Pentland floating offshore wind farm

Design and Access Statement

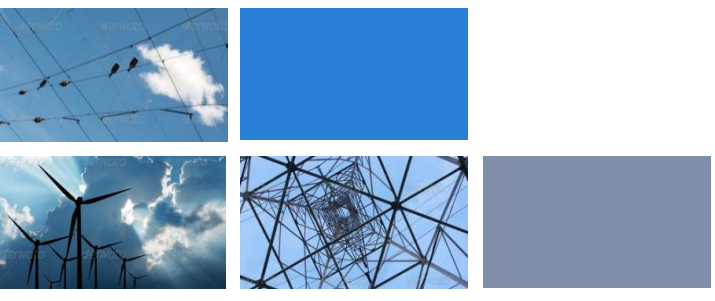
PENTLAND FLOATING OFFSHORE WIND FARM

PENTLAND FLOATING OFFSHORE WIND FARM
DESIGN AND ACCESS STATEMENT

Document Title:	Pentland Floating Offshore Wind Farm - Design & Access Statement
Document no.	GBPNTD-ENV-XOD-RP-00028
Project:	Pentland Floating Offshore Wind Farm
Originator Company	Xodus Group Ltd
Revision	01
Originator	Jennifer O'Neill
Date	10.10.2022

Revision History:

Revision	Date	Status	Originator	Reviewed	Approved
01	10.10.2022	Final	JO	RM	PM



CONTENTS

LIST OF FIGURES

LIST OF TABLES

GLOSSARY OF TERMS

Key Terms	Definition
Cable Joint Bay	Cable Joint Bays (CJBs) are typically required every 500 to 1,000 m to string together the onshore cable sections.
Dounreay Substation	The existing Scottish Southern Energy (SSE) Dounreay 132 kV Substation.
Dounreay Trì Floating Wind Demonstration Project (The Dounreay Trì Project)	The 2017 consented project previously owned by Dounreay Trì Limited (in administration) and subsequently acquired in 2020 by Highland Wind Limited (HWL). The Dounreay Trì Floating Wind Demonstration Project consent was for two demonstrator floating turbines with a marine licence covering the same area for which the Pentland Floating Offshore Wind Farm (PFOWF) Array, as defined, is applying for consent. The Dounreay Trì Project also gained consent for the onshore infrastructure required to support the offshore elements of the project. The offshore components of the Dounreay Trì consent are no longer being implemented. The onshore components will not be implemented if the application for which this EIA accompanies is approved.
Grid Connection Point	The point at which the electricity generated by the Project connects into the National Electricity Transmission System, located at the Dounreay Substation.
Grid Connection Cable Circuit	Electricity cable circuits connecting the Onshore Substation to the grid connection point. The circuit is made up of three cables in a trefoil or flat arrangement.
Offshore EIAR	The EIAR submitted for the Offshore Development. This was submitted to Marine Scotland in August 2022. This is available at https://pentlandfloatingwind.com/document-library/
Highland Wind Limited (HWL)	The Developer of the PFOWF Project (defined below) and the Applicant for the associated planning permissions and consents.
Landfall	Point where the Offshore Export Cable(s) from the PFOWF Array, as defined, will reach the shore and connect to the Onshore Cable Circuit(s).
Offshore Export Cable(s)	The cable(s) which transmits electricity produced from the offshore wind turbines to landfall.
Offshore Site	Area encompassing the PFOWF Array Area and Offshore Export Cable Corridor, as defined.
Offshore Development	All offshore components of the PFOWF (Wind Turbine Generators (WTGs), cables, floating substructures and all other associated infrastructure required) across all project phases from development to decommissioning.
Onshore Cable Circuit(s)	Electricity cable circuits running from the Transition Joint Bay to the Onshore Substation. Each circuit is made up of three cables in a trefoil or flat arrangement.
Onshore Site	The area where the Onshore Development, as defined, will be located and where the planning permission is being sought.
Onshore Substation	A substation (including transformers, switchgear, megavolt ampere reactor) located within the Onshore Site. Two indicative locations are assessed within this Onshore EIAR.
PFOWF Onshore Transmission Infrastructure (the Onshore Development)	All onshore components of the PFOWF including HDD, Onshore Cable Circuit(s) (i.e. those above Mean Low Water Springs), Transition Joint Bay, cable joint bays, Onshore Substation, construction compound and access (and all other associated infrastructure) across all project phases from development to decommissioning, for which HWL are seeking planning permission from The Highland Council. The focus of this document.
PFOWF Project (the Project)	The combined Offshore Development and Onshore Development for the Pentland Floating Offshore Wind Farm (PFOWF), as defined.
Transition Joint Bay	A concrete structure where offshore export cables and onshore cables are spliced together.

ACRONYMS AND ABBREVIATIONS

ABL	Abnormal Load
AC	Alternating Current
BS	British Standards
CaSPlan	Caithness and Sutherland Local Development Plan
CIP	Copenhagen Infrastructure Partners
CJB	Cable Joint Bay
CMS	Construction Method Statement
COP	Copenhagen Offshore Partners
DDA	Disability Discrimination Act 1995
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
GIS	gas-insulated switchgear
HDD	Horizontal Directional Drilling
HGV	Heavy Goods Vehicles
HVAC	High Voltage Alternating Current
HWL	Highland Wind Limited
HwLDP	Highland-wide Local Development Plan
km	kilometres
m	metres
MVAr	megavolt ampere
MLWS	Mean Low Water Springs
MOD	Ministry of Defence
MS-LOT	Marine Scotland Licencing Operations Team
NETS	National Electricity Transmission System
NRTE	Naval Reactor Test Establishment
PAC	Pre-Application Consultation
PAN	Proposal of Application Notice
PFOWF	Pentland Floating Offshore Wind Farm
PIR	Passive infrared
PPP	Planning Permission in Principle
SEPA	Scottish Environment Protection Agency
SHEPD	Scottish Hydro Electric Power Distribution
SHET	Scottish Hydro Electric Transmission
SPA	Special Protected Areas
SSEN	Scottish and Southern Electricity Networks
SSSI	Site of Special Scientific Interest
STATCOM	Static Synchronous Compensators
SuDS	Sustainable Drainage Systems
THC	The Highland Council
TJB	Transition Joint Bay
XLPE	Cross-linked polyethylene

1 INTRODUCTION

Xodus Group Limited has prepared this Design and Access Statement (DAS) on behalf of Highland Wind Limited (HWL) to accompany an application for Planning Permission in Principle (PPP) to The Highland Council (THC) under the Town and Country Planning (Scotland) Act 1997 (as amended). The application is to construct and operate the Onshore Transmission Infrastructure to export electricity from the Pentland Floating Offshore Wind Farm (PFOWF) to the National Electricity Transmission System (NETS) network (the 'Onshore Development').

The Onshore Development is located at the Dounreay coast in Caithness, immediately adjacent to the western boundary of the Vulcan Naval Reactor Test Establishment (Vulcan NRTE) and the Dounreay Site (former nuclear facility) and approximately 14 kilometres (km) west of Thurso. The Onshore Development comprises the following key elements:

- Cable landfall;
- Transition joint bay;
- Onshore substation;
- Cable joint bays;
- Onshore cabling;
- Construction compound, to accommodate a temporary work site, including parking, welfare facilities, offices and changing rooms; and
- Permanent and temporary access tracks.

This DAS has been prepared in accordance with The Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2013 and should be read in conjunction with the PFOWF Onshore Environmental Impact Assessment Report (Onshore EIAR) and associated supporting documentation.

1.1 Purpose of Design and Access Statement

Under the Town and Country Planning (Hierarchy of Development) (Scotland) Regulations 2009 and on the basis that the area of the development exceeds two hectares, the application is categorised as a 'National Development' and as such is supported by a DAS. The purpose of this DAS is:

- To describe the design principles and approach that have guided the development proposals;
- To consider access to the development and how the needs of all users have been incorporated into the design process;
- To demonstrate how the site and its surroundings have been fully assessed to ensure that the final design solution is the most suitable for the surrounding site; and
- To describe the starting point for the Onshore Development design, and subsequent alterations to the layout that have been made in response to the issues identified through the appraisal and consultation processes.

1.2 The Applicant

The PFOWF is being developed by HWL, a Special Purpose Vehicle established to deliver the Project.

HWL are majority-owned (90%) by a fund managed by Copenhagen Infrastructure Partners P/S (CIP) with HexiconAB as a minority shareholder (10%). Project development activities are being led by CIP's development partner, Copenhagen Offshore Partners A/S (COP).

CIP are a fund management company focused on energy infrastructure, including offshore wind, onshore wind, solar PV, biomass, energy-from-waste, transmission and distribution, and other energy assets such as reserve

capacity and storage. CIP has offices in Australia, Denmark, Germany, France, Italy, Japan, the Netherlands, the United Kingdom (UK), and the United States (US). CIP was founded in 2012 by senior executives from the energy industry in cooperation with PensionDanmark. CIP manages seven funds and has approximately €16 billion (£13.82 billion) under management.

HexiconAB are a leading floating offshore wind technology and project developer. They were founded in 2009 and are headquartered in Stockholm, Sweden.

COP are a leading and experienced provider of project development, construction management, and operational management services to offshore wind projects. The company is headquartered in Denmark and has offices in Australia, Brazil, Greece, Japan, South Korea, Taiwan, the UK, the US, and Vietnam. COP's team of specialists has a broad range of competencies within project management, early and late-stage project development, engineering, construction, procurement, and operational management as well as business development and project financing. The Project's development team is based in COP's Global Floating Wind Competence Centre, in Edinburgh.

2 THE DESIGN STATEMENT

2.1 The Site and Surroundings

The Onshore Development is located at the Dounreay coast in Caithness in the north of Scotland, immediately adjacent to the western boundary of the Vulcan NRTE site and the Dounreay Site within the THC administrative area. The nearest settlements include Reay and Thurso, which are located approximately 1.5 km west and 14 km to the east, respectively. The area where the Onshore Development will be located (the Onshore Site) covers an area of approximately 103 hectares. The site character is coastal-rural and comprises a patchwork of fields defined by fencing and drystone walling, with the landform of generally uniform level and raised atop shallow sea cliffs, approximately 10 m in height overlooking the Pentland Firth.

The main land use is farming, with mixed agriculture including cereal crops and rough pasture. The existing, but no longer operational, nuclear research and test establishments (Dounreay Site and Vulcan NRTE) dominate the local area, with the associated bulk building mass and enclosing perimeter of security fencing and walls prominent on the skyline. Within the eastern portion of the Onshore Site is the existing SSE Dounreay 132 kV substation (the Dounreay Substation), which forms the Grid Connection Point. The proximity of this Grid Connection Point is a key factor in HWL's decision to locate the Onshore Development at this location, minimising disturbance to the environment insofar as possible. The onshore cables from the Onshore Substation will be routed within the Onshore Site to the Dounreay Substation. The eastern part of the Onshore Site is crossed by two overhead transmission lines which are supported by steel towers. These lines originate at the Dounreay Substation.

The nearest residential receptor is Isauld House located approximately 150 m south west of the Onshore Site. Access to the Onshore Site is gained from the A836, located immediately adjacent to south-east of the Onshore Site. A detailed Project Description is contained with Chapter 6 (Volume 2) of the Onshore EIAR.

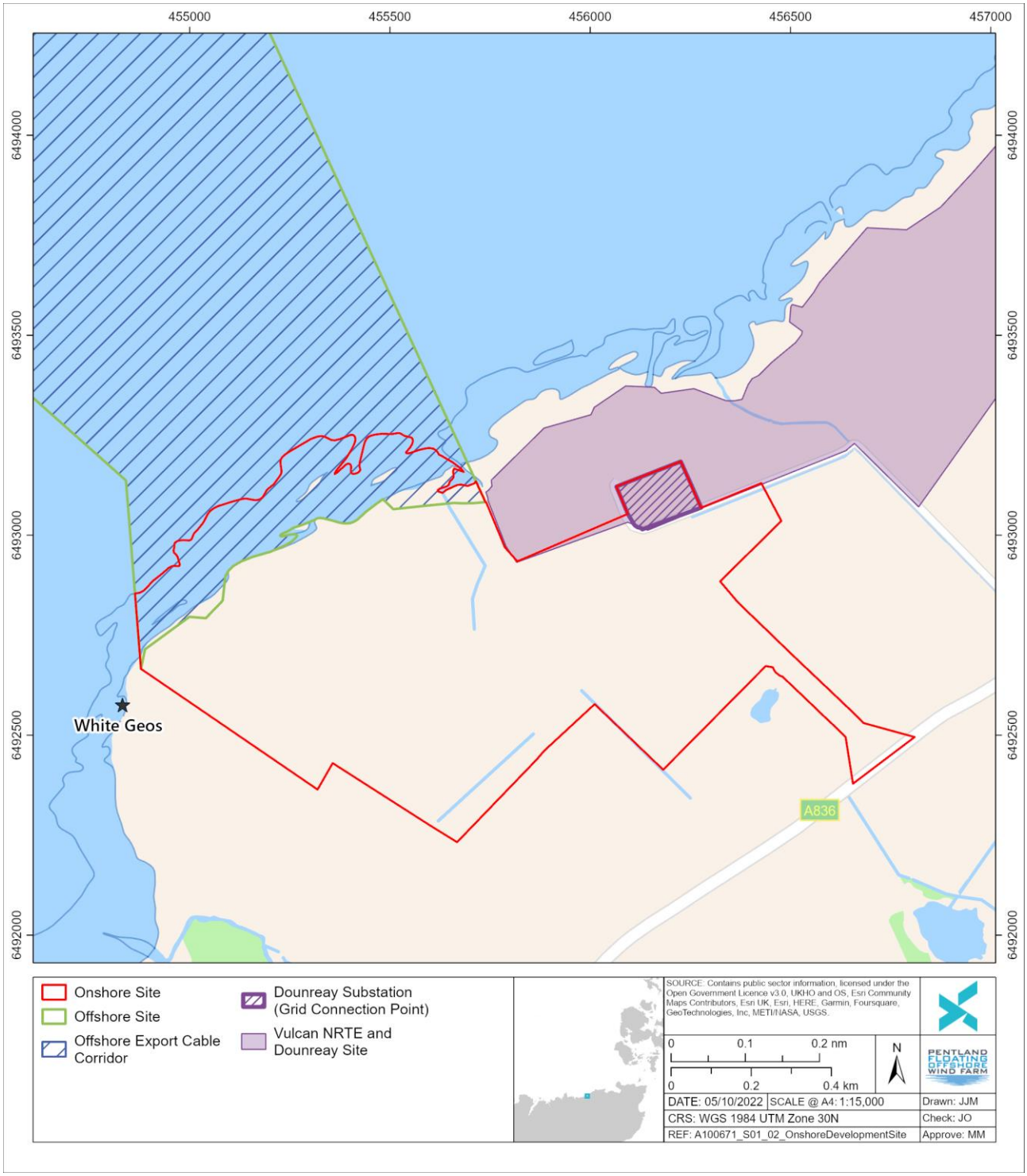


Figure 1 Onshore Development Location

2.2 Planning Policy Context

The design of the Onshore Development has taken account of design planning policies and guidance of relevance. A separate Planning Statement has been prepared to support the application and should be referred to for a detailed planning policy appraisal. Chapter 2: Planning Policy and Legislative Context (Volume 2) of the Onshore EIAR also sets out the policy and legislative frameworks relevant to the Onshore Development. For the purposes of this DAS, a summary of the key local planning policy context is provided below.

2.2.1 Local Planning Policy Context

At a local level, the key policy is provided within the following documents and their associated Supplementary Guidance (SG):

- The statutory development plan for the site is the Highland-wide Local Development Plan (the HwLDP) (adopted April 2012); and
- The Caithness and Sutherland Local Development Plan (the CaSPlan) (adopted August 2018).

2.2.1.1 The Local Development Plan

For the purposes of this DAS, the relevant policies contained within the statutory LDP, the HwLDP, in relation to design are set out in Table 1 below.

Table 1 LDP Policy Overview

Policy		Overview
Policy 28	Sustainable Design	Policy 28 sets out the requirement for all development to be designed in the context of sustainable development and climate change.
Policy 29	Design Quality and Place-Making	Policy 29 seeks a high quality of design in development within both urban and rural parts of the plan area.
Policy 61	Landscape	Broadly, Policy 61 states that new developments should be designed to reflect the landscape characteristics and special qualities identified in the Landscape Character Assessment of the area in which they are proposed.
Policy 67	Renewable Energy Developments	Broadly, Policy 67 states that the Council will support proposals where it is satisfied that they are located, sited, and designed such that they will not be significantly detrimental overall, either individually or cumulatively with other developments.
Policy 69	Electricity Transmission Infrastructure	Broadly, Policy 69 states that the Council will support proposals which are assessed as not having an unacceptable significant impact on the environment, including natural, built and cultural heritage features.

2.3 Key Design Considerations

2.3.1 Environmental Considerations

In addition to the policy considerations identified, key issues and constraints for consideration in the design process have been established through a combination of desk-based studies, field survey and consultation. The potential environmental effects of the Onshore Development are considered in detail within the Onshore EIAR, however a summary of the considerations made as part of the design process are detailed below:

- Onshore EIAR (Volume 2) Chapter 7 Geology and Hydrology: minimising impacts on groundwater and sensitive surface water features;
- Onshore EIAR (Volume 2) Chapter 8 Land Use, Agriculture and Soils: minimising impacts on agricultural land use and soils, including severance and fragmentation;
- Onshore EIAR (Volume 2) Chapter 9 Terrestrial Ecology: avoidance of sensitive species and sites, including ecology surveys and mapping;
- Onshore EIAR (Volume 2) Chapter 10 Terrestrial Ornithology: including surveys for breeding bird activity on the site;
- Onshore EIAR (Volume 2) Chapter 11 Archaeology and cultural Heritage: avoiding protected features and observed archaeology potential;
- Onshore EIAR (Volume 2) Chapter 12 Air Quality: minimising impacts on air quality arising from development during the construction, operation and maintenance and decommissioning phases;
- Onshore EIAR (Volume 2) Chapter 13 Landscape and Visual Amenity: minimise visual impacts, avoiding protected sites and important landscape features;
- Onshore EIAR (Volume 2) Chapter 14 Traffic and Transport: minimising disruption to the local road users and road network; and
- Onshore EIAR (Volume 2) Chapter 15 Onshore Noise and Vibration: operational noise levels and exposure at nearby properties.

2.3.2 Technical Considerations

So far as has been practicable efforts have been made to limit the development footprint. Although the Onshore Site footprint is larger than the previously consented Dounrey Trì development, which is considered further in following sections, this has been done to retain flexibility to facilitate coexistence with the consented but not yet built SSE (Scottish Hydro Electric Transmission [SHET]) Dounreay West Substation[1], also located west of the Vulcan NRTE and Dounreay Site as illustrated in Figure 1. This approach also allows HWL to minimise environmental effects while maximising economic efficiency.

Engineering and technical work undertaken to date has included the following:

- Desktop geotechnical assessment;
- Review of cable installation methodologies;
- An underground services assessment;
- A construction compound assessment; and
- Cable routeing studies.

[1] SSE (SHET) Planning Application available at: https://wam.highland.gov.uk/wam/applicationDetails.do?activeTab=summary&keyVal=PO7709IHI5P00

2.4 Design Evolution and Alternatives

2.4.1 Background

The Onshore Development is being developed in the same location as the previously consented Dounreay Trì Project, which was owned by Dounreay Trì Limited (in administration). Dounreay Trì Ltd undertook a landfall site search, selection process and considered potential alternatives in 2016 to support the Dounreay Trì Floating Wind Demonstration Project application for Section 36 consent and deemed planning permission.

In acquiring the Dounreay Trì Project, HWL undertook extensive due diligence work in 2020 and 2021 to support the decision to acquire the consented project. The site selection and description of alternative sites for the Dounreay Trì Project as presented within the Dounreay Trì Floating Wind Demonstration Project Environmental Statement (ES) (Dounreay Trì Ltd, 2016) were considered to align with HWL's project needs. This review confirmed the suitability of the location for the Onshore Development (as set out in [Volume 2] Chapter 5: Project Description of the Onshore EIAR).

The Onshore Site includes and expands upon the consented Dounreay Trì Project onshore development area. A larger area is now required to allow, so far as possible, co-existence with the SSE Dounreay West Substation, also located west of the Vulcan NRTE and Dounreay Site (as shown in Figure 1). Whilst subject to detailed design, the current indicative layout has access tracks and a proportion of both the cable corridor and potential siting of the substation within the SHET application boundary.

In 2021 a decision was made to expand the Onshore Site to the northeast from what was considered in the Scoping Opinion (MS-LOT, 2021). This was due to a better understanding of the land requirements for the SHET substation and to allow flexibility for co-existence between the two developments. This was discussed with THC and detailed in the Scoping Addendum (HWL, 2021) submitted to Marine Scotland in December 2021.

Site selection and alternatives are considered further within Chapter 3: Site Selection and Alternatives (Volume 2) of the Onshore EIAR.

2.4.2 Site Selection

The principal criteria applied during the site selection process in order to assess the site location options included:

- Environmental considerations;
- Economics of overall NETS design (including the offshore transmission infrastructure);
- Programme of works and contract dates;
- NETS capability, constraints and requirements for wider improvement works;
- Economically efficiency for the UK electricity consumer; and
- Optimal nationwide electrical solutions.

Taking the above into account, the Onshore Site was predominately chosen on the basis of the availability of grid connection options into the grid network whilst utilising existing infrastructure located in the immediate vicinity of Dounreay.

An assessment of viable grid connection options was undertaken by Arcadis Ltd on behalf of HWL (Arcadis, 2021). The report concluded that there is sufficient capacity to accommodate the power output of the Project without the need for significant enhancement works to the onshore transmission network. Enhancement works would result in increased environmental impacts and an overall cost which would not be as economically efficient for the UK consumer. Two options were identified for connection at Dounreay:

- Option 1: Onshore electrical infrastructure to connect the Project at, or near, the Dounreay Substation; and
- Option 2: A grid connection at, or near, the consented but not yet built SSE Dounreay West Substation.

At the Dounreay Substation, which currently operates at 132 kV and 33 kV, there is established infrastructure that could be utilised for the connection of the Project. The Dounreay Substation is located in close proximity to the identified landfall location, at the east of the Onshore Site as shown in purple hatching in Figure 1 above.

An agreement for a transmission connection into the Dounreay Substation was signed by HWL in 2021.

2.4.3 Site Appraisal

Although proximity to grid was the principal reason for selecting the Onshore Site at Dounreay as the location for the Onshore Development, a number of other advantages for selecting this location were also taken into consideration. These include:

- Proximity to the proposed Offshore Site location, reducing the length of Offshore Export Cable(s) required;
- Due to the close proximity of the landfall and the existing Grid Connection Point very short onshore cables routes are required (< 2 km). Therefore, the opportunity to minimise disturbance from cable laying on local communities, and other sensitive receptors;
- The Onshore Site is located in an area with very few residential receptors (three residential properties within 1 km of the Onshore Site);
- Landowner(s) agreement, in principle, to accommodate the Onshore Development;
- Favourable in relation to national and local planning considerations;
- There are no Core Paths or promoted public access routes, reducing any disturbance to formal recreational activities;
- There are very few utilities which overlap the Onshore Site (as discussed in Chapter 8: Land Use, Agriculture and Soils);
- The Onshore Site reduces interaction with environmentally designated sites e.g. avoidance of the Sandside Bay Site of Special Scientific Interest (SSSI);
- The Onshore Site is located in proximity to other industrial areas such as the Vulcan NRTE and Dounreay Site, thus, the land use and access from the A836 within the vicinity of the Onshore Site is appropriate for the Development;
- As the Onshore Site is located within the backdrop of other industrial developments, the landscape character of the site is unlikely to be significantly adversely impacted by the development (as discussed in Onshore EIAR (Volume 2) Chapter 13: Landscape and Visual Impact Assessment);
- Potential for design refinement (including footprint definition) during detailed design and further consultation with THC; and
- Significant electrical infrastructure already present in the locality e.g. substations, towers and overhead lines.

On the basis that the Onshore Site provides a suitable location from both an environmental and technical perspective as well as having previously been identified as the optimal site for the previously consented Dounreay Trì Floating Wind Demonstration Project, no alternatives were considered further.

2.4.4 Alternative Landfall Appraisal

An offshore export cable corridor (OECC) to landfall for the Dounreay Trì Project received consent in 2017. HWL reviewed this information to determine whether the consented landfall was in the most suitable location for the Onshore Development and remained a viable option. Alternative locations were also considered, as shown in Section 2.4.5.5.

The location and potential suitability of the landfall are influenced by many factors. In undertaking the review, HWL considered proximity to suitable grid connection locations and any associated onshore cable routeing and substation locations.

In selecting the landfall for the Onshore Development, the following factors were considered and weighted:

- Suitability of landfall options;
- Minimisation of potential environmental impacts:
- Cable stability and protection;
- Minimisation of the number of cable and pipeline crossings;
- A route for the OECC that is as direct as possible, when considering the above; and
- The potential onshore route to the Grid Connection Point.

These considerations are shown in Figure 2. A summary of the different landfall options, features, and environmental constraints is provided in Table 2.

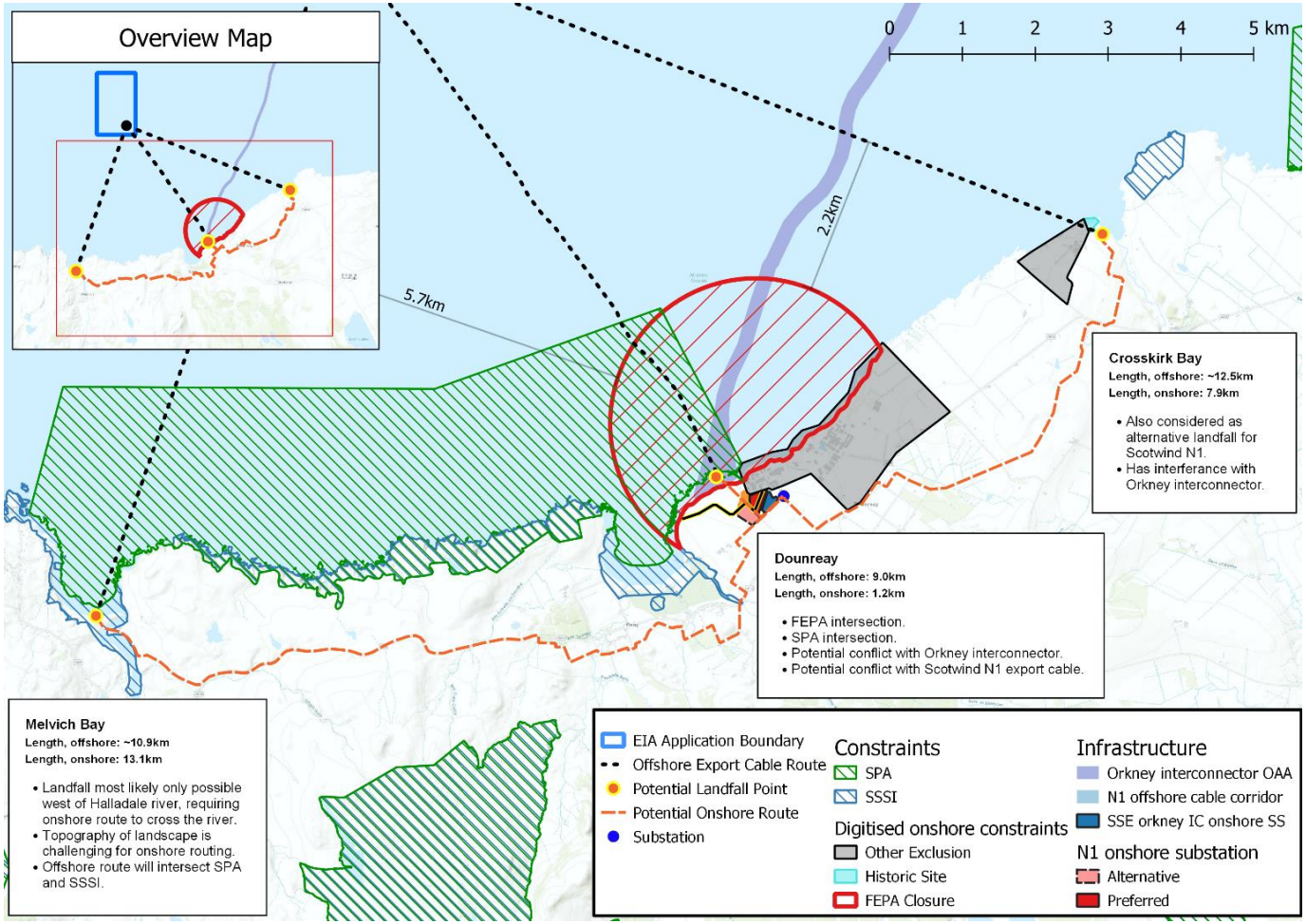


Figure 2 Cable Corridor and landfall options

Table 2 Summary of landfall options

Consideration	Melvich Bay	Dounreay	Crosskirk Bay
Offshore Export Cable Length (approximate)	10.9 km	9.0 km	12.5 km
Onshore Export Cable Length (approximate)	13.1 km	1.2 km	7.9 km
Landfall topography/character	Complex topography and requires crossing Halladale River	In close proximity to landfall location on relatively flat ground, next to industrialised setting of Dounreay and Vulcan NRTE	Requires crossing several fields and roads
Designated Sites	Intersects with an SPA and a Site of Special Scientific Interest	Intersects with an SPA	In proximity to a historic site
Food and Environment Protection Act (FEPA) Closure zone	Avoids	Intersects	Avoids
Orkney-Caithness Project (Interconnector) Option Agreement Area (OAA)	Avoids	Potential conflict (likely to be avoided through micrositing)	Interference with interconnector
Disturbance to onshore communities during construction	Due to the length of the onshore cable route and the topography of the land, this is likely to cause the greatest disturbance to local communities.	Minimal disturbance to local communities due to the location adjacent to Dounreay and minimal length of cable.	This is the second-longest route option to the Grid Connection Point. Road crossings would also be required and cause disturbance to local communities.

Following this review process, the preferred landfall location was identified as the previously consented Dounreay location, adjacent to the Vulcan NRTE site. Whilst this location requires crossing the Dounreay Food and Environment Protection Act closure zone and intersects an SPA designated for ornithology features, these risks can be managed through careful planning and the implementation of suitable controls and mitigations, such as tailored construction techniques and methods. The alternative options required crossing environmentally designated sites or features, and significantly increased the length of the onshore and offshore export cable corridors, thereby increasing potential environmental impacts as well as costs, transmission losses, and delivery risk.

2.4.4.1 Alternative option at Sandside Bay

An alternative landfall location option was also considered within Sandside Bay, further to the west of the Dounreay landfall. This option would require bringing the Offshore Export Cable(s) ashore through open-cut trenching. This alternative location was excluded on the following basis:

- A cable landfall on the eastern flank of Sandside Bay beach would be complicated by the orientation of the proposed landfall location (facing across as opposed to straight out the bay) and the presence of exposed rock in the foreshore area;
- Storm events are known to periodically expose the bedrock at Sandside Bay and could therefore expose/damage the Offshore Export Cable(s);
- Access to the beach is limited (narrow access track at the far western end of the bay), thus it is likely that a temporary access track would need to be established to allow vehicle access;

- Features of archaeological interest located immediately to the east of Sandside Bay would need to be avoided thereby complicating cable routeing;
- Sandside Bay and the land to the east above mean high water springs is a SSSI. A portion of the SSSI includes the foreshore and the banks of the Burn of Isauld (i.e. the land immediately to the east of Sandside Bay). Scottish Natural Heritage has stated a preference for either HDD or pinning options rather than trenching in this area (MS-LOT, 2016); and
- Historic radioactive particles have been found on the beach at Sandside Bay. Works within this area could unearth additional particles. Whilst the probability of coming into contact with a radioactive particle at Sandside Bay is one in 80 million (DSRL, 2016), it seemed unnecessary to continue with an option which was already technically and environmentally unfavourable (for the reasons described above).

No other landfalls were investigated any further due to the favourable location of the Dounreay landfall in terms of avoidance of environmentally sensitive features and proximity of options to connect into the existing grid network in the vicinity of Dounreay.

2.4.5 The Onshore Development

2.4.5.1 Cable Landfall

The Landfall location for the Project will be located in an area between the boundary of the Vulcan NRTE at the east of the Onshore Site and the White Geos (adjacent to Sandside Bay) at the west of the Onshore Site, as shown in Figure 1. The exact location of the Landfall will be established following the detailed investigation of environmental and technical factors. The Landfall installation will be achieved by HDD. The Landfall HDD will require a temporary landward working area (an HDD compound) of approximately 5,600 m^2 during construction to accommodate the drilling equipment and ancillary plant. The HDD compound, which will contain the TJB, will be located above Mean High Water Springs (MHWS).

The worst case parameters for the HDD and HDD compound are summarised below in Table 3.

Table 3 HDD Parameters

Parameter	Maximum Value / Description
Landfall Location	HDD will occur between the boundary of the Vulcan NRTE at the east of the Onshore Site and the White Geos (adjacent to Sandside Bay) at the west of the Onshore Site.
Number of Drilled Holes	2 successful drilled holes (up to five attempts)
Offshore HDD Length	Up to 700 m
Hole Bore Diameter	Up to 750 mm
HDD Compound Area	5600 m^2

2.4.5.2 TJB

At the cable landfall point, a concrete TJB will be required to house the joint between the Offshore Export Cable(s) and Onshore Cable Circuit(s). The TJB will be located above MHWS and comprise an area approximately 5 m wide, 15 m long and 2.5 m deep with a level concrete floor and walls. Following connection of the cables, the TJB may be backfilled to protect the joint. The area will then be reinstated.

Following reinstatement, a manhole cover will be the only surface level structure visible. This will provide access for maintenance purposes during the operational lifetime of the Project.

The worst case parameters for the TJB are summarised below in Table 4.

Table 4 TJB Parameters

Parameter	Maximum Value / Description
Number of TJBs	1
Length	Up to 15 m
Width	Up to 5 m
Depth	Up to 2.5 m
Maximum Excavated Materials	187.5 m^3

2.4.5.3 Onshore Cable

There will be a maximum of two High Voltage Alternating Current (HVAC) Onshore Cable Circuit(s) connecting the Offshore Export Cable(s) to the proposed Onshore Substation, each containing three cable cores, that will be installed in a maximum of two excavated trenches along the cable route. The overall length of the Onshore Cable Circuit(s) will depend on the Landfall location, Onshore Substation location and route to grid but is anticipated to be no longer than 2 km for each cable.

The specific details will be confirmed during the detailed design phase. The worst case parameters for the onshore cables are summarised below in Table 5.

Table 5 Cable Parameters

Parameter	Maximum Value / Description
Number of Cables	Up to 2
Cable Type	HVAC
Voltage	110 kV
Configuration	3 x single core aluminium or copper conductor XLPE or other solidly insulated material, potentially with lead sheathing or steel armour, and flat or trefoil configuration within trench
Length	Up to 2 km
Number of Trenches	Up to 2
Installation Method	Open Cut Trenching and HDD (where applicable)
Width of Trench	Approximately 3 m per trench
Depth	Up to 2 m
Working Corridor	Approximately 20 m per circuit
Excavated Materials	Up to 12,000 m^3

2.4.5.4 Onshore Substation

The Onshore Substation will include the electrical equipment required to connect the Onshore Development to the grid. The Onshore Substation will be an Alternating Current (AC) System which may include switchgear, transformers, harmonic filter, reactive compensation devices, power electronics, protection equipment, batteries and other auxiliary equipment and control systems.

The Onshore Substation and construction compound footprint is likely to be approximately 140 m x 80 m (1.12 hectares). This will accommodate a substation of approximately 65 m width, 65 m length and 14 m high from

finished foundation level and a construction compound of 6,975 m^2. It is currently envisaged that the construction compound will encapsulate the Onshore Substation or will be at close proximity to the Onshore Substation. The Onshore Substation will be above ground and will be secured through perimeter fencing, likely to be 2.4 m in height. Due to the nature of surrounding area, i.e. flat agricultural land with existing Dounreay Substation buildings and the Vulcan NRTE, and in the absence of existing bunding, it is not foreseen that any bunding will be required for landscaping purposes. This will be confirmed during the detailed design phase.

The main components encapsulated in the Onshore Substation are:

- Transformers utilising oil to gas-insulated switchgear (GIS) bushing technology;
- A megavolt ampere (MVAr) Reactor to utilise oil to GIS bushing technology;
- Static Synchronous Compensators (STATCOM) transformer to utilise oil to GIS bushing technology; and
- 4-hour fire barriers to be constructed between adjacent buildings housing transformers, reactors, STATCOM, switchgear and protection and control equipment.

Depending on final design, the electrical equipment may be housed externally or internally. The exact location of the Onshore Substation and construction compound and configuration and access roads will be confirmed at a later stage during the Approval of Matters Specified in Conditions, following landowner discussions, detailed design and confirmation of interactions with other projects. External lighting will be used to illuminate the building, but this will be intermittent and only used when people are on site. Passive infrared (PIR) sensor lighting may be provided around the external perimeter of the buildings. This will cover inside the Onshore Substation and up to the perimeter fencing only. Additional pole mounted PIR sensor lighting may also be provided at the Onshore Substation entrance gates.

The worst case parameters for the Onshore Substation and construction compound are summarised below in Table 6.

Table 6 Substation Parameters

Parameter	Maximum Value / Description
Substation Width	Up to 65 m
Substation Length	Up to 65 m
Substation Height	Up to 14 m
Substation Footprint	Up to 4,225 m^2
Construction Compound Footprint	Up to 6,975 m^2
Combined Substation and Construction Compound Footprint	Up to 11,200 m^2 (1.12 hectares)
Perimeter Fence Height	Up to 2.4 m

2.4.5.5 Substation Siting

Two indicative Onshore Substation locations have been identified within the Onshore EIAR and application to allow for worst case assessments to be undertaken and are shown on Figure 3. It is important to note that these indicative positions for the Onshore Substation and associated construction compound are not finalised within the Onshore Site. The final position will be subject to detailed once planning permission in principle is granted and will be subject to approval by THC through the application for Approval of Matters Specified in Conditions.

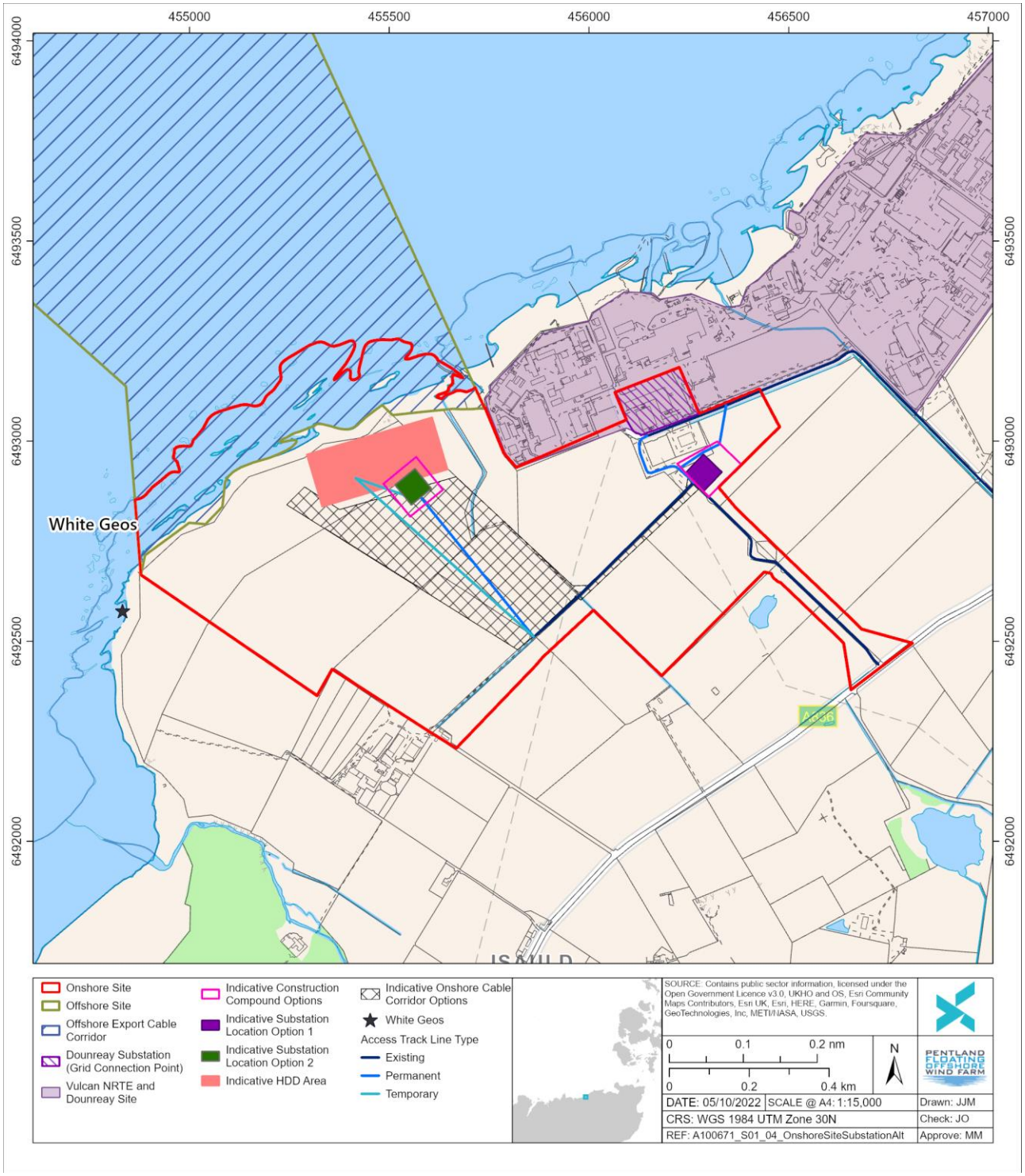


Figure 3 Indicative substation locations and infrastructure within the Onshore Site

2.4.6 Technical Alternatives

During the scoping process for the Project in 2020 (HWL, 2020), two options were considered in accordance with those previously consented for the Dounreay Tri Project, in order to bring the export cable ashore to the Dounreay landfall site. The two options identified for the export cable landfall were:

- Option 1: HDD – at a point between White Geos and the Vulcan NRTE. HDD involves drilling small pilot hole(s) from the landward side to a point below Mean Low Water Springs (MLWS). The hole is widened to accommodate a conduit pipe through which the cable is pulled. Once installed the cable is pulled into the cable transmission joint bay; or
- Option 2: Pinning – pinning the cable to the disused Dounreay cooling water intake, at Dounreay. The Dounreay cooling water intake is cut through bedrock. A cable duct could be pinned or screwed to the bedrock wall at low tide, and the cable pulled through the duct, utilising the existing route to shore formed by the water intake channel.

Option 2 has subsequently been discounted as a viable option from design feasibility studies and through consultation with Vulcan NRTE via the Ministry of Defence (MOD) in relation to the viability of using the cooling water intake infrastructure. As such, Option 1 has been taken forward (as discussed in [Volume 2] Chapter 5: Project Description of the Onshore EIAR). The main reasons this has been taken forward as the viable option are:

- HDD is technically feasible as demonstrated through HDD feasibility studies undertaken in 2021;
- HDD will provide sufficient cable protection;
- HDD will bypass the boundary of the North Caithness Cliffs SPA and thus reduce direct interaction with sensitive features of the SPA; and
- The flexibility of HDD means that it is likely possible to avoid crossing the planned SHET Orkney – Caithness Interconnector, depending on the final landfall location.

Further design alternatives for the Onshore Development infrastructure will be considered as part of detailed engineering design as the Project evolves and is refined going forward to ensure the most viable technical, economical, and environmental options are selected for the Project. The finalised design will be detailed within documentation submitted for the Approval of Matters Specified in Conditions and consulted on with THC and relevant consultees.

2.5 Consultation

Best practice in Environmental Impact Assessment (EIA) encourages consultation and engagement with stakeholders early in the process, with advice and input from key consultees being sought at the early stages of a project, to inform decisions about the Onshore Development. HWL is committed to undertaking robust and effective stakeholder engagement with respect to the Onshore Development and as such consultation with statutory, non-statutory and public consultees has been undertaken throughout the EIA and design iteration process.

Chapter 4: Stakeholder Engagement (Volume 2) of the Onshore EIAR considers stakeholder engagement in further detail while a full Pre-Application Consultation (PAC) Report has been submitted with the application for PPP.

2.5.1 Statutory Consultation

2.5.1.1 Pre-Application Advice Consultation

A meeting with THC was held on the 9th of September 2020 to provide Major Pre-Application Advice prior to the submission of the Scoping Report to Marine Scotland. Representatives from THC, SEPA, Transport Scotland, NatureScot and Marine Scotland were present. The objective of the meeting was to receive early indications of key stakeholders' views of the Onshore Development, to clarify information needed for subsequent applications, and to help improve the overall quality of the proposal.

This information was provided to HWL formally through receipt of a Pre-Application Advice Pack from the consultees, received on the 7th of October 2020. Responses contained within the pre-application advice pack have been used to inform topic specific considerations contained within the Onshore EIAR.

2.5.1.2 Scoping

In accordance with Regulation 12 of Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended) ('the EIA Regulations 2017'), HWL submitted a Scoping Request to Marine Scotland Licensing Operations Team (MS-LOT) on the environmental information to be provided in the EIA Report in December 2020 (HWL, 2020). At the time of the original submission, the Onshore Development was to be considered under the Deemed Planning approach, however, subsequently a decision was made to separate out the Onshore and Offshore works and to submit two separate EIARs accordingly. A Scoping Opinion was received from the Scottish Ministers in September 2021 (MS-LOT, 2021).

Due to changes in the Offshore Development's Design Envelope, and to ensure scoping consultation feedback on the Offshore Development was appropriate, HWL submitted a Scoping Report Addendum to MS-LOT in December 2021 (HWL, 2021), which provided information on the revised Offshore Development parameters (see Onshore EIAR [Volume 2] Chapter 3: Site Selection and Alternatives). In line with this Scoping Report Addendum request, a Scoping Opinion 'Addendum' was received from MS-LOT in May 2022 (MS-LOT, 2022).

Ongoing consultations, including discussions relating to specific environmental receptor assessment methodologies, have been undertaken by the relevant technical specialists throughout the EIA process. Further details of these consultations and how consultee comments have been addressed within the EIA are provided in the relevant technical assessment chapters (Volume 2) of the Onshore EIAR.

2.5.2 Public Consultation

2.5.2.1 Pre-Application Consultation

Due to the COVID-19 pandemic, and in line with the Town and Country Planning (Miscellaneous Temporary Modifications) (Coronavirus) (Scotland) Regulations 2020 (Scottish Parliament, 2020), which make temporary modifications to the Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2013 (Scottish Parliament, 2013) and to the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (Scottish Parliament, 2017), the usual requirements placed on developers to hold an in-person public consultation event were suspended, with a requirement to hold an online virtual event.

As such, the first PAC event, occurring during the COVID-19 pandemic, was held through an online virtual public exhibition. A second PAC event was held in person, and supplemented with an online virtual exhibition, to gain feedback from local communities and stakeholders and outline how feedback received by HWL during the consultation process was being considered. The first virtual exhibition was opened on the 27th September 2021 and closed on the 31st October 2021. A second series of events was held in May 2022 and included in-person events on the 11th and 12th of May 2022 at two local venues in Reay and Thurso as well as an online virtual exhibition from 9th to 20th May 2022.

2.5.2.2 Proposal of Application Notice

As part of the pre-application consultation process, a Proposal of Application Notice (PAN) was submitted by HWL to THC on the 20th of August 2021 as well as being distributed to seven Community Councils in close proximity to the Onshore Development. THC's North Highland Committee met on the 14th of September 2021 where the PAN for the PFOWF Onshore Development was discussed with committee members. Members were asked to note the submission of the PAN and highlight any material issues they wish to be brought to the attention of HWL before the submission of an application for planning permission. No comments were received.

In July 2022, the Onshore Site for the Onshore Development was amended to include the access track from the A836 and the Grid Connection Point. HWL therefore submitted a second PAN to THC in July 2022 with the revised Onshore Site to ensure any comments from Committee members could be raised before the submission of the application. Alongside the submission of this PAN, HWL held a further virtual PAC event in line with the requirement for consultation under the Town and Country Planning (Miscellaneous Temporary Modifications) (Coronavirus) (Scotland) Regulations 2020 (Scottish Parliament, 2020). This PAC event was

held in from August 29 2022 and 19 September and included a virtual exhibition as well as online question and answer sessions.

2.5.3 Additional Consultation

2.5.3.1 Project Briefing Letters

Although not a statutory requirement, in order to inform relevant stakeholders of the Project, two separate briefing letters were distributed to a wide reaching consultee list consisting of 80 business and organisational recipients on the 10th of September 2020 and 27th November 2020, in advance of submission of the PFOWF Scoping Report. The briefing letters provided an opportunity to inform and engage stakeholders on the Project at an early stage and allow an opportunity for them to feedback or request a meeting to discuss the Project proposals further.

2.5.3.2 Project Website

In addition to the consultation methods discussed above, HWL maintains a website dedicated to the Project (www.pentlandfloatingwind.com). This provides up-to-date information on the progress of the Project, including a document library, and provides information on how the public can contact the project team.

3 THE ACCESS STATEMENT

This section of the DAS outlines the proposed access arrangements for construction and operation of the Onshore Development and any implications of the construction and operation of the Onshore Development for public access. Chapter 8: Traffic and Transport of the Onshore EIAR (Volume 2) presents an assessment of traffic and transport of the impacts of vehicle movements to and from the Onshore Development associated with construction, operation and maintenance, and decommissioning phases of the Onshore Development.

3.1 Site Access

The nearest road to the development is the A836 which is a single lane carriageway that is approximately 6 m wide. The A836 is the main route to the Onshore Site and all construction vehicles will utilise it for access. The road links Thurso with Reay, Melvich and other settlements to the west, traversing the extent of the mainland north coast. It is considered that a large majority of heavy goods vehicles (HGV) and light goods traffic will travel to the Onshore Site via the A9 which is located approximately 14 km east, which serves many of the main settlements in the region and is the main trunk road connecting the A836 to the south.

Western Access Track

The western access track, which was installed during the upgrade of the Dounreay - Mybster overhead line in 2015 and the main Vulcan Road, is now agricultural in nature. The access track is approximately 6 m wide and 670 m long and will require upgrades including re-surfacing and upgrade of the bell mouth where it meets the A836.

Reusing this western access track means that there is no requirement to widen the track area beyond its existing footprint but only to resurface and make it fit for purpose for the Onshore Development. As there is already a track in place this can be left in situ or removed as required.

Eastern Access Track

The eastern access track corresponds to the existing road entrance from the A836 to the Vulcan NRTE site, including bell mouth at the junction. The running width is approximately 5 m, the track is paved and in good condition, with the road spanning approximately 1.3 km from the junction with the A836 and the Onshore Site. It is not currently envisaged that any upgrades would be required to the eastern track. Permission for use of this track for the purposes of the Onshore Development will be sought from the MOD.

3.1.1 Construction

Most Onshore Substation equipment will be delivered into the construction compound or directly to its installation location within the footprint of the Onshore Substation. Typically, assembly of equipment will occur both within the footprint of the Onshore Substation and in the construction compound.

If the final Onshore Substation position is not directly accessible via the main access to site via the western access track, an additional permanent access track may be required within the Onshore Site to allow for vehicular access to the Onshore Substation during construction and operation.

As a worst case this would result in an extension to the western access track of approximately 600 m if a coastal location is selected for the Onshore Substation. The position of the Onshore Substation and the access requirements will be finalised during detailed design at the post consent phase.

Temporary access tracks are likely to be required to provide access for the HDD works at the Landfall, as a worst case this would result in approximately 600 m of temporary access track from the western access track within the Onshore Site. Temporary access tracks will likely be fenced off to keep livestock out. Once construction is complete, the land will be reinstated including fences, gates, vegetation, tracks, roads or hard standings in accordance to planning consent, licences and to the Landowner's satisfaction.

The worst case parameters for the Access Tracks required at the Onshore Site are summarised below in Table 7.

Table 7 Onshore Site Access Track Parameters

Parameter	Maximum Value / Description
Permanent Access Track Length	600 m
Permanent Access Track Width	6 m
Temporary Access Track Length	600 m
Temporary Access Track Width	6 m

It is currently envisaged that there may be a need for limited Abnormal Load (ABL) deliveries to support the Onshore Development. If ABLs are needed, it is likely that access to site would be via the Vulcan NRTE access road which can support ABL vehicles. If planning permission in principle is granted, an ABL assessment will be undertaken as a condition of the planning permission consent, with use of this access road subject to agreement with the Ministry of Defence (MOD). This will be investigated further during detailed design once the final positions of the Onshore Substation and HDD compound are confirmed.

3.1.2 Operations and Maintenance

During normal operation, only the eastern access is proposed to be used for access to the Onshore Site. There will be a limited amount of traffic to and from the Onshore Substation for general operation and maintenance purposes. This is estimated to be around four vehicles per month carrying up to three persons per vehicle. Other than this, the Onshore Substation will be unmanned during operation and there will be no day-to-day personnel on site in normal operation. Although the Site will be an operational area and the substation will be accessible to authorised personnel only, the remainder of the Site will be accessible to the public with no restrictions.

3.1.3 Access for All

The legal requirements and obligations related to the Disability Discrimination Act 1995 (DDA) must be taken account in making reasonable adjustment to physical barriers and services in existing and new developments. The final detailed design of Onshore Development will be designed to be inclusive for those with accessibility restrictions in line with BS -2 (2018). This will include facilities including, but not limited to, the following:

- Parking bays designated for disabled people, which will be as close as feasible to the entrance of the building;
- The access route to the substation will be ramped, and will be level or have the shallowest possible gradient, with a width suitable for wheelchair use;
- Appropriate signage for clear notification of access routes; and
- Doorways and entrances to the substation will have suitable clearance for wheelchair users.

3.2 Public Access

The A836 and the A9 through Thurso makes up part of the North Coast 500 between John O' Groats and Tongue, the route is also part of the National Cycle Network. There are no marked paths, public walkways, Core Paths or public vehicular access across the Onshore Site with the site predominately characterised by agricultural land use bound by a steep sea cliff to the north and Dounreay and Vulcan nuclear sites to the east. Nonetheless, an Access Management Plan (AMP) will be provided within the Construction Method Statement (CMS) and detail how access will be restricted to the Onshore Site during construction works for health and safety requirements.

Therefore, during construction there would be no proposed closures or diversions of any of the Public Rights of Way, Core Paths or sections of the National Cycle Network within the surrounding area. Furthermore, during the operation and maintenance phase, there will be no additional public access restrictions as a result of the Onshore Development.

4 REFERENCES

Arcadis Ltd (2021). Highland Wind Ltd / Copenhagen Offshore Partners Pentland Floating Offshore Wind Farm Project- Design Report. March 2021. [Accessed 06/07/2022].

British Standards Institution (2018). BS 8300-2:2018 Design of an accessible and inclusive built environment. Buildings – code of practice. [Accessed 06/07/2022].

Dounreay Trì Limited (2016). Environmental Statement Dounreay Trì Floating Wind Demonstration Project. Available at: http://marine.gov.scot/sites/default/files/environmental_statement_0.pdf [Accessed 06/07/2022].

Dounreay Site Restoration Ltd (DSRL) (2016). Corporate report - Radioactive particles in the environment around Dounreay. 4 April 2016. Available Online at: https://www.gov.uk/government/publications/radioactive-particles-in-the-environment-around-dounreay [Accessed 06/07/2022].

Highland Wind Ltd (HWL) (2020). Request for Scoping Opinion. Pentland Floating Offshore Wind Farm EIA Scoping Report. A-100671-S00-REPT-001. 16 December 2020. Available Online at: https://marine.gov.scot/data/scoping-request-pentland-floating-offshore-wind-farm [Accessed 06/07/2022].

Highland Wind Ltd (HWL) (2021). Scoping Request Addendum Report – PFOWF. A100671-S01-REPT-005. 22 December 2021. https://marine.gov.scot/data/scoping-request-addendum-pentland-floating-offshore-wind-farm [Accessed 06/07/2022].

Marine Scotland Licensing Operations Team (MS-LOT) (2016). Dounreay Trì Floating Wind Demonstration Project Scoping Opinion. The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 (as amended). The Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) Scoping Opinion for the Proposed Section 36 Consent and Associated Marine License(s) Application for Dounreay Trì Floating Wind Demonstration Project, off Dounreay, Caithness [Accessed 06/07/2022].

Marine Scotland Licencing Operations Team (MS-LOT) (2022). Request for Scoping Opinion. Pentland Floating Offshore Wind Farm EIA Scoping Report Addendum. https://marine.gov.scot/data/scoping-opinion-addendum-pentland-floating-offshore-wind-farm [Accessed 06/07/2022].

The Highland Council (2012). Highland-wide Local Development Plan. Available from: https://www.highland.gov.uk/info/178/local_and_statutory_development_plans/199/highland-wide_local_development_plan [Accessed 06/07/2022].

The Highland Council (2018). Caithness and Sutherland Local Development Plan. Available from: https://www.highland.gov.uk/info/178/local_and_statutory_development_plans/283/caithness_and_sutherland_local_development_plan [Accessed 06/07/2022].

Scottish Parliament (1997). The Town and Country Planning (Scotland) Act 1997 (as amended). Available at: https://www.legislation.gov.uk/ukpga/1997/8/contents [Accessed 17/01/22].

Scottish Parliament (2009). The Town and Country Planning (Development Hierarchy) Regulations (Scotland) 2009 (as amended). Available at: https://www.legislation.gov.uk/ssi/2009/51/contents/made [Accessed 17/01/22].

Scottish Parliament (2013). The Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2013 (as amended). Available at: https://www.legislation.gov.uk/ssi/2013/155/contents/made [Accessed 17/01/22].

Scottish Parliament (2017). The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2018. Available at: https://www.legislation.gov.uk/ssi/2017/101/contents/made [Accessed 17/01/22].

Scottish Parliament (2017). The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (the EIA Regulations) (as amended). Available at: https://www.legislation.gov.uk/ssi/2017/102/contents/made [Accessed 17/01/22].

Scottish Parliament (2020). The Town and Country Planning (Miscellaneous Temporary Modifications) (Coronavirus) (Scotland) Regulations 2020. Available at: https://www.legislation.gov.uk/ssi/2020/124/contents/made [Accessed 17/01/22].