to be jointing bays, link boxes and transition bays) during the operational phase.					
		Future buildings (substation, jointing bays, link boxes and transition boxes).	Explosion (methane)	Severe	Likely	High	

Source	Pathway	Receptor	Associated hazard	Potential consequence of contaminant linkage	Likelihood of contaminant linkage	Risk classification	Justification
Off site sources discussed in **Table 12.43**	Lateral migration of dissolved phase contaminants in groundwater and migration beneath preferred cable corridor. Leaching and migration from unsaturated contaminated soils.	Groundwater within superficial Secondary A Aquifers.	Controlled Waters	Medium	Low likelihood	Moderate to low	Contaminants present in soils associated with the historic landfill, infilled land and surrounding, potentially contaminative industrial land uses identified within 250m of the Onshore Export Cable Corridor and Onshore Substation have the potential to leach into the superficial aquifers underlying the Onshore Export Cable Corridor and Onshore Substation.
		Groundwater within superficial Secondary Undifferentiated Aquifers.		Medium	Low likelihood	Moderate to Low	
	Gas and vapour migration	Construction and ground workers.	Health risk (methane, carbon dioxide and volatiles)	Severe	Likely	High	Without mitigation it is possible that workers will be exposed to ground gas migrating through permeable superficial deposits located beneath the Onshore Export Cable Corridor and Onshore Substation (associated with the identified historic landfill and other potential sources of Made Ground) whilst within confined spaces during the construction phase of works and subsequent maintenance works (i.e. within jointing bays, link boxes and transition bays along the Onshore Export Cable Corridor) or within enclosed spaces within the substation building. The risk could be reduced with the use of appropriate working methods incorporated into a CoCP and the correct use of PPE as well as through the implementation of ground gas mitigation measures within buildings if found to be necessary.
		Maintenance workers working within confined spaces (assumed to be jointing bays, link boxes and transition bays) during the operational phase.	Explosion (methane)	Severe	Likely	High	
		Future buildings (substation, jointing bays, link boxes and transition boxes).					

12.8 Conclusions and recommendations

12.8.1 Conclusions

55. The key objectives of the desk study and PRA were to provide information on the current condition of the Onshore Export Cable Corridor and Onshore Substation with respect to contamination, to characterise the environmental setting and to identify potential land quality risks and constraints identified with this project.

12.8.1.1 Summary of human health risk assessment

56. Based on the findings of the PRA, the risk posed to future and neighbouring site users from the isolated potential sources of contamination identified is considered to be **Moderate to low**. The risk posed to construction and maintenance workers with exception of sources of ground gas is considered to be **Moderate**.

57. The risk posed to construction and maintenance workers from the isolated potential sources of ground gas identified is considered to be **High**.

12.8.1.2 Summary of controlled waters risk assessment

58. Based on the findings of the PRA, the risk posed to surface waters from the isolated potential sources of contamination identified is considered to be **Moderate**. The risk posed to superficial and bedrock Secondary A Aquifers is considered to be **Moderate to low** and the risk posed to superficial Secondary Undifferentiated Aquifers is considered to be **Moderate to Low**.

12.8.1.3 Summary of other receptors

59. The risk posed to environmentally sensitive areas and to flora and fauna from identified isolated potential sources of contamination is considered to be **Moderate**.

60. The risk posed to buildings from identified isolated potential sources of contamination excluding ground gas is considered to be **Low**. The risk posed to future buildings from sources of ground gas is considered to be **High**.

12.8.1.4 Other identified risks

61. The risk posed by UXO is considered to be **Low**. However, special consideration should be given to the Braunton Burrows DIO training area as there is still a potential for UXO to be present in this area.

12.8.1.5 Recommendations and next steps

62. Based on the findings of the PRA the following recommendations are made:

- A post consent targeted intrusive ground investigation in potential source areas of contamination and GQRA to help better determine the presence, magnitude and extent of contaminants within the Onshore Export Cable Corridor and to inform discussions on appropriate mitigation measures to lower the risks identified within the PRA.
- Engagement and consultation with the Regulators (e.g. Local Authority Environmental Health Team) at an early stage (pre intrusive ground investigation) to agree a scope of works.
- Due to its use for DIO training purposes, it is recommended that further investigation is conducted on the section of the Onshore Export Cable Corridor adjacent to Braunton Burrows.
- A CoCP should be developed for use during construction works to protect workers, neighbouring site users, groundwater and surface waters. The CoCP should be further informed by the findings of subsequent intrusive ground investigation.
- Works should be undertaken in accordance with the requirements of the Health and Safety at Work Act, 1974 and the Construction Design and Management (CDM) Regulations, 2015.
- The movement and reuse of soils within the Onshore Export Cable Corridor should be undertaken in accordance with the CL:AIRE Code of Practice (CL:AIRE 2011) 'The definition of waste: Development Industry Code of Practice' where applicable; or an environmental permit that authorises the deposits of excavated material for recovery.
- The management of any waste activity must consider the waste hierarchy; hazardous waste must be managed in accordance with Hazardous Waste Regulations 2005; and the disposal of materials off site to landfill should be undertaken in accordance with the Landfill Regulations 2002.

12.9 References

CIRIA (2001). C552 Contaminated Land Risk Assessment, A Guide to Good Practice.

CL:AIRE, (2012). A Pragmatic Approach to Ground Gas Risk Assessment.

Devon County Council (2017). Devon Minerals Plan.

Environment Agency (2021). Land Contamination: Risk Management Guidance.

WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Annex A: Report Limitations

Limitations

The direct assessments and judgements given in this report are limited by both the finite data on which they are based and the proposed works to which they are addressed. The acquisition of data is constrained by both physical and economic factors and, by definition, is subject to limitations. Conditions at the site will change over time due to natural variations and may be affected by human activities.

This document has been prepared for the titled project and should not be relied upon or used for any other project. Royal HaskoningDHV accepts no responsibility or liability for the consequences of this document being used for a purpose other than that purpose for which it was commissioned. The assessments and judgements contained herein should not be relied upon as legal opinion.

The findings and opinions are relevant to the dates of the information reviewed and should not be relied upon to represent conditions at later dates. The opinions included herein are based on the information obtained from the assessments undertaken in the study area and from the experience of the reviewers.

This Phase I Land Quality Assessment has utilised a variety of publicly available data sources such as the Environment Agency, Envirocheck, historical maps and the British Geological Survey. Therefore, the study is limited by the age and limitations inherent in the data described.

WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Annex B: Zetica UXB Risk Maps

UNEXPLODED BOMB RISK MAP

SITE LOCATION

Map Centre: 244563,137902

LEGEND

- **High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
- **Moderate:** Areas indicated as having a bombing density of 15 to 49 bombs per 1000acre.
- **Low:** Areas indicated as having 15 bombs per 1000acre or less.

miltary	**industry**	**UXO find**
transport	**dock**	**Luftwaffe targets**
utilities	**Bombing decoy**	**other**

How to use your Unexploded Bomb (UXB) risk map?

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You can incorporate the map into your preliminary risk assessment* for potential Unexploded Ordnance (UXO) for a site. Using this map, you can make an informed decision as to whether more in-depth detailed risk assessment* is necessary.

What do I do if my site is in a moderate or high risk area?

Generally, we recommend that a detailed UXO desk study and risk assessment is undertaken for sites in a moderate or high UXB risk area.

Similarly, if your site is near to a designated Luftwaffe target or bombing decoy then additional detailed research is recommended.

More often than not, this further detailed research will conclude that the potential for a significant UXO hazard to be present on your site is actually low.

Never plan site work or undertake a risk assessment using these maps alone. More detail is required, particularly where there may be a source of UXO from other military operations which are not reflected on these maps.

If my site is in a low risk area, do I need to do anything?

If both the map and other research confirms that there is a low potential for UXO to be present on your site then, subject to your own comfort and risk tolerance, works can proceed with no special precautions.

A low risk really means that there is no greater probability of encountering UXO than anywhere else in the UK.

If you are unsure whether other sources of UXO may be present, you can ask for one of our **pre-desk study assessments (PDSA)**

If I have any questions, who do I contact?

tel: **+44 (0) 1993 886682**

email: **uxo@zetica.com**

web: **www.zeticauxo.com**

The information in this UXB risk map is derived from a number of sources and should be used in conjunction with the accompanying notes on our website: **(https://zeticauxo.com/downloads-and-resources/risk-maps/)**

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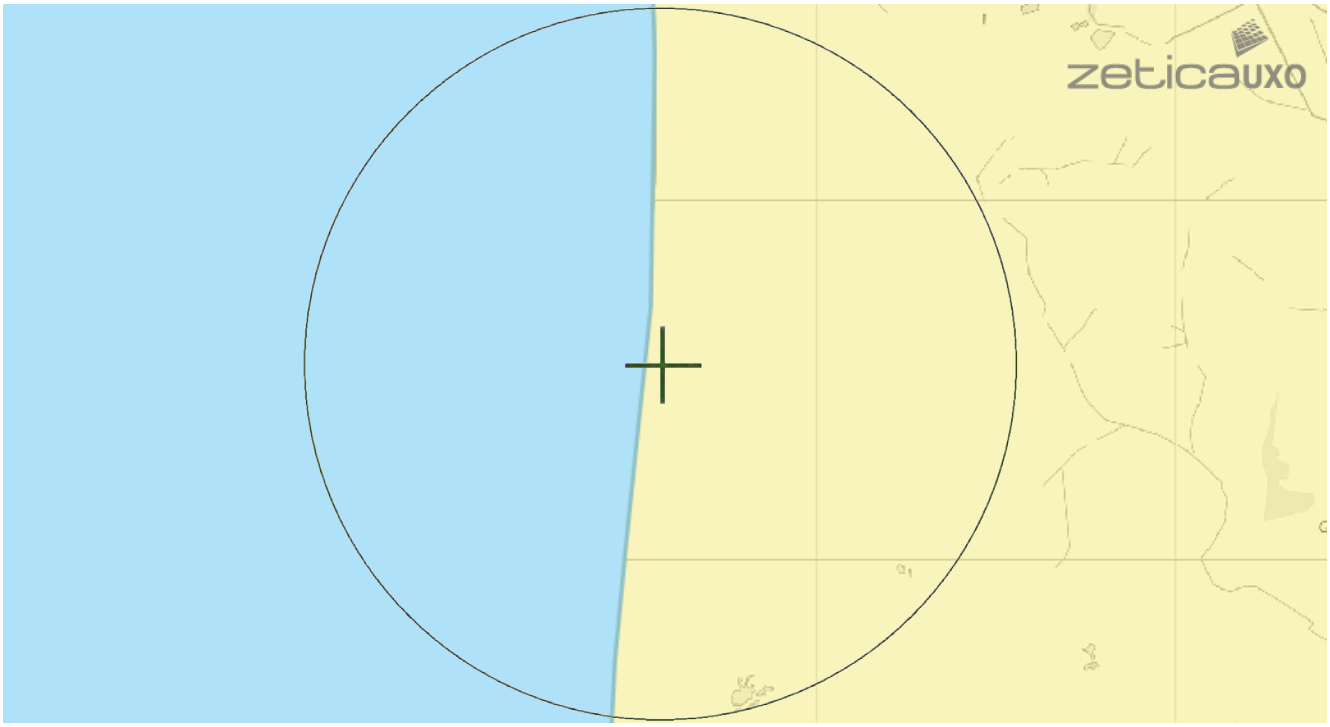
UNEXPLODED BOMB RISK MAP

SITE LOCATION

Map Centre: 244579,136547



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- **Moderate:** Areas indicated as having a bombing density of 15 to 49 bombs per 1000acre.
- **Low:** Areas indicated as having 15 bombs per 1000acre or less.

miltary | **industry** | **UXO find**
transport | **dock** | **Luftwaffe targets**
utilities | **Bombing decoy** | **other**

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UNEXPLODED BOMB RISK MAP

SITE LOCATION

Map Centre: 244971,134410

LEGEND

- **High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
- **Moderate:** Areas indicated as having a bombing density of 15 to 49 bombs per 1000acre.
- **Low:** Areas indicated as having 15 bombs per 1000acre or less.

miltary | **industry** | **UXO find**
transport | **dock** | **Luftwaffe targets**
utilities | **Bombing decoy** | **other**

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UNEXPLODED BOMB RISK MAP

SITE LOCATION

Map Centre: 246037,133215

LEGEND

- **High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
- **Moderate:** Areas indicated as having a bombing density of 15 to 49 bombs per 1000acre.
- **Low:** Areas indicated as having 15 bombs per 1000acre or less.

miltary	**industry**	**UXO find**
transport	**dock**	**Luftwaffe targets**
utilities	**Bombing decoy**	**other**

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UNEXPLODED BOMB RISK MAP

zeticaUXO

SITE LOCATION

Map Centre: 247351,131995

LEGEND

- **High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
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- **Low:** Areas indicated as having 15 bombs per 1000acre or less.

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transport | **dock** | **Luftwaffe targets**
utilities | **Bombing decoy** | **other**

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WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Annex C: Qualitative Human Health and Environmental Risk Assessment Methodology

Qualitative Methodology

The risk assessment considers the sources and potential receptors identified, together with linking pathways. These linkages are summarised in the Preliminary Conceptual Site Model and Qualitative Risk Assessment within the report, where the associated environmental risk is assessed for a given source and the end-use of the site. This assessment also takes account of specific chemicals of concern or groups of similar chemicals of concern. The column designated as 'Potential Consequence of Source- Pathway – Receptor-Linkage' in the Preliminary Conceptual Site Model and Qualitative Risk Assessment gives an indication of the sensitivity of a given receptor to a particular source/chemical of concern being considered. It is a worst case classification and is based on full exposure via the particular linkage being examined. The derivation of the classes used to rank this particular aspect is as follows based on CIRIA 552 'Contaminated Land Risk Assessment, A Guide to Good Practice' 2001:

Classification	Human Health	Controlled Water	Ecological	Built Environment
Severe	Acute risk to human health likely to result in 'significant harm' as defined by the Environmental Protection Act 1990, Part 2A	Substantial pollution of sensitive water resources	Significant change to the number of one or more species or ecosystems	Catastrophic damage to buildings, structures or the environment
Medium	Chronic damage to human health ('significant harm').	Pollution of sensitive water resources	Change to population densities of non-sensitive species	Damage to sensitive buildings, structures or the environment
Mild	Harm but not necessarily significant harm to humans	Pollution to non-sensitive water resources	Some change to population densities but with no negative effects on the function of the ecosystem	Easily repairable effects of damage to buildings or structures
Minor	Harm but not necessarily significant harm to humans which can easily be prevented with the use of PPE.	Slight pollution to non-sensitive water resources	No significant changes to population densities in the environment or in any ecosystem	Very slight non-structural damage or cosmetic harm to buildings or structures

Subsequently, in the column designated 'Likelihood of PCL, an assessment is made of the probability of the selected source and receptor being linked by the identified pathway. This assessment is ranked based on-site specific conditions as follows:

Classification of probability	Definition
High likelihood	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term
Low likelihood	There is a pollution linkage and circumstances are possible under which an even could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term
Unlikely	There is a pollution linkage, but circumstances are such that it is improbable that an event would occur in the very long term

The 'Risk Classification' column is an overall assessment of the actual risk, which considers the likely consequence of a given risk being realised and the likelihood of that risk being realised. The risk classifications are assigned using the following consequence/likelihood matrix:

Matrix				
Severe	Moderate to low	Moderate	High	Very High
Medium	Low	Moderate to Low	Moderate	High
Mild	Very Low	Low	Moderate to Low	Moderate
Minor	Very Low	Very Low	Low	Moderate to Low
Likelihood	**Unlikely**	**Low likelihood**	**Likely**	**High likelihood**

Overall risks are described as follows:

Very Low	The presence of the identified source does not give rise to the potential to cause unacceptable harm.
Low	It is possible that harm could arise to a designated receptor from an identified source, however, this is unlikely to be unacceptable.
Moderate	It is possible that harm could arise to a designated receptor from an identified source, but it is likely that such harm would be relatively localised or non-permanent - remedial action may be necessary.
High	A designated receptor is likely to experience unacceptable harm from an identified source without remedial action.
Very High	There is a high probability that severe unacceptable harm could arise to a designated receptor from an identified source without appropriate remedial action.

In cases of physical features, such as foundations and underground services, harm is defined as impact which would result in non-serviceability of the identified receptor or extra over build costs associated with redevelopment.