



Cambois Connection – Onshore Scheme
Environmental Statement Volume 3
Technical Appendix 10.1: Preliminary
Environmental Risk Assessment Report



Cambois Connection Onshore Scheme

Technical Appendix 10.1: Preliminary Environmental Risk Assessment Report

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SLR Project No.: 404.000041.00001

19 October 2023

Revision: A01

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
R01	31 July 2023	Josh Stinson	Siobhan Hall	Susie Playford
R02	28 August 2023	Josh Stinson	Siobhan Hall	Susie Playford
R03	17 October 2023	Jack Hughes	Susie Playford	Susie Playford
A01	19 October 2023	Jack Hughes	Susie Playford	Susie Playford

Basis of Report

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1.0 Introduction

1.1 Appointment

Berwick Bank Wind Farm Limited (BBWFL) is a wholly owned subsidiary of SSE Renewables (SSER) (hereafter referred to as 'the Applicant'). The Applicant is proposing the development of Offshore Export Cables, Onshore Export Cables, an Onshore Converter Station and associated grid connection at Blyth Substation in Northumberland, known as the 'Cambois Connection' ('the Project'). The onshore components of the Project, landward of Mean Low Water Springs (MLWS) comprise the Onshore Scheme.

The purpose of this infrastructure is to facilitate the export of green energy from the generation assets associated with the Berwick Bank Wind Farm (BBWF), located in the outer Firth of Forth. A separate application for developing a grid connection to Branxton, East Lothian, has been included as part of the Applicant's application for consent for BBWF, currently being determined separately¹. The Project will enable the BBWF to reach full generating capacity by the early 2030's.

The Project comprises two distinct proposals, or 'Schemes', which will require three separate consents. For the Onshore Scheme (all activities and infrastructure landward of MLWS) consent will be sought via a planning application to Northumberland County Council (NCC) as the local planning authority (LPA) under Section 57 of the Town and Country Planning Act 1990.

The offshore components of the Project seaward of Mean High Water Springs (MHWS) ('the Marine Scheme') are located within both Scottish and English waters. In Scotland, the Marine Scheme is entirely within offshore waters (i.e., between the 12 nautical miles (nm) limit and the Scottish Exclusive Economic Zone). In England, the Marine Scheme is within offshore waters and inshore waters.

SLR Consulting Limited (SLR) was commissioned by SSER (The "Client") to undertake a Preliminary Environmental Risk Assessment (PERA) of the Onshore Scheme (Figure 01), hereafter referred to as the 'Site'. This report documents the PERA methodology and results of the assessment and outlines any further recommended actions.

1.2 Proposed Development ('the Onshore Scheme')

The Site is located at Cambois, Northumberland, south of the River Wansbeck and north of the River Blyth.

The boundary for the Site along with the indicative infrastructure development zones is shown on Figure 02.

The Onshore Scheme includes a converter station to be constructed in close vicinity to the National Grid Blyth Substation, and associated export cables to enable the BBWF to connect to the National Grid.

The Site extends to an area of approximately 175 ha, however, it is expected that the land take for the Onshore Scheme will be approximately 32 ha, with the proposed converter station present in the western area of the Site, to the west of the existing North Sea Link (NSL) Converter Station, and the onshore cable route present through the centre of the Site, to the

¹ BBWF is subject to a separate consenting process. An application for consent under Section 36 of the Electricity Act 1989 (as amended) was submitted to MD-LOT and accepted in December 2022. The Branxton onshore infrastructure is subject to a separate planning application submitted to East Lothian Council and accepted in March 2023.



south of the former Britishvolt Factory (BV) site and to the south of the site to the existing grid connection point.

The Onshore Scheme comprises the following key zones as shown on Figure 02:

- Landfall and HVDC Zone:
 - A landfall location on the Cambois coastline;
 - High Voltage Direct Current (HVDC) onshore export cables connecting the offshore export cables at the landfall location and the proposed converter station;
- Converter Station Zone:
 - A converter station to convert HVDC electricity into High Voltage Alternative Current (HVAC), to allow incorporation into the UK energy network via underground HVAC cables;
- HVAC Zone:
 - HVAC underground grid cables connecting the proposed converter station to the existing National Grid Blyth substation located within the Northumberland Energy Park, to the north of the River Blyth.

Whilst each of the above development details have yet to be finalised, the PERA aims to report outline considerations in regard to potential for contamination which may impact upon any proposed development in these zones, to aid in design optimisation and determine potential constraints to the final detailed development plans.

This report assumes that the final development design, including building footprints, cable corridor locations and depths could occur within any location within the defined zone boundaries.

1.3 Background and Objectives

Further assessment of the Onshore Scheme is required to assess the potential environmental and ground condition concerns outlined within the factual baseline reports^{2, 3} for the Project.

The objective of this PERA report is to review all of the currently available information for the Site within the previous reports and develop a preliminary conceptual site model (PCSM) of potential risks to human, environmental receptors and property. The PCSM examines the potential for contaminant-pathway-receptor linkages. The potential risks associated with the potential linkages are discussed and SLR aims to outline recommended inspection and assessment measures for any potentially significant pollutant linkages identified.

The PERA will demonstrate to NCC that potential risks have been assessed in accordance with the current Land Contamination Risk Management guidance (LCRM)⁴.

In the absence of final development design, the PERA is only able to comment on potential or likelihood of risks to controlled waters, human health and property should the development occur within areas of concern highlighted.

² Berwick Bank Offshore Windfarm, Phase C Cable Landfall and Onshore Cable Route Site Assessment Report, Cathie, C9000-13-R01-02, August 2022

³ Cambois Connection Onshore Scheme, Volume 1: Environmental Impact Assessment Scoping Report, November 2022

⁴ Land contamination risk management (LCRM). <https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm>



1.4 Scope of Work

To adequately characterise the Site, in line with the requirements of LCRM, SLR has undertaken a review of existing, readily available information to develop a PCSM and determine the potential environmental risks and liabilities and Potential Pollutant Linkages (PPL) associated with the Site as outlined below:

- A review of land use history –a review of freely available historical maps;
- Assessment of site sensitivity and environmental setting –a review of geological and hydrogeological records (e.g. geological maps, groundwater sensitivity and vulnerability maps etc.);
- Review of existing baseline reports^{2,3} provided by the client;

The Site lies within a Coal Mining Reporting Area. A Coal Authority 'Development High Risk Area', is present in the northwest corner of the Site associated with the former Cambois Colliery. Cathie geotechnical engineers have undertaken a coal mining risk assessment⁵ and risks from coal mining have been assessed outwith this report:

- Site visit – a walkover of the Site and surrounding area has been undertaken to:
 - Assess visual evidence of contamination and identify potential sources of contamination associated with the Site;
 - Review the potential for pollution to have occurred at the Site;
 - Identify the surrounding land use;
 - Produce a photographic record of the Site; and
- Data assimilation and risk assessment – all relevant data has been gathered and summarised in this report outlining any outstanding pollutant linkages requiring further assessment following completion of the design.

1.5 Data Sources

SLR has collected and reviewed various reports and data sources in an attempt to characterise the Site and its surrounds. These sources are listed below:

- Berwick Bank Offshore Windfarm, Phase C Cable Landfall and Onshore Cable Route Site Assessment Report, Cathie, C9000-13-R01-02, August 2022;
- Cambois Connection Onshore Scheme, Volume 1: Environmental Impact Assessment Scoping Report
- Berwick Bank Offshore Windfarm, Coal Mining Risk Assessment, Cathie, C9000-24-01, September 2022;
- Information provided by the Magic Map DEFRA website;
- Information provided on the British Geological Survey website; and
- Google Earth/Streetview.

The information from the above sources is included within the following sections of this report.

⁵ Berwick Bank Offshore Windfarm, Coal Mining Risk Assessment, Cathie, C9000-24-01, September 2022.



2.0 Site Details

The following table summarises the background details of the Site in relation to the Onshore Scheme.

Table 2-1 Site Details

Site Details	
Site Address	Land at Cambois, Blyth, Northumberland, NE22 7BH.
National Grid Reference	Centre of Site - 429790, 583910.
Site Area	Approximately 175 ha based on which comprises three zones: the Landfall/HVDC Zone, Converter Station Zone and HVAC Zone.
Current Site Use	Full description of the Site is provided within the Site Walkover notes in Section 3.0.
Surrounding Land Use	North A large area of land in the north of the Site, which extends outwith the Site boundary, is currently derelict, however, is proposed to be developed by Britishvolt (BV) for a battery Gigaplant factory. A business park is present and further derelict land (former colliery) and the River Wansbeck beyond.
	West The A189 road forms the western boundary of the Site, with aggregate industries concrete factory and agricultural land beyond.
	South The River Blyth and the Sleek Burn form the southern boundary of the Site, with the Port of Blyth Harbour, a sewage works, a business park and residential housing beyond.
	East The North Sea (Tyne and Wear Coastal Waters) is present to the east of the Site.
Historical Land Use	<p>Available historical information and the previous baseline report by Cathie² indicates that the majority of the Site has experienced some degree of development, including a power station, coal storage and processing and associated industries e.g. rail, brick works, iron foundry etc.</p> <p>In addition, other developments on the Site include the construction of the A189 road bordering the western edge of the Site and the railway line to the east, which has been present since approximately 1898.</p> <p>The earliest map dated from 1865, shows the Site was largely undeveloped consisting of agricultural fields and coastal dunes.</p> <p>During the second world war it appears a series of pill boxes and an air raid shelter were located on and directly behind the coastal dunes in the east of the site, though no evidence of these was identified during the archaeological walkover carried out in February 2023;.This may be due to erosion and removal for the reuse of the landscape for leisure use (refer to Appendix 8.1: Archaeological Desk-Based Assessment).</p> <p>A large proportion of land in the south of the Site, directly to the south of Brock Lane was occupied by Blyth Power Station from 1974 until 2001 when it was decommissioned.</p> <p>The disused land in the north of the Site (which extends outwith the boundary) has experienced development since 1966 including a mineral railway, maintenance facility, bulk storage (coal and Pulverised Fuel Ash (PFA)), settling ponds, conveyors and extensive drainage.</p> <p>The BV Geotechnical and Geo-environmental report (summarised within the Cathie report 'Berwick Bank Offshore Windfarm, Cable Landfall and Onshore</p>



Site Details		
	<p>Cable Route Site Assessment Report C9000-13-R01-02' (refer to Table 2-2), explains this area was historically used as a coal stocking yard associated with the former Power Station until the 1990s. Coal supplies were transported via overhead conveyors to the power station site to the south. Coal stocking yards with drainage channels, PFA mounds, ash lagoons, associated facilities buildings and a Thermalite factory have all been present within this area.</p> <p>Cambois Colliery was located to the north of the Site from 1898 and operated until 1968. Associated colliery housing is still present to the north of the Site.</p> <p>During 1978 Battleship wharf, to the south, in the Port of Blyth was used as a landfill for construction waste.</p> <p>A business park and more recently a sewage works, are located northwest of the Site.</p> <p>Other land use in the surrounding area historically has been predominantly agricultural. The Port of Blyth and a Ferry Terminal is located to the southeast of the Site.</p>	
Geography	Elevation, Topography and Gradient	<p>The topography across the area is gently rising to the west, with an elevation of approximately 5 m above Ordnance Datum (aOD) in the east to 14m aOD in the west.</p> <p>Two historical PFA stockpiles are located in the centre of the Site which are distinct topographic features at approximately ~25 m aOD.</p>
	Flooding	<p>The environmental data search for the Cathie report² indicates that the majority of the Site is classed as 'Limited Potential for Groundwater Flooding to Occur'.</p> <p>The south of the Site (in the vicinity of the former Blyth Power Station) and the southwest have been identified as 'Potential for Groundwater Flooding of Property Situated below Ground Level'.</p> <p>The existing North Sea Link (NSL) Converter Station are noted as 'Potential for Groundwater Flooding to Occur at Surface'.</p> <p>The Environment Agency (EA) flood probability mapping indicates the dune / cliff areas immediately adjacent to the North Sea are classified as Flood Zone 3 ('Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding'). A small area to the south of Cambois Primary School, which is to the east of Unity Terrace at a short distance from Cambois Beach and adjacent to the Blyth Ferry Terminal is classified as Flood Zone 2 ('Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding'). A flood risk assessment is required for development in both of these areas. The remainder of the area is classified as Zone 1 – 'Land having a less than 1 in 1,000 annual probability of river or sea flooding'.</p>
	Surface Water	<p>There are two surface watercourses in close proximity of the Site. The river Wansbeck is located ~1 km to the north of the Site and Sleek Burn / River Blyth adjacent to the southern boundary. Sleek Burn originates outside of the Site to the west, running under the A189 and merging with the river Blyth in the centre of the southern site boundary. The river Blyth continues seawards in a south easterly direction for ~4 km.</p>



Site Details		
		<p>The Sleek Burn, river Blyth and River Wansbeck all have a 'moderate' overall classification and a "moderate' ecological classification⁶ according to Defra.</p> <p>The North Sea is present beyond to the eastern boundary of the Site and that area of the coastline is designated as a Marine Conservation Zone⁷ and a Special Protection Area (Marine Components GB).</p>
Geology and Hydrogeology	Geology – British Geological Survey (BGS)	<p><u>Made Ground (MG)</u></p> <p>Information provided by the BGS does not indicate the Site as being underlain by Made Ground.</p> <p>The Magic Map application⁷ records an area of built up ground within the central north of the Site, which extends north beyond the site boundary into the former BV site.</p> <p><u>Superficial</u></p> <p>The superficial deposits beneath the Site are recorded predominantly as Glacial Till.</p> <p>The foreshore area is recorded as coastal dunes comprising of Blown Sands.</p> <p>The nearshore superficial deposits, to the east of the Blown Sands, comprise Marine Beach Deposits.</p> <p><u>Solid</u></p> <p>The bedrock geology comprises the Pennine Middle Coal Measures Formation, with the majority of the Site being underlain by Sandstone.</p> <p>A southern portion of the Site and a small western portion of the Site are recorded to be underlain by Mudstone, siltstone and sandstone of the same formation.</p> <p>An igneous intrusion is present in the north of the Site: Mull Dyke-swarm – Microgabbro, running in a northwest to south orientation.</p> <p>An additional igneous intrusion: Mull Dyke-swarm – Microgabbro, of similar orientation is present to the south beyond the Site boundary and south of the river Blyth.</p>
	BGS Borehole Information	<p>BGS borehole records from within the Site, record Glacial Till deposits described as boulder clay to be present up to depths of between 13 m and 18 m below ground level (bgl). Bedrock is recorded to be present from ~15 m bgl comprising shale and sandstone.</p>
	Mining	<p>The Site is located within a Coal Mining Reporting Area. A Coal Authority 'Development High Risk Area' is present in the northwest of the Site associated with the former Cambois Colliery.</p> <p>A Coal Mining Risks Assessment has been undertaken previously by Cathie⁵.</p>
	Aquifer Status	<p>The Glacial Till superficial deposits at the Site are designated as a Secondary (undifferentiated) aquifer. The superficial Marine and Blow Sand deposits to the east are designated as Secondary A aquifer.</p>

⁶ <https://environment.data.gov.uk>

⁷ <https://magic.defra.gov.uk/MagicMap.aspx>



Site Details		
		The bedrock deposits at the Site are classified as a Secondary A Aquifer.
	Groundwater Vulnerability and Classification	The Site is not located within a Source Protection Zone. The groundwater vulnerability map ⁷ records the Site to be in an area of Medium to Low vulnerability.
	Abstractions (within 1km)	A licensed surface water abstraction point is recorded close to the southeast corner of the Site in the vicinity of Blyth Ferry Terminal.
	Radon Gas	The UK Radon map ⁸ records the majority of the Site to be in the lowest band of radon potential. Less than 1% of homes at or above the Action Level and no radon protective measures are necessary in the construction of new dwellings or extensions. The east of the Site is recorded to have elevated radon potential. Maximum radon potential is 1-3%.
Regulated Processes	Licences and Permits	The Envirocheck report utilised for the Cathie report ² records a historic waste facility or landfill site located ~700 m southeast of the Site, associated with the former Blyth Power Station, which was registered as having prohibited waste 'Liable To Cause Environmental Hazards Poisonous, Noxious and Polluting Wastes'. The Envirocheck report also records a registered active landfill site located at Blyth Power Station. The PFA Mounds present within the east of the Site are recorded as an inactive Licensed Waste Management Facility, inputting equal to or greater than 75,000 tonnes of PFA per year when operational.
	UXO (Unexploded Ordnance)	The Cathie report ² contains a pre desk study to further assess the potential UXO risks at the Site. The report recommended that a non intrusive UXO detection survey is undertaken in areas of potential UXO risk, in advance of intrusive works.

2.1 Previous Developments Investigations and Assessments

2.1.1 Planning Applications

A planning application (15/02706/DEMGDO) is present for prior notification of proposed demolition of 16 No. residential properties | 6, 8, 10, 12, 13, 15, 17, 19, 25 And 27 Waterfield Road 6, 8, 10, 12, 14 And 16 Sandfield Road, East Sleekburn, Bedlington, Northumberland NE22 7BH, dated 2015. These are some of the properties located in the centre of the Site but outwith the Site boundary. The decision was issued in Sept 2015 as 'Prior Approval not required'.

2.1.2 Previous Assessments

The Site has been subject to previous assessments associated with the Onshore Scheme, listed in Table 2-2 below and detailed in section 2.1.3.

⁸ <https://www.ukradon.org/information/ukmaps> [Accessed August 2023].



Table 2-2 Previous Assessment Reports

Ref	Date	Document Title and Author
1	August 2022	Berwick Bank Offshore Windfarm, Cable Landfall and Onshore Cable Route Site Assessment Report, Cathie, C9000-13-R01-02
1*		North Sea Link, Blyth Converter Station Site Ground Investigation (*summarised within report ref [1]).
1*		Britishvolt Geotechnical and Geo-Environmental Site Investigation (*summarised within report ref [1]).
2	September 2022	Berwick Bank Offshore Windfarm, Coal Mining Risk Assessment, Cathie, C9000-24-01
3	November 2022	Cambois Connection Onshore Scheme, Volume 1: Environmental Impact Assessment Scoping Report, XODUS, A-100742-S00-A-REPT-001

2.1.3 Summary of Previous Environmental Risk Assessments

[1] Berwick Bank Offshore Windfarm, Cable Landfall and Onshore Cable Route Site Assessment Report

The primary objective of the report was to establish an indicative Landfall and Onshore cable route to connect the Berwick Bank export cable to the proposed converter station and grid connection point at Blyth substation, based on a desk-based review and technical considerations.

The report concluded that the southern landfall option has fewer constraints, which is the landfall option now incorporated into the revised site boundary and part of the ‘Site’ discussed within this report.

The report recommended ground investigation to confirm geology, carry out geotechnical testing, carry out gas and groundwater monitoring and laboratory testing of soil.

North Sea Link, Blyth Converter Station Site Ground Investigation (summarised within report ref [1])

The investigation comprised boreholes, trial pits and geotechnical testing. Recorded ground conditions comprised topsoil over Glacial Till to depths of 23m bgl. No made ground or visual and olfactory evidence of contamination was encountered on the site.

Groundwater was recorded between 0.5 and 5.6m bgl within borehole installations.

No laboratory analysis of soil or groundwater was reported.

Britishvolt Geotechnical and Geo-Environmental Site Investigation (summarised within report ref [1])

The investigation comprised boreholes and trial pits across the site. The ground conditions comprised a continuous layer of Made Ground across whole site of varying thickness between 0.5 m to 3.0 m. PFA was encountered within several trial pits.

Glacial Till was recorded across the site, with isolated organic rich clays and peat encountered in some locations between 2-3 m bgl. The glacial till is generally noted to comprise firm to stiff sandy clay with a weathered profile to approximately 1.4 m bgl.

Extremely weathered bedrock was encountered between 19.4 m and 29.6 m bgl, resulting in an estimated thickness of peat beneath the site of greater than 18 m.

No groundwater monitoring data or laboratory analysis of soil or groundwater was reported.



Elevated levels of Carbon Dioxide were recorded in the centre of the site, up to maximum of 12.6% and elevated levels of Methane were also consistently recorded within the southern PFA mound.

[2] Berwick Bank Offshore Windfarm, Coal Mining Risk Assessment

The assessment of risk related to historic coal mining indicated that there is expected to be a relatively low risk of significant impacts, and adequate investigation should be carried out in the areas where shallow coal workings may be present.

Part of the site is designated as a 'Development High Risk Area' and the possibility of encountering very shallow unrecorded workings or mine entries, locally broken / fissured ground or mine gas cannot be completely ruled out, although the desk study indicates a reasonably thick cover of Drift deposits in this area.

It concludes that cable routes to and from a converter station have much relatively lower sensitivity to these potential mining related risks than the converter station structures.

[3] Cambois Connection Onshore Scheme, Volume 1: Environmental Impact Assessment Scoping Report

The EIA Scoping Report identifies the main receptors that may potentially be significantly impacted by the construction, operation and maintenance and decommissioning of the onshore scheme. For geology and contaminated land, the main potential impacts identified were during the construction phase.

2.1.4 Site History

The summary of the review of publicly available information is provided within Table 2-1.

The review of previous assessments has indicated that the Site has been subjected to former industrial activities including a power station, underground mine workings, mineral railway, bulk storage of coal and PFA and utilisation during the second world war for construction of pill boxes, an air raid shelter and pipe mines.

2.1.5 Site History Summary

The potentially contaminative former and current uses are detailed below:

On-site:

- Coal storage / processing;
- Recorded landfill (PFA);
- PFA storage / processing;
- Mineral railway / maintenance facilities
- Colliery spoil / waste
- Potential underground mine workings;
- Agricultural land;
- UXO;

Former use as a power station in the south:

- Coal fire power generation;
- Potential above ground oil storage tanks;
- Potential chemical plant and storage;



- Fuel waste / ash (including potential asbestos);

Off-site:

- Adjacent A189 to the west;
- Former colliery to the north;
- Historic landfill site to the southeast; and
- Infilled ground to the north (infilled ash lagoons).



3.0 Site Walkover

3.1 Site Survey Inspection

SLR undertook a survey of the Site and surrounds on 23rd and 24th March 2023. The results of the walkover inspection are presented below, and photographs are provided within Appendix 01. The walkover was undertaken across the Site to determine current site conditions.

3.1.1 Landfall / HVDC Zone

The Site walkover extended from the shoreline in the east to the western extent of the former BV site. The backshore area is predominately flat comprising grassed over dune systems bounded to the west by the Unity Terrace with housing and Cambois Primary School beyond. The land is publicly accessible and was generally noted to be free from obvious signs of gross contamination. The former housing development to north and south of the primary school had no obvious signs of demolition material with the ground grassed over. An active railway bisects the Site parallel to the Unity Terrace.

In the north of the zone is a site occupied primarily by scrap vehicles with signage indicating the site is used as a vehicle maintenance yard. This land was not accessed and was only observed from the rail bridge to the north.

Moving west the land is significantly raised by the north south linear former railway, accessed through narrow entrance in the south adjacent to Cow Gut watercourse. The railway is situated on a large bank of material, at points visibly evident to comprise colliery spoil type soils. The former rail maintenance facility was not accessible with a high green palisade fence bordering the area.

To the west of the railway embankment, a series of heavily modified watercourses separate the Site boundary from the large PFA mounds within the former BV site. To the north Maw Burn flows east between the two PFA mounds, before being culverted at the former BV site eastern boundary, mapped to issue directly east within the marine waterbody. In the south, Cow Gut is diverted around the southern end of the larger PFA mound before diverting south at the former BV site boundary where flow is parallel to the fence line. The water course flows south before being culverted beneath Brock Lane and eventually mapped to issues into Port of Blyth.

The two large PFA mounds were generally grassed over with a narrow band of topsoil evidence in cutting of approximately 15 cm overlying PFA type material. The wider former BV site is surfaced with mixed asphalt and concrete hard standing with a number of open surface water drains channelling water south-east towards two large (boarded off) settlement ponds. A number of stockpiles are present on the former BV site, relating to graded natural material and colliery spoil material free from obvious indicators of contamination. The former BV site is cleared of any former buildings or above ground infrastructure relating to its industrial history. A newly constructed surface water drain, channels water before the southwest boundary of the former BV site south where it appears to be culverted beneath Brock Lane.

3.1.2 Converter Station Zone

The zone is predominately occupied by four agricultural fields each internally bounded by hedgerows and externally by the woodland to the north and west, NSL Converter Station to the east and Brock Lane to the south. Beyond the woodland to the west is the north-east south-west orientated A189. In the east of the Site is what appears to be restored land formerly occupied by the contractor's compound for the NSL development adjacent. The fields are grassed, with clayey organic topsoils observed at surface. A narrow strip of land for the NSL



development link cable is evident in the east, with the contrast in vegetation growth marking the buried cables excavation extents (approximately 20 m wide). A number of pylon columns and bases bisect the zone east west in the south. The field area is accessed by a gate in the south-east.

3.1.3 HVAC Zone

The land outwith the overlapping area of the Landfall / HVDC Zone is predominately south of Brock Lane and is occupied by a number of agricultural fields. The HVAC Zone to the east within the land occupied by the Energy Park was not accessible for the Site walkover. A series of asphalt tracks are recorded centrally, possibly associated with the adjacent Blyth Substation development to the east or former power stations. Whilst no visible evidence of contamination was recorded, potential extensive made ground soils may be associated with the former track network.

The southern area is bounded by the Sleek Burn into the River Blyth. A large drainage outlet, supported with extensive rock armour, connected to the NSL Converter Station is noted out falling into Sleek Burn.

The area to the west was noted as densely wooded, with limited access. A housing development is located immediately south of this wooded area, slightly down topographic gradient from the Site.



4.0 Preliminary Conceptual Model and Risk Assessment

4.1 Preliminary Conceptual Site Model

As part of the evaluation of the Site and in accordance with current best practice, the Site has been considered in terms of a preliminary CSM using the principles of a risk assessment comprising the potential *Source – Pathway – Receptor* (S-P-R) model of potential pollutant linkages in accordance with LCRM⁹.

Table 4-1 lists the potential sources, pathways and receptors identified at the Site and presented thereafter on Figure 4-1. Sources

Table 4-1 Preliminary Conceptual Site Model

Preliminary Conceptual Site Model
<p>The principal sources of contaminants of concern (CoC) at the Site are likely associated with historical use as a coal and PFA storage, power station and mineral railway with maintenance facility, outlined below, with previous site uses of interest shown separately and CoCs presented in bold.</p> <p>Historical mapping indicates that the Site was historically associated with coal yard for storage and processing.</p> <ul style="list-style-type: none">• <u>Coal Storage and Colliery Spoil: Main CoC – Hazardous Ground Gases, Heavy Metals, Sulphates, Asbestos.</u>• <u>Coal content within Colliery Spoil potential source of combustible materials.</u> <p>Historical mapping indicates that the Site was historically occupied by the operation of a mineral railway.</p> <ul style="list-style-type: none">• <u>Extensive Made Ground potentially present on and off-site: Main CoC – Hydrocarbons (fuels, oils and Lubricants), PAHs, PCBs and Asbestos.</u> <p>Historical mapping indicates that the Site was formerly occupied by Blyth Power Station in the south (however this area is likely out with the development footprint).</p> <ul style="list-style-type: none">• <u>Main CoC – Hydrocarbons, Asbestos, Lubricating Oils, PCBs, Acids, Alkalis, Sulphurous Compounds, Cleaning Reagents, Pulverised Fuel Ash (PFA).</u> <p>Historical mapping indicates that the Site was formerly occupied as a landfill comprising the deposition and stockpiling of PFA.</p> <p>Historical mapping indicates former railway maintenance facility located to the northeast of the Site. Historical photographs indicate use of the Site for fuelling with visible staining at surface.</p> <ul style="list-style-type: none">• <u>Extensive Made Ground potentially present on and off-site: Main CoC – Hydrocarbons (fuels, oils and Lubricants).</u> <p><u>Other Sources:</u></p> <p>The Site is located within an area of elevated radon potential of 1-3%.</p> <p>A parcel of land in the north-east is currently utilised for storage, maintenance and scrapping of motor vehicles. This area is located above the former reservoir, infilled in the mid-20th century.</p> <p>Former terraced housing adjacent to the current primary school appears demolished in the mid-20th century.</p>

⁹ July 2023. Land Contamination Risk Management (LCRM): Stage 1 Risk Assessment.



Preliminary Conceptual Site Model

- **Agricultural fields: Main CoC – pesticides.**

Infilled ground and historic landfill sites in close proximity to the south.
 Presence of UXO.

Previous Reports:

Made ground up to 3 m thickness was identified in the northern part of the Site to the south of the former BV site, inferred to underlie the former coal yard. The west is recorded to be underlain by Glacial Till to >18 m bgl overlying coal measures bedrock.

Pathway	Description	
Ingestion of soils and soil-derived dusts, direct contact with soils, inhalation of soils and soil-derived dusts. Indoor inhalation of hazardous ground gases.	On-site	Via direct contact, inhalation or ingestion of contaminated soils or inhalation of dusts generated during future site operations by construction workers or site users.
Migration of hazardous ground gases into buildings	On-site	Via migration through permeable shallow soils (made ground), historical mine workings and proposed onshore cable route.
	Off-site	Via lateral migration through permeable shallow soils (made ground) and historical mineworking's. Via movement of groundwater downgradient and volatilisation of contaminants and ground gases.
Drainage (surface water drainage with former coal yard)	On-site	Via watercourse, surface and foul water drainage discharging south towards the marine water body, River Blyth and Port Blyth freshwater bodies.
Leaching of mobile CoC to controlled waters	Groundwater (Shallow)	Leaching of soil-borne contaminants through shallow permeable strata to shallow perched groundwater.
	Groundwater (Superficial Deposits)	Migration of impacted groundwater via preferential pathways (service conduit and ducts) to groundwater body within superficial deposits. Lateral and vertical migration within superficial deposits will be limited due to low permeability.
	Groundwater (Deeper Aquifer)	Vertical migration of contaminants from perched groundwater to underlying bedrock aquifer.
	Surface Water	Lateral migration of soil-borne contaminants and drainage water via preferential pathways (proposed onshore cable route, service conduits and ducts) to the River Blyth at the southern Site boundary and North Sea at the eastern boundary. Limited by presence of hardstanding across the Site.
Exposure of proposed buildings	Damage to property / concrete from aggressive ground conditions and potential ground instability.	

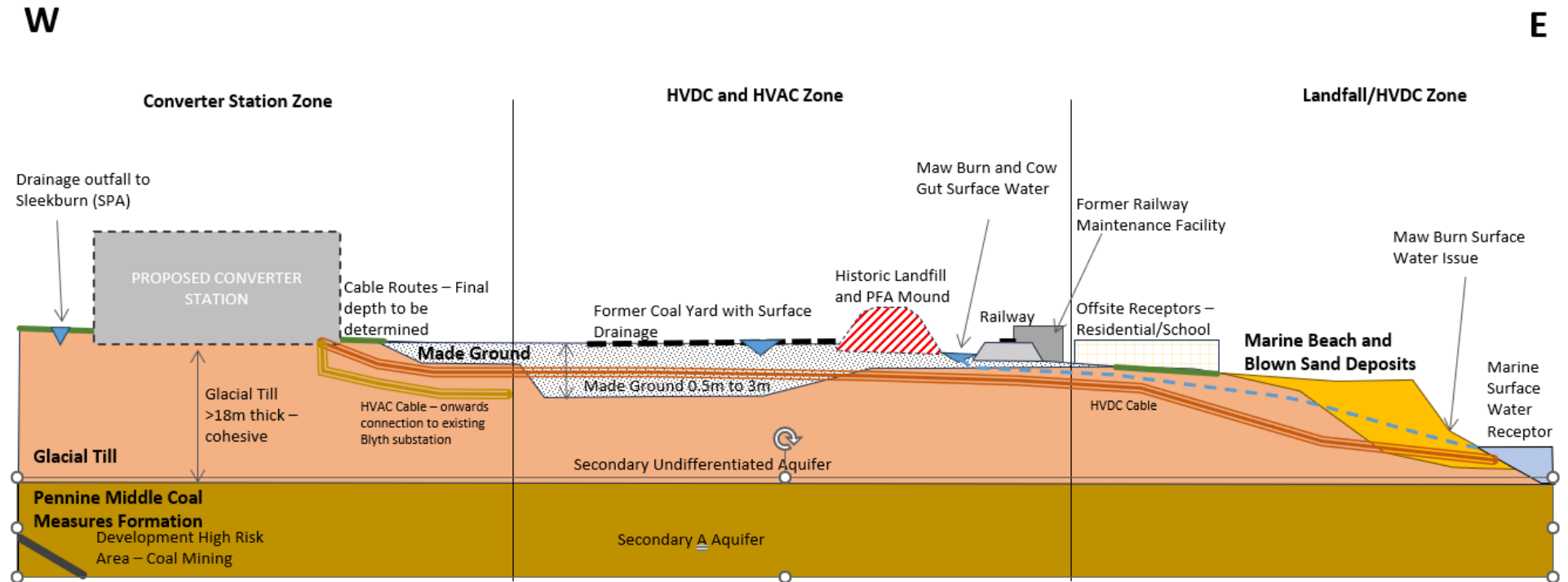


Preliminary Conceptual Site Model	
and cable to aggressive ground / differential settlement/ phytotoxic concentrations in soils	Damage to property from combustible materials (i.e. coal content within colliery spoil) of shallow soils within the area of the proposed cable corridors for the import and export cables.
Exposure of services and buildings to contaminants	Direct contact of services / buildings to contaminants in soil or in migrating groundwater.
Receptor	Location
Future site users and construction workers.	The proposed convertor station is located in the west. Construction along the cable route corridor will involve deep excavations into Made Ground soils.
On-site buildings	The proposed converter station is situated in the west of the Site.
On-site members of the public	Public footpath and public open space within the boundary of the Site to the east and in the centre of the Site.
Groundwater	The superficial deposits at the Site are designated as a secondary (undifferentiated) aquifer. Superficial deposits in the east are classified as Secondary A Aquifers. The bedrock deposits at the Site are classified as a Secondary A Aquifer.
Surface waters	The nearest surface water features are the Sleek Burn and River Blyth adjacent to the southern Site boundary, and the North Sea marine water body adjacent to the eastern boundary. The River Wansbeck is located ~1 km to the north of the Site. The three rivers have 'moderate' overall and ecological classification according to Defra. The North Sea at the coastline is designated as a Marine Conservation Zone and a Special Protection Area (SPA). Cow Gut and Maw Burn bisect the eastern area of the Site, flow east and south respectively. Each surface water is heavily modified.
Offsite residential properties	The closest residential development is located within the centre of the Site however, is excluded from the development boundary and therefore classified as 'offsite'.

Based on the above key contamination sources, pathways and receptors outlined above, a schematic presentation has been outlined in the context of the development zoning within Figure 4-1.



Figure 4-1: Preliminary Conceptual Site Model¹⁰



¹⁰ This cross-section / CSM model is schematic and for context only and Indicative Zones of Infrastructure are more accurately depicted in Figure 02.



4.2 Preliminary Environmental Risk Assessment

Following the desk study and review of existing information on the Site and surrounds, potentially contaminative former site uses were identified at on and offsite locations.

The Onshore Scheme will comprise a converter station, landfall area and underground transmission cables (HVAC and HVDC). The PCSM has identified potential risks to receptors including human health, controlled waters and property. Further detailed consideration of the PCSM is detailed below in the context of each Onshore Scheme zone.

4.2.1 Potential Pollutant Linkages

Based on the identified source-pathways-receptors generated, the potential pollutant linkages have been determined in the context of proposed end use of each development zone i.e., a situation where the source(s), pathway(s) and receptor(s) are all present at a site and therefore a real (as opposed to a perceived) risk of potential impact exists. These are presented below in Table 4-2.

Table 4-2: Potential Pollutant Linkages and Development Zones

Linkage	Zone	Assessment Likelihood of PPL
On-site health	Landfall / HVDC	<p>Present: The shallow Made Ground within the Site may contain elevated concentrations of contaminants based on the historic site usage and pose risks to sensitive future users.</p> <p>The presence of any gross concentrations of separate phase hydrocarbons that may be present from the former rail maintenance facility may pose potential short terms exposure risks during the construction phase.</p> <p>Any potential for asbestos may be present in shallow surface soils / Made Ground and may potentially represent an inhalation risk for respirable fibres if these are disturbed and generated by future site works and pose potential risks to construction workers.</p> <p>The Zone is located within an area of elevated radon potential 1-3% and radon protection measures may be required.</p> <p>Potential linkage via soil derived dusts during construction phase of works to the public as the Site is generally open to the public with public footpaths in the east and public roads through the centre of the Site. However, risk can be mitigated with by appropriate dust suppression measures during the construction phase, as detailed in Volume 2, Chapter 14: Air Quality and Volume 3, Technical Appendix 14.3: Air Quiliaty Mitigation Measures.</p>
	Converter Station	<p>Unlikely: No significant thickness of made ground or former contaminative sources are considered likely within this development zone.</p> <p>Hazardous ground gasses derived from the potential mine workings underlying the Site have the potential to migrate into site buildings through permeable Made Ground and preferential pathways such as the onshore cable corridor, piled foundation, fractured bedrock, the mine workings themselves, service corridors and ducts. However, this is limited by the presence of significant thicknesses of lower permeability Glacial Till and is unlikely to pose a risk.</p>
	HVAC	<p>Potentially Present: No significant thickness of made ground or former contaminative sources are considered likely within the development zone. Localised areas of made ground present at road and path crossings, unlikely to be considered a significant source of contamination.</p>



Linkage	Zone	Assessment Likelihood of PPL
On-site buildings and Property	Landfall/HVDC	<p>Potentially Present: Potential damage to cable route concrete from aggressive ground conditions if present.</p> <p>Unlikely: Potential damage to property may occur from combustible materials (i.e. colliery spoil with a high coal content) within the area of the proposed cable corridors final route, however unlikely due to soils inherent moisture content and on the provision of thermally suitable backfill material utilised within any cable corridors.</p>
	Converter Station	<p>Potentially Present: Potential damage to concrete from aggressive ground conditions.</p> <p>Unlikely: Explosive risks to property from hazardous ground-gas. This is not considered present given the absence of a viable significant source of methane.</p>
	HVAC	<p>Potentially Present: Potential damage to cable route may occur from aggressive ground conditions if present.</p> <p>Potential damage to property from combustible materials within the area of the proposed cable corridors for the import and export cables.</p>
Off-site buildings	All Zones	<p>Unlikely: Superficial deposits recorded at the Site are Glacial Till which will mitigate lateral movement of groundwater, volatilisation of contaminants and ground gases.</p>
Groundwater (Superficial deposits)	Landfall/HVDC	<p>Potentially Present: Groundwater beneath the Site may be considered a potential pathway for migration of mobile contamination to surface water receptors (Sleek Burn, River Blyth and the North Sea). There is also a licensed surface water abstraction point recorded close to the southeast corner of the Site in the vicinity of Blyth Ferry Terminal.</p> <p>Whilst there is potential for leachable contaminants to migrate into groundwater through vertical migration and lateral migration through permeable Made Ground and preferential pathways onsite, the underlying Glacial deposits are classified as a Secondary Undifferentiated Aquifer and unlikely to be considered a sensitive receptor due to the lower permeability nature of the cohesive soils.</p> <p>The Marine and Blown Sand deposits are classified as a Secondary A aquifer, the proximity to the marine body and absence of abstraction from the aquifer indicate risks to the receptor are low.</p>
	Converter Station	<p>Unlikely: The underlying Glacial deposits are classified as a Secondary Undifferentiated Aquifer and unlikely to be considered a sensitive receptor due to the lower permeability nature of the cohesive soils.</p>
	HVAC	<p>Unlikely: The underlying Glacial deposits are classified as a Secondary Undifferentiated Aquifer and unlikely to be considered a sensitive receptor due to the lower permeability nature of the cohesive soils.</p>
Groundwater (Bedrock)	All Zones	<p>Unlikely: The underlying solid geology of the Site is classified as a Secondary A Aquifer. Groundwater is likely to be present in the Pennine Middle Coal Measures Formation, but mobility of water via filtration will be restricted by the extensive thickness of overlying Glacial Till (>18 m). Groundwater in the bedrock will generally be mobile within the fractures, joints, and faults but any significant movement in the vertical direction is likely to be restricted by mudstone layers.</p>



Linkage	Zone	Assessment Likelihood of PPL
		Significant dilution of the groundwater body by tidal influence of the North Sea is expected, which would limit the suitability for abstraction for human consumption.
Surface water	Landfall/HVDC	<p>Present: Via surface runoff or lateral migration of potentially impacted groundwater to surface water receptors.</p> <p>The nearest surface water receptors are the River Blyth to the south and the North Sea to the east. Maw Burn flows east before being culverted and directly issuing into the marine receptor. Cow Gut watercourse flows south issuing into Port of Blyth via a culvert beneath Brock Lane.</p> <p>Historical sources of contaminants of concerns potentially present including potential presence of mobile contaminants from former railway maintenance facility in the north. Present site drainage and water courses considered pathway to marine surface water environment and river Blyth to the south.</p> <p>The relatively low permeability Glacial Till and discontinuous nature of the shallow groundwater bodies underlying the zone are likely to limit the potential migration of contaminants laterally from the source areas.</p>
	Converter Station	<p>Potentially Present: Given the absence of potentially significant sources credible risks to the surface water are not considered viable. However, given the proximity to the surface water receptor (River Blyth) 350 m south, preferential pathways in the form of surface water and foul drainage need to be assessed following final design should any potential onsite sources of contamination be identified.</p>
	HVAC	<p>Potentially Present: The zone is bounded to the South by the River Blyth and in the event potential sources of mobile contaminants of concern are present may pose a risk to the surface water receptors.</p>
Further Assessment Required		

4.3 Potentially Significant Pollutant Linkages

4.3.1 Onsite Human Health

Potential on-site sources have been identified from the former use of the Site by a power station, by coal and PFA storage and as by a mineral railway. Potential sources include CoC in Made Ground from colliery spoil and former industrial uses of the Site. Made Ground has been identified on and in the vicinity of the Site up to 3 m in thickness in the west of the Landfall / HVDC zone.

Given the future use of the Site as a convertor station and underground cable route, site users and staff are unlikely to have direct ingestion, dermal contact or inhalation risk from contaminants at the Site unless gross contamination is present. It is possible that future construction workers may have viable exposure pathways if residual contamination is present in the soils, in particular within the former railway and maintenance facility in the Landfall / HVDC zone.

There is potential for residual asbestos containing materials to be present within the Made Ground beneath the Landfall / HVDC and HVAC zone and may become a risk to site workers and/or adjacent site users of the public open space if respirable fibres are generated by future construction works.



Further assessment of the risks to human health are recommended following the final cable routes and convertor station layout. Further assessment of the Landfall / HVDC zone in relation to the former rail maintenance facility and infilled reservoir is required.

4.3.2 Groundwater – Superficial Deposits

There is potential for leachable contaminants derived from extensive made ground on-site and off-site, or present within surface soils from historic activities to migrate into any groundwater body within the superficial deposits and via potential preferential pathways. However, the coverage of superficial deposits across the Site is low permeability Glacial Till, which will inhibit lateral and vertical migration of leachable contaminants.

Preferential pathways may be created by the proposed cable corridor and sub-surface infrastructure, including site drainage and culverts. Groundwater may be considered a potential pathway for migration of mobile contamination to surface water receptors (Sleek Burn, River Blyth and North Sea).

Further investigation and assessment of potential risks to groundwater as a receptor and as a potential pathway to the surface water receptor are required.

4.3.3 Surface Water

The nearest surface water receptors are the Sleek Burn and the River Blyth to the south and the North Sea to the east.

A hydraulic connection with groundwater beneath the Site may be present via vertical and lateral migration from site drainage and preferential pathways, however mobility of water will be restricted by the low permeability Glacial Till.

Further investigation is required to confirm that the Site does not pose potential risks to the surface water when considered in line with the development proposals and a managed site drainage system which should be considered as part of further assessment works when considering this receptor.

4.3.4 Property

The likelihood for potential damage to buildings from exposure to aggressive ground, differential settlement, and inadequate foundations should undergo further assessment based on the review of historical site activities and the information from the site walkover.

within regards to combustible materials (i.e. coal content within colliery spoil) of shallow soils within the areas of the proposed cable corridors for the import and export cables. The cables may generate prolonged heat during operations; however given inherent moisture content in of buried soils and inherent mitigation measures provided by a suitable backfill material in contact with HV cable, the risks of smouldering or combustion occurring are low.

Due to the development history at the Site, former foundations and other buried structures may be present in the shallow ground. Any areas of hardstanding within the Site may require removal prior to development.

Further geotechnical assessment of the soils is recommended prior to construction.

4.4 Potentially Significant Pollutant Linkages Summary

Having considered the above criteria including the uncertainties and gaps in the conceptual model, the Preliminary Risk Assessment (using desk study and information from a site walkover and previous reports) has highlighted that the Site development area does have a history of potentially contaminative site uses. The previously identified on-site activities include use as a storage area for coal and PFA stockpiles and a mineral railway and maintenance

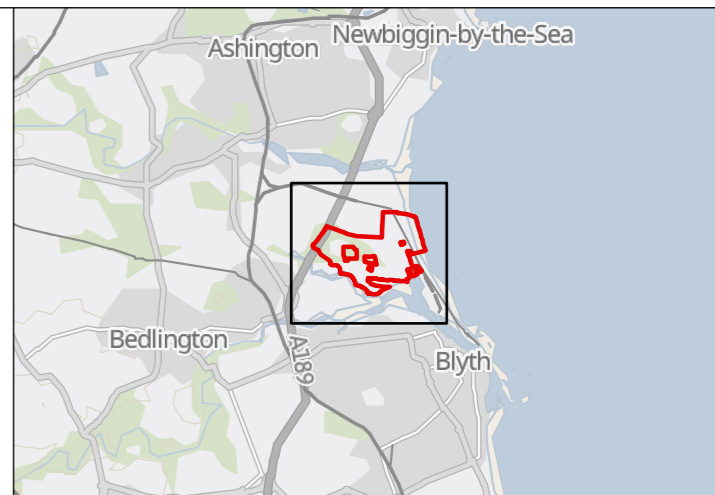
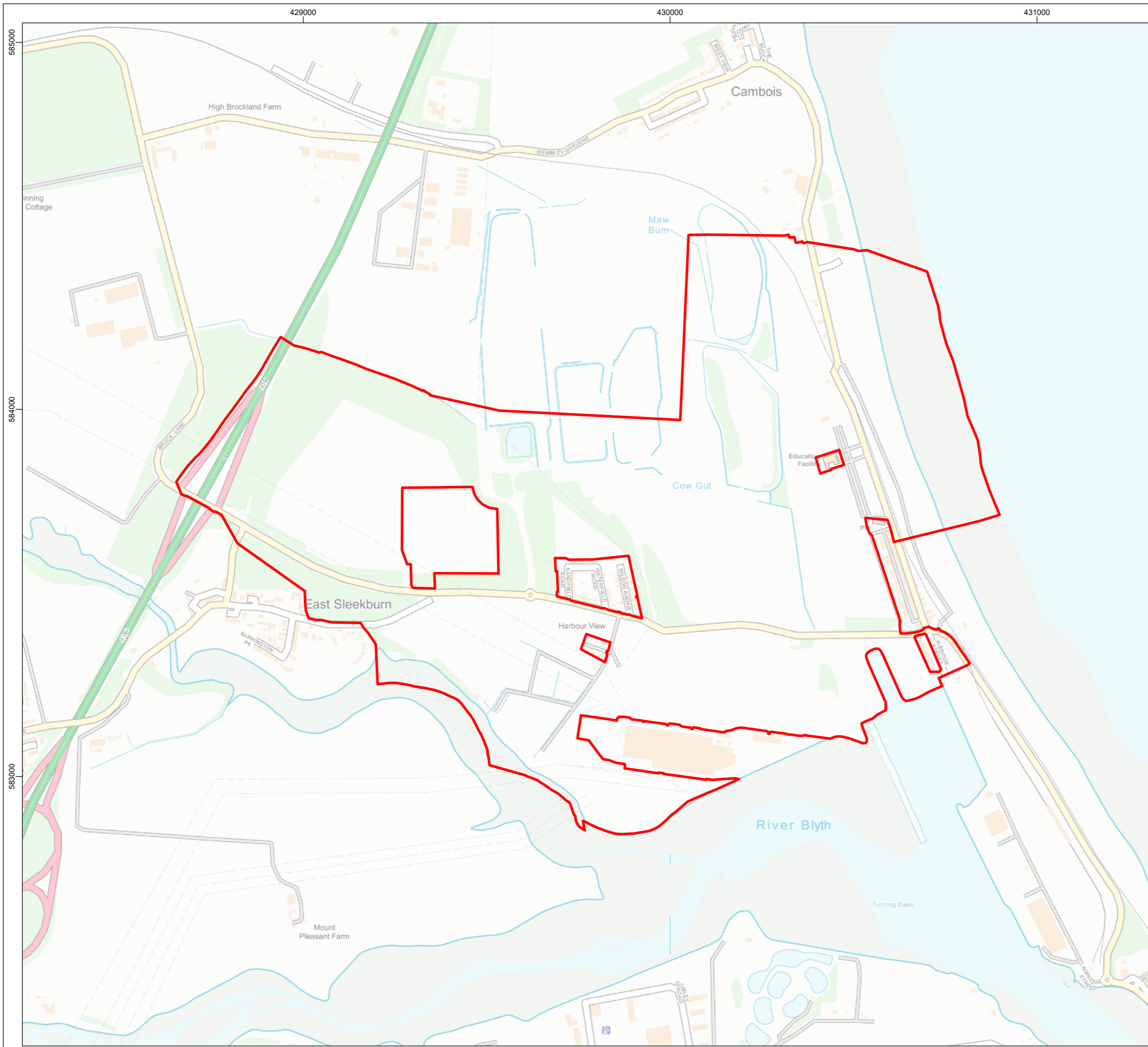


facility. Therefore, further investigation is required to investigate potentially significant risks to future human health, controlled waters and property receptors.



Appendix A Figures





Legend
 Site Boundary

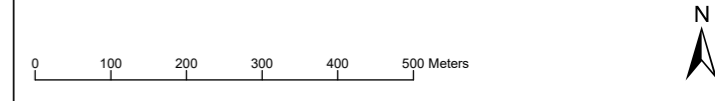
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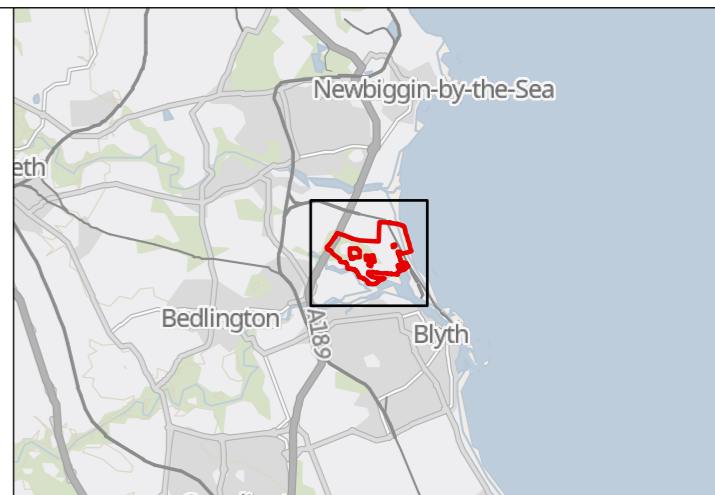
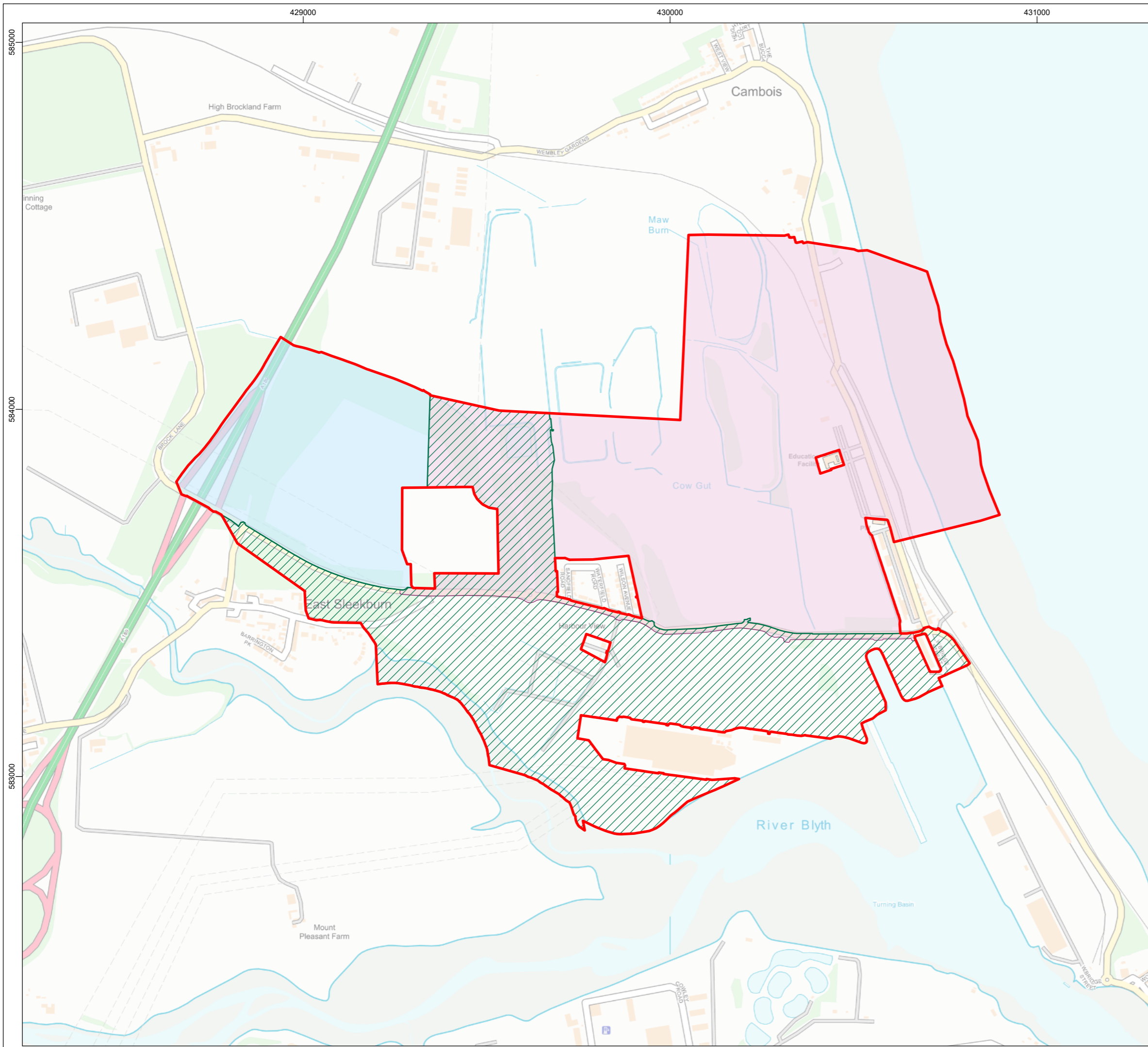
Project
CAMBOIS CONNECTION ONSHORE SCHEME

Title
FIGURE 01: SITE BOUNDARY PLAN



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Scale	Plot Size	Datum	Projection
1:10,000	A3	OSGB36	BNG
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- Legend**
- Site Boundary
 - Landfall and High-Voltage Direct Current (HVDC) Zone
 - High-Voltage Alternating Current (HVAC) Zone
 - Converter Station Zone

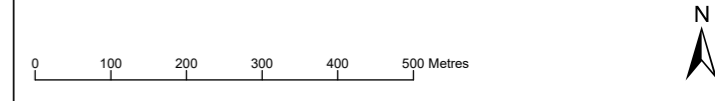
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Project
CAMBOIS CONNECTION ONSHORE SCHEME

Title
FIGURE 02: INDICATIVE ZONES OF INFRASTRUCTURE



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Appendix B Site Walkover Photographs



Photo 1: British Volt Site – Drainage and Hardstanding



Photo 2: British Volt Site – Surfacing



Photo 3: Cow Gut Watercourse



Photo 4: PFA Mound – Soil Profile



Photo 5: Northern PFA Mound – Looking South



Photo 6: Cow Gut at southern end of site



Photo 7: Existing Settlement Ponds



**Photo 8: Stockpiles of Material
HVDC/Landfall Zone**



**Photo 9: Former Railway Maintenance
Facility – Looking North**



Photo 10: Scrapyard over former Reservoir – Looking South



Photo 11: Cow Gut in Southeast Corner of Site



Photo 12: Maw Burn adjacent to PFA Mounds



Photo 13: NorthSea Link Station



Photo 14: Field at Proposed Converter Station



Photo 15: Drainage Outfall from NorthSea Station to Sleek Burn

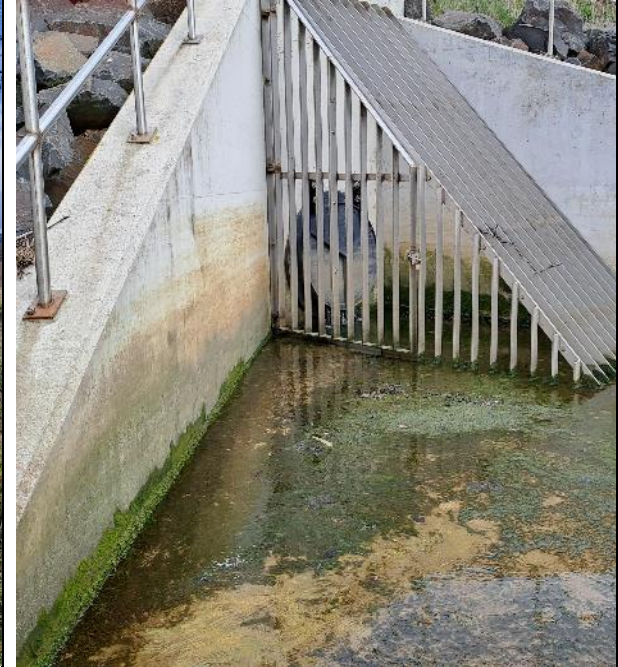


Photo 16: Unknown Made Ground – HVAC Zone



Photo 17: Former Railway Embankment



Photo 18: Colliery Spoil Type Material on Embankment



