



Scoping Report

Dounreay Trì Floating Wind Demonstration Project

Dounreay Trì Limited
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Acronyms and Abbreviations

AB	Aktiebolag, the Swedish term for a limited company
AC	Alternating Current
ADR	Air Defence Radar
ADTF	Average Daily Traffic Flow
AfL	Agreement for Lease
AIS	Automatic Identification System
ALARP	As Low as Reasonably Practicable
AOC	Aircraft Operator Certificate
ARC	Amphibian and Reptile Conservation Trust
ASFB	Association of Salmon Fishery Boards
ATBA	Area to be Avoided
ATC	Air Traffic Control
AtoN	Aids to Navigation
BGS	British Geological Survey
BODC	British Oceanographic Data Centre
BOWL	Beatrice Offshore Wind Ltd
BP	Before Present
BSBI	Botanical Society of the British Isles
BTO	British Trust of Ornithology
CAA	Civil Aviation Authority
CBC	Common Bird Census
CCS	Carbon Capture and Storage
CCW	Countryside Council for Wales
CIA	Cumulative Impact Assessment
CJB	Cable Joint Bays
CNS	Communication and Navigation System

COWRIE	Collaborative Offshore Wind Research in the Environment
CP	Count Point
cSAC	Candidate Special Area of Conservation
DAFOR	Dominant, Abundant, Frequent, Occasional, Rare
DC	Direct Current
DDC	Dounreay Demonstration Centre
DECC	Department of Energy and Climate Change
DEM	Digital Elevation Model
DFOWDC	Dounreay Floating Offshore Wind Development Centre
DGC	Defence Geographic Centre
dSPA	draft Special Protection Area
DSRL	Dounreay Site Restoration Ltd
DTi	Department of Trade and Industry
EC	European Commission
EHWS	Extreme High Water Springs
EIA	Environmental Impact Assessment
ELWS	Extreme Low Water Springs
EMF	Electromagnetic Force
EMF	Electromagnetic Force
EMP	Environmental Management Plan
EPC	Engineering, Procurement and Construction
EPR	Ethylene Propylene Rubber
ES	Environmental Statement
EU	European Union
EUNIS	European Union Nature Information System
FAD	Fish Aggregation Device
FGL	Finished ground level

FL	Fly Level
FLOWW	Fishing Liaison with Offshore Wind and Wet Renewables Group
FSS	Food Standards Scotland
GEN	General Planning Principle
GPS	Global Positioning System
GWDTE	Groundwater Dependant Terrestrial Ecosystems
GWfGS	Greenland White-fronted Goose Study
HBRG	Highland Biological Recording Group
HDD	Horizontal Directional Drilling
HER	Historic Environment Record
HGV	Heavy Goods Vehicles
HIAL	Highlands and islands Airports Limited
HIE	Highlands and Islands Enterprise
HMPA	Historic Marine Protected Area
HRA	Habitats Regulations Assessment
HS	Historic Scotland
HSE	Health, Safety and Environment
IAQM	Institute of Air Quality Management
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IEA	Institute of Environmental and Assessment
IEEM	Institute of Ecology and Environmental Management
IEMA	Institute of Environmental Management and Assessment
INSPIRE	Impulse Noise Sound Propagation and Impact Range Estimator
IoA	Institute of Acoustics
ISO	International Standards Organisation
JNAPC	Joint Nautical Archaeology Policy Committee
JNCC	Joint Nature Conservation Committee

JTB	Joint Transmission Bay
km	Kilometre
kV	Kilo Volt
LAT	Lowest Astronomical Tide
LBAP	Local Biodiversity Action Plan
LCA	Landscape Character Areas
LCT	Landscape Characteristic Type
LFA	Low Fly Area
LGV	Light Goods Vehicle
LI	Land Institute
LOS	Loss of Signal
LVIA	Landscape and Visual Impact Assessment
MAIB	Marine Accident Investigation Branch
MBES	Multi-Beam Echo Sound
MCA	Maritime Coastguard Agency
MDA	Managed Danger Area
MESH	Mapping European Seabed Habitat
MGN	Marine Guidance Note
MHR	Main Helicopter Routes
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
mm	Millimetre
MMO	Marine Management Organisation
MoD	Ministry of Defence
MOU	Memorandum of Understanding
MPA	Marine Protected Areas
mph	Miles per Hour

MRE	Marine Renewable Energy
MRV	Marine Research Vehicle
MS	Marine Scotland
MSA	Minimum Sector Altitude
MSFD	Marine Strategy Framework Directive
MSI	Marine Scotland Interactive
MS-LOT	Marine Scotland - Licencing and Operations Team
MSS	Marine Scotland - Science
MW	Megawatts
NAS	Nautical Archaeology Society
NATS	National Air Traffic Services
NBN	National Biodiversity Network
NCMPA	Nature Conservation Marine Protected Area
NDA	Nuclear Decommissioning Authority
NFU	National Farmers Union
NHZ	Natural Heritage Zone
NLB	Northern Lighthouse Board
nm	Nautical miles
NMP	National Marine Plan
NNR	National Nature Reserve
NRA	Navigational Risk Assessment
NSAs	National Scenic Areas
NUC	Not Under Command
NVC	National Vegetation Classification
O&M	Operations and Maintenance
OFA	Orkney Fishermans Association
OIC	Orkney Islands Council

OREI	Offshore Renewable Energy Installations
PAN	Planning Advice Note
PAR	Precision Approach Radar
PEXA	Practice and Exercise Area
PFOW	Pentland Firth and Orkney Waters
PHA	Preliminary Hazard Assessment
PMF	Priority Marine Feature
PRAG-D	Particles Retrieval Advisory Group (Dounreay)
pSPA	potential Special Protected Area
PSR	Primary Surveillance Radar
RAF	Royal Air Force
RES	Renewable Energy Systems
RIFE	Radioactivity in Food and the Environment
RLG	Regional Locational Guidance
RNLI	Royal National Lifeboat Institution
ROC	Renewables Obligation Certificate
ROV	Remotely Operated Vehicle
RSPB	Royal Society for the Protection of Birds
RYA	Royal Yachting Association
SAC	Special Area of Conservation
SAR	Search and Rescue
SB	Scottish Badgers
SCADA	Supervisory Control And Data Acquisition
SDI	Scottish Development International
SEA	Strategic Environmental Assessment
SEPA	Scottish Environmental Protection Agency
SFF	Scottish Fishermen's Federation

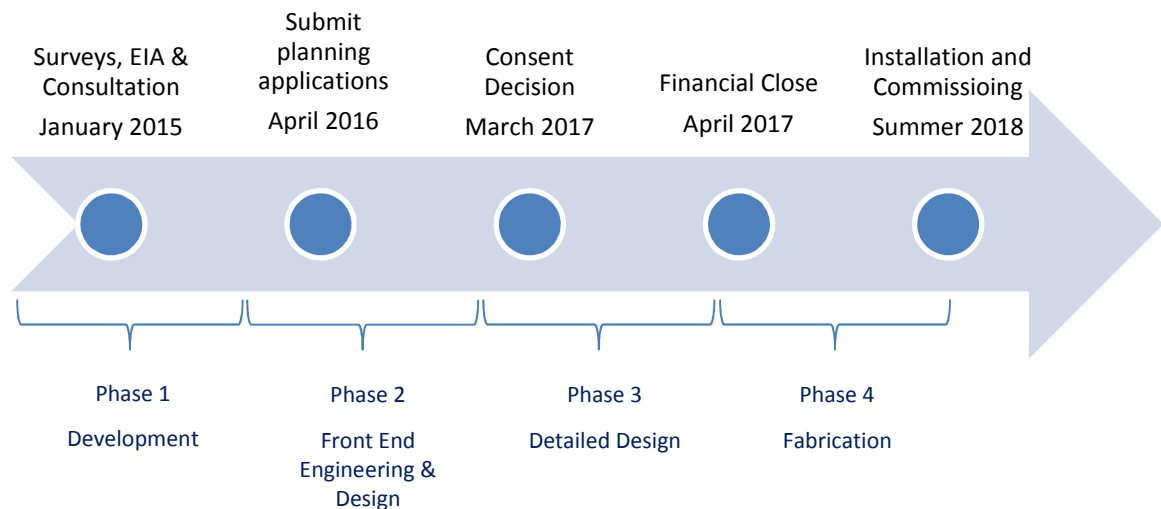
SHEP	Scottish Historic Environment Policy
SHE-T	Scottish Hydro Electric Transmission
SLA	Special Landscape Areas
SLVIA	Seascape, Landscape and Visual Impact Assessment
SNH	Scottish Natural Heritage
SNIFFER	Scotland & Northern Ireland Forum for Environmental Research
SPA	Special Protection Area
SPD	Scottish Planning Policy
SPEAR	Simple Propagation Estimator and Ranking
SPP	Scottish Planning Policy
SPV	Special Purpose Vehicle
SSE	Scottish and Southern Energy
SSEPD	Scottish and Southern Energy Power Distribution
SSR	Secondary Surveillance Radar
SSSI	Special Site of Scientific Interest
THC	The Highland Council
TRA	Temporary Reserve Area
UK	United Kingdom
UKBAP	UK Biodiversity Action Plan
UKCS	UK Continental Shelf
UKHO	United Kingdom Hydrographic Office
UKTAG	United Kingdom Technical Advisory Group
UKTI	United Kingdom Trade & Investment
UNESCO	United Nations Educational, Scientific and Cultural Organization
UXO	Unexploded Ordnance
VMS	Vessel Monitoring System
VP	View Point

VTs	Vessel Traffic Services
WeBS	Wetland Bird Survey
WHO	World Health Organization
WLA	Wild Land Areas
WSI	Written Scheme of Investigation
WTG	Wind Turbine Generator
WWT	Waterfowl and Wetlands Trust
ZTV	Zone of Theoretical Visibility

Non-Technical Summary

Introduction

- 1.1 Dounreay Tri Limited ("the Applicant") is proposing to demonstrate a floating offshore wind farm called Dounreay Tri ("the Project") which is proposed to consist of a two turbine offshore wind farm with an installed capacity of between 8 to 16 megawatts (MW) approximately 6 km off Dounreay, Caithness; a single export cable to bring the power to shore at, or near, Sandside Bay; and an onshore substation and associated electrical infrastructure near Dounreay Substation.
- 1.2 Consent is required under Section 36 of the Electricity Act 1989 (as amended). An application for consent under Section 36 in Scottish Territorial Waters is made to the Marine Scotland - Licensing Operations Team (MS-LOT) on behalf of the Scottish Ministers. In addition, the Marine (Scotland) Act 2010 states that a Marine Licence is required to construct, alter or improve any works, or deposit any object in or over the sea, or on or under the seabed. As with the Section 36 application, the Marine Licence applications will be made to MS-LOT.
- 1.3 The Growth and Infrastructure Act 2013 allows for MS-LOT to 'deem' planning permission for onshore elements of offshore electricity generation schemes granted consent under Section 36 of the Electricity Act, which is the intention for this Project. As such, a separate planning application shall not be submitted to the Highland Council, rather deemed consent for the associated onshore infrastructure shall be sought as part of the Section 36 application. The Highland Council will thus become a Statutory Consultee to MS-LOT.
- 1.4 Under the Habitats Regulations, any development that is considered by the Competent Authority to have the potential to have a likely significant impact on a European site is required by law to prepare a Habitats Regulations Appraisal (HRA). This document is provided as a shadow report to this document.
- 1.5 The Project will have an installed capacity of up to 16 MW and will connect to the grid at, or near, the Dounreay 132/33/11kV Substation. The two wind turbines and platform shall be wholly located within the Site (Figure 1.1) with one subsea cable exporting renewable electricity ashore.
- 1.6 The main offshore components are:
 - Offshore wind turbines;
 - A semi-submersible, floating foundation;
 - Mooring lines;
 - Mooring bouys;
 - Drag anchors or pin-piles;
 - A single cable to bring the renewable electricity ashore; and
 - Scour protection for anchors and the export cable, where necessary.



Indicative project programme and milestones

- 1.7 The figure above provides an indicative programme which highlights key project milestones. Subject to receiving consent (i.e. planning permission) in March 2017, the Applicant would proceed to fabricate the platform in a dry dock and then install the platform off Dounreay in the summer of 2018.
- 1.8 The Project has been scoped and the results of the Scoping Assessment are presented in this document. Tables 12-1 and 12-2 summarise the Scoping Assessment. It is considered that the Project may potentially have an impact on the following receptors which will be taken forward to the assessment phase and discussed fully in the Environmental Impact Assessment (EIA) phase and presented in the accompanying Environmental Statement (ES).

Offshore Environment

- 1.9 Early indications are that the Project has the potential to cause localised movement of seabed sediments due to the placement of anchor blocks and associated changes to localised currents on or near the seabed. Scour impacts are scoped in and will be addressed with respect to the physical environment, the benthic environment and also fish and shellfish ecology.
- 1.10 Additional physical changes as a result of the Project include potential impacts to localised currents, and sediments including a potential increase in localised suspended sediments and the disturbance of contaminated sediments. These impacts are scoped in and will be discussed in terms of the physical environment, the benthic environment, fish and shellfish, marine mammals and commercial fisheries.
- 1.11 There is the potential that fish and shellfish and marine mammals may be impacted by underwater noise during both the construction and operational phases, this impact is scoped in and considered in the respective chapters. Airborne noise is scoped out in both the construction and operational phases.
- 1.12 Habitat disturbance and loss, displacement of species and the potential creation of new habitat are considered as potential impacts and are discussed in the benthic and fish and shellfish chapters. Potential impacts through pollution incidents, the introduction of non-native species and impacts of thermal load or electro-magnetic fields (EMF) from the cable are all scoped in

and discussed in terms of the benthic environment, elasmobranch species, fish and shellfish, marine mammals and fish and shellfish.

- 1.13 The potential for the structures to act as fish aggregation devices is scoped in and is described in terms of fish species in both the commercial fisheries and fish and shellfish chapter. Submarine cables are considered to have the potential to entangle marine fauna and this is scoped in and described in terms of basking shark and marine mammals.
- 1.14 The Applicant has commissioned aerial surveys to record birds and marine mammals using the Site. Potential impacts on birds may include displacement, disturbance and/or collision (bird strike). Marine mammals may avoid the area during the period of installation. Potential impacts on birds and marine mammals will be assessed as part of the Environmental Impact Assessment.
- 1.15 Potential impacts to commercial fishing are considered to include loss of fishing grounds and associated displacement of vessels, change in aggregation and distribution of fish species, obstruction to fishing vessel transit routes, and the potential for gear to be lost through entanglement.
- 1.16 Navigational risks are scoped in including potential for collision with the structure itself and displacement of vessels as a result of the presence of the Project. Also considered is the potential for increased transit routes as vessels travel around the Project rather than through it.
- 1.17 Potential impacts on marine, aviation and meteorological radar are scoped in as is the potential for impact on telecommunications. In the operational phase it is considered possible that the Project may impact on aviation including military operations, routine helicopter movements and search and rescue operations and this is scoped in.
- 1.18 The Site is located between 6 - 9 km offshore. The Project shall be constructed in the site and shall be visible from land. Visual impacts are scoped in and a full assessment will be undertaken.
- 1.19 There is the potential for known and unknown archaeological artefacts and features to be present in the Site or along the export cable corridor and this is scoped in for the construction phase. There is the potential for some seabed disturbance to be necessary in any maintenance and this impact is scoped in for this phase also.
- 1.20 Other marine users were identified as having the potential to be impacted by the Project and these are scoped into the assessment phase.
- 1.21 There is the potential for a positive impact in terms of socio-economics and this will be taken forward to the assessment phase. Impacts on recreation and tourism are also considered to require assessment and these will be addressed in the EIA phase.

Onshore Environment

- 1.22 There is the potential for the loss of habitat, individuals or breeding territories through construction work within the onshore study area. Bird species associated with North Caithness Cliffs and/or Caithness Lochs Special Protection Area (SPA) in proximity to construction and maintenance activities may also be displaced or disturbed depending upon cable route selection and timing of construction/maintenance activity within the onshore study area. However, the level of disturbance would be temporary and occur rarely. Ongoing ornithology surveys will be completed in December 2015. An assessment of potential impacts will then be completed, after a cable route has been selected.
- 1.23 There is the potential for the loss of sand dune habitat, a feature of Sandside Bay Site of Scientific Interest (SSSI), as well as Annex I habitats and Groundwater Dependant Terrestrial

Ecosystems (GWDTEs) depending on cable route and construction route selection. Cable construction may also result in the loss of Scottish primrose plants.

- 1.24 Mortality, displacement or disturbance to protected species associated with Caithness and Sutherland Peatlands Special Area of Conservation (SAC) may occur as a result of cable construction. Otter, pine marten, badger and reptiles are likely to be present within the onshore study area during the construction and operations and maintenance phases. The impact of the Project's operations and maintenance activities upon Caithness and Sutherland Peatlands SAC will therefore be considered.
- 1.25 The Project does not affect any features with the potential to support bat roosts within the onshore study area and there is only a small area of invertebrate habitat temporarily disturbed during construction of the Project. Therefore these impacts are not considered within the EIA.
- 1.26 Installation activities associated with the cable landfall and onshore cable route could directly affect the sand dune habitat within Sandside Bay SSSI with the potential for loss of habitat. Potential impacts on the nearby Red Coast SSSI will also be considered. Construction of the substation is not anticipated to result in any adverse impacts on nature conservation designations as substation would be located immediately adjacent to existing Dounreay 132/33/11kV substation and within the context of the large industrial complex that is Dounreay Nuclear Facility.
- 1.27 No potential impacts are anticipated from the operation phase as the cable will be buried and the substation shall be located immediately adjacent to the Dounreay Nuclear Facility.
- 1.28 Any in combination effects relating to European site will be considered in the HRA. Any cumulative impacts on SSSIs will be considered in the EIA.
- 1.29 The key potential impacts on the onshore archaeology and cultural heritage within the onshore study area are considered to be direct and/or indirect, cumulative and residual physical disturbance to known archaeological finds, features and/or landscapes of cultural significance and potentially as well as of yet unknown cultural heritage aspects. Direct physical impacts are those that would produce a physical impact on heritage assets and archaeological features. Direct impacts may be caused by a range of activities associated with the installation, maintenance and decommissioning of the onshore aspects of infrastructure.
- 1.30 Indirect impacts are those that would produce an impact on the historical landscape and setting of identified cultural heritage sites and resources. Indirect impacts may relate to the Project affecting views to, or from, cultural heritage features with important landscape settings, or may result from increased noise or vibration. Such impacts are likely to persist throughout the operational phase of the Project and will be considered within the ES. The potential impacts on the setting of Scheduled Monuments, Listed Buildings, gardens and designed landscapes, Inventoried Battlefields, and World Heritage Sites will be identified and assessed. Indirect and direct impacts will be considered within the EIA.
- 1.31 During operation of the Project cables, substation and switch gear will create electric and magnetic fields. The design of the Projects' electrical infrastructure (faradays cage, 3 phase electrical cable and burial depth) will ensure that no potential impact occurs. Therefore, all electric and magnetic field impacts are scoped out of the EIA process as there will be no significant impacts.
- 1.32 Construction of the substation/switch gear building and access road will include groundworks, aggregates and cements all of which can be sources of dust. In addition, excavation works associated with the cable installation have the potential to give rise to dust impacts. There is the potential for this to have a significant impact in EIA terms and will therefore be assessed. Dust

can however be mitigated to reduce impacts, appropriate mitigation will be identified as part of the EIA process and subject to a condition of consent.

- 1.33 There is a carbon cost of construction associated with materials utilised and their transport. During operations the wind turbines will produce low carbon power, reducing the need for fossil fuel burning and hence provide a carbon saving. The overall carbon saving associated with the Project has the potential to be significant positive environmental impact, this will be scoped in to the EIA.
- 1.34 During construction, operation and decommissioning there is potential for mainly coastal areas to experience direct and indirect impacts on perceptual qualities. There is also potential for receptors at land-based viewpoints to experience visual impacts. Landscape and visual impacts are scoped in and are taken forward to the assessment phase.
- 1.35 Utilising the Institute of Environmental and Assessment (IEA) Guidance Notes, a high level assessment was carried out for traffic and transport. The IEA guidelines identify the following rules by which to undertake an assessment of potentially significant traffic and transport related environmental impacts:
 - Rule 1: Include roads where traffic flows are predicted to increase by more than 30% (or where the number of HGVs are predicted to increase by more than 30%); and
 - Rule 2: Include any specifically sensitive areas where traffic flows are predicted to increase by 10% or more.
- 1.36 Using worst-case daily movements, the high level assessment identified that increased traffic movements associated with the Project are below the 30% and 10% trigger level for all movements to the east and south of the site. As such there is no potential for significant impact.

Cumulative Impact Assessment

- 1.37 Cumulative impacts are considered on an individual receptor basis and the following developments are considered to have the potential to interact with the Project:
 - The Orkney-Caithness interconnector cable;
 - HIE Dounreay Floating Wind Deployment Centre;
 - Brims Tidal Array; and
 - Meygen.
- 1.38 The following impacts and receptors are considered to not be impacted by the Project and have been scoped out of further assessment: offshore geology, changes to the wave regime, coastal processes, airborne noise in both the construction and operational phases, increased sedimentation in the construction and operational phases and barrier impacts to migrating fish. Also scoped out of further assessment is the potential for ghost fishing from lost fishing gear. There is not anticipated to be any interaction between the Project and aviation, military or meteorological radar during the construction phase and no impact to PSR or SSR radar during the construction phase. Preliminary investigations also indicate no impact to air defence radar so this is also scoped out.
- 1.39 Additionally, there are no aggregate extraction areas, oil fields or spoil disposal activities in the vicinity of the Project so these receptors are scoped out of further assessment.

Conclusions and Next Steps

- 1.40 In conclusion, the Dounreay Tri project has the potential to impact on the physical, biological and human environment both on and offshore and as such a full environmental impact

assessment will be undertaken and the results presented in an accompanying Environmental Statement which will be submitted to Marine Scotland alongside the consent application.

- 1.41 Suitable methods for assessment will be discussed with the relevant stakeholders through this scoping process and on-going consultation in the assessment phase, and appropriate mitigation and monitoring developed where required.

1 Introduction

- 1.1 Hexicon AB is a Swedish design and engineering company that has developed a semi-submersible foundation for offshore wind power that hosts two Wind Turbine Generators (WTGs). Hexicon wishes to demonstrate this technology in Scottish waters.
- 1.2 In order to be eligible for 3.5 Renewable Obligation Certificates (ROCs) the Project must be commissioned and connected to the grid before the 1st of October 2018. Accordingly, Hexicon has created a Special Purpose Vehicle (SPV) called “Dounreay Trì Limited” for the sole purpose of developing, financing, constructing and demonstrating this technology within a site approximately 9 km off Dounreay, Caithness (“the Site”) (Figure 1-1).
- 1.3 Dounreay Trì Limited (“the Applicant”) is proposing to demonstrate a floating offshore wind farm called Dounreay Trì (“the Project”) which shall consist of:
 - A two turbine offshore wind farm with an installed capacity of between 8 to 16 megawatts (MW), subject to final approval of The Crown Estate, approximately 9 km off Dounreay, Caithness;
 - A single export cable to bring the power to shore at, or near, Sandside Bay; and
 - Subject to a Connection Offer from Scottish and Southern Energy Power Distribution (SSEPD), the associated onshore electrical infrastructure to connect the Project at, or near, the substation at Dounreay.

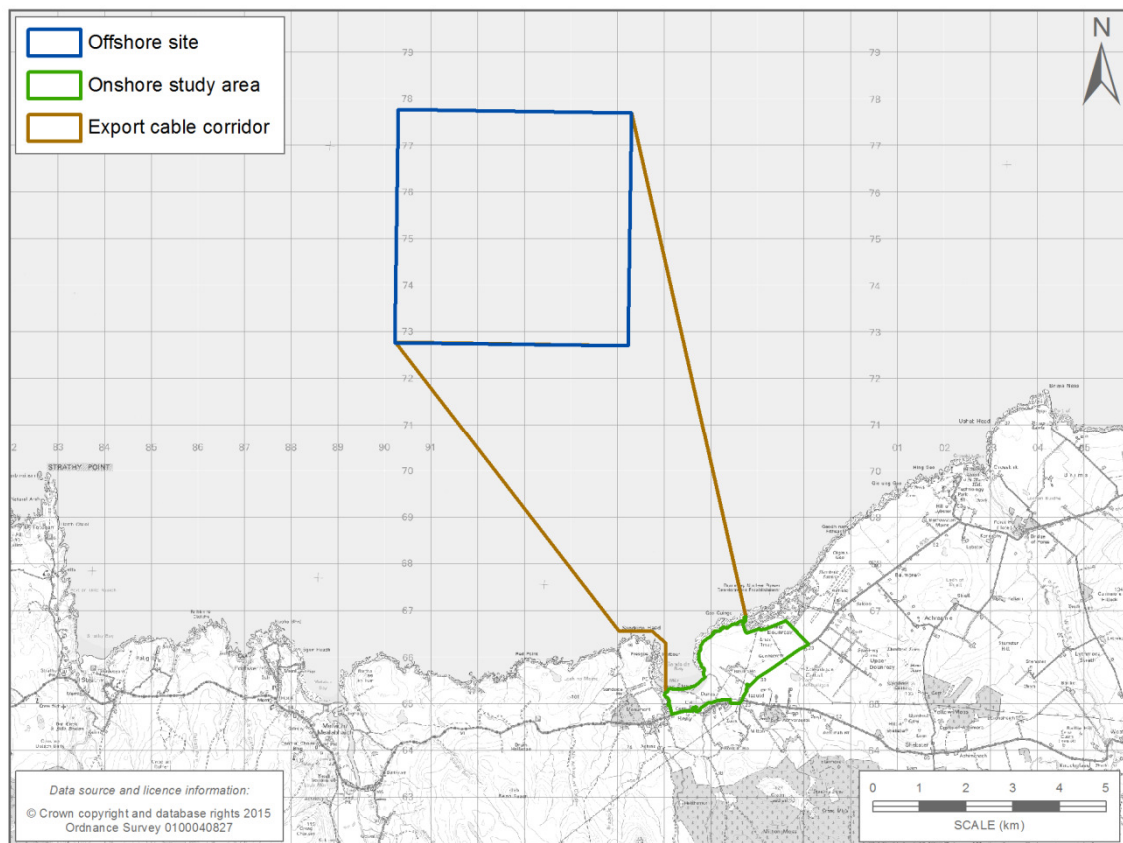


Figure 1-1 Offshore site, export cable corridor and onshore study area

- 1.4 Figure 1-1 depicts the Offshore Site, the export cable corridor and the onshore study area. Coordinates for the four corners of the Offshore Site are provided in Table 1-1.

Table 1-1 Offshore Site Coordinates

Corner	Northing	Westing
NW	58 ⁰ 40'25.6"	3 ⁰ 53'36.0"
NE	58 ⁰ 40'27.7"	3 ⁰ 48'25.7"
SE	58 ⁰ 37'46.0"	3 ⁰ 48'22.0"
SW	58 ⁰ 37'44.0"	3 ⁰ 53'31.9"

- 1.5 Tables 12-1 and 12-2 summarise the potential impacts offshore and onshore, respectively.

2 Legislative Context and Regulatory Requirements

- 2.1 The UK has committed to sourcing 15% of its total energy needs from renewable sources by 2020 under the 2009 Directive on Renewable Energy (2009/28/EC) including electricity, heat and transport. The UK and Scottish Governments have also made legally binding commitments through the Climate Change Act 2008 and the Climate Change (Scotland) Act 2009.
- 2.2 There are four key drivers for the shift in energy production to low carbon sources, including renewable energy, in the UK and Scotland which are:
- The need to tackle climate change;
 - The need to secure energy supply;
 - The need for new energy infrastructure; and
 - The need to maximise economic opportunities.

Scotland's energy policy and the need for renewable energy

- 2.3 The challenges of climate change, energy supply and security of supply are driving policy on renewable energy developments. There are now a significant number of national and international policies, strategies and regulations relating to climate change and the development of renewable energy in Europe, the UK and Scotland.
- 2.4 The Dounreay Tri Project intends to demonstrate a multi-turbine floating wind platform. This will allow Hexicon to test and further develop the technology, including fabrication methods and design of the moorings and anchors. The Project will contribute up to 16 MW installed capacity from wind energy and will make a contribution to achieving these policy aims. The lessons learned in developing this demonstration project can then be applied to developing the technology further to contribute to achieving relevant International, European, UK and Scottish policy aims including for example:
- Kyoto protocol;
 - EU Renewable Energy Directive (2009/28/EC);
 - UK Climate Change Act 2008;
 - The Climate Change (Scotland) Act 2009;
 - The Scottish Government's 2020 Routemap for Renewable Energy in Scotland; and
 - Scotland's Offshore Wind Route Map 2013.

Environmental Impact Assessment

- 2.5 European Commission Directive 85/337/EEC¹ (the EIA Directive), as codified by Directive 2011/92/EU², requires an assessment to be completed of the impacts of certain public and private projects on the environment before development consent is granted. The requirements of the EIA Directive are transposed into law in Scotland through the Regulations applied under specific consenting frameworks, as set out below.

¹ Council Directive 85/337/EEC of 27 June 1985 on the assessment of the impacts of certain public and private projects on the environment.

² Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the impacts of certain public and private projects on the environment (codification).

Section 36 of the Electricity Act 1989

- 2.6 To construct and operate an electricity generating station, such as a wind farm, with a capacity greater than 1 MW in Scottish Territorial Waters, consent is required under Section 36 of the Electricity Act 1989 (as amended). An application for consent under Section 36 in Scottish Territorial Waters is made to the Marine Scotland - Licensing Operations Team (MS-LOT) on behalf of the Scottish Ministers.
- 2.7 The Application shall be for the construction and operation of two offshore demonstration turbines on a single floating platform, within Scottish Territorial Waters, with the capacity to generate up to 16 MW of electricity. The application shall be supported by a single Environmental Statement (ES), prepared in accordance with the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000, as amended.

Marine Licence

- 2.8 The Marine (Scotland) Act 2010 states that a Marine Licence is required to construct, alter or improve any works, or deposit any object in or over the sea, or on or under the seabed. A Marine Licence is required where the works are seaward of the mean high water springs (MHWS). As the Development is seaward of the MHWS a Marine Licence will therefore be required to deposit the anchors, mooring lines and install the export cable in/on the seabed.
- 2.9 As with the Section 36 application above, the Marine Licence applications will be made to MS-LOT. The Environmental Statement (ES) shall also be prepared in accordance with the Marine Works (Environmental Impact Assessment) Regulations 2007, as amended.

Town and Country Planning

- 2.10 The Growth and Infrastructure Act 2013 allows for MS-LOT to 'deem' planning permission for onshore elements of offshore electricity generation schemes granted consent under Section 36 of the Electricity Act, which is the intention for this Project. As such, a separate planning application shall not be submitted to the Highland Council, rather deemed consent for the associated onshore infrastructure shall be sought as part of the Section 36 application. The Highland Council will thus become a Statutory Consultee to MS-LOT.

Habitats Regulations

- 2.11 There is a network of protected sites that aim to conserve natural habitats and species that are rare, endangered, vulnerable or endemic within the EU. This network, known as 'Natura 2000', includes Special Areas of Conservation (SAC) designated under the Habitats Directive for their habitats and/or species of European importance and Special Protection Areas (SPA) classified under the Birds Directive for rare, vulnerable and regularly occurring migratory bird species and internationally important wetlands.
- 2.12 The requirements of the Habitats Directive are transposed in Scotland and its territorial seas, by means of the (Conservation (Natural Habitats, &c.) Regulations 1994 (as amended). These regulations apply in the terrestrial environment and the territorial waters out to 12 nm. The Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 (as amended) transpose the Habitats Directive beyond 12 nm. These are collectively referred to as the "Habitats Regulations" hereafter.
- 2.13 Candidate SACs (cSACs), potential SPAs (pSPAs) and Sites of Community Importance (SCIs) should be subject to the same considerations as SACs and SPAs. In addition, sites designated under the 1971 Ramsar Convention for their internationally important wetlands shall also be addressed. While Ramsar sites are not European sites for the purposes of the Habitats Directive,

they will nevertheless be considered in any subsequent material produced by Dounreay Tri Limited.

- 2.14 Under the Habitats Regulations, development that is considered by the Competent Authority to have the potential to have a likely significant effect on a European site cannot be consented until an Appropriate Assessment, undertaken by the Competent Authority, has ascertained that the Project will have no adverse effect on the integrity of those European sites.
- 2.15 In accordance with Regulation 48 of the Habitats Regulations, anyone applying for development consent should provide the Competent Authority with such information as may reasonably be required to enable it to determine whether an Appropriate Assessment is required. For the purposes of this application there is one competent authority, MS-LOT.
- 2.16 The ES will be accompanied by a separate, shadow HRA report. The outcome of any Appropriate Assessment would be determined by the Competent Authority and would be produced prior to determination of the applications.
- 2.17 The Habitats Regulations present a different legal test to the EIA Regulations. As a result, the HRA will be screened separately from this Scoping Report, however the European sites which are in the vicinity of the Site are discussed in Section 7.7 Nature Conservation Designations.

3 Site selection and Engagement to date

Site selection

- 3.1 In August 2014, Hexicon sought to locate a site in Scottish waters to demonstrate their multi-turbine platform. Marine Scotland (2014) had published the *Potential Scottish Test Sites for Deep Water Floating Wind Technologies - Regional Locational Guidance* (RLG). The Regional Locational Guidance (RLG) identified eleven sites which were considered suitable for floating wind. Accordingly, each site was reviewed according to Hexicon's criteria. Only three sites identified in the RLG met Hexicon's criteria:
 - North East Aberdeen;
 - North Coast (Dounreay); and
 - Southern Moray Firth.
- 3.2 These three sites were examined in greater detail using publically available information and the results presented at a Site Selection Workshop, hosted by Marine Scotland and attended by Scottish marine stakeholders, in Edinburgh on the 10th of October 2014.
- 3.3 On the basis of the information available and feedback from the workshop, the Southern Moray Firth Site appeared to be unsuitable for development. A deep trench lay landward of the site and presented a significant technical constraint. The site is also intensively fished and may be designated to protect marine mammals.
- 3.4 The North East Aberdeen Site lay approximately 23 km from shore, significantly increasing the length and cost of the export cable. Furthermore, the site and export cable corridor lay within ground that is fished by a range of gear types, including scallop dredgers. Scallop dredging could damage subsea cables, so presents a significant risk.
- 3.5 Hexicon chose the Dounreay site which lies south of the shipping traffic. The Dounreay site was selected for the following reasons:
 - The Site has suitable water depths, close to shore thus reducing the export cable length and costs compared with other sites;
 - The substrate is gravelly sand;
 - The average wind speed is good and has been calibrated with data from RES's Forss Wind Farm;
 - On the basis of discussions with Scottish Fishermen's Federation (2014), the site lies out-with intensively fished areas; and
 - Marine Scotland completed a detailed geophysical survey during the summer of 2014, including sub bottom profile of the site. This information is publically available.

Engagement to date

- 3.6 The Applicant will consult with the public prior to submitting consent applications. The Applicant will provide advance notice of the public consultation event in local press.
- 3.7 Table 3-1 sets out the key meetings and dialogue the Applicant has had to date.

Table 3-1 Meetings and engagement to date

Meeting	Date	Purpose
2014		
Marine Scotland (Policy)	22 nd September	To discuss the selection of a demonstration site for a multi-turbine, floating wind project, in Scottish Waters.
The Crown Estate	22 nd September	A key attraction is remaining eligible for 3.5 ROCs.
Site Selection Workshop (a number of key stakeholders representing the human, physical and biological environment)	10 th October	To discuss: The selection of a demonstration site for a multi-turbine, floating wind project, in Scottish Waters. The data available/survey requirements for each site. Potential environmental impacts.
Marine Scotland (Science)	23 rd October	To discuss the survey data available and future survey plans for the NE Aberdeen site and the North Coast.
Scottish Fishermen's Federation	23 rd October	To discuss the fishing activity at both the NE Aberdeen site and the North Coast site, with a view to avoiding high value fisheries, where possible.
The Crown Estate	27 th November	To confirm Hexicon had selected the Dounreay site and to enquire about the leasing process and likely timescales.
SSEPD	19 th December	To discuss connecting at, or near, Dounreay substation.
2015		
HIE	14 th January	To confirm that Hexicon had selected the Dounreay site and to discuss HIEs ambition for a floating wind demonstration centre.
The Crown Estate	20 th January	To discuss the technology plan.
The Crown Estate	2 nd April	To discuss the development, technology and financing plans. To discuss leasing timescales and content.
SSEPD	7 th April	Call to discuss connection options and voltages at, or near, Dounreay Substation.
Landowners	16 th April	To introduce the Project and discuss access for onshore surveys.
NDA	16 th April	To confirm that Hexicon had selected the Dounreay site and to enquire about radiological contamination, existing offshore data sets and the NDA's work with local

Meeting	Date	Purpose
		stakeholder groups.
The Highland Council	17 th April	To introduce the Project and discuss the development programme.
SSEPD	6 th May	To discuss grid connection application routes and timescales for Dounreay.
HIE	6 th May	To discuss an MOU, grid capacity and sharing survey data.
Marine Scotland (Licensing and Operations) and SNH	12 th May	To introduce the Project and discuss the development programme. To set out the aerial and onshore ecological survey methods.
The Highland Council, SNH, SEPA, MS-LOT,	10 th June	Highland Council Pre-Application Committee which discussed the proposal, consenting strategy and key environmental sensitivities.
SDI	24 th June	Call with SDI to discuss the Scottish supply chain.
Landowners	14 th July	Meeting to discuss construction access.
HIE	15 th July	Meeting to discuss grid, MOU contents and highland ports.
Marine Scotland (MS-LOT)	17 th July	Review of complete development programme, consent determination period and consenting strategy.
SDI	4 th August	Call to arrange meetings with both Global Energy Group (Nigg) and the Port of Ardersier.
Harland & Wolff	17 th August	Call to discuss availability and potential constraints both with the dry dock and Belfast Harbour.
Port of Ardersier	21 st August	Call with SDI, HIE and others to discuss potentially fabricating the platform at the Port of Ardersier, Nairn.
Nigg Energy Park	24 th August	Call with SDI, HIE and Global Energy Group to discuss potentially fabricating the platform at Nigg Energy Park.
UKTI	10 th September	Call to discuss supply chain contacts.
UKTI	11 th September	Call to discuss project financing.
HIE	15 th September	Meeting to discuss progress with MOU.

4 Project Description

Project Objectives

4.1 The Project has two key objectives:

- **Technical:** To test the performance of a multi-turbine floating wind platform in a real offshore environment; e.g. fatigue loading, power output, controls etc. and use these results to refine the platform for larger scale projects; and
- **Economic:** Verification of the economic return through this demonstration project shall provide a base for more reliable estimations for utility scale projects. This full scale demonstration project is an important step towards developing a commercially competitive product.

Design Envelope

- 4.2 As set out further in Chapter 5, the ES will include a clearly defined “Design Envelope”. The Design Envelope is also known in UK legal nomenclature as the Rochdale Envelope³.
- 4.3 Key components of the Project are outlined below. At this early stage, the Design Envelope remains indicative and will be refined following environmental surveys, technical and engineering studies and discussions with stakeholders and the community, as part of the EIA process.

4.1 Offshore Infrastructure

- 4.4 The Project will have an installed capacity of up to 16 MW and will connect to the grid at, or near, the Dounreay 132/33/11kV substation. The two wind turbines and platform shall be wholly located within the Site (Figure 1.1) with one subsea cable exporting renewable electricity ashore.
- 4.5 The main offshore components will include:
- Two offshore wind turbines;
 - A semi-submersible foundation;
 - Mooring lines or chain;
 - Mooring bouys;
 - Anchors or pin-piles;
 - One cable to bring the renewable electricity ashore; and
 - Scour protection for anchors and the export cable, where necessary.

³ Case law (for example Rochdale MBC Ex. Parte C Tew 1999) has affirmed the legal principle that the content of any consent for development requiring EIA cannot exceed the scope of EIA. However, an enduring difficulty for the promoters of complex infrastructure projects such as offshore wind farms is that it is not possible to be precise about each element of a development at the time of the submission of a consent application. A valid approach to this issue is to define a design envelope (known as a Rochdale envelope) comprising a series of realistic worst-case scenarios for individual environmental or technical disciplines, which will define the scope of the EIA and in turn the scope of any consent or licence.

Turbine Envelope

- 4.6 The turbine envelope must provide enough flexibility to accommodate modifications to currently available turbines. The following turbine options set maximum and minimum dimensions for turbine technology against which the environmental impacts of the Project can be assessed. These minimum and maximum dimensions used to define the turbine envelope are based on actual, current offshore wind turbine technology (for example, 4 MW turbines) and increasingly conceptual turbines (for example 8 MW turbines) which could become available during the Project's development time span. The final turbine envelope will be subject to reviews conducted throughout the EIA and design process. Comments from stakeholders will also be considered as part of such reviews. Table 4.1 provides three possible turbine size and number configurations which achieve an installed capacity of between 8 and 16 MW.

Table 4-1 Turbine options

Nominal Rating	Maximum rotor tip height (m LAT)	Maximum number of turbines	Maximum rotor diameter (m)	Maximum hub height (above MHWS)	Air draft (above MHWS)
4 MW	185	2	130	120	22
6 MW	197	2	154	120	22
8 MW	210	2	180	120	22

- 4.7 Each wind turbine operates automatically. Each turbine can yaw – the nacelle rotates to face the rotor blades into the wind. The rotor blades can also pitch – the blades can rotate into or out of the wind depending on the wind speed. Each turbine is self-starting when the wind speed reaches an average of about 3 to 5 m/s (about 10 mph). The output increases with the wind speed until the wind speed reaches typically 10 to 13 m/s (about 25 mph). At this point, the power is regulated at rated (maximum) power. When the maximum operational wind speed is reached, typically 25 to 30 m/s (about 60 mph), the wind turbine will cut-out, either fully or gradually, in order to limit loading. If the high wind speed cut out is gradual, the wind turbine will continue to generate some power through to higher wind speeds, the maximum being dependent on the wind turbine design. A SCADA (Supervisory Control and Data Acquisition) computer system monitors and controls the output from each wind turbine. An integrated alarm system will be triggered automatically in the event of a fault.

Turbine Installation

- 4.8 The wind turbines will be installed and commissioned either at the fabrication port, prior to transit to Dounreay, or at a port closer to the Dounreay site.

Safety Requirements

- 4.9 The Project will be designed and constructed to satisfy the safety requirements of the Maritime and Coastguard Agency (MCA) as well as the marking, lighting and fog-horn specifications of the Civil Aviation Authority (CAA) and the Northern Lighthouse Board (NLB). At present, requirements specify that the turbines must be marked with lights that are visible from 2 nm and from all angles during construction.
- 4.10 When in operation, the platform shall be marked with clearly visible unique identification characters, which will be visible from all sides and comply with applicable requirements in Maritime and Coastguard Agency Marine Guidance Notice MGN 371. Currently these

recommend that they should be visible from at least 150 m from the structure and permanently lit by down lights to minimise light pollution. The colour scheme of the turbine tower, nacelle and blades is likely to be light grey RAL 7035, white RAL 9010 or equivalent.

The Platform

- 4.11 The platform is a large, floating, column-stabilised platform supporting two WTGs. The platform has buoyancy columns that are interconnected with steel lattice truss framework. The platform's size (to be confirmed on final design with selected turbine supplier) provides inherent stability, whilst the lattice steel work reduces the effect of wave loads. Figures 4.1 and 4.2 provide further illustration and detail. The platform can be adapted to different turbine sizes and the total capacity is dependent on the wind turbines selected. Figure 4.2 and
- 4.12 Table 4-2 provide indicative details of the platform dimensions and parameters when utilizing turbines with a rotor diameter of 132 m.



Figure 4-1 Floating platform concept

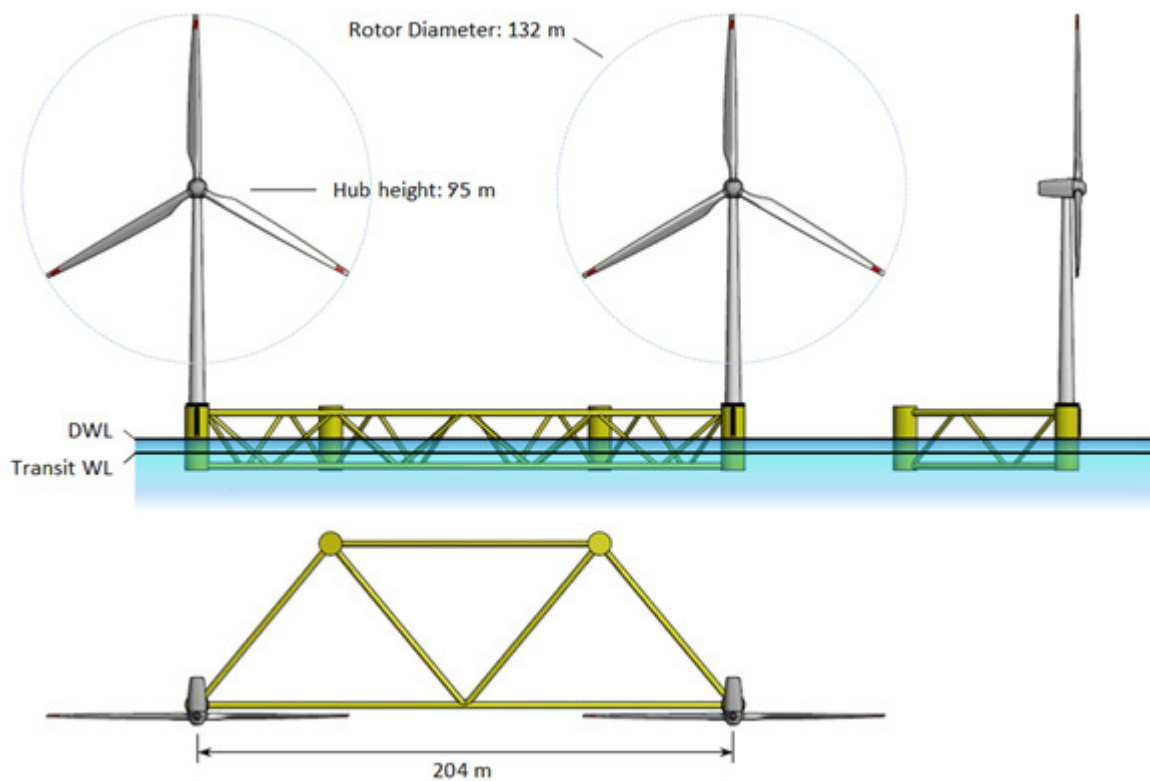


Figure 4-2 Indicative platform parameters (assuming 5 MW turbines are used)

Table 4-2 Indicative platform dimensions (assuming 5 MW turbines are used)

Aspect	Dimensions
Length	205m
Draught (operating)	19m
Draught (Transit)	6m
Total displacement	16,000Te

Mooring options

- 4.13 The platform must rotate in order to reduce wake effects (i.e. turbulence) between the turbines. Wake effects shall occur when one turbine is down wind of the other. Two mooring systems are currently being considered to rotate the platform: an active mooring system, using winches and a passive mooring system which aligns with the prevailing tidal, wind and wave conditions.

Active mooring system

- 4.14 The platform is moored via two independent mooring systems (one for station keeping and one to control heading) and orientated with the turbines perpendicular to the predominant wind direction. Whilst the yawing of the turbines will capture wind from all directions, the platform is designed to rotate $\pm 45^\circ$ to minimise wake effects in all possible wind directions. Since the platform rotates both turbines, it is possible to place the turbines close together and reduce wake impacts.

- 4.15 The platform (including the $\pm 45^\circ$ turn radius) would occupy a sea surface area of approximately 220 m by 220m.
- 4.16 The mooring arrangement is shown in Figure 4.3. There are four lines, two fore and aft, for controlling the platforms heading controlled by electric winches. Four centralised lines keep station. The station keeping lines are passive and have no need for active winches. Due to the two different purposes of the lines they may also have different configurations with polyester, steel wire, chain or combinations thereof.
- 4.17 The anchors would have a radius of approximately 800m from the buoy and occupy an area of approximately 2km^2 on the seabed.

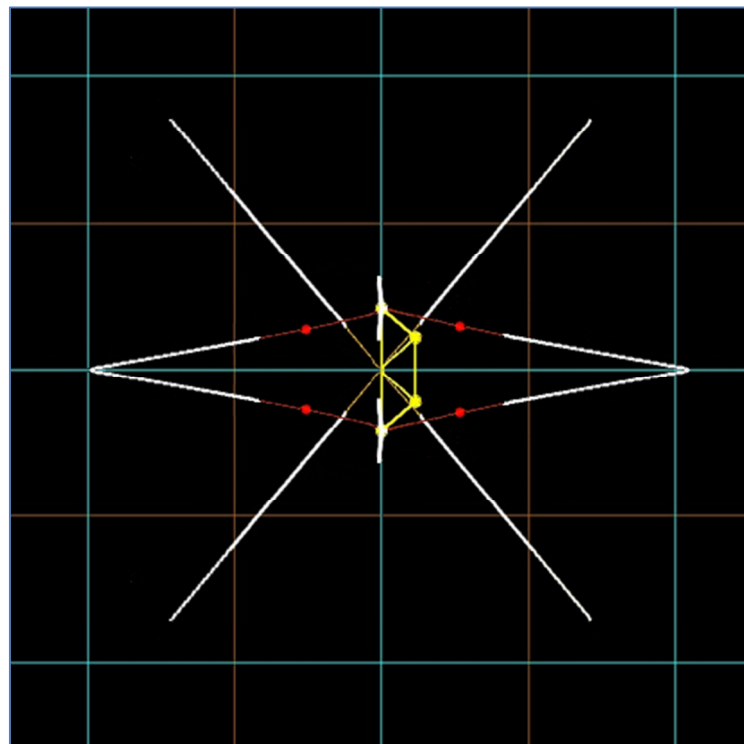


Figure 4-3 Active mooring system

- 4.18 Six or more anchors shall hold the platform in position. At present, drag embedded anchors are preferred for all of the mooring lines. Two or more pin piles may be required to anchor the control heading lines due to the anticipated forces required to rotate the platform, however these will only be considered if drag anchors are unsuitable. A small drag embedment anchor or clump weight shall stabilise the export cable where it touches down on the seabed.

Passive mooring system

- 4.19 The platform is moored to the seabed. The platform can rotate 360° . The platform will align with the prevailing wave, tidal or wind conditions. This is same means by which boats swing at anchor.
- 4.20 The mooring arrangement is shown in plan view in Figure 4-4 and in profile in Figure 4-5. There are 6 lines for holding the platform in position. The upside of a passive arrangement is simplification and a smaller seabed footprint. The mooring lines are most likely to be chain, steel wire or a combination thereof.

- 4.21 The platform (including the 360° turn radius) would occupy a sea surface area of approximately 220m by 220 m. The anchors would have a radius of approximately 350m from the platform centre and occupy an area of approximately 0.75km² on the seabed.

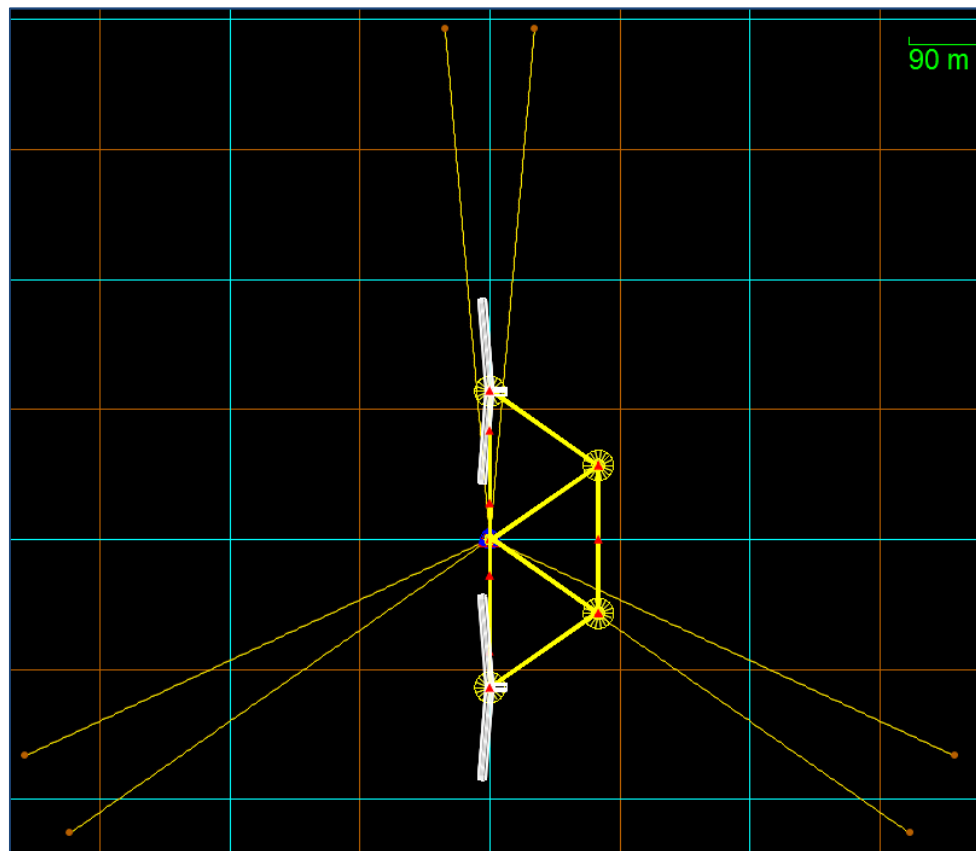


Figure 4-4 Passive mooring system

- 4.22 Six or more anchors shall hold the platform in position. At present, drag embedded anchors are preferred. A small drag embedment anchor or clump weight shall stabilise the export cable where it touches down on the seabed.

Scour Protection

- 4.23 Scour protection is designed to prevent structures being undermined by sediment processes and seabed erosion. The impacts of scour can be managed by protecting the seabed around the base of the anchors and the export cable. Several types of scour protection exist, including mattress protection, sand bags, grout-filled bags, stone bags and artificial seaweeds.
- 4.24 The final choice and detailed design of a scour protection solution will be made after detailed design of the anchors is complete, taking into account a range of aspects including seabed conditions, meteorological and oceanographical data, water depth, foundation type, maintenance strategy and cost.

Intra-array Cables

- 4.25 Intra-array cables shall connect the wind turbines. These cables shall be integrated into the top-side of the platform.

Export Cable

- 4.26 The export cable shall be buried in the seabed between the Site and the landfall. The export cable will make landfall at, or near, Sandside Bay.
- 4.27 The marine cable shall include conductor cores and a fibre optic cable encased in one cable which is armoured. The copper or aluminium conductors are covered by an insulation of polyethylene (cross linked XLPE) or EPR (Ethylene Propylene Rubber). The insulation is contained within an insulation screen, a lead alloy sheath (to ensure no ingress of water into the insulation).
- 4.28 The portion of the cable closest to the platform shall be dynamic so the platform can rise and fall without stretching or snapping the cable. A dynamic cable would typically be suspended in a “lazy-wave” (s-shape) acting like a flexible riser would on an oil and gas platform. Buoyancy elements lift the cable from the seabed and suspend it in the water, well below the sea surface. The cable shall touchdown on the seabed beyond the platform. A small anchor or clump weight shall stabilise the export cable touchdown. The remainder of the export cable will be buried under the seabed with a target burial depth of 1.5 m.

Offshore Substation

- 4.29 This Project shall not require an offshore substation.

Fabrication and installation activities

- 4.30 The platform is a steel truss structure with welded steel joints. The basic premise of the fabrication and installation methodology is as follows:
- Rolling of steel and fabrication of sections of the platform, Scottish fabrication options are being explored;
 - Joining of the sections of the platform in a dry dock or quayside location;
 - Fit out, turbine installation and commissioning of the platform at the dry dock or quayside;
 - While the fabrication is taking place, the subsea cable, anchors and mooring lines will be installed at the Dounreay site. The lines will be buoyed and marked as required, ready for installation of the platform. Anchor handling and installation can be carried out from a local port using local support vessels, where possible. Cable laying and particularly anchor installation will be done as late as possible prior to platform installation to minimise risks to the components and shipping. Scour protection for the anchors and cable may be required depending on the seabed conditions and the metocean conditions experienced at the Site;
 - Tow the platform to Site and then hook up to the export cable and the anchor lines; and
 - Final testing and export power.
- 4.31 The environmental management of construction activities will be carried out under the provisions of an Environmental Management Plan (EMP), which will be agreed with key stakeholders prior to construction. The provisions of an EMP typically include issues such as fuel and chemical handling, pollution prevention and control and storage of waste and effluent.

Programme of works (offshore)

- 4.32 Approximate durations for typical construction activities associated with individual components are provided below:

- Fabrication and turbine installation may take approximately 12 - 18 months. The platform shall be fabricated in a dry dock, offsite; and
- Subsea cable, anchors and mooring lines would be installed at the Dounreay site, as will the anchors and mooring lines. This would take 2 - 3 months, subject to weather.

4.33 The overall programme of works would likely remain 12 - 18 months as the fabrication of the platform and installation of the cable, anchors and moorings would occur in parallel.

Operations and Maintenance

4.34 Once operational, the Project will require regular inspections, servicing and maintenance throughout its lifetime. This will require technicians and support staff. Given the distance of the Project from shore and project size, it is assumed that an Operations and Maintenance (O&M) hub may be required. The O&M hub would be shortlisted and selected during the consent determination period. O&M vessels would steam between the port and the Project. Operations and maintenance activities will be defined within the Design Envelope and addressed in the relevant technical chapters of the ES.

4.35 Turbine maintenance falls into two categories: Preventative maintenance and corrective maintenance. Preventive maintenance will be mostly undertaken using crew vessels (although helicopters could be used in certain circumstances) to access the turbine and includes tasks such as the replacement of consumables (filters and oil) as well as a general inspection of the turbine. Crew transfers from vessels are expected to be via boat landing whereas helicopter access will be via heli-hoist. Corrective maintenance includes minor repairs/restarts and major component replacements (such as generator, blades, etc.). This is required if the results of condition monitoring or preventive maintenance suggest it is necessary, or if monitoring alarms are triggered (some of which may result in the wind turbines being remotely shutdown). It is expected that on average up to eight visits per turbine, per year will be required for fault rectification and up to three per turbine, per year for major component replacement (these figures may vary significantly from year to year). Corrective maintenance will be carried out using crew boats, helicopter or specialised vessels depending on weather conditions and the details of the breakdown. Major component replacements (nacelle, blades etc.) may mean that the platform is returned to port.

4.36 Foundation maintenance will be mostly undertaken using vessels to access the foundations and divers for subsea inspections. Preventive maintenance operations will include routine inspections of the subsea and topside structures, along with confined space operations which may require specialised technicians. The structural integrity of the foundation structure and ancillary structure (access ladders, walkways etc.) will be assessed along with the level of corrosion and marine growth. Marine growth will be removed if it is causing excessive loading on the foundation structure or restricting access. High-pressure water cleaners (using sea water with no additives) will most likely be used for general cleaning and marine growth removal.

4.37 Additionally, separate inspections (such as bathymetry) will inspect the condition of the seabed and scour protection (if utilised) around the anchors and export cable.

Decommissioning

4.38 The design life of the turbines and other major components of the Project are likely to be 25 years.

4.39 The Energy Act 2004 requires Dounreay Tri Limited to provide a decommissioning plan, supported by appropriate financial security, prior to constructing the Project. Decommissioning activities will comply with all relevant legislation at that time.

- 4.40 At the end of the operational lifetime of the Project, it is anticipated that there will be a requirement for all structures above the seabed to be completely removed. For the purposes of the EIA, the decommissioning of the wind farm is likely to be the reverse of the construction process. Decommissioning best practice and legislation will be applied at that time.

Decommissioning the Platform

- 4.41 The removal and dismantling of the platform will largely be a reversal of the installation process and subject to the same constraints. Even though decommissioning may not require the same level of precision as installation, it will be undertaken in the same controlled manner and in accordance with a risk management plan to ensure the same level of safety and pollution control measures. All components will be recycled, where possible.

Decommissioning the export cable

- 4.42 Relevant stakeholders and regulators will be consulted to determine which sections of the offshore cable will need to be removed. If there are no issues with stakeholders/regulators and the risk of the cable becoming exposed is minimal, then the cable may be left in situ to avoid disturbing the seabed unnecessarily. The ends of the cables will be cut as close to the seabed. The ends will be weighted down and buried (probably using an ROV) to ensure they do not interfere with trawling etc.
- 4.43 The sequence for removal of the cable is anticipated to be:
- Locate the cable using a grapnel and lift it from the seabed. Alternatively, or in addition, it may be necessary to use an ROV to cut and/or attach a lifting attachment to the cable so that it can be recovered to the vessel;
 - Seabed material may need to be removed to locate the cable. This is likely to be carried out using a water jetting tool similar to that used during cable installation;
 - The recovery vessel will either 'peel out' the cable as it moves backwards along the cable route whilst picking it up on the winch or cable engines, or, if the seabed is very stiff/hard it may first under-run the cable with a suspended sheave block to lift the cable from the seabed. The use of a suspended sheave block could be carried out before by a separate vessel such as a tug prior to the recovery vessel 'peeling out' the cable;
 - The recovery vessel will either spool the recovered cable into a carousel or cut into lengths as it is brought aboard before transport to shore; and
 - The cables will be recycled onshore.

Removal of scour protection

- 4.44 It may be preferable to leave the scour protection in-situ to preserve the marine habitat that may have developed over the life of the Project. Relevant stakeholders and regulators will be consulted to establish what the best approach is. If removal is deemed necessary, the removal sequence is anticipated to be:
- For rock armour, the individual boulders are likely to be recovered using a grab vessel, and transferred to a suitable barge for transport to an approved onshore site for appropriate re-use or disposal; or
 - The filter layer is likely to be dredged and transported to be reused or disposed of at a licensed disposal area (this could be offshore or onshore).

4.2 Onshore Infrastructure

4.45 The on infrastructure shall comprise of:

- A cable landfall at, or near, Sandside Bay;
- A cable joint transition bays, where offshore and onshore cables are spliced together;
- The onshore cable shall be buried to a depth of approximately 1 m, subject to ground conditions; and
- A substation or switchgear to transfer power to the grid, to comply with requirements of the Grid operator, to contain equipment and provide control functions. A grid connection has been requested at, or near, the existing Dounreay 132/33/11KV Substation.

Cable landfall

4.46 The landfall is an interface between the offshore and onshore aspects of the offshore wind farm. The construction work will typically involve both offshore elements as well as onshore elements.

4.47 There are three options for landing a cable at, or near, Sandside Bay:

- Option 1 Trenching** – a conventional beach landfall heading into south-eastern corner of Sandside Bay. This is currently the base case. A trench would be excavated through the intertidal zone from a point below MLWS to the cable Joint Transmission bay which would be located well above MHWS. The trench is then backfilled;
- Option 2 Horizontal Directional Drilling (HDD)** - at a point between Sandside Bay and Dounreay. HDD involves drilling a small pilot hole from the landward side to a point below MLWS. The hole is widening to accommodate a conduit pipe through which the cable is pulled. Once installed the cable is fed into the cable joint transmission bay. HDD requires a temporary landward working area of up to 1000 m² per cable circuit during construction to accommodate the drilling equipment and ancillary plant. This will be above MHWS. Once installed the working area is restored to pre-construction conditions; or
- Option 3 Pinning** - the cable to the disused Dounreay cooling water intake, at Dounreay. The cooling water intake is cut through rock. A cable duct could be pinned or screwed to the rock wall at low tide and the cable pulled through the duct.

Joint Transition Bay

4.48 At the cable landfall point, a concrete Joint Transmission Bay (JTB) may be required to house the joint between the multi-core offshore export cable, and the single core onshore cable.

4.49 The JTB would be located above MHWS and comprise an area approximately 2 m wide, 5 m long and 1 m deep with a level concrete floor and walls.

4.50 The purpose of the JTB is to allow a firm, solid base for cable jointing which can be covered by a tent or container to allow the necessary environmental conditions. Following connection of the cables, the JTB may be backfilled to protect the joint. The area will then be reinstated.

Onshore cable

4.51 The onshore cable will be installed in excavated trenches along the cable route over a distance of up to 2 km. Cable will be delivered by Heavy Goods Vehicles (HGVs).

4.52 Once the onshore cable route is finalised the appropriate installation method will be decided. However, it is anticipated that open-cut trenching will be the primary installation method. HDD may be required, if obstacles are encountered:

- Open cut trenching will comprise ducted installation. A trench will be dug using backed-hoe excavators to a depth of 1 – 2 m. The turf, top soil and spoil will be separated and placed beside the trench. Ducts would then be laid on top of sand and then the excavated material would be backfilled and restored. Cable would then be drawn through the buried ducts at cable joint bays; and
- HDD would generally be used at key crossings of sensitive features such as water courses. A much smaller drilling rig and working area (20 m x 20 m) would be required when compared to the landfall HDD operations but the technique is the same.

4.53 The working area includes the corridor in which the access road, the cable trenches, excavated material and any other equipment/machinery is placed. The dimensions of the access road depends on the type of cable trench and whether access for cable drum transport to the cable pulling sites (at the cable jointing bays) is necessary. It is expected that one cable will be installed in a single trench up to 3 m wide with an associated working corridor width of up to 20 m. This working width would encompass the cable trench, an access track, oil and turf storage and fencing. Certain sections may be wider, if required, for temporary parking, storage and cable pulling equipment.

4.54 The onshore cable corridor can be reinstated and re-cultivated after installation is complete. However, construction above the cable is not permitted.

Cable Joint Bay

4.55 Cable Joint Bays are required every 500 - 1,000 m to string together the onshore cable sections. The joints will occur within CJBs; these are typically slightly smaller than the JTBs (5 m long and 1.5 m wide) but ostensibly the same design.

4.56 The CJBs will be dug to approximately 1.5 m below ground level. This can take place prior to the trenching operation as long as the bay is temporarily covered until the jointing operation. During the jointing operation the bay will be covered by a tent or a container to ensure the correct environmental conditions for the jointing work. A working area of approximately 20 x 20 m is required adjacent the CJBs to provide space for the cable drums at one end, and the pulling equipment and auxiliary supply for the jointing work at the other end. This can be contained within the cable route working corridor. Following the cable jointing operation, the CJB will be backfilled and the ground restored.

4.57 A manhole cover will be the only surface level structure visible following full reinstatement of the cable corridor. This provides access for maintenance. The precise positioning will be agreed with landowners.

Switchgear or Substation

4.58 The turbines will export power at 33kv. The Project will require either a:

- Switchgear to connect to the distribution network at 33KV; or
- Substation to connect to the transmission network at 132KV.

4.59 The onshore substation or switchgear will include the electrical equipment required to connect the Project to the grid. This may include switchgear, transformers, filtering and harmonic equipment, reactive compensation devices, protection equipment and other auxiliary equipment.

- 4.60 The entire footprint to the edge of the fence line is likely to be an area of approximately 50 m x 50 m (0.25 hectares). The maximum height of the main electrical components is up to 8 m above finished ground level (FGL).
- 4.61 The majority of electrical plant should be indoors owing to the coastal location. The exact configuration, access roads, HGV and abnormal loads will be decided at a later stage.
- 4.62 External lighting will be used to illuminate building but this will be intermittent and only used when people are on site.

Typical onshore construction activities

- 4.63 Onshore construction activities will fall into the following generalised categories, noting that some activities may occur in parallel:

Cable landfall and onshore cable corridor

- Erect site fencing;
- Excavation or Horizontal Directional Drilling (HDD);
- Possible laying of ducts for later installation of cables;
- Backfilling and compaction of soil; and
- Reinstatement, where necessary.

Onshore switchgear or substation

- 4.64 Construction of the onshore switch gear or substation would comprise the following stages:
- Construction of temporary access roads from the existing road network;
 - Site preparation including site clearance, fencing off of the construction area, provision of services to the site and creation of a construction compound with welfare facilities;
 - Civil works to prepare the site for the heavy duty equipment required for the installation of the foundations and buildings. This will comprise earthworks to create a firm and level platform across the site;
 - Foundation works for the main electrical components and buildings which may comprise piled and/or shallow foundations;
 - Provision of the main utilities to services the site including electrics, water and telecommunications;
 - Construction of the main buildings housing the switchgear and controls;
 - Installation and testing of electrical equipment;
 - Landscaping works including earthworks and vegetation planting; and
 - Commissioning activities.

Onshore operations and maintenance

- 4.65 Following commissioning, it is assumed that the onshore substation will operate continuously (24 hours a day, 7 days a week) except during planned shutdowns for maintenance. The onshore substation will be designed to remain in situ during the life of the wind farm, which is envisaged to be up to 20 - 25 years.
- 4.66 There will be a limited amount of traffic to and from the substation for general operation and maintenance purposes. This is estimated to be around four vehicles per month carrying up to

three persons per vehicle. Beside this, there will be no day to day personnel on site in normal operation. Unexpected faults may lead to increasing traffic volumes depending on the type of fault.

- 4.67 Routine activities on the underground cable system during the operational phase will be regular and ad-hoc visits to the manholes as required for inspection/maintenance purposes. Non-routine activities could include repair of damage to cable or replacement of failed cable joint.

Decommissioning

- 4.68 The onshore switchgear or substation will first be disconnected from the high voltage transmission system, de-energised and all equipment earthed. Potential hazards and pollutants to the environment will be identified and a plan put in place to ensure removal is carried out with minimal risk of damage to surrounding environment. All electrical equipment/plant items will be dismantled and removed. Parts will be re-used, recycled or disposed of.
- 4.69 Usually, due to the disruption of their removal, it is preferable to leave decommissioned cables in situ. The ends of the cables will be cut and any overground installations (link boxes) removed. If required by regulators or if it is economic to recover the cable for scrap without causing significant disruption, the decommissioned cable may be removed. HDD sections for will remain buried unless it is absolutely essential for the re-purposing of the site.

Programme of Works (onshore)

- 4.70 The construction of the onshore infrastructure is likely to take 12 - 18 months to complete:
- Cable landfall installation – the total duration of drilling and installing a duct may take approximately 1 - 2 months. However, the exact timing is site specific and depends on the installation strategy;
 - Underground cable system – the work for a single cable section, i.e. 500 - 1200 m (distance between two CJBs) including trenching, cable pull-in and re-establishment of the top soil will last approximately 1 - 2 months. This assumes a single excavation team;
 - Onshore substation – a typical construction period for switch gear or substation such as is proposed for this project is 12 - 18 months;
 - The overall programme of works would likely be 12 - 18 months as the construction of the cable landfall, underground cable system and substation can be undertaken in parallel.

Health and Safety

- 4.71 Development, construction, operation, repowering and decommissioning will be undertaken in accordance with the requirements of the Health and Safety at Work etc. Act (1974) and subordinate legislation. Health, safety and environmental risks will be identified and arrangements implemented throughout the Project's lifecycle to ensure all potential health, safety and environmental issues are managed, as required by legislation and in accordance with the principle of ALARP (as low as reasonably practicable).

5 Environmental Impact Assessment Methodology

Introduction

- 5.1 Environmental Impact Assessment (EIA) is a process which identifies the potential environmental impacts of a development and then seeks to avoid, reduce or offset any adverse impacts through mitigation measures where possible. The EIA process is both iterative and cyclic and runs in tandem with project design. As potential impacts are identified, the design of the project can be adjusted and mitigation measures proposed. Consultation, a vital component of the EIA process, continues throughout each stage and contributes both to the identification of potential impacts and the development of mitigation measures.

Scoping Assessment Methodology

- 5.2 A high level appraisal of the potential for impact will be undertaken in the Scoping Report. This will be undertaken using best judgement of the available data and professional expertise. A full assessment will be undertaken of those potential impacts in the Environmental Impact Assessment phase and presented in the Environmental Statement (ES). A full explanation of the assessment methodology for the EIA will be presented in the ES.
- 5.3 The prediction of impacts will be made using the known parameters of the project and through experience of similar projects. The prediction of impacts includes consideration of the construction, operation and decommissioning phases of the project.

Design Envelope

- 5.4 The design envelope describes the worst-case scenario for each receptor group. Approaching the assessment individually ensures that all scenarios within the possible design have been assessed.
- 5.5 The design envelope is compiled using the parameters as described in Chapter 4: Project Description.

The Study Area

- 5.6 The Dounreay Tri Project offshore site is considered to be the offshore area delineated in Figure 5-1 in blue and referred to as the 'Site', the export cable corridor area of search is marked in orange on the same figure and referred to as the 'export cable corridor' in this document.

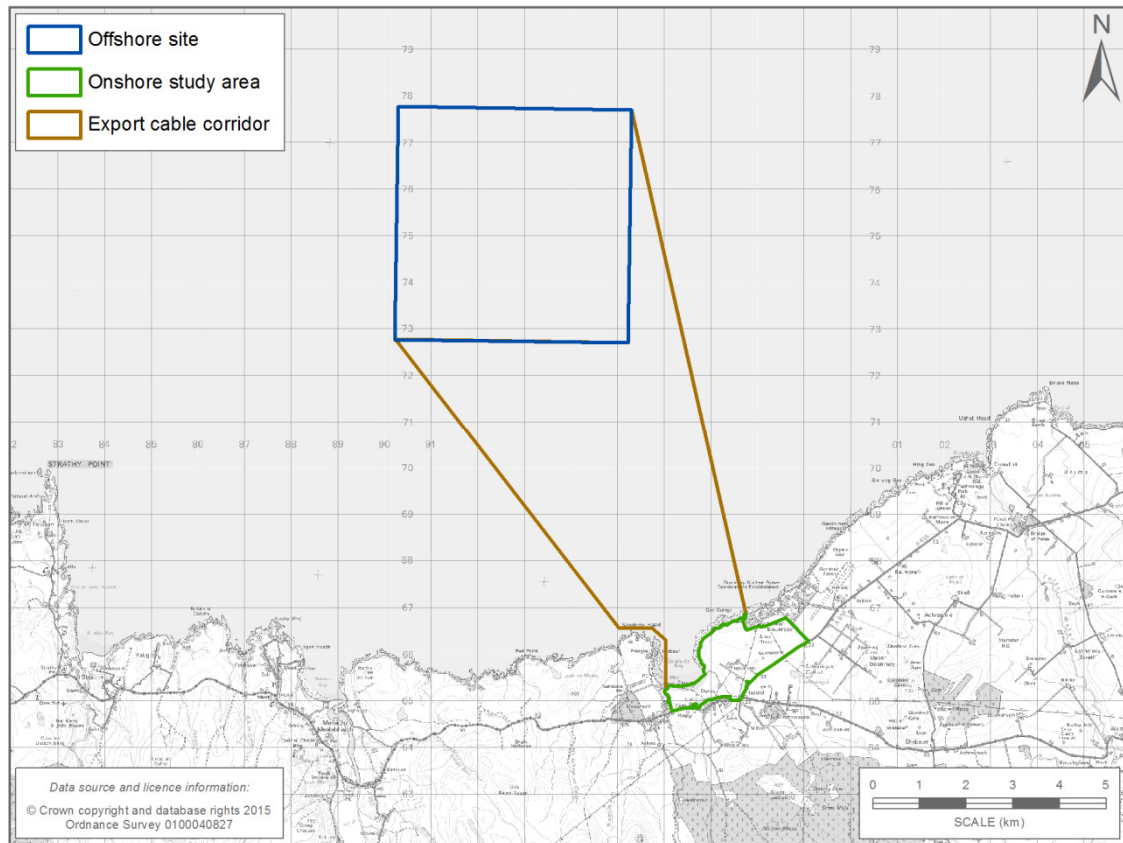


Figure 5-1 Offshore site and export cable corridor

Cumulative Impacts

- 5.7 The Scoping Report and corresponding ES intends to consider projects which are “reasonably foreseeable” such as:
- Existing development either built or in construction;
 - Approved development, awaiting implementation; and
 - Proposals awaiting determination within the planning process with design information in the public domain.
- 5.8 This approach accords with Scottish Natural Heritage Guidance: Assessing the cumulative impact of onshore wind energy developments (SNH, 2012a) and the Renewable UK Cumulative Impact Assessment Guidelines (RUK, 2013).
- 5.9 Once the relevant projects (sources) and receptors have been identified, possible pathways linking the two will be identified. Where no pathway exists between a source (other than Dounreay Tri) and a receptor, cumulative impacts can be ruled out. This screening process will help to refine the relevant projects and receptors and inform the spatial extent of the Cumulative Impact Assessment (CIA). This will result in list of key issues for consideration in the Dounreay Tri CIA.
- 5.10 At this stage, it is anticipated that the Dounreay Tri CIA will focus on a number of key issues including:
- Impacts on shipping and navigation, including constriction of shipping routes, increased navigational risk and disruption, increased travel and running costs from increased numbers of vessels serving various developments;

- Impacts on local residents, including employment opportunities, improvements to local infrastructure, increased industrial activity and increased demand on social services during construction, with benefits to the wider UK economy;
- Impacts on commercial fisheries, including impacts from displacement and the 'ripple effect' into other areas, increased steaming times, increased running costs and conflict between users of different gear because of construction activities, use of seabed and increased vessels, impacts on dependent shore based industries;
- Cumulative loss of benthic habitat from particular developments with impacts on important species;
- Cumulative impacts on birds from disturbance during construction, loss of feeding grounds, noise;
- Cumulative impacts on marine mammals from disturbance during construction, loss of feeding grounds, noise; and
- Contributions to achieving the Scottish and UK renewable energy targets and promotion of marine renewable energy technology.

5.11 The identities of relevant projects to be taken into consideration as part of the cumulative impact assessment will vary from receptor to receptor and are therefore considered within each of the relevant chapters of this Offshore Scoping Report. The projects listed below are indicative of the type of plans or projects that will be included within the scope of the cumulative impact assessment:

- The proposed Orkney-Caithness interconnector cable project;
- HIE Dounreay Demonstration Centre (DDC);
- Brims Tidal Array; and
- Meygen.

Transboundary Impacts

5.12 Due to the location of the Dounreay Tri Project, there are no transboundary impacts foreseen and this is scoped out of the assessment.

Monitoring

5.13 The Environmental Statement will include recommendations for monitoring certain impacts attributed to the Project. Monitoring proposals will be linked to clearly defined criteria. Monitoring is liable to occur where there is either uncertainty in the original impact assessment or where an impact is deemed to be significant. Dounreay Tri Limited will produce a draft Environmental Management and Monitoring Plan.

Layout of the Scoping Report

5.14 In the technical scoping chapters, for both the onshore and offshore environment, the following structure has been adopted, where applicable:

- Introduction;
- Guidance and legislation;
- Available information;
- Study area;
- Studies and surveys carried out to date;

- Description of the current environment;
- Overview of potential offshore impacts;
- Data gaps;
- Assessment methodology;
- Project level surveys and studies; and
- Conclusions and next steps.

6 Offshore Physical Environment

Introduction

- 6.1 This chapter describes the key sensitivities and potential changes to the physical environment arising from the offshore aspects of the Dounreay Trì Project – the ‘Project’. The physical environment receptors within this chapter are categorised in the following sections:
- Physical conditions (geology, bathymetry and geomorphology and coastal environment);
 - Physical processes (waves, tides and sediment flows); and
 - Noise.
- 6.2 The Site is considered to be the offshore area delineated in Figure 5-1 in blue and referred to as the ‘Site’, the export cable corridor area of search is marked in orange on the same figure and referred to as the ‘export cable corridor’.
- 6.3 Onshore water bodies are not considered in this chapter, being instead addressed in Section 12.2: Geology, Physical Processes, Hydrology and Land Use.

6.1 Geology, Bathymetry and Physical Conditions

Introduction

- 6.4 This section will provide an overview of the geological, bathymetric and physical environment in the Dounreay Trì Project offshore site – the ‘Site’ and export cable corridor and how this fits within the regional physical processes within the Pentland Firth.

Guidance and Legislation

- 6.5 There is no specific guidance which should be taken into account.

Available Information

- 6.6 Publically available, regional and local information sources including scientific papers have been used to inform this section. The key information sources are listed below:
- British Geological Survey. Area Maps and Reports (BGS, 2015a);
 - British Geological Survey. Geology of Britain viewer (BGS, 2015b);
 - British Geological Survey. Free downloads - Browsing (BGS, 2015c);
 - British Oceanographic Data Centre. Oceanographic and Marine Data (BODC, 2015);
 - United Kingdom Hydrographic Office (UKHO) Admiralty Chart data & UKHO INSPIRE bathymetric data;
 - Seazone. HydroSpatial One data (Seazone, 2015); and
 - Marine Scotland Science. Farr Point Bathymetry Survey (MSS, 2014).

Consultation

- 6.7 There has not been any consultation undertaken specifically relating to the physical environment. The following have been identified as relevant EIA stakeholders:
- Marine Scotland Science (MSS); and
 - Scottish Environment Protection Agency (SEPA).

Study Area

- 6.8 The study area lies on the north coast of mainland Scotland in north-west Caithness, Highland Region. The nearest town is Thurso, some 12 km to the east, and the village of Reay is about 1 km to the south. The scoping review focused on the following areas for which information has been gathered using published sources of information and re-interpretation of commercially available data.
- 6.9 The different study areas (Figure 6-1) are defined as:
- District – Onshore study area (containing onshore cable and substation) (C) and Offshore ‘Site’ (D) containing Dounreay Trì wind turbine generators (WTG);
 - Region – Main Study Region (B) including Onshore and Offshore Districts; and
 - Area – Contextual environment for all studies (A).

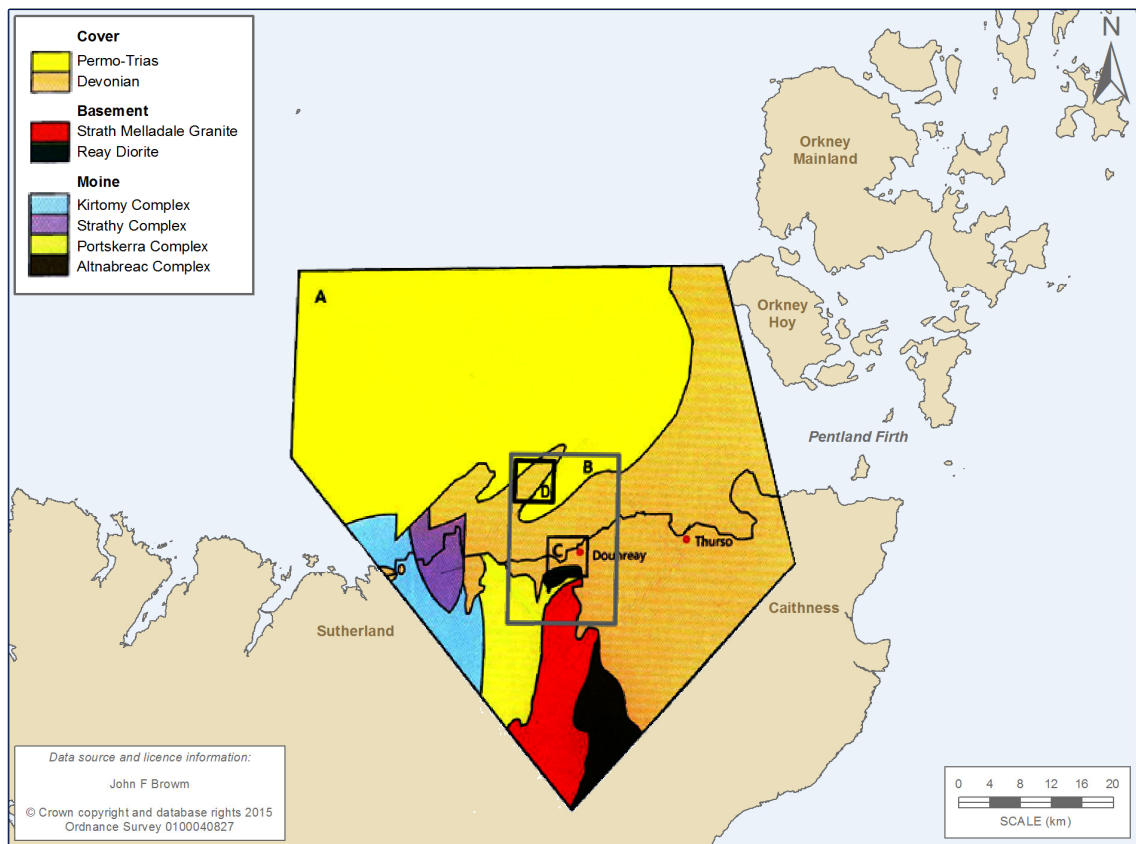


Figure 6-1 Study area

- 6.10 This section concerns the offshore Site and export cable corridor only. The onshore cable route and substation are described in Section 12.2: Geology, Physical Processes, Hydrology and Land Use.

Surveys and Studies Carried Out to Date

- 6.11 No studies have been carried out for this receptor by the applicant. Marine Scotland undertook an offshore bathymetry survey off the north coast of Scotland in 2014 and this data has been used to inform the scoping assessment.

Description of the Current Environment

Geology

- 6.12 The geology of the north of Scotland involves rocks of Lewisian age (2.5 billion years old), the Caledonian mountain chain which formed about 450 million years ago through to the Quaternary (2.2 million years ago). The Caledonian mountains formed when two major continents Laurentia, in the west and Baltica in the east collided. This long mountain chain stretched from Alabama through New York, Ireland, Scotland and up to northern Norway and Greenland. The collision pushed up high mountains with roots extending deep into the upper mantle. This welded the two continents together. East-west motion subsided and the region experienced a tectonic rebound. These mountains originally were as high as the Himalayas. Rapid erosion of the mountain tops formed conglomerates in the low-lying valleys. When the region experienced pull-apart tectonics in the early Devonian, 400 million years ago, rift valleys and half-graben basins formed. These also filled with coarse immature sediments until a low relief, flat, broad and elongate basin resulted. This intramontane basin eventually stopped having major tectonic movements and slowly filled with fine-grained lacustrine sediment of the middle Devonian Orcadian Basin. This lake basin, Lake Orcadie, lasted for some 10 million years.
- 6.13 In Caithness and eastern Sutherland the rocks tend to decrease in age from south-west to north-east. The Caledonian metamorphic basement intruded by large igneous intrusions (Strath Halladale granite, Raey diorite and Helmsdale granite) is overlain by Lower Devonian (lower old red sandstone) conglomerates and breccia. These pass up into the Middle Devonian (middle old red sandstone) lower and upper Caithness flagstone groups separated by the Achanarras Fish Bed. The uppermost rock sequence is the fluvial sandstones with occasional aeolian sand of the John O'Groats and Dunnet Head sandstone possibly of upper Devonian age (upper old red sandstone).
- 6.14 The shore sections are often complicated by many small faults and high cliffs add to the problems. Several major faults have been traced, mainly from the coast into the interior and confirmed by seismic section. Smaller faults undoubtedly exist but are not exposed. These faults include: normal faults, reverse faults and wrench faults. Because of the abundance of these faults simple geometry cannot be used to estimate stratigraphic thicknesses.
- 6.15 The Reay area lies on the western margin of the Orcadian Basin. The Devonian sedimentary rocks (Flagstones) rest on the crystalline basement rocks. The Reay Landfall also lies south of the margin of the offshore West Orkney Basin of Permo-Triassic and younger sedimentary rocks resting on the Devonian and basement rocks. This basin contains oil fields west of Shetland.
- 6.16 Red Point Coast Special Site of Scientific Interest (SSSI) to the west of Sandside Bay is immediately adjacent to the export cable corridor. This site is listed for (among others) geological interests including Quaternary geology and geomorphology and non-marine Devonian stratigraphy.

Bathymetry and Morphology

- 6.17 Regional nautical charts show water depths in the Site are in the range 60 m - 110 m. Water depth is greatest in the north-west corner of the Site, and decreases gradually towards the south-east corner. Going south along the export cable corridor the seabed shelves gently to the north-west at about 0.5°. Although not clear on the charts at this location (unlike that observed around Orkney and the north-east coast of Caithness) submarine cliffs have been observed at about ± 10 m related to a still stand in sea rise at around 7000 years BP and another at about ± 45 m related to the sea-level position about 9500 years ago.

- 6.18 Marine Scotland carried out an offshore multibeam echo sounder bathymetry survey off the north coast of Scotland in 2014. This data were originally thought to be sufficient to inform this development. However on closer evaluation, the data has shown many defects which hampered detailed interpretation at this point in time and will be insufficient to micro-locate the Project. On the larger scale the potential track across the seabed shelves gently to the north-west at about 0.5°. Although not clear on the charts at this location (unlike that observed around Orkney and the north-east coast of Caithness) two submarine cliffs have been observed at about ± 10 m related to a still stand in sea rise at around 7000 years BP and another at about ± 45 m related to the sea-level position about 9500 years ago. The high resolution profile on the potential cable route shows that the ± 45 m cliff/steep slope does exist but probably requires much more analysis to verify whether or not this will be a significant risk to subsea cable placement.

Coastal Environment

- 6.19 Adjoining the export cable corridor at its landward end the coastal environment extends from the western edge of the Dounreay Nuclear Facility to Sandside Bay. The cliff top from Dounreay to Sandside starts at 6 m in the Dounreay Burn passing through 9 m at White Geos at the entrance to the Bay dropping to 4 m in the sand dunes at the outfall of the Burn of Isauld.
- 6.20 From Dounreay Burn to White Geos the rocks exhibit bedding plane dips of about 10° to the NNW while the rocks slope about 6 ½° into the water topped by a small ± 1 m vertical cliff. By White Geos the vertical cliff is about ± 4 m. The next section of the coastline going due south still has a 4 m vertical cliff section consisting of flagstones of both the Dounreay Shore and Sandside Bay Formations.

Physical Processes

- 6.21 The physical process characteristics that are relevant to understanding the Project's potential offshore environmental impacts during construction, operation and decommissioning are the following:
- Sediment regime;
 - Wind;
 - Hydrodynamics – waves, water levels, tidal flows, fronts and stratification; and
 - Water quality.

Sediment Regime

- 6.22 Mapped National marine landscape types present within the offshore Site are 'shelf sand plain' in the northern offshore section of the Site and 'shallow sand plain' in the south. 'Shallow sand plain' extends inshore to the coast along the potential cable route. The Marine Scotland sea bottom videos show predominantly sand with areas of slightly gravelly sand and other spots with more muddy and rock pavement zones. The predominant sediment type is muddy sand which extends all the way inshore to the coastline.
- 6.23 The thickness of sediment across the majority of the Site is greater than 2 m. Sediment thickness decreases to approximately 1 m in the southernmost part of the Project Site, at its shallowest reaches approximately 0.1 m. Sediment thickness decreases to 0 m towards the coast. Analysis of ripple marks and dunes indicate that locally considerable variation in the sediment thickness exists.

- 6.24 Throughout the Site and towards the coast, the thickness of Quaternary deposits is between 0 - 10 m.
- 6.25 There are no known sediment quality issues associated with the Site or within the identified export cable corridor at the present time. A recent review of the status of the marine environment around Scotland, covering hazardous substances, eutrophication, radioactivity, oil/chemical spills, algal toxins and microbiology of bathing and shellfish waters found no significant concerns for the northern coastal area (Baxter *et al.*, 2011).

Wind

- 6.26 Wind speeds at both 80 m and 100 m elevation are greatest at distances furthest offshore and are highest in the western half of the Project Site (7 - 10 m/s and 8 - 10 m/s at 80 m and 100 m respectively). Lowest wind speeds for both elevations are present in the south-east sector of the Site (7 - 8 m/s). Similar wind speeds are present in the south-west sector of the Project Site at 80 m, but are greater at 100 m elevation (to 8 - 9 m/s). Wind speeds have been calibrated against the Forse data.

Hydrodynamics – Waves

- 6.27 Annual mean significant wave height across the majority of the Site is 1.75 - 2.0 m. To the south of the Site annual mean significant wave height values are in the range 1.5 – 1.75 m decreasing further closer to shore.

Hydrodynamics – Water Levels and Tidal Flows

- 6.28 The annual mean spring tidal range across the Site is 3.5 m – 4 m, with a corresponding neap range of 1.5 m – 2 m. Tidal velocities range from approximately 0.25 – 0.75 m/s during spring tides and 0.1 – 0.5 m/s for neap tides.

Hydrodynamics – Stratification

- 6.29 Only six burns enter the sea within the landward side of the export cable corridor from west to east they are:
- Allt Achadh na Gaodha;
 - Lady's Well Burn;
 - Sandside Burn;
 - Reay Burn;
 - Burn of Isauld; and
 - Dounreay Burn.

- 6.30 The volume of water coming down each of these watercourses is relatively small and has watersheds draining poor agricultural land, peat and bogs. Due to the low volume of water, this is not expected to carry pollutants into the marine environment. Likewise, because of the low volumes of freshwater entering the ocean, dilution impacts will dominate and no adverse impacts are anticipated.

Water Quality

- 6.31 The north coast of Scotland is influenced by the North Atlantic Drift current, which carries oceanic water north and east through the Faroe - Shetland Channel to the Norwegian coast. This flow exerts a relative warming influence in winter and a cooling influence in summer. Average temperatures along the north coast are 12.5 – 13°C in summer and 6.5 – 7°C in

winter. The salinity of the sea in the coastal area between Cape Wrath and the Pentland Firth (34.75 parts per thousand) is slightly below that of normal sea water (35 parts per thousand), owing to the mixing of Atlantic water with low-salinity coastal waters (Barne *et al.*, 1996).

- 6.32 There are no known water quality issues associated with the Site or within the export cable corridor.

Identification of Potential Impacts

- 6.33 Bedrock seafloor solid geology and bathymetry will not be impacted in the long-term by this development. Local impacts relating to the anchoring methods and open cut trenching with possible armouring for the offtake power cable need to be assessed.
- 6.34 Sediment changes related to open cut trenching and cable armouring may lead to sediment disturbance and water clouding. Sensitive location across medium sandy bottom could mitigate this since the sands over much of the eastern side of the export cable corridor appear to be of sufficient size to settle rapidly after disturbance. This could potentially minimise the impact on sediment quality and water quality.
- 6.35 Offshore water quality could be impacted by mooring systems disturbing mud and silt. Such impacts are not expected to be permanent and ongoing. Trenching and embedding of the cable from the facility to the cable landing will disturb mud and silt which should settle relatively quickly after construction has completed.

Cumulative Impacts

- 6.36 No cumulative impacts are anticipated.
- 6.37 Table 6-1 summarises all potential impacts.

Table 6-1 Potential impacts on geology, bathymetry and physical conditions during construction, operations and maintenance and decommissioning of the Project

Potential impacts during construction		
Impact	High level impact summary and justification	Scoped in/out
Impact on geology	None predicted	Scoped out
Changes to bathymetry	No change predicted.	Scoped out
Seabed scour	Localised movement of seabed sediments due to the placement of anchor blocks and associated changes to localised currents. Considered to be minor due to the small number and size of anchors but extent is unknown.	Scoped in
Localised change to currents	Changes to currents due to placement of block anchors are not considered to be significant due to the small number and size of anchors.	Scoped in
Increase in suspended sediments	Sediment changes related to open cut trenching and cable installation may include potential sediment disturbance and an increase in suspended sediments resulting in a change to	Scoped in

	water quality.	
Disturbance of contaminated sediment	Potential disturbance of contaminated or radioactive particles.	Scoped in, described in Section 7.3: Benthic Ecology and Section 7.4: Fish and Shellfish Ecology.
Potential impacts during operations and maintenance		
Impact	High level impact summary and justification	Scoped in/out
Removal or creation of seabed features such as sand waves	Seabed sedimentary features disturbed during operations may move or be destroyed as sedimentary system reaches new equilibrium.	Scoped in
Impact on sediment regime	Areas of enhanced slope if disturbed may cause movement in local sedimentary system.	Scoped in
Changes to wave regime	The floating base structure for the Dounreay Trì offshore wind farm may impact wave pattern and affect the local wave base near shore. Due to the small size of the floating platform and the distance to shore, this is scoped out.	Scoped out
Potential impacts during decommissioning		
Potential impacts arising during the decommissioning phase are expected to be similar to, but not exceeding, those arising during the construction phase.		As construction
Potential cumulative impacts		
It is not considered that there is any potential for cumulative impacts affecting the physical environment.		Scoped out

Data Gaps

- 6.38 Marine Scotland undertook an offshore bathymetry survey off the north coast of Scotland in 2014. This data were originally thought to be sufficient to inform this development. However on closer evaluation the data has shown many defects and is considered to be insufficient to micro-locate the Project.
- 6.39 Examination of the Marine Scotland data indicates that soft sediment cover, sand and Quaternary Till, over the area of interest precludes the extension of detailed base rock solid geology offshore.

Method of Assessment

- 6.40 The principle sources of data characterising the seabed are the British Geological Survey mapping and regional reports, with additional data inputs from Marine Scotland.
- 6.41 The seafloor sediment is generally composed of sand, with some sandy gravel. The principal method to be employed is careful examination of the available Marine Scotland data. Assessment of seafloor topography, slope, tidal current generated features and Marine

Scotland bottom videos will also be undertaken. Available wind, tide and marine landscape maps will also inform the study.

Project Level Surveys and Studies

- 6.42 There are no surveys proposed for this topic.

Conclusions and Next Steps

- 6.43 Due to the small scale of the Project the potential impact on the physical environment is not considered to be significant. As the Site is located 6 - 9 km offshore from the coast and the number of turbines is small, it is considered that the Project will have a minimal impact on coastal processes. It is also considered that due to the small scale of the Project it will not adversely impact the localised wave, tidal and wind regimes. Therefore additional works on the physical process sections, other than a desk based scour assessment noted above, have been scoped out of the EIA process at this stage.
- 6.44 In conclusion impacts on geology, bathymetry and physical processes are scoped out and will not be taken forward to the assessment phase.
- 6.45 Potential impacts on sediment regime, localised scour and current movement, water quality and sediment quality are scoped in and will be taken forward to the assessment phase. Sediment quality impacts such as disturbance of contaminated sediments will be described in Section 7.2: Benthic Ecology and Section 7.3: Fish and Shellfish Ecology.

6.2 Offshore Noise

Introduction

- 6.46 This section will consider the airborne and underwater noise generated offshore during construction, operation and decommissioning in the Dounreay Trì Project offshore site – the ‘Site’ and export cable corridor and highlights the key sensitivities and potential impacts that may arise from the Dounreay Trì Project – the ‘Project’.
- 6.47 The Site is considered to be the offshore area delineated in Figure 5-1 in blue and referred to as the ‘Site’, the export cable corridor area of search is marked in orange on the same figure and referred to as the ‘export cable corridor’.
- 6.48 It is important to note that noise itself is not a receptor and as such will be assessed and described in the respective sections e.g. Section 7.3: Fish and Shellfish Ecology, Section 7.4: Marine Mammals, Turtles and Basking Sharks and Section 8.6: Other Users of the Marine Environment.

Guidance and Legislation

- 6.49 Guidance in the deployment of offshore wind turbines in Scottish waters and for mitigating the impact of noise comes in the form of:
- The World Health Organisation’s (WHO) Night Noise Guidelines for Europe (WHO, 2009);
 - The British Standard Institution’s code of practice for noise and vibration control on construction and open sites (BS 5228) (BSI, 2002);
 - The Department of Trade and Industry’s (DTI) ‘The Assessment and Rating of Noise from Wind Farms’ (ETSU-R- 97) (DTI, 1996);

- The Department of Trade and Industry (DTI) - ETSU-R- 97 'The Assessment and Rating of Noise from Wind Farms';
- The Institute of Acoustics'(IoA) 'A Good Practice Guide to the Application of ETSU-R- 97 for the Assessment and Rating of Wind Turbine Noise' (IoA, 2013);
- European Union – Directive 2008/56/EC 'Marine Strategy Framework Directive' (MSFD) (EU, 2008);
- Joint Nature Conservation Committee (JNCC) – Marine Noise Registry (JNCC, 2015; and
- IOS 9613 - 2 – 'Acoustics - Attenuation of Sound during propagation – Part 2: General method of calculation' (ISO, 1996).

Consultation

- 6.50 Full details of the consultations conducted to date are provided in Chapter 3: Site Selection and Engagement to Date. Highland Council has commented that it is unlikely that airborne noise will result in being a significant impact due to its location from shore (THC, 2015) but request that an assessment should still be carried out in order to comply with ETSU-R- 97. An assessment will be undertaken prior to construction commencing, should this be necessary.
- 6.51 It was also recommended that the assessment should also consider potential impacts upon protected species such as White-Beaked Dolphins during installation. As described above, impacts on marine mammals will be addressed in Section 7.4: Marine Mammals, Turtles and Basking Sharks.
- 6.52 Additional consultation will be undertaken and described within the specific receptor chapter.

Study Area

- 6.53 The study area, with particular reference to offshore noise, consists of the offshore Site and export cable corridor; the surrounding waters, which may experience the marginal increase in vessel traffic; as well as the range at which the anthropogenic noise, both airborne and underwater, may be perceived.

Surveys and Studies Carried Out to Date

- 6.54 There are no specific surveys or studies relating to noise in or around the Project area.

Description of the Current Environment

- 6.55 There are a variety of noise sources which occur within UK territorial waters, both natural and anthropogenic. Natural noise sources include wind and wave action, fish and marine mammal species vocalisations and geological events such as earthquakes. Anthropogenic sources range from land based construction noise transmitted through the seabed, to vessel noise, at sea seismic surveys or the use of fishing and navy sonar. The nature of the seabed topography and sediment will affect how quickly and easily any noise generated in the area will travel.
- 6.56 The Pentland Firth is a busy area for shipping and it is likely that the background noise levels are noticeable. There are no known surveys or available data which would give a baseline measure of the existing noise levels.

Identification of Potential Impacts

Airborne Noise

- 6.57 There is a potential for impacts upon receptors as a result of airborne noise during construction. At this stage, the construction methods have not been finalised and as such construction noise will be scoped in.
- 6.58 It is not expected that airborne noise generated due to operation of the wind turbines will be a significant impact as a result of the distance the Site is located from shore. Modern wind turbines are actively engineered to minimise mechanical noise within the nacelle as well as the aerodynamic noise produced from the turbine blades.

Underwater Noise

- 6.59 It has previously been stated that gravity anchors are the preferred method of mooring for this structure, but pin piling has not been ruled out as an option.
- 6.60 The Joint Nature and Conservation Committee have said “the installation of driven piles in the marine environment without mitigation is likely to produce noise levels capable of causing injury and disturbance to marine mammals”. They continue by highlighting “Pile driving is also likely to cause injury (e.g. hearing impairment) and there remains the possibility of causing death in marine mammals that are in very close proximity” (JNCC, 2010).
- 6.61 As offshore noise results in impacts upon receptors, and is not a receptor itself, it will be mentioned in reference with respective sections such as Section 7.3: Fish and Shellfish Ecology, Section 7.4: Marine Mammals, Turtles and Basking Sharks, and Section 8.6: Other Users of the Marine Environment.

Cumulative Impacts

- 6.62 As mentioned previously, the potential impact as a result of the accumulation of individual smaller impacts is present. As a result of the high energy potential of the Pentland Firth and Orkney Waters (PFOW) there are a number of neighbouring developments in vicinity of this Project. This includes the Dounreay Demonstration Centre (DDC) project, located approximately 500 m to the west; the Brim Ness tidal array project, 31 km to the north-east; and the MeyGen tidal array projects, located 38 to the east.
- 6.63 Independently the Project has already been established to have a minimal/negligible impact to airborne noise levels. But cumulatively, if works on neighbouring projects were to coincide with each other’s deployment timelines then this increases the possibility of potential impact on local receptors.
- 6.64 Table 6-2 summarises the potential impacts.

Table 6-2 Potential impacts of offshore noise during construction, operations and maintenance and decommissioning of the Project

Potential impacts during construction		
Impact	High level impact summary and justification	Scoped in/out
Airborne noise during construction on human receptors onshore	The offshore works area is approximately 6 - 9 km offshore (6 km at the closest point). It is considered unlikely that due to the distances involved, noise generated in the offshore works area will adversely impact human receptors onshore.	Scoped out, an assessment may still be carried out in order to comply with ETSU-R- 97 if considered necessary.
Airborne noise during construction on human receptors offshore	Potentially human receptors on passing vessels such as fishing boats, recreational vessels and merchant vessels may be exposed to noise during the construction phase. It is considered however that this exposure will be minimal and sporadic and potential impacts will not be significant.	Scoped out, an assessment may still be carried out in order to comply with ETSU-R- 97 if considered necessary.
Underwater noise during construction affects marine mammals and fish	Construction methods may involve the use of pin piles, impacts of construction noise on biological receptors has been scoped in.	Scoped in and addressed in Section 7.4: Fish and Shellfish Ecology and Section 7.5: Marine Mammals, Turtles and Basking Sharks.
Potential impacts during operations and maintenance		
Impact	High level impact summary and justification	Scoped in/out
Airborne noise during operation on biological receptors	Potentially biological receptors may be exposed to noise generated by the operating turbines. It is considered that any noise generated will be low any exposure will be minimal and sporadic and as such potential impacts will not be significant.	Scoped out
Underwater noise during operation on marine mammals and fish	Potentially biological receptors may be exposed to underwater noise associated with anchors and mooring lines. It is considered possible that this noise may cause an adverse impact and as such is scoped in for further assessment.	Scoped in. Described in receptor specific chapter.
Airborne noise during operation	The offshore works area is approximately 9 km offshore. It is considered unlikely that due to	Scoped out

on human receptors onshore	the distances involved, noise generated by the operational turbines will adversely impact human receptors onshore.	
Airborne noise during operation on human receptors offshore	Potentially human receptors on passing vessels such as fishing boats, recreational vessels and merchant vessels may be exposed to noise generated by operational turbines. It is considered however that the noise generated will be minimal and any exposure will be minimal and sporadic and as such potential impacts will not be significant.	Scoped out
Potential impacts during decommissioning		
Impact	High level impact summary and justification	Scoped in/out
Decommissioning noise	Potential impacts arising during the decommissioning phase are expected to be similar to, but not exceeding, those arising during the construction phase.	As construction
Potential cumulative impacts		
Impact	High level impact summary and justification	Scoped in/out
Cumulative noise impacts	Construction schedules may overlap, and thus additional assessments would be necessary.	Scoped in

Data Gaps

- 6.65 Currently there are a number of data gaps in regards to understanding potential causes and impacts of underwater and airborne noise for this Project. This is a result of a number of undetermined factors including particular technologies; deployment method; baseline conditions of the seabed, water column and wind resource; and also receptor sensitivity.
- 6.66 To date, Scotland has three fully commissioned and operational offshore wind farms; including the 10 MW Beatrice demonstration site, in the Moray Firth; the 180 MW Robin Rigg wind farm, in the Solway Firth; and the 7 MW Energy Park Fife demonstration wind farm, in the Firth of Forth (OWS, 2015). Additional understanding of planned projects will need to be obtained, especially within the Pentland Firth and Orkney Waters (PFOW), in order to produce an assessment of potential accumulated impacts. Examples of which include the Dounreay Demonstration Centre (DDC), which will be located some 500 m to the west.
- 6.67 The presence of these projects, and experience, within Scotland in offshore wind, along with local experience in the marine and tidal industry within the PFOW, will provide ample potential for effective impact analysis.

Method of Assessment

- 6.68 As specified above, any potential noise impacts arising from Project activities will be covered as part of the receptor-based impact assessment process.

Airborne Noise

- 6.69 It is recognised that the majority of the construction will be completed off-site, but with necessary infrastructure works taking place onshore. These onshore works will fall under the powers of the Local Authority, under Section 60 of the Control of Pollution Act 1974. A noise assessment will be required to cover these works if there is potential for disturbance. This should be in accordance with part one (Noise) of BS 5228 (THC, 2015). These works will be investigated within the Onshore Noise section.
- 6.70 It is likely that it will not be feasible to measure the baseline noise assessment of the location in question therefore it is proposed that a simplified ETSU standard of 35Db LA90 at wind speeds up to 10 m/s will be used.

Underwater Noise

- 6.71 The assessment into the impact that underwater noise can potentially produce can be investigated with the use of software packages such as SPEAR (Subacoustech, 2015b) (Simple Propagation Estimator and Ranking). SPEAR, developed by Subacoustech Environmental Ltd, utilises a database of frequency content, source level and transmission losses for a variety of activities. SPEAR can be used in this regard to estimate the range of impacts as a result of deployment, operation and decommissioning practices.
- 6.72 INSPIRE (Impulse Noise Sound Propagation and Impact Range Estimator) software package, also produced by Subacoustech Environmental Ltd, can also be used to determine potential impacts as a result of activities; but with particular reference to piling methods. This can be simulated for a number of variables including water depth, pile size, blow energies and location (Subacoustech, 2015b).

Project Level Surveys and Studies

- 6.73 No project level surveys are suggested.

Conclusions and Next Steps

- 6.74 In conclusion, noise as a standalone receptor is not taken forward to the assessment phase rather, the impacts of underwater noise in both the construction and operational phases on receptors such as marine mammals and fish is taken forward and will be discussed in the respective chapters.

6.3 Historic radioactive contamination

Introduction

- 6.75 This section provides a high level description of the historic radioactive contamination along the Caithness coast and highlights the key sensitivities and potential impacts that may arise from the Project. It also presents a summary of the relevant UK guidance and details of the methodology which will be applied to the EIA.
- 6.76 The Site is considered to be the offshore area delineated in Figure 5-1 in blue and referred to as the 'Site', the export cable corridor area of search is marked in orange on the same figure and referred to as the 'export cable corridor'.

Guidance and Legislation

- 6.77 The relevant regulations, policies and guidelines that will be taken into consideration as part of the assessment of potential impacts due to radioactivity are listed below:

- Marine (Scotland) Act 2010;
- Food and Environment Protection Act 1985; and
- Draft Pilot Pentland Firth and Orkney Waters Marine Spatial Plan, July 2015.

Available Information

6.78 The following key sources of information shall be used for the assessment:

- Particles Retrieval Advisory Group (Dounreay) PRAG-D reports;
- Particle Cleanup – Sandside Bay (DSRL, 2015);
- Nuclear Decommissioning Authority;
- Radioactivity in Food and the Environment (RIFE); and
- Orkney – Caithness 220 kV Link, Marine Environmental Appraisal. Prepared by Environ UK for SSE.

Consultation

6.79 Full details of the consultations conducted to date are provided in Chapter 3: Site Selection and Engagement to Date. The following document produced as part of the consultation process refers to the assessment of potential impacts from radioactive particles:

- The Highland Council Pre-Application Advice Pack, Reference No: 15/02035/PREAPP, Date Issued: 7 July 2015.

6.80 The following have been identified as relevant stakeholders and will be consulted during the EIA phase:

- Scottish Environment Protection Agency (SEPA);
- Marine Scotland;
- Food Standards Scotland (FSS);
- Nuclear Decommissioning Authority; and
- Dounreay Site Restoration Ltd (DSRL).

Study Area

6.81 Any potential impacts due to interactions with radioactive particles will depend upon the receptor being assessed. The appropriate study area shall be defined separately in each of the relevant receptor impact assessments.

Surveys and Studies Carried Out to Date

6.82 No specific site-specific radioactivity surveys have been conducted to date.

Description of the Current Environment

6.83 Fragments of irradiated nuclear fuel were discharged to sea as a result reprocessing of nuclear fuels at the Dounreay Nuclear Facility during the 1960s and 70s (DSRL, 2015). Studies have shown that the most hazardous particles are clustered on the seabed in the immediate vicinity of the discharge outfall located to the north of the facility located 1 - 2 km to the east of the export cable corridor. The presence of the particles near the old discharge pipe is believed to be the source of smaller, less hazardous particles detected in the wider area – most notably in the Sandside Bay area. An extensive programme of remediation activity has been undertaken

by DSRL to detect and retrieve hazardous particles from a 60 ha area of seabed near the outfall using remotely operated vehicles (ROVs), clean-up vehicles and divers.

Identification of Potential Impacts

- 6.84 It is known that radioactive particles are present in the offshore and intertidal sediments. It is feasible that the construction phase may potentially disturb these particles resulting in their release to the wider environment. However, the release of the particles is not in itself an impact; rather it is the effect of the radioactive particle on vulnerable receptors such as fish, shellfish, marine mammals and potentially humans should sufficient particles enter the food chain. The impact of the release of the radioactive particles will be assessed relative to the specific receptor and presented in the appropriate chapter of the Environmental Statement.

Cumulative Impacts

- 6.85 There are no cumulative impacts anticipated.
- 6.86 Table 6-3 summarises the potential impacts.

Table 6-3 Potential impacts of radiation during construction, operations and maintenance and decommissioning of the Project

Potential impacts during construction		
Impact	High level impact summary and justification	Scoped in/out
Disturbance of sediments containing radioactive particles	The Site and export cable corridor are located relatively close to the Dounreay Nuclear Facility and it is known that there are small numbers of radioactive particles present in the offshore and intertidal sediments. These may be released into wider environment. Potential impacts will be assessed and described in the specific receptor chapter.	Scoped in and described in the specific receptor section as follows: Section 7.3: Benthic Ecology, Section 7.4: Fish and Shellfish Ecology, Section 7.5: Marine Mammals, Turtles and Basking Sharks and Section 8.2: Commercial Fisheries.
Potential impacts during operations and maintenance		
Impact	High level impact summary and justification	Scoped in/out
Hydrodynamic changes leading to seabed scour around subsea infrastructure (including mooring cables as result of movement with wave and tides)	Localised movement of seabed sediments due to the placement of anchor blocks and associated changes to localised currents. Considered to be minor due to the small number and size of anchors.	Scoped out
Potential impacts during decommissioning		

Potential impacts arising during the decommissioning phase are expected to be similar to, but not exceeding, those arising during the construction phase.	As construction
Potential cumulative impacts	
It is not considered that there is any potential for cumulative impacts.	Scoped out

Method of Assessment

- 6.87 There is no prescriptive assessment process or existing guidance to lead the assessment and as such the assessment of potential impacts related to interactions with radioactive particles arising from Project activities will make use of the published information and will be conducted as part of the receptor-based impact assessment process.

Data Gaps

- 6.88 No site-specific data for radioactivity have been collected for the Site and export cable corridor. This data gap will be addressed by conducting a desk based review of the existing and publically available information. It is envisaged that the available data will provide the required level of detail to conduct a robust impact assessment without the need for the commissioning of additional survey work.

Potential surveys

- 6.89 No surveys are proposed. Existing data and those data gathered in the assessment phase will be sufficient for the assessment.

Conclusions and Next Steps

- 6.90 Radiation is not a receptor but, if disturbed during the construction phase, can have impacts on other biological and human receptors and as such will be considered in those chapters rather than as a stand-alone chapter.

7 Offshore Biological Environment

Introduction

- 7.1 This chapter considers the impact of the Dounreay Trì Project – the ‘Project’ on the following biological receptors present within the Dounreay Trì Project offshore site – the ‘Site’ and export cable corridor:
 - Intertidal ecology;
 - Benthic ecology;
 - Fish and shellfish;
 - Marine mammals;
 - Ornithology; and
 - Nature conservation.
- 7.2 The Site is considered to be the offshore area delineated in Figure 5-1 in blue and referred to as the ‘Site’, the export cable corridor area of search is marked in orange on the same figure and referred to as the ‘export cable corridor’.
- 7.3 An overview of the relevant baseline environment is provided for each along with the anticipated impacts, a baseline characterisation strategy, impact assessment strategy and where applicable, possible mitigation and monitoring measures.

7.1 Intertidal Ecology

Introduction

- 7.4 This section characterises the intertidal communities (flora and fauna living between Extreme Low Water Springs (ELWS) and Extreme High Water Springs (EHWS) in the export cable corridor associated with the Dounreay Trì Project - the ‘Project’.
- 7.5 The Dounreay Trì Project offshore site is considered to be the offshore area delineated in Figure 5-1 in blue and referred to as the ‘Site’, the export cable corridor area of search is marked in orange on the same figure and referred to as the ‘export cable corridor’.

Guidance and Legislation

- 7.6 The following guidance and legislation are applicable:
 - European Commission (EC) Habitats Directive;
 - Water Framework Directive;
 - Special Sites of Scientific Interest (SSSI) designated under the Wildlife and Countryside Act 1981 (as amended);
 - UK Biodiversity Action Plan (UKBAP) – priority habitats and species;
 - Institute of Ecology and Environmental Management Guidelines for Ecological Impact Assessment in the United Kingdom – Marine and Coastal (relevant to most sections); and
 - Joint Nature Conservation Committee. 1993. Reprinted Handbook for Phase 1 habitat survey – a technique for environmental audit. England Field Unit Nature Conservancy Council 1990.

Available Information

7.7 The following data sources will be referenced in the creation of this section:

- Spatial data on other users of the marine environment on National Marine Plan Interactive (<http://www.scotland.gov.uk/Topics/marine/seamanagement/nmpihome>);
- SNH, information about designated sites, their qualifying interests and conservation status. SNHi Information Service, Sitelink
http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=1405;
- National Biodiversity Network (NBN) - national biodiversity records;
- Highland Biodiversity Action Plan 2015 – 2020; and
- Caithness Biodiversity Action Plan 2003.

Consultation

7.8 There has been a small amount of consultation with SNH who recommend that there may be merit in undertaking a strategic approach to cable landfall installation through engagement with Highlands and Islands Enterprise (HIE), who plan on landing a cable for the Orkney-Caithness interconnector within close proximity to the cable landfall.

7.9 The following have been identified as relevant stakeholders and will be consulted during the EIA phase:

- HIE;
- SNH;
- Dounreay Site Restoration Ltd;
- SEPA; and
- Highland Council.

Study Area

7.10 The study area for potential impacts on intertidal ecology is defined by the export cable corridor landfall, beginning from the splash zone just above Extreme High Water Springs down to the kelp zone of Extreme Low Water Springs.

Surveys and Studies Carried Out to Date

7.11 A site-specific Phase 1 intertidal habitat survey was carried out in October 2015 for the export cable corridor and landfall in Sandside Bay, Reay. The methodology utilised consists of biotope mapping and is based on the Countryside Council for Wales (CCW) 'Handbook for Marine Intertidal Phase 1 Biotope Mapping Survey' (Wyn *et al.*, 2000) and the 'Marine Nature Conservation Review: Rationale and Methods' (Hiscock, 1996).

7.12 The survey area is detailed in Figure 7-1.

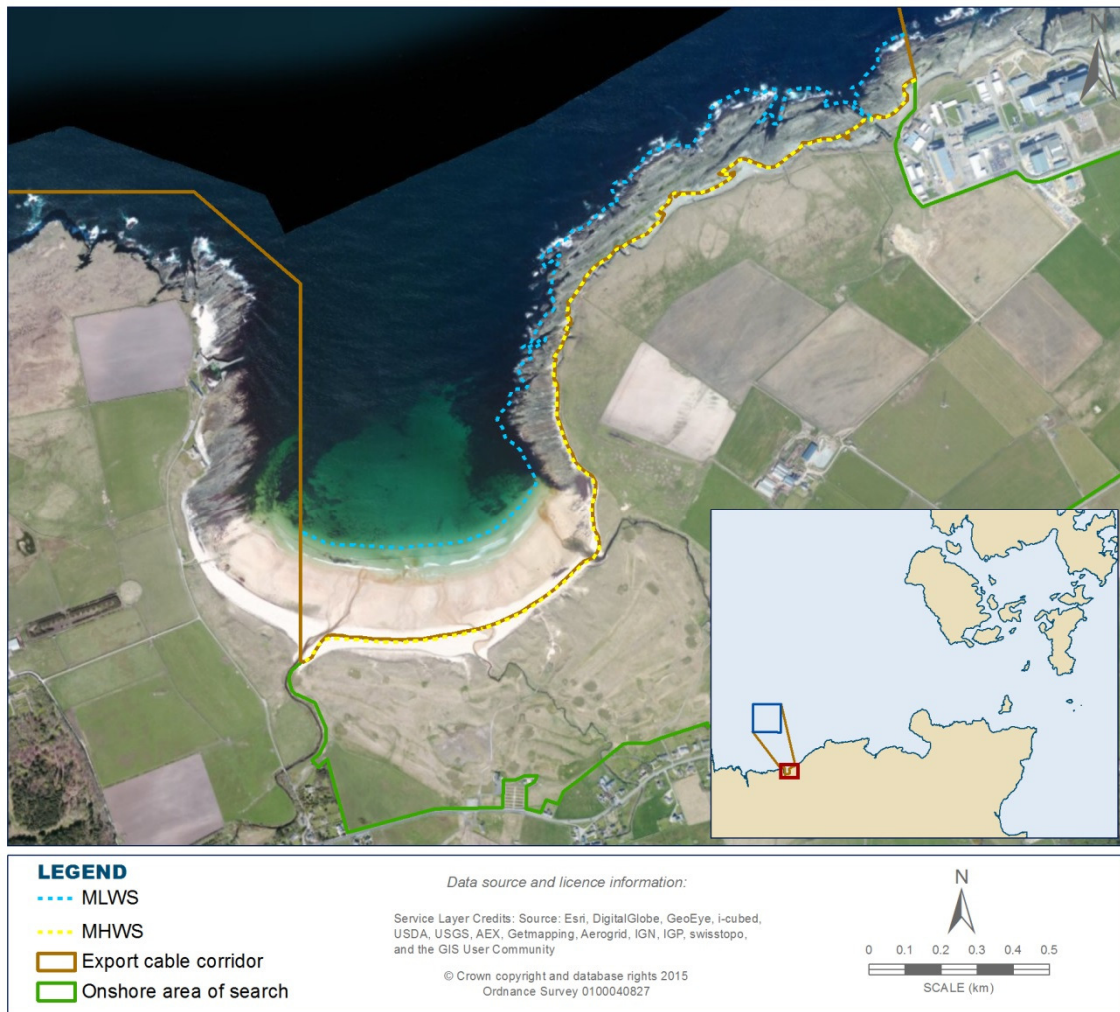


Figure 7-1 Intertidal survey study area

Description of the Current Environment

- 7.13 The export cable corridor route overlaps with Sandside Bay area of SSSI which lies just west of Dounreay and has been designated for sand dune habitat. There is currently no detailed information held regarding coastline communities for the wider area. However, the mixture of exposed rocky shores and coarse sand beaches with finer sand in the deeper inlets is typical of the Scottish coastline.
- 7.14 Preliminary analysis of the baseline survey confirms that there are no rare or vulnerable species present in the intertidal zone that are listed under the EC Habitats Directive, OSPAR threatened and/or declining or UKBAP priority species or habitat. The full range of species and habitat biotopes found in the cable landfall AoS will be mapped and presented in the EIA chapter for intertidal ecology.

Identification of Impacts

- 7.15 The method of cable laying may result in localised habitat loss and disturbance. Associated with this localised habitat loss will be a (small scale) direct impact on intertidal species in terms of disturbance and displacement during the construction phase. In addition, depending on the long-term construction methods for example, cable burial in soft sediment or cable protection there may be the potential for habitat creation.

Cumulative Impacts

- 7.16 It is considered that there may be potential cumulative impacts with the development of HIE Orkney-Caithness Interconnector project.
- 7.17 Impacts are summarised in Table 7-1.

Table 7-1 Potential impacts on intertidal ecology during construction, operations and maintenance and decommissioning of the Project

Potential impacts during construction		
Impact	High level impact summary and justification	Scoped in/out
Loss of habitat or species through work at the cable landfall	The level and type of disturbance will depend on the character of the shoreline, where the export cable is landed and the methods used. This will be considered further during the EIA.	Scoped in
Disturbance to or displacement of fauna in proximity to the Site through construction activities		Scoped in
Potential impacts during operations and maintenance		
Impact	High level impact summary and justification	Scoped in/out
Creation of new habitats and introduction of species	The potential for habitat creation will depend on the character of the shoreline, where the export cable is landed and the burial methods used. This will be considered further in the EIA phase.	Scoped in
Potential impacts during decommissioning		
Potential impacts arising during the decommissioning phase are expected to be similar to, but not exceeding, those arising during the construction phase.		As construction
Potential cumulative impacts		
There is the potential for cumulative impacts.		Scoped in

Data Gaps and Approach

- 7.18 The information gathered during the intertidal survey is sufficient to characterise the baseline conditions of the study area and therefore there are no data gaps.

Assessment Methods

- 7.19 A baseline intertidal survey was recently carried out at the export cable landfall to characterise the baseline environment. Preliminary analysis indicates that there are no protected species present in the intertidal zone.
- 7.20 This information will be further processed in the assessment phase to produce a biotope map of the study area to present the mix of species and habitats identified during the survey. A

desk based assessment will be undertaken to assess whether there are likely to be any potential impacts associated with the project.

Conclusions and Next Steps

- 7.21 In conclusion, the intertidal zone could potentially be impacted in terms of disturbance during the construction phase and also during any routine maintenance and so is taken forward to the assessment phase.

7.2 Benthic Ecology

Introduction

- 7.22 This section provides a high level description of the benthic community (flora and fauna living in and on the seabed) in the Dounreay Tri Project offshore site – the ‘Site’ and export cable corridor, and highlights the key sensitivities and potential impacts that may arise from the Dounreay Tri Project – the ‘Project’. It also presents a summary of the relevant UK guidance and details of the methodology which will be applied during the EIA phase.
- 7.23 The Site is considered to be the offshore area delineated in Figure 5-1 in blue and referred to as the ‘Site’, the export cable corridor area of search is marked in orange on the same figure and referred to as the ‘export cable corridor’.

Guidance and Legislation

- 7.24 A range of international and national legislation covers the conservation of marine biodiversity in Scottish waters. The relevant regulations, policies and guidelines that will be taken in to consideration as part of the assessment of potential impacts to benthic ecology are listed below:
- The Conservation of Habitats and Species Regulations 2010 and the EC Habitats and Species Directive (Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora);
 - Nature Conservation (Scotland) Act 2004;
 - Marine and Coastal Access Act (2009) and Marine (Scotland) Act (2010);
 - UK Biodiversity Action Plan; and
 - Draft Pilot Pentland Firth & Orkney Waters Marine Spatial Plan, July 2015.

Available Information

- 7.25 The following key sources of information shall be used for the assessment:
- Marine Scotland Interactive (MSI) website (bathymetry, video and photographic data);
 - Mapping European Seabed Habitat (MESH) project data;
 - UKSeaMap;
 - Orkney – Caithness 220 kV Link, Marine Environmental Appraisal. Prepared by Environ UK for SSE; and
 - Various Scottish Natural Heritage (SNH) reports on the benthic environment off the north coast of Scotland, primarily: Moore, C.G. 2015. Biological analyses of underwater video from research cruises in marine protected areas and renewable energy locations around Scotland in 2014. Scottish Natural Heritage Commissioned Report No. 819.

Consultation

- 7.26 Full details of the consultations conducted to date are provided in Chapter 3: Site Selection and Engagement to Date. The following document produced as part of the consultation process contains information relevant to the assessment of potential impacts to benthic ecology:
- The Highland Council Pre-Application Advice Pack, Reference No: 15/02035/PREAPP, Date Issued: 7 July 2015.
- 7.27 The following have been identified as relevant stakeholders and will be consulted during the EIA phase:
- SNH; and
 - Marine Scotland Science.

Study Area

- 7.28 The benthic ecology impacts are expected to be localised around the infrastructure placed on the seabed within the Site and export cable corridor therefore the study area shall correspond to these areas.

Surveys and Studies Carried Out to Date

- 7.29 To date, no site-specific characterisation surveys relevant to benthic ecology have been conducted.

Description of the Current Environment

- 7.30 There are no Marine Protected Areas (MPAs) within the Site or export cable corridor. The nearest MPA is North-West Orkney MPA, located 31 km to the north of the Site, recommended for its importance to biodiversity (sandeels) and geodiversity (marine geomorphology of the Scottish Shelf Seabed including sandbanks and sand and sediment wave fields).
- 7.31 At the closest point, the Site is located approximately 6 km from the northern coastline of Scotland in water depths of ranging from 60 to 90 m. The predicted EUNIS classification for the Site is predominantly circalittoral fine sand or circalittoral muddy sand. The Site falls within an area of seabed surveyed by Marine Scotland in 2014 (Moore, C.G. 2015). The dominant habitat type observed within the boundary of the Site is consistent with the EUNIS classification - slightly rippled fine sand. Patches of scattered gravel, pebbles, cobbles and occasional boulders on sand are also observed, mainly in the south-western sector of the Site. Video collected within the export cable corridor indicate a gradual increase in the proportion of coarser sediment types as water depth decreases towards the coast and areas of rocky seabed are present. Emergent tubes, polychaete casts and bivalve siphons, most of which resembled those of *Arctica islandica* were observed in the sandy sediments. In areas where hard substrates were present encrusting communities of soft corals, bryzoans and hydroids were observed.
- 7.32 The North Scotland coastline is composed of Atlantic and Mediterranean high energy infralittoral rock interspersed with sandy beaches of infralittoral fine or muddy sand. Areas of high-moderate energy infralittoral rock are likely to provide conditions suitable for the development of kelp forest/park habitats.

Identification of Potential Impacts

- 7.33 Although impacts are considered to be localised given the small scale of the project, depending on the construction methods, there is the potential that the benthic environment and species may be impacted by increased suspended sediments and a reduction in water quality during the construction phase. It is likely that there will be highly localised and small scale habitat and species loss directly beneath the anchor blocks and seabed disturbance along the export cable route. There is also the possibility of localised impacts from the disturbance of contaminated or radioactive sediments.
- 7.34 Longer term impacts will include the creation of new habitat via the marine infrastructure and associated colonisation and the potential introduction of non-native species during the construction phase.
- 7.35 Increased vessel use in the area will result in an increased risk of pollution through vessel collision. There is also the potential for electro-magnetic field impacts arising from the export cable and a highly localised change in the thermal load of the immediate area.

Cumulative Impacts

- 7.36 Impacts to benthic ecology are expected to be temporary and relatively localised therefore there will be limited scope for cumulative impacts. However, it is possible that cumulative impacts associated with in parallel construction may arise and as such these shall be considered as part of the CIA.
- 7.37 Impacts are summarised in Table 7-2.

Table 7-2 Potential impacts on benthic ecology during construction, operations and maintenance and decommissioning of the Project

Potential impacts during construction		
Impact	High level impact summary and justification	Scoped in/out
Damage from placement of infrastructure (cables, moorings, anchors) on the seabed	Substrate, habitat and species loss Significance of impact not known as will depend on species and habitats within the footprint and surrounding area of any infrastructure placed on the seabed.	Scoped in
Installation of subsea infrastructure in inshore waters	Increased suspended sediment and turbidity Seabed survey data will be utilised to allow for micro-siting to avoid particularly sensitive habitats or species, with any impacts generally being short-term and localised.	Scoped in
Disturbance of contaminated sediments	The Site is located relatively close to the Dounreay Nuclear Facility and it is known that there are small numbers of radioactive particles present in the offshore and intertidal sediments These may be released into wider environment.	Scoped in
Potential impacts during operations and maintenance		
Impact	High level impact summary and justification	Scoped in/out

Hydrodynamic changes leading to scour around subsea infrastructure (including mooring cables as result of movement with wave and tides)	Localised movement of seabed sediments due to the placement of anchor blocks and associated changes to localised currents. Considered to be minor due to the small number and size of anchors but extent is unknown.	Scoped in
Damage to habitat or species due to pollution from routine and accidental discharges	Industry best practice will be followed for all operations therefore impacts unlikely to be significant.	Scoped in
Introduction of marine non- natives	Potential use of infrastructure as stepping stones, and introduction of species through vessel movements.	Scoped in
Colonisation of subsea infrastructure, scour protection and support structures	Whilst this could have a beneficial effect, this is dependent on the colonising species which may include non-native species.	Scoped in
Impact to benthic communities from any thermal load or EMF arising from the cable during operation	The potential impacts on benthic species from thermal changes and EMF from export cables is not well understood at present.	Scoped in
Potential impacts during decommissioning		
Potential impacts arising during the decommissioning phase are expected to be similar to, but not exceeding, those arising during the construction phase. Following removal of structures opportunities for habitat recovery in the former location of foundations may arise.		As construction
Potential cumulative impacts		
It is considered feasible that there may be cumulative impacts arising from the interaction of the Project with others.		Scoped in

Data Gaps

- 7.38 Site-specific benthic habitat and species data will be required to conduct the impact assessment for the Site and export cable corridor. This data gap will be initially addressed by conducting a desk based review of the existing available information. If necessary the desk based study may potentially be supplemented by site-specific field survey work where the existing data do not provide the level of detail required to conduct a robust impact assessment. The scope and methodology of any benthic surveys will be agreed with Marine Scotland and any other relevant stakeholders prior to mobilisation.

Potential Surveys

- 7.39 No surveys are proposed. Existing data is assumed to be sufficient for the assessment.

Method of Assessment

- 7.40 The assessment of impacts generated by the Project will require an overview of habitats and species (classified into biotopes where appropriate) in and around the Site and export cable corridor. This will then be assessed in the context of the wider environment. Data exists on the MarLIN website to allow an assessment of the sensitivities of individual biotopes and species to be included as part of any impact assessment.

Conclusions and Next Steps

- 7.41 Potential impacts to the benthic environment has been scoped into the assessment and will be considered in the EIA phase.

7.3 Fish and Shellfish Ecology

Introduction

- 7.42 This section provides a high level description of the fish and shellfish community in the vicinity of the Dounreay Tri Project (the 'Project') by considering fish and shellfish ecology, spawning and nursery ground usage, elasmobranch species (excluding basking shark), migratory species and species of nature conservation interest.
- 7.43 The Dounreay Tri Project offshore site is considered to be the offshore area delineated in Figure 5-1 in blue and referred to as the 'Site', the export cable corridor area of search is marked in orange on the same figure and referred to as the 'export cable corridor'.

Guidance and Legislation

- 7.44 The following general guidance and legislation is relevant to Fish and Shellfish Ecology:
- Council Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna (EU Habitats Directive) 1992;
 - The European Habitats Directive (EC Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna);
 - Wildlife & Countryside Act 1981;
 - Nature Conservation (Scotland) Act 2004;
 - Marine and Coastal Access Act (2009);
 - Marine (Scotland) Act (2010);
 - Priority Marine Features (PMFs);
 - OSPAR Convention; and
 - UK BAP and Scottish Biodiversity Strategy.

Available Information

- 7.45 The following information is available and will inform the EIA phase:
- Spatial data on spawning and nursery grounds of fish and on conservation zones on National Marine Plan Interactive (<http://www.scotland.gov.uk/Topics/marine/seamanagement/nmpihome>);
 - Spawning and nursery grounds data from high level spatial maps (Coull *et al.*, 1998 and Ellis *et al.*, 2012);

- MarLIN and NBN gateway databases;
- UKSeaMap 2010: Predictive mapping of seabed habitats in UK waters. JNCC Report, No. 446 (McBreen *et al.*, 2011);
- Review of migratory routes and behaviour of Atlantic salmon, sea trout and European eel in Scotland's coastal environment: implications for the development of marine renewables. Scottish Marine and Freshwater Science Vol 1 No 14 (Malcom *et al.*, 2010);
- UK Offshore Energy Strategic Environmental Assessment (DECC, 2009);
- Confirmation of presence, absence and seasonality from local and national fishermen's associations, representatives, groups and federations; and
- Fish landings data and tagging projects from Marine Scotland Science, and ICES rectangle data and reports.

Consultation

7.46 No specific consultation has been undertaken for the Scoping Phase. The following stakeholders have been identified as relevant and will be consulted in the EIA phase:

- Scottish Natural Heritage (SNH);
- Marine Scotland Science (MS);
- Association of Salmon Fishery Boards (ASFB);
- Scottish Fisherman's Federation (SFF);
- Local Fishermen's Association;
- Caithness District Salmon Fishery Board; and
- Northern District Salmon Fisher Board.

Study Area

7.47 The Site and export cable corridor are situated within ICES sub-area rectangle⁴ 46E6 which includes the north-east coast of Scotland from Strathy Point to Duncansby Head and the south-west region of the Orkney Islands. The study area is identified as this ICES rectangle boundary which extends over 1 degree longitude by 30' latitude; which at the project latitude, is an area of approximately 3,240 km².

Surveys and Studies Carried Out to Date

7.48 No site-specific surveys or studies for fish and shellfish have been carried out to date.

Description of the Current Environment

7.49 There are no Special Areas of Conservation (SACs) for fish located within the Site or the export cable corridor; however, the rivers Thurso, Naver and Borgie, located 17 km, 23 km and 24 km from the Site, respectively, are all designated as SACs for their importance to Atlantic salmon

⁴ The International Council for Exploration of the Sea (ICES) is a global organisation which coordinates oceanic and coastal monitoring and research, and advises international commissions and governments on marine policy and management issues.

Fisheries effort and landings data (volume and value) are reported by defined statistical rectangles (geographical areas) to Marine Scotland and ICES.

(*Salmo salar*). The Pentland Firth may be an important migratory route for Atlantic salmon (Malcolm *et al.*, 2010) from these and other rivers.

- 7.50 Atlantic salmon and sea trout (*Salmo trutta*) are host species for freshwater pearl mussel (*Margaritifera margaritifera*). Freshwater pearl mussel is a feature of several designated sites in Scotland including the River Naver SAC and River Borgie SAC.
- 7.51 The north-west Orkney MPA, a Nature Conservation Marine Protected Area (NCMPA), is located 33 km to the north of the Site. This MPA is an area of importance for sandeels, fish that burrow into the sand to escape from predators. Sandeels are a key source of food for a range of marine wildlife, including many types of larger fish and seabirds. Newly hatched sandeel larvae from this MPA are exported by currents to sandeel grounds around Shetland and south of the Moray Firth. Predicted EUNIS habitat data (McBreen *et al.*, 2010) suggests there may be suitable habitat for sandeels within the Site, however, this would need to be confirmed with Marine Scotland.
- 7.52 Fish and shellfish species on the Priority Marine Features (PMF) list may be present in the area (MS, 2015).
- 7.53 European eel (*Anguilla anguilla*) and sea trout are other species of conservation concern that are likely to be present in the area at certain times of the year. Some sea trout may stay in coastal waters year round.
- 7.54 Elasmobranchs are also common in the Pentland Firth waters. Some species of skate and ray are species of conservation concern, with the common skate being listed as Critically Endangered on the IUCN Red List. Both skates and rays are likely to be found on sandy substrates in and around the Site.
- 7.55 The waters off the north coast of Scotland are known spawning and nursery areas for a number of species of commercial and conservation importance (Figure 7-2). The Site and export cable corridor may overlap with suitable habitat for spawning grounds for lemon sole, sprat and sandeel and nursery areas for lemon sole, haddock and sandeel. It should be noted that these areas are spatially and temporally variable.
- 7.56 Commercially important shellfish species targeted in the area include species of crab, lobster and scallop (discussed in Section 8.1: Commercial Fisheries). There are no active finfish or shellfish aquaculture sites within the vicinity of the Project, the nearest is at least 30 km to the west.

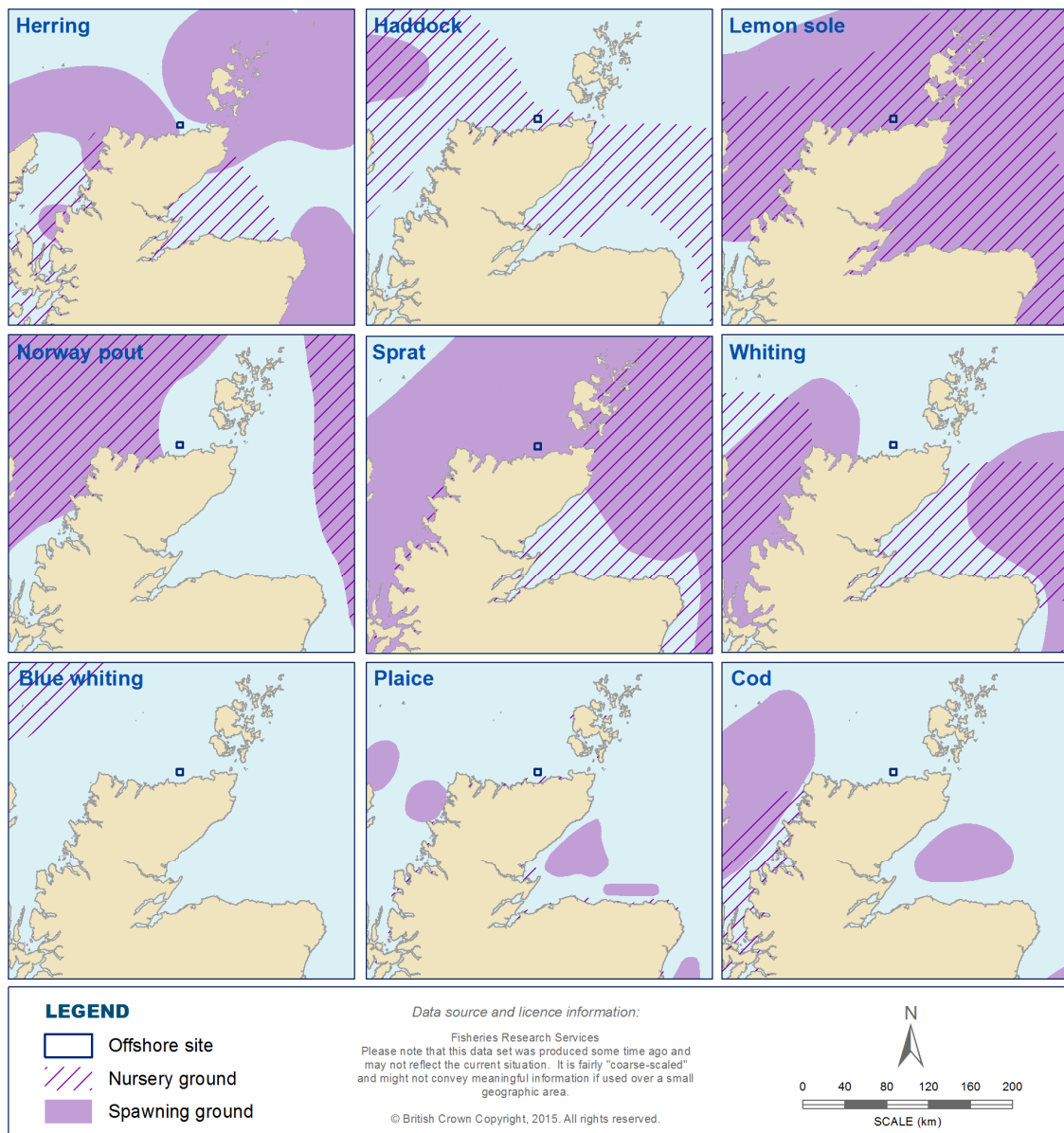


Figure 7-2 Spawning and nursery areas

Identification of Potential Impacts

- 7.57 Fish and shellfish species may be impacted by the Project either indirectly by habitat loss and localised disturbance both in the construction and operational phases. There is the potential that hearing specialists may be impacted by noise in the construction phase depending on the methods of construction used. In addition it is possible that electro-sensitive fish species such as elasmobranches and rays may be impacted by electro-magnetic fields (EMF) generated by the cable in the operational phase.

Cumulative Impacts

- 7.58 Cumulative impacts may arise from the development of the Dounreay Demonstration Centre (DDC) and the Orkney – Caithness interconnector cable; both of which are adjacent to the Project.
- 7.59 Impacts are summarised in Table 7-3.

Table 7-3 Potential impacts upon fish and shellfish ecology during construction, operations and maintenance and decommissioning of the Project

Potential impacts during construction		
Impact	High level impact summary and justification	Scope in/out
Disturbance or damage to sensitive species due to underwater noise generated from construction activities	Disturbance to fish populations caused by underwater noise generated during construction (i.e. pin pile drilling) including effects on migratory fish and fish spawning behaviour. This may depend on the number of pin piles required, and the duration and timing of install activities. Impacts likely to be highly localised.	Scoped in
Direct habitat loss due to disturbance of spawning and nursery grounds during the installation of export cables and placement of anchors on seabed	The Site occupies very small proportions of potential habitat for a number of PMF, commercial or sensitive species, however the scale is such that impacts are sufficiently small that no impacts on national, regional or population-level are likely to occur. The extent of habitat loss will depend on type of anchors and export cable installation methods. Disturbance may be temporary and recovery possible along export cable route. Impacts are likely to be highly localised.	Scoped in
Effects of increased sedimentation / smothering on fish and shellfish during placement of anchors and export cable	Increased sedimentation may lead to smothering of slow moving or sessile species. However, due to the small scale of the Project and the dynamic conditions in the area (including sediment disturbance from swell, tide and fishing activity), any disturbance from construction activity is likely to be highly localised and no significant negative effects anticipated.	Scoped out
Potential impacts during operations and maintenance		
Impact	High level impact summary and justification	Scope in/out
Habitat loss of spawning and nursery grounds due to presence of anchors and export cable on the seabed	The total footprint of anchors may be relatively small and impacts here not significant, however the export cable corridor could have a greater impact on seabed habitats depending on location (and presence of sensitive habitat), length, whether cable protection is used and the type of material. Disturbance may be temporary and recovery possible along export cable route.	Scoped in
Effects of electromagnetic fields from subsea and dynamic cables on sensitive species	EMF may impact sensitive species e.g. elasmobranchs and teleost fish (i.e. flat fish, salmonids and gadoids) by altering foraging or migratory behaviour. Extent will depend on cable protection measures utilised, if any, and effects highly localised.	Scoped in
Barrier effects on migratory fish from	The small scale and offshore location of the development, enabling passage either side, is unlikely to	Scoped

the presence of the floating platform and associated infrastructure	present a significant barrier to movement for migratory fish or basking sharks. Furthermore, the Site is located at least 17 km from the nearest SAC for migratory salmonids.	out
Effects of operational noise on sensitive species	Disturbance to migratory fish populations, especially salmon and sea trout, caused by underwater noise generated by a single floating structure with two turbines is not likely to be at significant levels above ambient noise levels in the area. The project is also sufficiently small that noise emissions should not create a barrier effect to migration through the Pentland Firth, which is already an important shipping channel. However, although it is considered that this will not be a significant impact, it is scoped in for further assessment as the level of potential noise is unknown.	Scoped in
Fish aggregation around the floating structure and associated infrastructure	The offshore infrastructure may act as a fish aggregation device (FAD), providing refuge for some species and also habitat for some shellfish and benthic species, whilst also potentially attracting larger predators which could indirectly increase entanglement or collision risk for both fish and marine mammals species.	Scoped in
Entanglement with mooring lines and dynamic cables	Potential risk of entanglement of fish, particularly migratory or basking shark, with mooring lines and dynamic cables. Risk considered low for fish, however risk to basking shark will be considered further.	Scoped in
Ghost fishing due to lost fishing gear becoming entangled in moorings and cables	Potential for lost gear to become entangled with project infrastructure leading to ghost fishing. Fishing is likely to be avoided in the vicinity of the Site, however gear lost elsewhere could be swept into the area. Moorings and dynamic cables will however be monitored for potential debris and to reduce risk of break-free, therefore risk of ghost fishing should be very low.	Scoped out
Potential impacts during decommissioning		
Potential impacts arising during the decommissioning phase are expected to be similar to, but not exceeding, those arising during the construction phase.		As construction
Potential cumulative impacts		
There is the potential for cumulative impacts.		Scoped in

Data Gaps

- 7.60 Existing research and data are considered to be sufficient to inform the assessment. A desk based assessment will be based on the most recent available data on spawning and nursery grounds and migratory behaviour of sensitive species. Seabed images collected in the area will also be reviewed to determine the suitability of the sediments present as spawning and nursery grounds.

Method of Assessment

- 7.61 The assessment of impacts arising from the Project on fish and shellfish species will require a desk based data gathering exercise and assessment augmented by consultation in the ES phase. The data gathered will permit an appraisal of the likely presence or absence of specific fish and shellfish species, their seasonality and vulnerability and their conservation status and from this, assess the likely impact.

Conclusions and Next Steps

- 7.62 Potential impacts to fish and shellfish species has been scoped into the assessment and will be considered in the EIA phase.

7.4 Marine Mammals, Turtles and Basking Sharks

Introduction

- 7.63 This section of the Offshore Scoping Report considers the species of marine mammals, turtles and basking shark which may be affected by the Project. This section concentrates on species which are known or are likely to occur in the Site and off the North Coast of Scotland. A summary of the conservation status and legal protection afforded these species is provided, with links to nature conservation designations (Section 7.6) as appropriate.
- 7.64 The assessment of potential impacts upon marine mammals, turtles and basking sharks which will be presented in the EIA will be informed using the detail presented in the following relevant chapters: project description; physical processes; benthic ecology; fish and shellfish ecology; nature conservation; ornithology. As such, this section also draws upon the information presented in Chapters 6, 7 and 8 of this Scoping Report.
- 7.65 It should be noted that a shadow HRA will be undertaken alongside the EIA for the proposed Project. The HRA will consider relevant European designated sites.

Surveys and studies carried out to date

- 7.66 Dounreay Trì Limited commenced aerial marine mammal surveys in January 2015. The survey programme covers a 12 month period and will be complete by December 2015. This follows Marine Scotland's "survey, deploy and monitor approach".
- 7.67 Aerial surveys are adept at recording marine mammals, turtle and basking sharks. Data recorded includes, species, distance sampling of marine mammals together with a calculation of densities.

Other sources of information

- 7.68 The other information sources are listed below:
- European Seabirds at Sea (ESAS) database;
 - Digital stills (photographs);
 - The SCANS I and II projects; and
 - Scientific Advice on Matters Related to the Management of Seal Populations, 2014.

Description of current environment

- 7.69 18 Marine mammals from four species were recorded during seven surveys from January to June 2015. Relatively few marine mammals were recorded during the first 7 surveys, although

there is a possibility that the study area is being used by low densities of white-beaked dolphins. This relatively low marine mammal activity corresponds with other data sources – no marine mammals were recorded either in the ESAS data or digital stills data during the January to June period. Table 7.6 lists the species recorded in the aerial study area which includes the Site and a 2km buffer.

Table 7-4 Marine mammal species recorded in the study area

Species	No. detected in Study Area*
Grey seal (Halichoerus grypus)	2
Harbour porpoise (Phocoena phocoena)	2
White-beaked dolphin (Lagenorhynchus albirostris)	11
Risso's dolphin (Grampus griseus)	3

* Source: Dounreay Tri Limited interim aerial survey results, January to June 2015.

Grey seals

- 7.70 Grey seals are the larger of the two species of seal resident in UK waters and are feeding generalists with sandeel being the predominant prey species. Grey seals forage in the open sea, returning to land to rest, moult and breed. They may range widely to forage, frequently travelling over 100km between haul out sites. Approximately 38% of the worlds grey seal population breeds in the UK, with the overall UK population at the start of the 2010 breeding season estimated at 104,200. Approximately 50,200 pups were estimated to have been born in the UK in 2010 (SCOS, 2014). Known grey seal at-sea usage is provided in Figure 7-3.

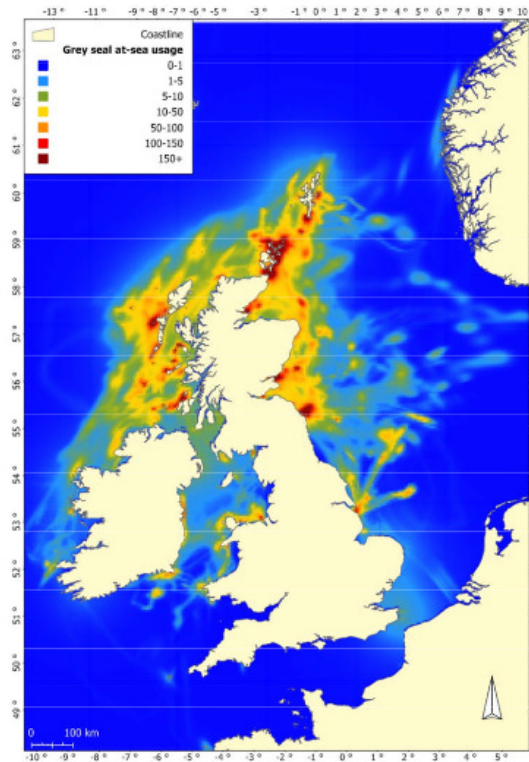


Figure 7-3 Grey seal at sea usage

(Source: SCOS, 2012)

7.71 A number of articles of legislation afford protection to seals in Scottish waters, which include the following:

- It is an offence to kill, injure or take a seal at any time of year except to alleviate suffering or where a licence has been issued to do so by Marine Scotland under the Marine (Scotland) Act 2010; and
- Both grey and harbour seals are listed in Annex II and V of the EU Habitats Directive.

Harbour porpoise

7.72 The harbour porpoise is the smallest and most numerous cetacean found in UK waters, with a widespread and primarily coastal or shelf distribution. Harbour porpoise diet is typically small fish, including gadoids, herring, sandeel and gobies. The peak calving period for harbour porpoises in Scottish waters is between April and June, indicating a possible increased sensitivity to any potential disturbance during this time.

7.73 Harbour porpoise are protected under the following legislation:

- Appendix II of the Bern Convention;
- Annex II and Annex IV of the Habitats Directive; and
- OSPARs first list of threatened and declining species.

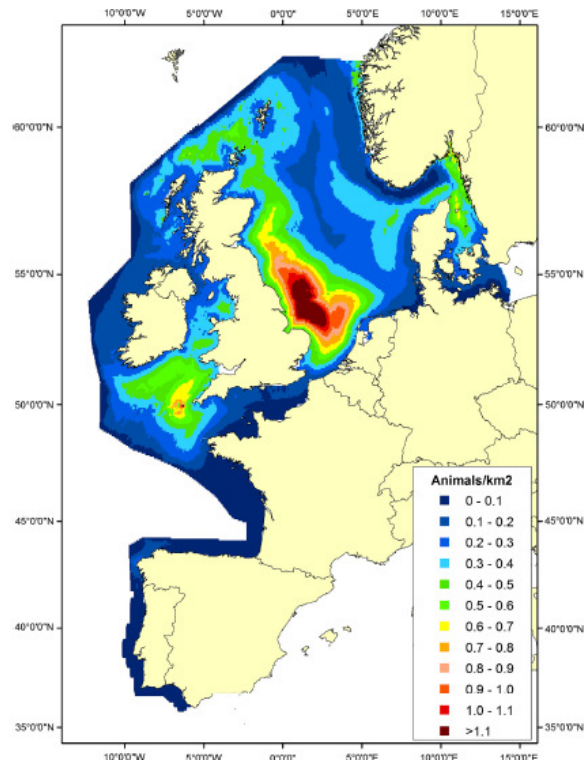


Figure 7-4 Predicted surface density for harbour porpoise in 2005

(from Hammond et al., 2013)

Risso's dolphin

7.74 In the northern and central North Sea, Risso's Dolphins are primarily observed around Shetland and Orkney. The north of Scotland represents the northern limit for this species. In the Hebrides, Risso's dolphins tend to inhabit deeper water, which is home to their preferred prey of squid, octopus and cuttlefish. They can occasionally be seen in coastal areas. Abundances of this species can vary greatly from year to year (Baines and Evans, 2009). The breeding and calving season is believed to span from spring to early summer (Baines & Evans, 2009).

7.75 Risso's dolphin are protected under UK and European legislation, namely:

- The Nature Conservation (Scotland) Act 2004; and
- EU Habitats Directive.

White-beaked dolphin

7.76 The white-beaked dolphin is found in the temperate and sub-arctic waters of the North Atlantic and northern North Sea. In the Hebrides, they are usually seen in open waters further from the coast, and seem to favour the northern Hebrides. The movement of white-beaked dolphins into coastal waters during summer months is thought to relate to the calving period. It is possible the seasonal movement of white-beaked dolphins is also related to the seasonal abundance or movement of prey species, such as herring or mackerel.

7.77 White-beaked dolphin are protected under UK and European legislation, namely:

- The Nature Conservation (Scotland) Act 2004; and
- EU Habitats Directive.

Other species

- 7.78 For species such as white-sided dolphins, killer whales, common dolphins, striped dolphins, long-finned pilot whales, sperm whales, humpback whales, fin whales, northern bottlenose whales, Sowerby's beaked whales and other pinniped species, the area off the north of Scotland appears to be only a marginal part of their habitat, and is likely to be inhabited only during a restricted part of the year by relatively few individuals.

European Protected Species (EPS)

- 7.79 All species listed under Annex IV of the Habitats Directive are termed 'European Protected Species' or EPS, including cetaceans and marine turtles. The Habitats Regulations make it an offence to kill, injure, capture or disturb an EPS. The JNCC produced guidance in 2008 titled 'The deliberate disturbance of marine European Protected Species'. Subsequent guidance for minimising the risk of injury and/or disturbance to marine mammals has been produced for certain activities, including piling and seismic survey.
- 7.80 Limited guidance is provided for marine turtles, presumably due to the very low numbers in UK waters, however the guidance does note that '*for species that tend to be solitary when not breeding, which is the case for the sturgeon and turtles occurring in the UK, the spatial and temporal extent of the activity(s) would need to be large enough for a significant group to be affected*'.
- 7.81 The JNCC (2008) outline three main aspects to consider when assessing the potential to cause disturbance, as follows:
- A consideration of the species that could be present in the area affected and could be vulnerable to significant disturbance from the activity;
 - The numbers likely to become exposed to disturbance with relation to what would constitute a significant group, per relevant species; and
 - The likelihood that the local abundance and distribution of relevant species could become significantly affected.

Identification of key issues

- 7.82 Given the conservation status of marine mammals and the proximity to sites designated for harbour seal and grey seal, the assessment of potential impacts presented in the ES will draw on information presented both in the wider EIA (i.e. nature conservation designations and fish and shellfish ecology) as well as the HRA. It should be noted that there is potential for mobile species such as marine mammals to move between the sites and as such individuals may be present within or in close proximity to the Project. At present, the key species anticipated to be considered within the EIA for marine mammals are harbour porpoise, harbour seals and grey seals, however this will may be refined following the completion of the bird and marine mammal surveys in November 2014. Other species of cetacean will be included within the EIA, at a level appropriate to their occurrence in the area and corresponding sensitivity.
- 7.83 Table 7-5 presents the key issues for marine mammals, basking sharks and turtles which may arise from the construction, operation or decommissioning of the Project.

Table 7-5 Summary of the potential impacts on marine mammals, turtles and basking sharks during construction, operation and decommissioning of the proposed Project

Potential impacts during construction		
Impacts associated with construction noise (piling) including the risk of physiological impact, barrier effect and displacement	The Project may require pin-piled anchors. Piling noise can have various impacts on marine mammals, turtles and basking shark, with the evidence base suggesting that mitigation ensures such impacts are generally limited to short term and temporary displacement or disturbance effects.	Scoped in
Impacts of construction noise on prey species of marine mammals, turtles and basking shark	As per benthic ecology (Section 7.2) and Fish and Shellfish (Section 7.3)	Scoped in
Disturbance due to the physical presence of vessels and other human activity	The potential for physical presence of installation vessels, project equipment etc to disturb species is temporary and short term, with the evidence base suggesting limited impact.	Scoped out
Risk of injury resulting from collision of marine mammals, basking shark and turtles with installation vessels	Increased vessel traffic movements (as a result of construction) will be considered in light of increase collision risk to marine mammals. Installation vessels may use ducted propellers.	Scoped in
Impacts associated with effects upon marine water quality, particularly due to any disturbed sediments affecting turbidity but also to any accidental release of pollutants.	As per benthic ecology (Section 7.2)	Scoped in
Potential impacts during operation		
Risk of injury resulting from collision or entanglement of marine mammals, basking shark and turtles with mooring lines.	The platform will be held in position by eight or more mooring lines.	Scoped in
Impacts of operational noise	The evidence base suggests that the level of operational noise is significantly less than construction noise and detectable only at short ranges from each turbine.	Scoped in

Habitat exclusion resulting from the physical presence of devices occupying key foraging/breeding/spawning areas	The addition of a structure in the marine environment can deter individuals, potentially leading to exclusion from an area. Some evidence exists from monitoring studies at existing wind farms to inform the issue.	Scoped in
Disturbance due to the physical presence of vessels and other human activity	The potential for physical presence of vessels, to disturb species during operation is likely to be less frequent but over a longer term than during construction. The evidence base suggests potential for habituation.	Scoped in
Risk of injury resulting from collision of marine mammals, basking shark and turtles with operational vessels	Increased vessel traffic movements (as a result of operation) will be considered in light of increase collision risk to marine mammals. Vessels used in the operation of the wind farm may utilise ducted propellers.	Scoped in
Risk associated with electromagnetic fields associated with subsea cabling	Concerns that EMF may affect some species have been considered in a number of reports, notably COWRIE, providing a good evidence base, with mitigation (armour and burial) minimising effects.	Scoped in
Long term habitat change, including the potential for change in foraging opportunities	As per benthic ecology (Section 7.2) and Fish and Shellfish (Section 7.3)	Scoped in
Impacts associated with changes in fisheries practices	As per commercial fisheries (Section 8.1)	Scoped in
Potential effects during decommissioning		
Potential impacts arising from decommissioning phase are expected to be similar to those arising during the construction phase, and would be temporary and of short duration.		As construction section
Potential cumulative impacts		
Construction noise	The main sources of noise considered in project specific cumulative impact assessments are piling, with cumulative effects tending to be shipping, piling, dredging, construction etc. To draw on Fish and Shellfish (Section 7.3).	Scoped in
Disturbance due to the physical presence of vessels	The potential for physical presence of vessels, project equipment etc. to disturb species is	Scoped in

and other human activity	likely to be localised, with the evidence base suggesting limited impact and potential for habituation.	
Risk of injury resulting from collision of marine mammals, basking shark and turtles with construction vessels	Mitigation measures are typically incorporated to minimise the risk of collision with construction vessels.	Scoped in
Impacts associated with effects upon marine water quality, particularly due to any disturbed sediments affecting turbidity but also to any accidental release of pollutants.	As per benthic ecology (Section 7.2).	Scoped in
Long term habitat change, including the potential for change in foraging opportunities	As per benthic ecology (Section 7.2) and Fish and Shellfish (Section 7.3).	Scoped in
Potential inter-related impacts		
The inter-relationships between relevant receptors will be considered in the ES where potential pathways exist between topic areas. The key inter-relationships during the construction and operation of the Project that will be considered in the ES for marine mammals, turtles and basking shark are benthic and fish ecology and designated sites.		

Relevant UK guidance, methodologies or best practice

7.84 The assessment will be prepared in the context of key legislation and/or guidance documents related to marine mammals, turtles and basking shark and offshore wind farm development, which include the following:

- Evans, P.G.H. (2008). Offshore Wind Farms and Marine Mammals: Impacts and Methodologies for Assessing Impacts. Proceedings of the ASCOBANS/ECS workshop;
- Diederichs, A. Nehls, G. Dahne, M. Adler, S. Koschinski, S. and Verfub, U. (2008). Methodologies for measuring and assessing potential changes in marine mammals behaviour, abundance or distribution arising from the construction, operation and decommissioning of offshore wind farms. Report commissioned by COWRIE Ltd. 91 p;
- Sea Mammal Research Unit (SMRU) (2010) Approaches to Marine Mammal Monitoring at Marine Renewable Energy Developments. Final Report on behalf of The Crown Estate;
- IEEM (2010). Guidelines for Ecological Impact Assessment in Britain and Ireland. Marine and Coastal, Institute for Ecology and Environmental Management, Winchester, UK, 72pp;

- Joint Nature Conservation Committee (2010a). Statutory nature conservation agency protocol for minimising the risk of disturbance and injury to marine mammals from piling noise. JNCC August 2010, 14 p;
- Statutory Nature Conservation Agencies. (2012). Guidance for staff advising on the potential risk of seal corkscrew injuries April 2012;
- Camphuysen, C.J. Fox, T. Leopold, M.F. and Petersen, I.K. (2004). Towards standardised seabirds at sea census technique in connection with environmental impact assessments for offshore wind farms in the UK. A report for COWRIE; and
- MacLean, I.M.D. Wright, L.J. Showler, D.A. and Rehfish, M.M. (2009). A review of assessment methodologies for offshore wind farms. British Trust for Ornithology report commissioned by COWRIE.

7.85 It is standard industry practice to adopt a series of marine mammal mitigation measures during construction, which can include the use of marine mammal observers, passive acoustic monitoring (PAM), soft start to piling etc. Mitigation measures will be identified during the formal EIA process, to be informed through the assessment process itself in consultation with stakeholders.

Existing knowledge base

7.86 During the EIA a review will be undertaken of any relevant post-consent monitoring data and industry reports in order to investigate the existing evidence base. This information will be used to provide further insight into the potential environmental impacts, based upon offshore wind industry experience.

7.87 The following paragraphs provide a high-level overview of the existing knowledge base and make reference to reports and/or studies that are relevant to the consideration of potential impacts on marine mammals, turtles and basking sharks. This information will be combined with site-specific studies and modelling to inform the EIA. Examples of the reports that are available which can provide insight into outcomes of monitoring undertaken at other offshore wind farm sites are provided below:

- COWRIE reports (<http://www.thecrownestate.co.uk/energy-infrastructure/downloads/cowrie/>)
 - Methodologies for measuring and assessing potential changes in marine mammal behaviour, abundance or distribution arising from the development of offshore wind farms;
 - High resolution video survey of seabirds and mammals in the Rhyl Flats area;
 - Acoustic mitigation devices (AMDS) to deter marine mammals from pile driving areas at sea - audibility and behavioural response of a harbour porpoise and harbour seals; and
 - Measurement of underwater noise generated by acoustic mitigation devices.
- Strategic Review of Offshore Wind Monitoring Data Associated with FEPA licence conditions (<http://www.cefes.defra.gov.uk/media/393490/strategic-review-of-offshore-wind-farm-monitoring-version-final-19-august-2010-sir.pdf>)
- Outputs from SCANS I and II (<http://biology.st-andrews.ac.uk/scans2/index.html>);
- Recent SCOS reports (<http://www.smru.st-andrews.ac.uk/pageset.aspx?psr=411>);

- Joint Nature Conservation Committee (2008). The deliberate disturbance of marine European Protected Species. Guidance for English and Welsh territorial waters and the UK offshore marine area. Impacts and Methodologies for Assessing Impacts;
- Joint Nature Conservation Committee (2010a). Statutory nature conservation agency protocol for minimising the risk of disturbance and injury to marine mammals from piling noise. JNCC August 2010, 14 p;
- Evans, P.G.H. (2008). Offshore Wind Farms and Marine Mammals: Impacts and Methodologies for Assessing Impacts. Proceedings of the ASCOBANS/ECS WORKSHOP;
- Diederichs, A. Nehls, G. Dahne, M. Adler, S. Koschinski, S. and Verfub, U. (2008). Methodologies for measuring and assessing potential changes in marine mammals behaviour, abundance or distribution arising from the construction, operation and decommissioning of offshore wind farms. Report commissioned by COWRIE Ltd. 91 p;
- Sea Mammal Research Unit (SMRU) (2010) Approaches to Marine Mammal Monitoring at Marine Renewable Energy Developments. Final Report on behalf of The Crown Estate;
- Statutory Nature Conservation Agencies. (2012). Guidance for staff advising on the potential risk of seal corkscrew injuries April 2012;
- Camphuysen, C.J. Fox, T. Leopold, M.F. and Petersen, I.K. (2004). Towards standardised seabirds at sea census technique in connection with environmental impact assessments for offshore wind farms in the UK. A report for COWRIE; and
- MacLean, I.M.D. Wright, L.J. Showler, D.A. and Rehfish, M.M. (2009). A review of assessment methodologies for offshore wind farms. British Trust for Ornithology report commissioned by COWRIE.

Proposed project level surveys and studies

- 7.88 Aerial surveys will continue following the completion of the initial year of onsite aerial survey and the aerial survey programme will follow the Survey, Deploy and Monitor methodology which are proposed to be extended to the floating offshore wind farm demonstrator programme by the Scottish Government. This will facilitate the more rapid development and deployment of these demonstrator projects and also ensure sufficient onsite data is collected as part of an ongoing monitoring programme.
- 7.89 Following the completion of the initial year of aerial survey, the data will be assessed and utilised as part of the EIA process. It is proposed, following initial consultation with SNH and Marine Scotland that one year's data will be used for the consent process as the data obtained is of high quality and the size and impact of the Project has a limited impact on marine mammals. ESAS and digital stills data shall also be used to describe the abundance and distribution of marine mammals over a longer time period. The following information outputs will be used:
- Species occurrence;
 - Temporal variation in occurrence; and
 - Distribution maps.

7.5 Ornithology

Introduction

- 7.90 This section considers the species of birds that may be affected by the Project. The section concentrates on species that are known to or are likely to occur within the Site and off the North Coast of Scotland. Designated for birds are summarised in section 7.1 'Nature Conservation Designations'.
- 7.91 It should be noted that a shadow HRA will be undertaken alongside the EIA for the proposed Project (see Chapter 2).
- 7.92 The extent of the study area for birds will take into account the known distribution and maximum foraging range of each species (from Thaxter et al. 2012). It is anticipated that the final study area will be agreed following the completion of the bird surveys and as part of the consultation process, with the designated sites to be considered agreed through the HRA screening process.

Surveys and studies carried out to date

- 7.93 Dounreay Trì Limited commenced aerial bird surveys in January 2015. The survey programme covers a 12 month period and will be complete by December 2015. This follows Marine Scotland's "survey, deploy and monitor approach".
- 7.94 Aerial surveys are adept at recording birds. Data recorded includes, species, distance sampling, flight heights together with a calculation of densities.

Other sources of information

- 7.95 The other information sources are listed below:
- European Seabirds at Sea (ESAS) database; and
 - Digital stills (photographs).

Other sources of information

- 7.96 This section has been primarily informed by detail presented in the information sources listed in paragraph 7.3. Further to this, a number of publically available regional information sources have been used to inform this section. The key information sources are listed below:
- Mavor, R.A. Heubeck, M. Schmitt, S. and Parsons, M. (2008). Seabird numbers and breeding success in Britain and Ireland, 2006. Peterborough, Joint Nature Conservation Committee. (UK Nature Conservation, No. 31.);
 - Thaxter, C.B. Lascelles, B. Sugar, K. Cook, A.S.C.P. Roos, S. Bolton, M. Langston, R.H.W. and Burton, N.H.K. (2012). Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas. Biological Conservation in press;
 - Mitchel, P.I. Newton, I.S.F. Ratcliffe, N. and Dunn, T.E. (Eds.) (2004). Seabird Populations of Britain and Ireland: results of the Seabird 2000 census (1998-2002). Published by T and A. D. Poyser, London; and
 - Kober, K. Webb, A. Win, I. Lewis, M. O'Brien, S. Wilson, L.J. and Reid, J.B. (2010). An analysis of the numbers and distribution of seabirds within the British Fishery Limit aimed at identifying areas that qualify as possible marine SPAs. JNCC Report No. 431.
- 7.97 The assessment of potential impacts upon ornithology which will be presented in the EIA will be partly informed using the detail presented in the following relevant technical Chapters:

project description; physical processes; benthic ecology and fish and shellfish ecology. As such this section also draws upon the information presented in Chapters 4, 6 and 7 of this Offshore Scoping Report.

Description of current environment

- 7.98 The Site is located near to a number of important bird sites which have been classified as Special Protection Areas (“SPA”) under the European Council (“EC”) Directive 2009/147/EC on the conservation of wild birds (“the Birds Directive”). The most significant of these are likely to be the North Caithness Cliffs SPA to the east, which holds internationally important concentrations of guillemot *Uria aalge*, and an internationally important breeding assemblage of seabirds including fulmar *Fulmarus glacialis*, kittiwake *Rissa tridactyla*, razorbill *Alca torda* and puffin *Fratercula arctica*. These seabird species are likely to use the waters in and around the Dounreay project for feeding.
- 7.99 Further afield are SPAs classified for nesting seabirds (which are likely to be ecologically linked) are internationally important seabird colonies at Hoy SPA and Sule Skerry and Sule Stack SPA. The former holds nationally important concentrations of nesting red-throated divers *Gavia stellata* and internationally important concentrations of breeding great skuas *Catharacta skua*, and an internationally important breeding assemblage of seabirds, including fulmar, kittiwake, great black-backed gull *Larus marinus*, Arctic skua *Stercorarius parasiticus*, guillemot and puffin.
- 7.100 The latter SPA comprises two offshore islands which hold nationally important concentrations of European storm-petrel *Hydrobates pelagicus* and Leach’s storm-petrel *Oceanodroma leucorhoa*, and internationally important breeding numbers of gannet *Morus bassanus* and puffin, and an internationally important breeding assemblage comprising also shag *Phalacrocorax aristotelis* and guillemot.
- 7.101 A total of 3043 birds of 12 species were recorded during seven surveys from January to June 2015. The identification rate to species was over 97%. The primary observations from the surveys to date are that:
- Low to moderate density of fulmars were recorded, mainly during the winter months;
 - Low density of gannets were present, and these increased in numbers in late June, although most of these were in the buffer area around the project site;
 - Kittiwakes were one of the commonest species recorded during these surveys and reached moderate density in June;
 - A low density of great black-backed gulls was recorded and these were the only large gulls present in these surveys. Only a very small sample size of flight heights was possible for this species;
 - Arctic terns were found to be present at moderate density during the June surveys;
 - Guillemots were the second commonest species recorded and high density was found to occur in the two June surveys;
 - Razorbills were only present at low density in the study area and were also found to be most abundant in the summer months;
 - The density of puffins was generally found to be low to moderate, but one of the June surveys found very high density of this species which was not present in a follow-up survey less than three weeks later, suggesting that this concentration was ephemeral and highly likely to be an exploitation of a temporary food source; and

- The abundance of marine mammals at the site was low, but white-beaked dolphins were present in the survey area in the first three surveys carried out between January and March.

7.102 The total number of objects detected in each survey flight which were assigned to species level are presented in Table 7.6 and 7.7.

Table 7-6 Number of objects detected during each survey assigned to species level

Species	Jan	Feb	Mar	Apr	May	Jun (i)	Jun (ii)	Total
Fulmar <i>Fulmarus glacialis</i>	42	47	26	61	4	11	9	200
Gannet <i>Morus bassanus</i>	0	0	4	2	1	5	36	48
Red-throated diver <i>Gavia stellata</i>	0	0	0	0	0	0	1	1
Great northern diver <i>Gavia immer</i>	0	0	0	0	0	0	1	1
Great skua <i>Stercorarius skua</i>	0	0	0	0	2	1	3	6
Kittiwake <i>Rissa tridactyla</i>	3	10	12	21	5	131	116	298
Common gull <i>Larus canus</i>	1	1	0	0	0	0	0	2
Great black-backed gull <i>Larus marinus</i>	6	4	13	0	0	0	0	23
Arctic tern <i>Sterna paradisaea</i>	0	0	0	0	0	3	39	42
Guillemot <i>Uria aalge</i>	102	86	139	77	132	223	259	1018
Razorbill <i>Alca torda</i>	7	0	0	2	4	4	34	51
Puffin <i>Fratercula arctica</i>	0	0	0	5	44	1174	130	1353
Grey seal <i>Halichoerus grypus</i>	0	0	1	0	0	0	1	2
Risso's dolphin <i>Grampus griseus</i>	0	0	3	0	0	0	0	3
White-beaked dolphin <i>Lagenorhynchus albirostris</i>	2	7	2	0	0	0	0	11
Harbour porpoise <i>Phocoena phocoena</i>	0	0	0	0	1	0	1	2
Total	163	155	200	168	193	1552	630	3061

* Source: Dounreay Tri Limited interim aerial survey results, January to June 2015.

Table 7-7 Number of objects with no species ID detected during each survey assigned to species groups

Species group (No ID)	Jan	Feb	Mar	Apr	May	Jun (i)	Jun (ii)	Total
Fulmar / gull species	0	0	1	1	0	0	0	2
Large gull species	0	1	1	0	0	0	0	2
Tern species	0	0	0	0	0	0	1	1
Large auk	3	0	6	1	0	2	2	14
Auk species	0	0	0	13	0	37	7	57
Auk / small gull	0	0	0	0	0	1	0	1
Large auk / diver species	2	0	0	0	0	0	0	2
Seal species	0	0	2	0	0	0	0	2
Seal / small cetacean species	1	0	0	0	2	0	0	3
Total	6	1	10	15	2	40	10	84

* Source: Dounreay Tri Limited interim aerial survey results, January to June 2015.

7.103 The behaviour of seabirds has been categorised as follows: flying and sitting. The number of each observed is presented in Table 7-8. Loafing has been included for information only and has not been analysed in the results overall.

- Fulmar fluctuated in the number of individuals flying with an overall percentage of 83% flying between January and June. All fulmars in Survey 1 (January) and 6 (first June survey) were flying. The lowest percentage recorded flying was in Survey 4 (April) with 54% of observations;
- All gannets recorded during Survey 3 to 5 were flying, but when the abundance peaked in the second June survey, the percentage was just 8%, revealing the variation in behaviour for this species;
- The overall percentage of great skua recorded flying in all months was 66.7%, although the sample size was low;
- The overall percentage of kittiwakes recorded flying was 65%. However, the percentage was greater than this in all surveys except in the second June survey when the percentage flying was 55%;
- All apart from one Arctic tern was recorded flying or 98% of all observations between January and June 2015;
- Flying guillemot had a low percentage (15%) between January and June with the most of this species flying during Survey 3 (March) at 54% of observations. When abundance peaked in the first and second June surveys, the percentage flying was just 1% and 3% respectively;
- All razorbills recorded to date were sitting on the sea;
- Only one individual puffin was observed flying in Survey 4 (April) and 3 individuals were observed flying in Survey 6 (first June survey); and

- Great black-backed gull had the highest percentage of flying birds in Survey 2 with 75% and 67% and 31% in Survey 1 and 3.

Table 7-8 Summary of seabird behaviours between January and June 2015

Species	Number recorded flying	Number recorded sitting	% Flying	Total
Red-throated diver	1	0	100%	1
Great northern diver	0	1	0%	1
Fulmar	165	35	83%	200
Gannet	14	34	29%	48
Great skua	4	2	67%	6
Kittiwake	194	104	65%	298
Common gull	2	0	100%	2
Great black-backed gull	11	12	48%	23
Arctic tern	41	1	98%	42
Guillemot	148	870	15%	1018
Razorbill	0	51	0%	51
Puffin	4	1349	0%	1353
No ID				
Fulmar / gull species	0	2	0%	2
Large gull species	2	0	100%	2
Tern species	1	0	100%	1
Large auk	7	7	50%	14
Auk species	4	53	7%	57
Auk / small gull	0	1	0%	1
Large auk / diver species	0	2	0%	2
Total	598	2524	19%	3122

* Source: Dounreay Tri Limited interim aerial survey results, January to June 2015

Identification of key species and issues

- 7.104 The assessment of potential impacts presented in the EIA will draw on information presented both in the wider EIA (i.e. nature conservation designations and fish and shellfish ecology) as well as the HRA. There is potential for birds to move between the sites to migrate or commute to foraging areas. The impact assessment will take account of these factors, together with the known ecology, flight patterns, flight heights etc of individual species.
- 7.105 Table 7-9 presents the key issues for ornithology which may arise from the construction, operation or decommissioning of the Project (as informed by the reports listed under paragraph 7.103 and in consideration of the existing evidence base described in paragraph 7.98).

Table 7-9 Summary of the potential impacts upon ornithological features to be considered within the EIA

Potential impacts during construction		
Potential impact of disturbance/displacement/exclusion due to construction noise or physical presence	The potential for construction impacts to lead to disturbance/displacement / exclusion will be short term and temporary, with a number of monitoring studies providing an evidence base.	Scoped in
Potential for a barrier effect due to physical presence	The potential for construction impacts to lead to a barrier effect will be short term and temporary, with a number of monitoring studies providing an evidence base.	Scoped in
Potential change in habitat/prey availability	As per benthic ecology (Section 7.2) and Fish and Shellfish (Section 7.3)	Scoped in
Potential increase in suspended sediment affecting visibility	As per benthic ecology (Section 7.2) and Fish and Shellfish (Section 7.3)	Scoped in
Potential impacts during operation		
Potential impact of disturbance/displacement/exclusion due to physical presence, marine noise and maintenance works	The potential for the physical presence of the Project to lead to disturbance/displacement/exclusion will be for the duration of the Project, however noise levels will be less and habituation is more likely to be a factor. A number of monitoring studies provide an evidence base.	Scoped in
Collision risk, in particular for migratory species/populations	The potential for collision risk is very well studied, with numerous guidance documents, recommended methods/approaches and increasing numbers of monitoring studies available.	Scoped in
Potential for a barrier effect due to physical presence	The potential for the physical presence of the Project to lead to a barrier effect will be for the duration of the Project, however noise levels will be less and habituation is more likely to be a factor. A number of monitoring studies provide an evidence base.	Scoped in
Potential change in habitat/prey availability	As per benthic ecology (Section 7.2) and Fish and Shellfish (Section 7.3)	Scoped in

Potential increase in suspended sediment affecting visibility	As per benthic ecology (Section 7.2) and Fish and Shellfish (Section 7.3)	Scoped in
Creation of a roosting habitat or foraging opportunities	The addition of new structures presents the opportunity additional for roosting and foraging. Potential for foraging opportunities are as per benthic ecology (Section 7.2) and Fish and Shellfish (Section 7.3) with some evidence from monitoring reports to inform the potential for roosting.	Scoped in
Potential impacts during decommissioning		
Potential impacts arising from decommissioning phase are expected to be similar to but not exceeding those arising during the construction phase, and would be temporary and of short duration.		As construction section
Potential cumulative impacts		
Potential impact of disturbance/displacement to physical presence	Disturbance and displacement effects will be considered in the ES	Scoped in
Potential for a barrier effect due to physical presence	The potential for a barrier effect will be informed by a number of monitoring studies, which provide an evidence base.	Scoped in
Potential change in habitat/prey availability	As per benthic ecology (Table 7.1) and Fish and Shellfish (Table 7.5)	Scoped in
Potential increase in suspended sediment affecting visibility	As per benthic ecology (Table 7.1) and Fish and Shellfish (Table 7.5)	Scoped in
Collision risk, in particular for migratory species/populations	The potential for collision risk is very well studied, with numerous guidance documents, recommended methods/approaches and increasing numbers of monitoring studies available from operational offshore wind farms.	Scoped in
Potential inter-related impacts		
The inter-relationships between relevant receptors will be considered in the ES where potential pathways exist between topic areas. The key inter-relationships during the construction and operation of the Project that will be considered in the ES for ornithology are benthic and fish ecology and designated sites.		

Relevant UK guidance, methodologies or best practice

7.106 This assessment will be prepared in the context of key legislation and/or guidance documents related to ornithology and offshore wind farm development, which include the following:

- Camphuysen, C.J. Fox, T. Leopold, M.F. and Petersen, I.K. (2004). Towards standardised seabirds at sea census technique in connection with environmental impact assessments for offshore wind farms in the UK. A report for COWRIE;
- MacLean, I.M.D. Wright, L.J. Showler, D.A. and Rehfisch, M.M. (2009). A review of assessment methodologies for offshore wind farms. British Trust for Ornithology report commissioned by COWRIE;
- King, S. Maclean, I.M.D. Norman, T. and Prior, A. (2009). Developing guidance on ornithological cumulative impact assessment for offshore wind farm developers. COWRIE;
- Band, B. (2012). Using a collision risk model to assess bird collision risks for offshore windfarms. Strategic Ornithological Support Services (SOSS), Project SOSS-02; and
- Walls, R., Pendlebury, C. Budgey, R. Brookes, K. and Thompson, P. (2009). Revised best practice guidance for the use of remote techniques for ornithological monitoring at offshore wind farms. COWRIE REMTECH-08-08.

7.107 Where necessary mitigation and/or monitoring measures will be identified as required during the formal EIA process, to be informed through the assessment process itself in consultation with stakeholders.

Existing knowledge base

7.108 During the EIA a review will be undertaken of any relevant post-consent monitoring data and industry reports in order to investigate the existing evidence base. This information will be used to provide further insight into the potential environmental impacts, based upon offshore wind industry experience.

7.109 The following paragraphs provide a high level overview of the existing knowledge base and make reference to reports and/or studies that are relevant to the consideration of potential impacts on ornithology. This information will be combined with site-specific studies to inform the EIA. Examples of the reports that are available which can provide insight into outcomes of monitoring undertaken at other offshore wind farm sites are provided below:

- Camphuysen, C.J. Fox, T. Leopold, M.F. and Petersen, I.K. (2004). Towards standardised seabirds at sea census technique in connection with environmental impact assessments for offshore wind farms in the UK. A report for COWRIE;
- MacLean, I.M.D. Wright, L.J. Showler, D.A. and Rehfisch, M.M. (2009). A review of assessment methodologies for offshore wind farms. British Trust for Ornithology report commissioned by COWRIE;
- Mavor, R.A. Heubeck, M. Schmitt, S. and Parsons, M. (2008). Seabird numbers and breeding success in Britain and Ireland, 2006. Peterborough, Joint Nature Conservation Committee. (UK Nature Conservation, No. 31.);
- Mitchel, P.I. Newton, I.S.F. Ratcliffe, N. and Dunn, T.E. (Eds.) (2004). Seabird Populations of Britain and Ireland: results of the Seabird 2000 census (1998-2002). Published by T and A. D. Poyser, London;

- Thaxter, C.B. Lascelles, B. Sugar, K. Cook, A.S.C.P. Roos, S. Bolton, M. Langston, R.H.W. and Burton, N.H.K. (2012). Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas. Biological Conservation in press;
- Kober, K. Webb, A. Win, I. Lewis, M. O'Brien, S. Wilson, L.J. and Reid, J.B. (2010). An analysis of the numbers and distribution of seabirds within the British Fishery Limit aimed at identifying areas that qualify as possible marine SPAs. JNCC Report No. 431;
- King, S. Maclean, I.M.D. Norman, T. and Prior, A. (2009). Developing guidance on ornithological cumulative impact assessment for offshore wind farm developers. COWRIE;
- Band, B. (2012). Using a collision risk model to assess bird collision risks for offshore windfarms. Strategic Ornithological Support Services (SOSS), Project SOSS-02; and
- Walls, R., Pendlebury, C. Budgey, R. Brookes, K. and Thompson, P. (2009). Revised best practice guidance for the use of remote techniques for ornithological monitoring at offshore wind farms. COWRIE REMTECH-08-08.

Proposed project level surveys and studies

- 7.110 Aerial surveys will continue following the completion of the initial year of onsite aerial survey and the aerial survey programme will follow the Survey, Deploy and Monitor methodology which are proposed to be extended to the floating offshore wind farm demonstrator programme by the Scottish Government. This will facilitate the more rapid development and deployment of these demonstrator projects and also ensure sufficient onsite data is collected as part of an ongoing monitoring programme.
- 7.111 Findings of the existing knowledge base will be fully investigated, and reported upon, during the EIA, High-level examples of the findings relevant to ornithology are summarised below:
- Collision risk in operation is typically a well-studied issue at EIA;
 - The actual risk of barrier effects is difficult to determine from monitoring studies; and
 - The risk of disturbance and displacement appears to be species specific.

7.6 Nature Conservation Designations

Introduction

- 7.112 This section identifies nature conservation designations that could potentially be affected by the Dounreay Tri Project - the 'Project', offshore site – the 'Site' and associated export cable corridor. Reference should also be made to individual sections (Section 7.2: Benthic Ecology, Section 7.5: Ornithology, Section 7.3: Fish and Shellfish Ecology and Section 7.4 Marine Mammals, Turtles and Basking Sharks) for details of all species and habitats of conservation interest that could potentially be affected by the Project.
- 7.113 The Site is considered to be the offshore area delineated in Figure 5-1 in blue and referred to as the 'Site', the export cable corridor area of search is marked in orange on the same figure and referred to as the 'export cable corridor'.

Guidance and Legislation

- 7.114 The following legislation is relevant to Nature Conservation:

Council Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna (EU Habitats Directive) 1992

- 7.115 The Habitats Directive (Council Directive 92/43/EEC) promotes the maintenance of biodiversity by requiring Member States to take measures to maintain or restore natural habitats and wild species listed on the Annexes to the Directive at a favourable conservation status, introducing robust protection for those habitats and species of European importance. Member states are required to contribute to a coherent European ecological network of protected sites by designating Special Areas of Conservation (SACs) for habitats listed in Annex I and for species listed in Annex II of the Directive.

The Council Directive on the Conservation of Wild Birds (EU Birds Directive)

- 7.116 The Birds Directive (2009/147/EC) provides measures for the identification and classification of Special Protection Areas (SPAs) for rare or vulnerable species listed in Annex I of the Directive, as well as for all regularly occurring migratory species.

Conservation (Natural Habitats, &c.) Regulations 1994 (as amended)

- 7.117 In Scotland, the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended), commonly known as the Habitats Regulations implement the species protection requirements of the Habitats Directive in Scotland on land and inshore waters out to 12 nautical miles. The Habitats Regulations require that where a plan or project has the potential to significantly affect a 'Natura⁵' site, it must be subject to an 'Appropriate Assessment' by the competent authority. A Habitats Regulations Appraisal (HRA) will be required for this Project in relation to birds, marine mammals and migratory fish interests

Wildlife and Countryside Act 1981 (as amended)

- 7.118 The Wildlife and Countryside Act 1981 provides for the notification and confirmation of Sites of Special Scientific Interest (SSSIs); these sites are identified for their flora, fauna, geological or physiographical features.

Nature Conservation (Scotland) Act 2004

- 7.119 The Nature Conservation (Scotland) Act 2004 sets out a series of measures which are designed to conserve biodiversity and to protect and enhance the biological and geological natural heritage of Scotland. The Act increases protection for SSSIs and strengthens wildlife enforcement legislation.

Marine and Coastal Access Act (2009) and Marine (Scotland) Act (2010)

- 7.120 These Acts provide powers to designate Marine Protected Areas (MPAs) within offshore and territorial waters to provide a network of areas to manage and protect seas. Thirty MPAs (17 in Scottish territorial waters fall under the Marine (Scotland) Act 2010 and 13 in offshore waters under the Marine and Coastal Access Act 2009) have been designated to conserve geodiversity and biodiversity features including one species of seabird – black guillemot *Cephus grylle*.
- 7.121 Under Section 117 of the Marine (Scotland) Act 2010, Scottish Ministers are permitted to designate specific seal haul-out sites to provide additional protection for seals from intentional or reckless harassment. 194 seal haul-out sites were designated through The Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014 laid in the Scottish Parliament on 26 June 2014.

⁵ SPAs and SACs are collectively referred to as the Natura network or Natura/European sites.

Available Information

7.122 The key information sources that will be used to inform the assessment are listed below:

- SNH Sitelink website for detailed information on Natura 2000 sites (SPAs, SACs and Ramsar sites) and SSSIs (www.snh.org.uk/snhi); and
- Scientific papers.

Consultation

7.123 The following have been identified as relevant stakeholders and will be consulted during the EIA phase to ensure that all designated sites considered relevant to the Project have been identified:

- SNH; and
- Marine Scotland.

Study Area

7.124 The study area for this section comprises any designated sites with natural heritage interests that have potential connectivity with the offshore components of the Project (e.g. overlap with the Site or export cable corridor, or sites with migratory species or other species as qualifying features that may overlap or be affected by the Project). All sites with potential connectivity to the Project will be identified in the habitats Regulation Appraisal (HRA).

Surveys and Studies Carried Out to Date

7.125 A detailed desk study and consultation will provide the necessary baseline information regarding designated sites.

7.126 No surveys are anticipated for Nature Designations.

Description of the Current Environment

7.127 The Project is out with any sites designated for nature conservation interests at European, national or local levels. There are several sites designated for nature conservation interests of European or national importance within the wider area (Figure 7-5 and Figure 7-6). The closest and most relevant sites are detailed below.

European Nature Conservation Designations

Special Protection Areas (SPAs)

7.128 The export cable corridor overlaps with a marine component of the North Caithness Cliffs Special Protection Area (SPA), a site designated for its internationally important populations of breeding seabirds.

7.129 Many seabird species forage across very large areas during the breeding season therefore SPAs at considerable distances from the Site could have qualifying interests that could be affected by the Project.

7.130 The north coast of Scotland is an internationally important migratory route for numerous species including wildfowl that breed in Arctic latitudes and overwinter in the UK. There are two SPAs with migratory wildfowl interests in the wider area, these are North Sutherland Coastal Islands SPA located approximately 26 km to the south-west of the Site which is designated for wintering aggregations of Greenland barnacle goose *Branta leucopsis*, and Caithness Lochs SPA, approximately 16 km to the south-east of the Site designated for non-

breeding aggregations of Greylag goose *Anser anser*, Greenland white-fronted goose *Anser albifrons flavirostris* and whooper swan *Cygnus cygnus*.

- 7.131 SPAs with qualifying interests with potential connectivity to the Project will be identified and considered in the Habitats Regulations Appraisal (HRA).

Draft Special Protection Areas

- 7.132 Pentland Firth and Scapa Flow draft SPA (dSPA) 31 km to the east of the Site has been identified as an important area for marine birds including a number of wintering and breeding season interests (Figure 7-5). At this distance from the Site, there is no potential for these interests to be affected by the Project.

Ramsar Sites

- 7.133 There are no Ramsar sites relevant to the offshore component of the Project.

Special Areas of Conservation (SACs)

- 7.134 There are no SACs within the Site, export cable corridor or the immediate vicinity. The nearest SAC is Strathy Point SAC located approximately 8 km to the west of the export cable corridor designated for 'vegetated sea cliffs on the Atlantic coast' however there is no potential for the Project to affect this site. The nearest SACs to the Site designated for grey seals *Halichoerus grypus* are Faray and Holm of Faray SAC and North Rona SAC; these sites are approximately 90 km and 120 km from the Site respectively. Sanday SAC, 115 km to the north-east of the Site is designated for harbour seals *Phoca vitulina*. At these distances from the Project, these three sites are considered unlikely to be affected by the Project. There are no SACs for cetaceans on the north coast of Scotland. Moray Firth SAC designated for bottlenose dolphin *Tursiops truncatus* is approximately 121 km to the south-east of the Site. There are limited observations of this species in Pentland Firth and Orkney Waters (Thompson *et al.*, 2011).
- 7.135 The rivers Thurso, Borgie and Naver, located 18 km, 24 km and 27 km from the Site respectively, are all designated as SACs for their importance to Atlantic salmon. A tagging study of Atlantic salmon caught and released at Armadale Bay on the north coast of Scotland found that Atlantic salmon may not have well-defined migratory routes in the Pentland Firth and Orkney waters region (Godfrey *et al.*, 2014) therefore there is potential for this species to pass through the Site during migration.
- 7.136 Rivers Naver and Borgie are also designated for freshwater pearl mussel *Margaritifera margaritifera*. The Project is highly unlikely to have a direct effect upon freshwater pearl mussel, however their lifecycle is highly dependent upon Atlantic salmon, therefore any effect the Project may have on Atlantic salmon is likely to have an indirect effect on freshwater pearl mussel.
- 7.137 All SACs with qualifying interests with potential connectivity to the Project will be identified and considered in the HRA. Figure 7-5 and Table 7-10 detail the locations and distances relative to the Project.

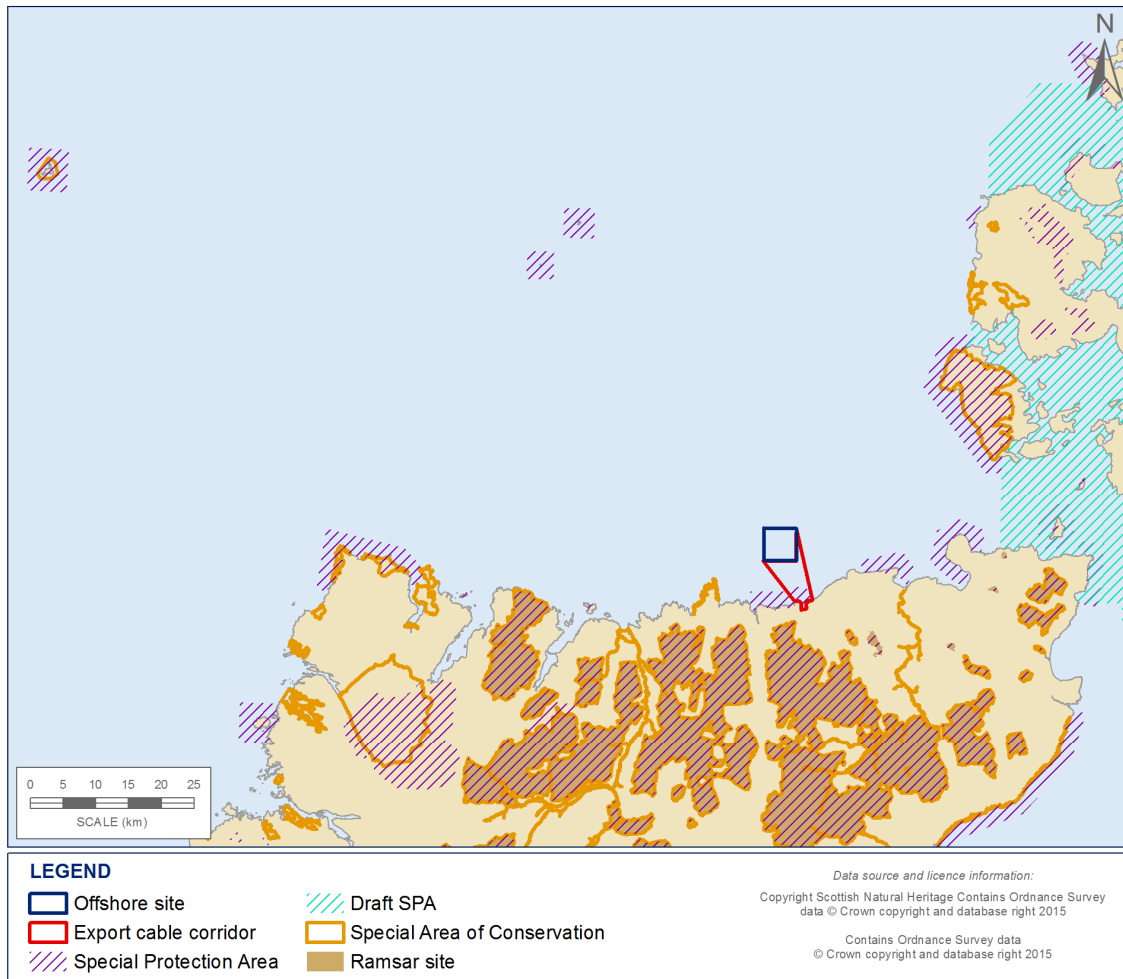


Figure 7-5 Nature conservation designations of European importance

Table 7-10 European designations in the vicinity of the offshore components

Site name	Closest distance (km)	Qualifying feature
North Caithness Cliffs SPA	0 km	Northern fulmar <i>Fulmar glacialis</i> ; Kittiwake <i>Rissa tridactyla</i> ; Common guillemot <i>Uria aalge</i> ; Razorbill <i>Alca torda</i> ; Atlantic puffin <i>Fratercula arctica</i> ; seabird assemblage. Not relevant to the offshore components of the project: Peregrine <i>Falco peregrinus</i> .
River Thurso SAC	18 km	Atlantic salmon <i>Salmo salar</i>
River Borgie SAC	24 km	Atlantic salmon; Freshwater pearl mussel <i>Margaritifera margaritifera</i> Not relevant to the offshore components of the project:

Site name	Closest distance (km)	Qualifying feature
		Otter <i>Lutra lutra</i>
River Naver SAC	27 km	Atlantic salmon; Freshwater pearl mussel

National Conservation Designations

Marine Protected Areas (MPAs)

7.138 There are no Marine Protected Areas (MPAs) within the Site. The nearest MPA is Northwest Orkney MPA, located approximately 32 km to the north of the Site, recommended for its importance to biodiversity (sandeels) and geodiversity (marine geomorphology of the Scottish Shelf Seabed including sandbanks and sand and sediment wave fields) (Figure 7-). Sandeels are a key source of food for a range of marine wildlife, including many types of larger fish and seabirds. Given the distance of the Site from designation, there is unlikely to be any impact on the MPA.

National Nature Reserves (NNRs)

7.139 There are no national nature reserves relevant to the offshore components of the Project.

Sites of Special Scientific Interest (SSSIs)

7.140 The export cable corridor overlaps with Sandside Bay Site of Special Scientific Interest (SSSI) which lies just north of Reay and has been designated for sand dune habitat. Red Point Coast SSSI to the west of Sandside Bay is immediately adjacent to the export cable corridor. This site is listed for ornithological, geological and botanical interests including breeding common guillemot, Quaternary geology and geomorphology, non-marine Devonian stratigraphy, maritime cliff and Scottish primrose *Primula scotica*. Eilean nan Ron SSSI, 27 km to the south-west, is listed for non-breeding Greenland barnacle goose. Figure 7-6 and Table 7-11 detail the locations.

Designated Seal Haul-Outs

7.141 The Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014 under the Marine (Scotland) Act 2010, provides protection for seals at designated seal haul-outs from intentional or reckless harassment. There are four designated seal haul-out sites on the north coast of Scotland for harbour seal, these are Kyle of Tongue Sandbanks (36 km), Loch Eriboll and Whiten Head (35 km), Eilean Hoan (45 km), and Gill's Bay (37 km). There are also two sites designated as grey seal breeding colonies relevant to the Project, these are Eilean nan Ron (Tongue) (27 km) and Sule Skerry (54 km). There are numerous designated seal haul-outs throughout the Orkney Islands.

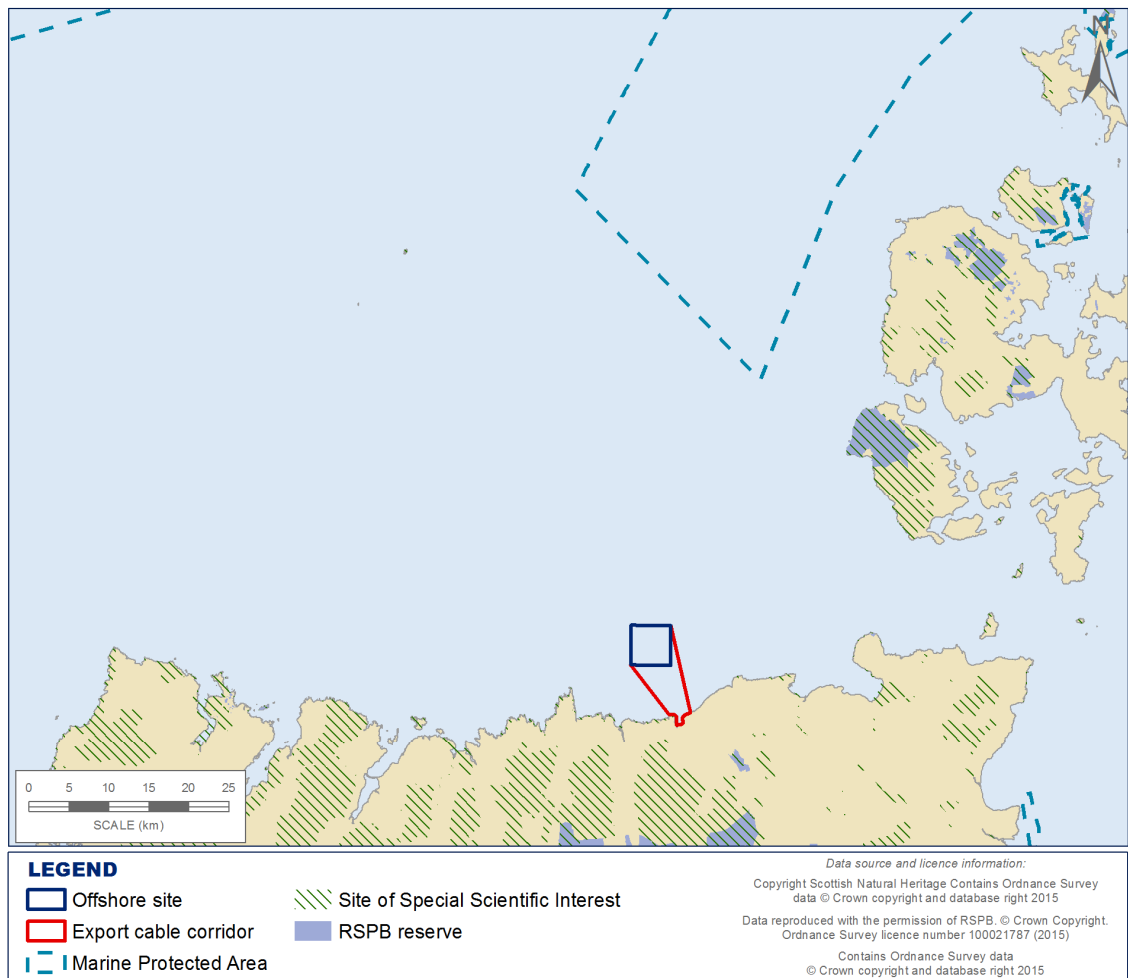


Figure 7-6 Nature conservation designations of national importance

Table 7-11 National designations in the vicinity of the offshore components

Site name	Closest distance (km)	Notified interest
Sandside Bay	0 km	Sand dunes
Red Point Coast SSSI	0.02 km	Common guillemot (breeding) Scottish primrose <i>Primula scotica</i> Maritime cliff Non-marine Devonian Quaternary of Scotland
Eilean nan Ron SSSI	27 km	Greenland barnacle goose (non-breeding)

Local Designations

7.142 There are no local designations that could potentially be affected by the offshore components.

Identification of Potential Impacts

7.143 Impacts are identified in terms of the specific receptor or qualifying feature rather than the award of and continuation of a specific designation i.e. the Project may have an impact on a particular species which can be assessed but it is not possible to assess whether the impact on a given species will have implications on a given designated site.

7.144 To this end, Nature Conservation in itself is not proposed to be taken forward to the assessment phase; rather the potential impacts on species will be described on a receptor by receptor basis and also within the HRA.

7.145 Table 7-12 summarises the potential impacts.

Table 7-12 Potential impacts on nature conservation during construction, operations and maintenance and decommissioning of the Project

Potential impacts during construction		
Impact	High level impact summary and justification	Scoped in/out
Disturbance to SPA qualifying interests due to vessel traffic during construction and installation	The export cable route overlaps with the North Caithness Cliffs SPA. Cable laying activities have the potential to affect this designated site.	Scoped in and covered in Section 7.6: Ornithology.
Disturbance and auditory injury from underwater noise generated during construction (particularly piling) to SAC qualifying interests (seals, salmon)	Noise associated with installation of pin piles will be considered in relation to SAC qualifying interests. Noise levels associated with installation of gravity base anchors and moorings would not be anticipated to have any adverse impacts on SAC qualifying interests.	Scoped in and covered in Section 7.4: Marine Mammals, Turtles and Basking Sharks, and Section 7.3: Fish and Shellfish Ecology.
Potential impacts during operations and maintenance		
Impact	High level impact summary and justification	Scoped in/out
Mortality risk to SPA qualifying interests from collision with wind turbine blades	Operational wind turbines pose a collision risk to flying birds including seabirds and migrating wildfowl.	Scoped in and covered in Section 7.5: Ornithology
Displacement of SPA qualifying interests from foraging areas due to presence of the Project	SPA qualifying interests could potentially use the development site for foraging therefore there is the potential for displacement due to the presence of the development.	Scoped in and covered in Section 7.5: Ornithology.
Disturbance as a result of	Increased vessel activity has the	Scoped in and covered

increased vessel activity at the site (physical presence and noise-related) (SAC qualifying interests – seals and Atlantic salmon)	potential to affect SAC qualifying interests (seals and Atlantic salmon).	in Section 7.3: Fish and Shellfish Ecology and Section 7.4: Marine Mammals, Turtles and Basking Sharks.
Impacts of electromagnetic fields (EMF) on sensitive species (SAC qualifying interest – Atlantic salmon)	EMF from the export cable has the potential to affect Atlantic salmon.	Scoped in and covered in Section 7.3: Fish and Shellfish Ecology.
Impacts of operational noise on Atlantic salmon	Operational noise from the development could potentially affect Atlantic salmon.	Scoped in and covered in Section 7.3: Fish and Shellfish Ecology.
Potential impacts during decommissioning		
Potential impacts arising during the decommissioning phase are expected to be similar to, but not exceeding, those arising during the construction phase.		As construction
Potential cumulative impacts		
Cumulative impacts on non-European designated sites qualifying features will be considered in the specific receptor chapter.		

Data Gaps

7.146 At this stage there are not considered to be any data gaps.

Method of Assessment

7.147 The ES chapter will provide details of the baseline conditions based on desk based study, review of survey data and consultation with relevant stakeholders where necessary. The EIA will identify and assess the potential impacts of the Project on nature conservation sites in accordance with the prevailing guidance from the Institute of Ecology and Environmental Management (IEEM, 2006). A cumulative impact assessment will be undertaken to assess the potential impacts of the Project along with other proposed and existing developments in the wider area. The list of developments to be considered in the cumulative assessment will be agreed in consultation with Marine Scotland.

7.148 Due to the proximity of the Project to a number of SPAs and SACs in the wider vicinity, it is anticipated that a Habitats Regulations Appraisal (HRA) will be required.

Conclusions and Next Steps

7.149 In conclusion, due to the proximity of a number of SPAs and SACs in the vicinity of the Site, Nature Designations will be brought forwards to the assessment phase and all impacts on nature conservation sites will be fully addressed within the relevant receptor chapters.

8 Offshore Human Environment

Introduction

- 8.1 This chapter considers the impact of the Dounreay Tri Project – the ‘Project’ on the human environment within or using the Dounreay Tri Project offshore site – the ‘Site’ and export cable corridor and considers the following receptors:
- Commercial fisheries;
 - Shipping and navigation;
 - Aviation;
 - Seascape, landscape and visual amenity;
 - Archaeology and cultural heritage;
 - Other users of the marine environment; and
 - Socio-economics, recreation and tourism.
- 8.2 An overview of the relevant baseline environment is provided for each along with the anticipated impacts, a baseline characterisation strategy, impact assessment strategy and where applicable, possible mitigation and monitoring measures.
- 8.3 Air quality is covered in Section 11.3.

8.1 Commercial Fisheries

Introduction

- 8.4 This section characterises commercial fishing activity in and around the Dounreay Tri Project offshore site – the ‘Site’ and associated export cable corridor. Fishing activities considered include finfish and shellfish fisheries, finfish and shellfish marine aquaculture and coastal salmon netting.
- 8.5 The Site is considered to be the offshore area delineated in Figure 5-1 in blue and referred to as the ‘Site’, the export cable corridor area of search is marked in orange on the same figure and referred to as the ‘export cable corridor’.
- 8.6 Impacts relating to the distribution and abundance of target species are addressed in the biological chapters for the benthic environment (Section 7.2: Benthic Ecology and Section 7.3: Fish and Shellfish Ecology). Other impacts associated with commercial fisheries including navigation and socio-economics are discussed in Section 8.2: Shipping and Navigation, Appendix A: Preliminary Hazard Analysis and Section 8.7: Socio-economics, Recreation and Tourism.

Guidance and Legislation

- 8.7 The relevant regulations, policies and guidelines that will be taken into consideration as part of the assessment of potential impacts on Commercial Fishing are:
- Best Practice Guidance for Fishing Industry Financial and Economic Impact Assessments (Seafish, 2009);
 - Guidance on overlaps with fishing (Subsea Cables UK, 2012);
 - Emergency procedures for fouling gear (Subsea Cables UK, 2015); and

- Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison (FLOWW, 2014).

Available Information

8.8 The following information sources will be utilised in the assessment phase:

- Fishing Effort and Quantity and Value of Landings by ICES Rectangles (SG, 2014);
- Agriculture and Fisheries – Publications (SG, 2015a);
- Scottish Government Vessel Monitoring System (VMS) data for spatial distribution and speed of fishing vessels;
- Project Automatic Identification System (AIS) data from the Preliminary Hazard Assessment (PHA) with spatial distribution of vessels including fishing vessels;
- Marine Scotland vessel surveillance data;
- ScotMap Data - Inshore Fisheries Mapping Project in Scotland (MS, 2014b); and
- National Marine Plan Interactive (MS, 2015a).

Consultation

8.9 The following have been identified as relevant stakeholders and will be consulted during the EIA phase: Marine Scotland and Marine Scotland Science (MSS);

- Local fishermen;
- Local Harbour Authorities;
- Scottish Fishermen's Federation (SFF);
- Scottish Pelagic Fishermen's Association;
- Inshore Fisheries Groups;
- Orkney Fisheries Association (OFA); and
- District Salmon Fishery Boards.

Study Area

8.10 The Site and export cable corridor are situated within ICES sub-area rectangle⁶ 46E6 which includes the north-east coast of Scotland from Strathy Point to Duncansby Head and the south-west region of the Orkney Islands (Figure 8-1). The study area is identified as this ICES rectangle boundary which extends over 1 degree longitude by 30' latitude; which at the project latitude, is an area of approximately 3,240 km². National fisheries data will provide context to the importance of the local area for Scottish commercial fisheries.

⁶ The International Council for Exploration of the Sea (ICES) is a global organisation which coordinates oceanic and coastal monitoring and research, and advises international commissions and governments on marine policy and management issues.

Fisheries effort and landings data (volume and value) are reported by defined statistical rectangles (geographical areas) to Marine Scotland and ICES.

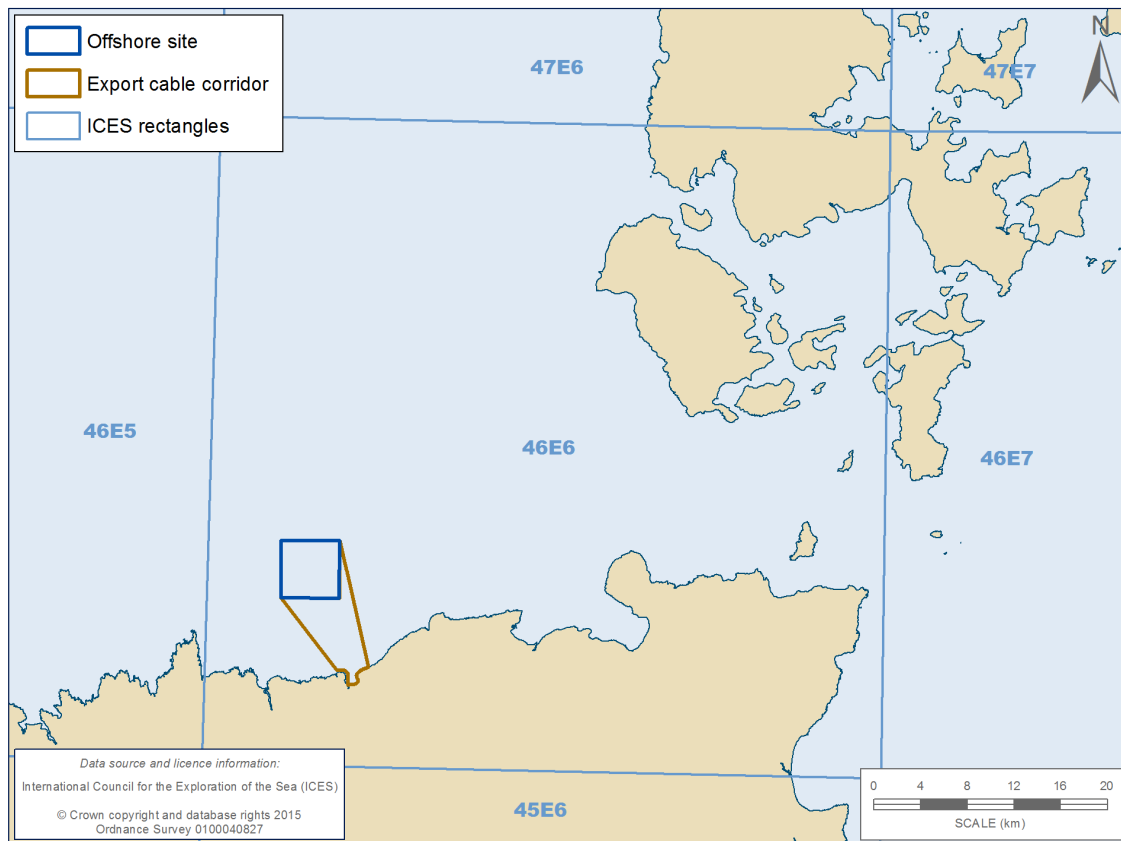


Figure 8-1 Study area and ICES square

Surveys and Studies Carried Out to Date

- 8.11 No surveys or studies with regards to commercial fisheries in the marine environment have been carried out to date. It is envisaged that consultation will be undertaken with various fishing representatives and local fishermen, where necessary, to fill any data gaps and finalise baseline characterisation for the impact assessment.

Description of the Current Environment

Inshore Fisheries

- 8.12 Commercial fisheries activity in Scotland's inshore waters is managed by Marine Scotland out to 12 nautical miles (nm) from the coast. The majority of inshore fishing activity is generally undertaken within 6 nm of the Scottish coastline.
- 8.13 There were 2,030 active Scottish based vessels registered in 2014. The Scottish fishing industry is dominated by vessels of 10 m overall length or less, accounting for approximately 70% of the Scottish fleet. This smaller vessel fleet typically fishes the inshore coastal waters while a larger fleet fish further offshore. Approximately 87% of the fleet 10 m overall length or less is dominated by vessels using pots or creels to target shellfish (MS, 2015b).
- 8.14 Pelagic species are the most important species landed into Scotland in tonnage, followed by demersal and then shellfish at an average of 126,500 tonnes, 88,900 tonnes and 57,800 respectively from 2010 - 2014. However, shellfish landings have a greater market value at an average of £140.2 million, followed by pelagic at £138.6 million and demersal at £94.6 million.
- 8.15 Landings data for 2010 - 2014 indicate that the predominant target species from ICES rectangle 46E6 is shellfish, followed by demersal and pelagic species, both by average quantity

and value (Table 8-1) (SG, 2014). The main fishing types include crab and lobster potting, scallop dredging, demersal trawling and herring fishing.

- 8.16 While landings in ICES rectangle 46E6 represent a small proportion of Scottish landings, these landings, particularly shellfish, will likely be important to the local inshore fishery of smaller vessels (typically less than 15 m overall length) targeting shellfish species.

Table 8-1 Landings and value by species type from ICES 46E6 (2010 - 2014)

Species type	Demersal		Pelagic		Shellfish	
Year	Quantity (tonnes)	Value (£)	Quantity (tonnes)	Value (£)	Quantity (tonnes)	Value (£)
2010	426	812,810	153	45,607	1,125	2,497,686
2011	827	1,512,143	78	45,900	1,289	2,939,530
2012	527	876,214	1,090	596,870	1,045	2,410,143
2013	418	637,138	1,050	368,465	1,060	2,129,642
2014	1,032	1,655,590	391	109,110	971	1,953,530
Average	646	1,098,779	553	233,191	1,098	2,386,106

- 8.17 The offshore area (24.8 km²) represents a small proportion of the available fishing grounds in ICES 46E6 (0.8%), therefore vessel monitoring and surveillance data collated by Marine Scotland is used to help identify the spatial distribution of fishing activity.
- 8.18 AIS fishing vessel tracks (vessels greater than 15 m) during the study period October 2014 to September 2015 are widespread throughout the offshore area and occasionally through the export cable corridor (Figure 8-2). There are clear densities of traffic north of the Project area in the Pentland shipping channel (east to west) and transits between Scrabster Harbour and to offshore fishing grounds further north and north-west (Figure 8-3). Further analysis of this data is provided in the PHA.

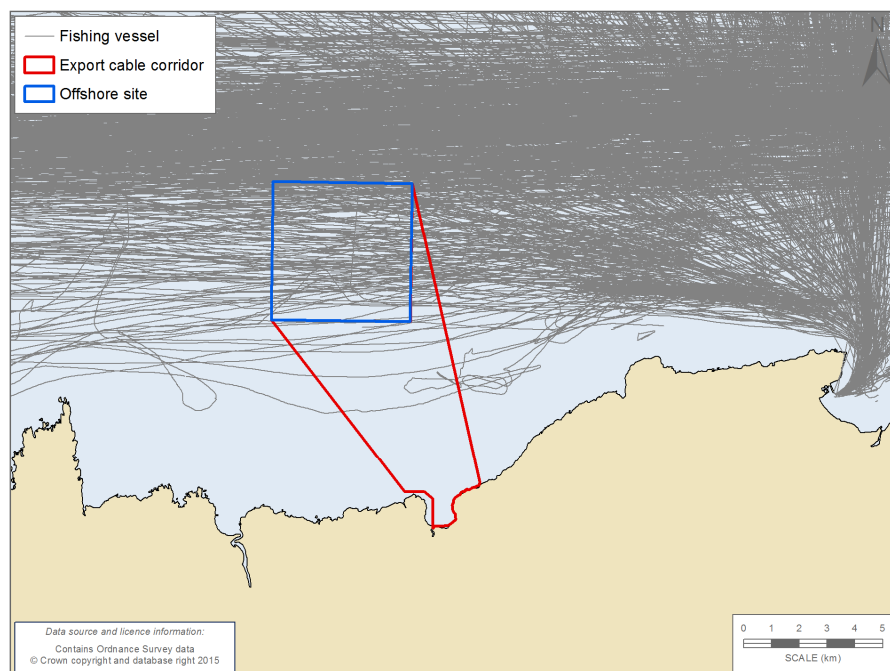


Figure 8-2 AIS tracks

- 8.19 The majority of vessels are likely to be pot/creel boats, with a small number operating in the Site or export cable corridor (1 - 3 vessels) and low to medium number of pot/creel boats (1 - 5 vessels) within the export cable corridor (Figure 8-3). Activity along the wider north coast appears to be generally concentrated further east off Thurso and Dunnet Head and westwards towards Armadale Bay. At least one scallop dredging vessel may operate in the area, including the western boundary of the Site (Figure 8-3). There doesn't appear to be any scallop diving activity in the Site or export cable corridor (Figure 8-3).

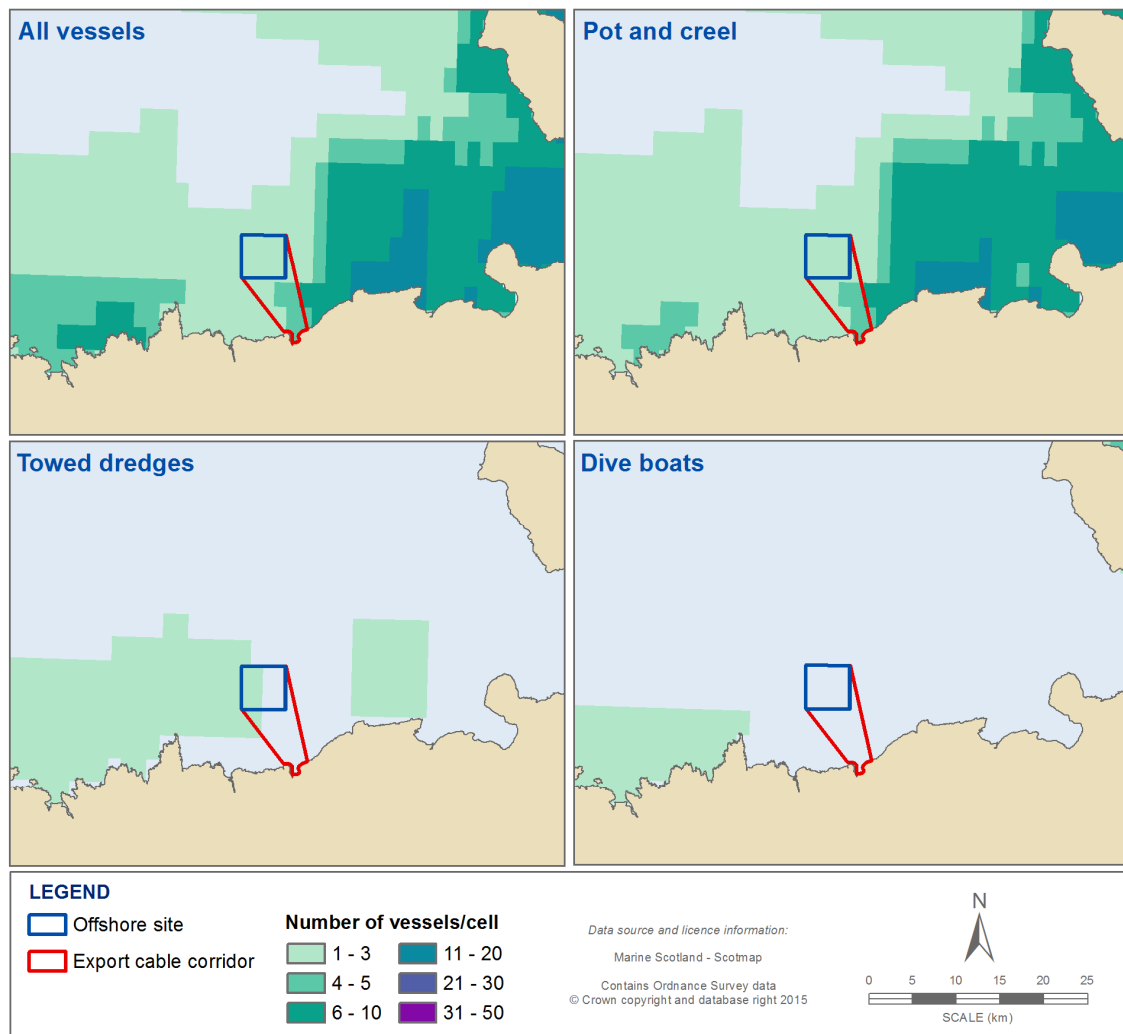


Figure 8-3 ScotMap data

- 8.20 Initial consultation with SFF during the site selection process indicates that the Site is not intensively fished and that the southern extent avoids known fishing grounds.

Other Marine Fisheries

- 8.21 There are no active finfish or shellfish marine aquaculture sites within the vicinity of the Project. The nearest marine aquaculture site is located 30 km east of the Site in the Kyle of Tongue or at least 50 km north in Orkney waters.
- 8.22 There is a low intensity fixed engine fishery located in Melvich Bay where the River Halladale enters the Pentland Firth, west of the cable landfall point in Sandside Bay. Catch statistics report low numbers of wild grilse from June to August each year (SG, 2015b).

Identification of Potential Impacts

- 8.23 Commercial fishing interests maybe impacted during the construction phase by temporary exclusions from the construction area on safety grounds and there may be a temporary increase in steaming time for vessels which routinely transit through the Site to reach fishing grounds to the north.
- 8.24 During the operational phase there will be a loss of a small area of fishing grounds directly associated with the floating structures and the possibility of a long-term increase in steaming time to fishing grounds.
- 8.25 Displacement of fishing vessels to other areas is likely to be very minor as the overall area of the Project is small, however this will be considered in the assessment phase.

Cumulative Impacts

- 8.26 Cumulative impacts may arise between fishing and other sea users as a result of development of the Dounreay Demonstration Centre (DDC) and during the construction of the Orkney – Caithness interconnector cable.
- 8.27 Table 8-2 summarises the potential impacts.

Table 8-2 Potential impacts on commercial fisheries during construction, operations and maintenance and decommissioning of the Project

Potential impacts during construction		
Impact	High level impact summary and justification	Scoped in/out
Loss of access to fishing grounds due to the presence of vessels and safety zones	Current distribution of existing fishing activity may be affected by the Project. Disturbance to existing fishing activity also may occur during cable installation.	Scoped in
Obstruction of regular fishing vessel transit routes due to the presence of vessels and safety zones	The development may result in changes to local navigation and transit routes for fishing vessels.	Scoped in
Change in abundance or distribution of target species	The addition of new structures at the seabed may provide suitable shelter and habitat for some commercial species, increasing abundance. Disturbance to some fish species may also occur during construction and operation.	Scoped in and considered further in Section 7.4: Fish and Shellfish Ecology.
Potential impacts during operations and maintenance		
Impact	High level impact summary and justification	Scoped in/out
Loss of access to fishing grounds due to the presence of floating platform and associated	Current distribution of existing fishing activity may be affected by the Project. Disturbance to existing fishing activity also may occur during cable installation.	Scoped in

moorings		
Displacement to other fishing grounds resulting in increased pressure on resources or conflict with other sea users	Any displacement of existing fishing activity from the area may result in increased pressure on other existing grounds; affecting those fishing locally and in other areas. This has the potential to impact existing local fishing management practices and relationships between existing sea users.	Scoped in
Obstruction of regular fishing vessel transit routes due to the presence of floating platform and associated moorings	The development may result in changes to local navigation and transit routes for fishing vessels.	Scoped in
Potential for fishing gear to become entangled with floating and subsea structures, resulting in damage to or loss of fishing gear	Potential navigational risk, will also be considered in the PHA and Navigational Risk Assessment (NRA).	Scoped in
Change in abundance or distribution of target species	The addition of new structures at the seabed may provide suitable shelter and habitat for some commercial species, increasing abundance. Disturbance to some fish species may also occur during construction and operation.	Scoped in and considered in Section 7.4: Fish and Shellfish Ecology.
Potential impacts during decommissioning		
Potential impacts arising during the decommissioning phase are expected to be similar to, but not exceeding, those arising during the construction phase. Following removal of structures opportunities for habitat recovery in the former location of foundations may arise.		As construction
Potential cumulative impacts		
There is the potential for cumulative impacts arising in association with the potential DDC and the Orkney-Caithness interconnector developments.		Scoped in

Data Gaps and Approach

8.28 The Site itself represents a small area of the ICES rectangle area (0.8%) however, in order to define the level of fishing which occurs in that particular area, consultation and further data analysis will be required. It is proposed that the baseline conditions can be further refined and potential impacts assessed by obtaining the following information:

- A vessel traffic analysis will be undertaken as part of the project Navigational Risk Assessment (NRA). Information gathered, including AIS data, will be analysed to identify fishing vessel activity in the study area (vessels greater than 15 m);

- Review of Marine Scotland VMS amalgamated data which combines VMS tracking data (vessels greater than 15 m) with landings data to provide indication of fishing intensity by species and gear type in Scottish waters;
- Any other available spatial data on inshore fishing vessels, particularly those <15 m, such as Succorfish data from The Crown Estate⁷ may capture vessels as part of the Pentland Firth and Orkney Waters (PFOW) study;
- Consultation with local fishermen and their representatives will be required to fill data gaps, increase understanding of the spatial and temporal distribution of fishing activity in the Project area and relative importance in terms of value, seasonal use, access to other grounds in context of wider PFOW and north coast; and
- Data from the benthic ecology and fish ecology chapters may provide information on any important or sensitive grounds for fisheries main target species.

Method of Assessment

- 8.29 A desk based assessment utilising available data augmented by consultation will be undertaken. Certain impacts, such as obstruction and navigational issues and changes to fish species distribution, will be assessed within different chapters and will be cross referenced to in the Commercial Fishing chapter.

Conclusions and Next Steps

- 8.30 Commercial fisheries shall be scoped in and further consultation will be required to clearly define the nature, spatial extent and temporal variability of fishing activity within the vicinity of the Project.
- 8.31 Data gathered during the preparation of the NRA will provide additional vessel transit data to inform the potential impacts of the Project on commercial fisheries within the vicinity of the Project.

8.2 Shipping and Navigation

Introduction

- 8.32 This section characterises shipping activity in the Pentland Firth by considering commercial ports, commercial shipping activity and shipping routes, fishing vessel activity, recreational vessel activity, maritime incidents, Search and Rescue (SAR) resources and other navigational features. The section goes on to describe the key sensitivities and an initial appraisal of the potential impacts arising from the Dounreay Trì Project – the ‘Project’ on shipping and navigation and presents a summary of the relevant UK guidance, methodologies and best practice which will be applied to the EIA.
- 8.33 The Site is considered to be the offshore area delineated in Figure 5-1 in blue and referred to as the ‘Site’, the export cable corridor area of search is marked in orange on the same figure and referred to as the ‘export cable corridor’.
- 8.34 Key information and data gaps associated with each receptor are identified and an outline of the approach to addressing each information/data gap is provided. Key stakeholders that

⁷ The Crown Estate and Orkney Sustainable Fisheries project with objectives to capture fishing activity of the small inshore Pentland Firth and Orkney Waters fleet in terms of vessel location and speed (a voluntary project of up to 20 vessels fitted with VMS representing the region). Anonymised data may be made available directly to Developers.

would be consulted with regards to each receptor are also listed. This section also outlines the scope of the surveys and studies that will be completed in support of the EIA process and that will be subject to consultation with relevant consultees.

Guidance and Legislation

8.35 The primary guidance documents that will be used during the assessment are as follows:

- MCA Marine Guidance Notice 371: 'Offshore Renewable Energy Installations (OREI) - Guidance on UK Navigational Practice, Safety and Emergency Response Issues' (MCA, 2008a);
- MCA Marine Guidance Notice 372: 'Offshore Renewable Energy Installations (OREIs) - Guidance to Mariners Operating in the Vicinity of UK OREIs' (MCA, 2008b);
- Guidance on the assessment of the impact of offshore wind farms: Methodology for Assessing the Marine Navigational Safety Risks of Offshore Wind Farms (DTI, 2005);
- Methodology for Assessing the Marine Navigational Safety & Emergency Response Risks of Offshore Renewable Energy Installations (OREI) (DTI, 2013);
- Health and Safety Guidelines: Offshore Wind and Marine Energy H&S Guidelines (RenewableUK, 2014);
- Health and Safety Executive Offshore Technology Report on Marine Risk Assessment (HSE 2001); and
- RP-H101- Risk Management in Marine and Subsea Operations (DNV, 2003).

Available Information

Automatic Identification System

- 8.36 Automatic Identification System (AIS) is an automatic tracking system used on ships and by vessel traffic services (VTS) for identifying and locating vessels. AIS is required to be fitted aboard all ships of 300 gross tonnage and upwards engaged on international voyages, cargo ships of 500 gross tonnage and upwards not engaged on international voyages, and passenger ships irrespective of size built on or after 1 July 2002. Phased European Union (EU) legislation⁸ means that all fishing vessels of 15 m or over having AIS installed by 2014.
- 8.37 Freely available data available from the Marine Management Organisation (MMO) of anonymised AIS tracks⁹ data derived from this to show vessel density that most vessel traffic is to the north of the Site with vessels traversing between the headlands of Cape Wrath and John O'Groats. Vessel density within the Site and associated export cable corridor is relatively low with less than one vessel per day on average for 2012 (Figure 8-4). The Scrabster to Stromness passenger ferry passes approximately 9.2 nm to the east of the Site as indicated by the high vessel density track between Scrabster and Stromness.

⁸ As from 31 May 2012: all vessels above 24 m. As from 31 May 2013: all vessels above 18 m. 31 May 2014: all vessels above 15 m.

⁹ Data from the first 7 days of each month at two monthly intervals was collected for 2012.

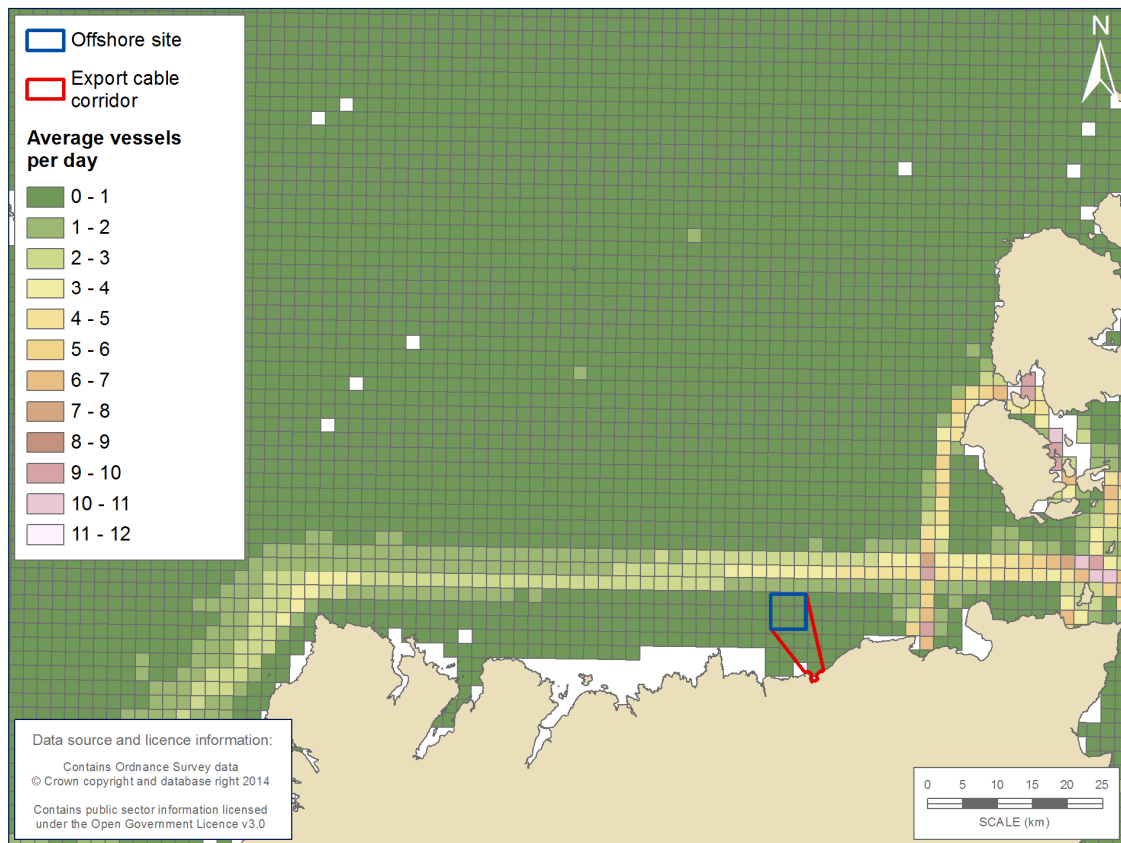


Figure 8-4 Shipping density and key navigational features around the Study Area

Vessel Monitoring System

- 8.38 The Vessel Monitoring System (VMS) is a form of satellite tracking using transmitters on board fishing vessels providing data to the fisheries authorities at regular intervals on the location, course and speed of vessels. VMS is required to be fitted to EU vessels above 15 m (and as from 1 January 2012 – vessels above 12 m). Anonymised VMS data can be requested from Marine Scotland Compliance and can give an indication of whether the area is used for fishing based on position and speed.

ScotMap

- 8.39 ScotMap is a Marine Scotland project which provides spatial information on the fishing activity of Scottish-registered commercial fishing vessels under 15 m in length (MS, 2014a). Data were collected during face-to-face interviews with individual vessel owners and operators and relates to fishing activity for the period 2007 to 2011. This dataset has its limitations. Individuals defined their fishing areas with variable levels of precision and the coverage in terms of vessels was 72% overall. On the basis of the ScotMap data the Site is within a region of fairly low fishing effort of up to 3 vessels in the offshore area and up to 4 vessels using the area within the export cable corridor. There may also be fishermen not interviewed by the ScotMap project who also use the area.

Consultation

- 8.40 The key stakeholders of relevance to shipping and navigation are:
- Marine Scotland;
 - Maritime and Coastguard Agency (MCA);

- Northern Lighthouse Board (NLB);
- Orkney Islands Council (OIC) Marine Services;
- Scrabster Harbour Trust;
- Scottish Fishermen's Federation (SFF);
- The Royal Yachting Association (RYA);
- Royal National Lifeboat Institution (RNLI); and
- Pentland Firth Yacht Club.

Study Area

- 8.41 A study area encompassing the north coast and out to approximately 12 nm has been considered in this section in order to sufficiently describe shipping that might be potentially affected by the Project.

Surveys and Studies Carried Out to Date

- 8.42 None undertaken for the purpose of the Scoping Report.

Description of Current Environment

- 8.43 Tides in the area are of semi-diurnal tidal pattern with a mean spring tidal range of 3 - 4 m and 1 - 2 m during neap tides) (ABPMer, 2008).
- 8.44 Tidal currents in the Site are generated by water moving between the North Atlantic and the North Sea through the Pentland Firth. Although tidal currents within the Pentland Firth itself are very strong the Project Site lies to the west and peak tidal current flow during mean spring tides is relatively low at 0.5 - 0.6 m/s (0.2 - 0.3 m/s for neap tides) for the Site and 0.5 m/s or less (0.3 m/s or less for neap tides) within the export cable corridor (ABPMer, 2013).
- 8.45 Annual mean wind speeds for the Site are estimated to exceed 9.5 m/s (at 100 m) (RES, 2015). The strength of wind and the frequency of wind directions vary considerably over time, but, in general, winds in the north of Scotland are predominantly from the south and west. The highest mean wind speeds and gusts are typically recorded during the winter months (December to February).
- 8.46 The average significant wave height expected in the Site range from 1.5 m close to the shore to 1.9 m further offshore (ABPMer, 2008).
- 8.47 The Pentland Firth itself is subject to a voluntary ship reporting system whereby vessels are advised to contact the Aberdeen Coastguard one hour before entering the Firth and again on leaving. There are Admiralty Chart warnings about the very strong tidal streams within Pentland Firth. These warnings also specify an Area to be Avoided (ATBA), advising laden tankers not entering Scapa Flow to avoid the Pentland Firth in adverse weather or restricted visibility.
- 8.48 No navigational channels are marked on Admiralty charts for the area surrounding the Site.
- 8.49 Seven lighthouses are present along the north coast of the Scottish mainland and Pentland Firth and Orkney Waters (PFOW), namely Cape Wrath, Loch Eriboll, Strathy Point, Holburn Head, Dunnet Head, Stroma and Duncansby Head.
- 8.50 The nearest industrial/fishing ports are Scrabster, Stromness and Lyness. There are also small harbour facilities along the North coast comprising small jetties, semi natural harbours, harbour walls and slipways.

Identification of Potential Impacts

- 8.51 The potential impacts are likely to be associated with potential displacement and safety impacts on marine traffic.

Cumulative Impacts

- 8.52 Cumulative impacts may arise with vessel traffic displaced or redirected due to construction on the nearby Dounreay Demonstration Centre (DDC) and Orkney-Caithness Interconnector.
- 8.53 Table 8-3 summarises the potential impacts.

Table 8-3 Potential impacts on shipping and navigation during construction, operations and maintenance and decommissioning of the Project

Potential impacts during construction		
Impact	High level impact summary and justification	Scoped in/out
Potential for vessel-to-structure collision risk	During construction a temporary increase in vessel movements in the Site and along the export cable corridor will occur.	Scoped in
Potential for vessel-to-vessel collision risk	Increased vessel-to-vessel collision risk may occur due to the presence of construction vessels, either at the Site on route to the Site. Towing the structure to Site also poses a risk if the tow is lost between the structure and the towing vessel. If the mooring are going to be installed prior to the support structure being installed then there may be a period of time where the mooring are left unattended and may pose a risk.	Scoped in
Potential impacts during operations and maintenance		
Impact	High level impact summary and justification	Scoped in/out
Project vessel in difficulties whilst at sea	Risk of grounding or foundering.	Scoped in
Vessel instability during heavy lifting operations	If the turbines are installed on the platform on Site then heavy lifting operations would be required.	Scoped in
Displacement of vessels from main routes	The physical presence of construction vessels may displace vessels from current routes and affect existing transits to ports.	Scoped in
Impacts on established shipping routes and additional steaming times	The physical presence of structure may displace vessels from current routes and affect existing transits to ports.	Scoped in
Changes to availability of	The physical presence of structures within current open sea areas could affect the availability of adverse weather	Scoped

adverse weather routes	routes.	in
Displacement of vessels from main routes	The physical presence of structures and their associated operational safety zones (if applied for and granted) may displace vessels from current routes and affect existing transits to ports.	Scoped in
Potential for vessel-to-installation collision risk	Additionally the presence of structures may increase risks of vessel to structure collisions, including the risk of collision of vessels not under command (NUC), for example vessels drifting because of machinery related problems.	Scoped in
Potential for vessel-to-vessel collision risk	The increase in traffic volume resultant from the wind farm maintenance vessels may also lead to an increase in encounters and therefore increased risk of vessel-to-vessel collisions.	Scoped in
Potential impacts from subsea cables on ship, anchoring or fishing activity	The presence of export cables could increase the risk of anchor snagging for vessel anchors or fishing gear.	Scoped in
Potential impacts on marine radar communications and positioning systems	VHF radio, telecommunications equipment, radar and navigational equipment such as compasses may be affected when in close proximity to the Site because of physical presence of structures and cables. Implementing standard safety measures is expected to address a number of these issues. Specific issues raised through consultation, such as some potential radar impacts, will be considered further.	Scoped in
Potential impacts on SAR	The ES will consider the effect of the Project on maritime emergency response activities. The project may give rise to an increased demand for emergency response facilities (including Search and Rescue and pollution control) because of the presence of operation and maintenance activities over the lifetime of the Project. MGN 371 requires an Emergency Response and Cooperation Plan (ERCoP) to be developed for each wind farm project to identify how emergencies will be dealt with. Following the introduction of this plan and further analysis, the potential impacts on emergency services are not expected to be significant.	Scoped in
Impacts on existing or proposed Aids to Navigation (AtoNs) and VTS or vessel TSS	The Project may result in a change in existing navigation markings and the presence of structures which will require appropriate marking and lighting.	Scoped in
Impacts on other marine users	There is the potential for impacts on activities at other marine operations and sites, such as, spoil disposal sites and operations, marine archaeology and wrecks,	Scoped in

	commercial fisheries. This is considered further in Section 8.1 Commercial Fisheries, Section 8.5 Archaeology and Cultural Heritage and Section 8.6: Other Users of the Marine Environment.	
Potential impacts on recreational craft and commercial fishing activity	The navigation or safety of recreational vessel and fishing has the potential to be affected by the issues discussed above and will be assessed as part of the shipping and navigation EIA process. The implications of the Project on VHF and radar capability may be more significant for smaller vessels with a lower capability of equipment than the large commercial vessels considered above.	Scoped in
Potential impacts during decommissioning		
Potential impacts arising during the decommissioning phase are expected to be similar to, but not exceeding, those arising during the construction phase, and would be temporary and of short duration.		As construction
Potential cumulative impacts		
The potential for cumulative impacts will be assessed during the EIA process. The EIA will consider the impacts of the construction, operation and decommissioning of the Project cumulatively with other relevant projects and activities.		Scoped in

Data Gaps

- 8.54 AIS data are available for the area and will be used for the assessment. VMS data between 2011 - 2013 are also available but additional data will be requested from Marine Scotland Compliance to cover the period between 2013 -present. There is the potential that vessels not fitted with AIS or VMS may not be recorded on available data, this will be discussed and identified through consultation with the key stakeholders.

Project Level Surveys and Studies

- 8.55 The scope of surveys and studies related to shipping and navigational safety will be finalised in consultation with statutory advisors such as the MCA and the Northern Lighthouse Board (NLB), and will be based on site-specific sensitivities. A site-specific radar survey to determine the use of the site by smaller vessels (less than 15 m length) not fitted with AIS or VMS may be required. Consultation with Marine Scotland, MCA and NLB will determine the need for such a survey.

Method of Assessment

- 8.56 Navigational safety is one of the key issues to be considered when developing an offshore wind farm and as such careful planning is required in consultation with the relevant statutory advisors.
- 8.57 A Preliminary Hazard Assessment (PHA) has been created. Consultation upon the PHA will take place with NLB and the MCA. The PHA includes the following information for discussion with the relevant advisors:
- Proposed approach to the full NRA;

- Detail the Hazard Identification and Risk Assessment process and tools (such as Hazard and Risk Control Logs);
 - Identification and review of data available including uncertainties in the data;
 - Provide a gap analysis highlighting surveys and studies required for NRA; and
 - Identify the key marine navigation and safety issues in advance of the full risk assessment.
- 8.58 As part of the EIA process data from the Marine Accident Investigation Branch (MAIB) and the RNLI will be analysed in order to review the maritime incidents that have occurred in the vicinity of the Project, the results of which will inform the EIA.
- 8.59 During the EIA phase impacts on port radar and port vessel management with respect to the ports in the vicinity of the Site will need to be considered. This will include reviewing relevant data as well as consultation with port operators and statutory authorities to identify potential receptors and concerns.
- 8.60 Central to the assessment of potential impacts upon shipping and navigation will be a Marine Navigational Safety Risk Assessment (NRA). The NRA will be undertaken in accordance the relevant DTI/MCA methodologies for assessment of wind farms and will consider the guidance set out in MGN 371 (and 372).
- 8.61 A key component of this will be consultation with relevant stakeholder organisations and other sea users.

Conclusions and Next Steps

- 8.62 In conclusion all the potential impacts identified in this section have been scoped in.

8.3 Aviation

Introduction

- 8.63 This section characterises civil and military aviation with respect to the offshore aspects of Dounreay Tri Project – the ‘Project’ by considering the proximity to and operations of civil airports, the types of radar operating around the north Scottish coast, helicopter operations and MoD operations. The potential impacts arising from the Project on these activities are considered with a summary presented of the relevant UK guidance, methodologies and best practice that will be applied in undertaking the EIA.
- 8.64 The Site is considered to be the offshore area delineated in Figure 5-1 in blue and referred to as the ‘Site’, the export cable corridor area of search is marked in orange on the same figure and referred to as the ‘export cable corridor’.

Guidance and Legislation

- 8.65 The Aviation Industry and the provision of Air Navigation Services (including radar services) are regulated through extensive legislation; however, the main mechanism for regulating the relationship between aviation and onshore wind is through the consenting system and the guidance outlined below. The following documents as a minimum will be considered during the EIA process:
- CAA. CAP 670 Air Traffic Services Safety Requirements, Third Issue, Amendment 1/2014, 2014 (CAA, 2014a);

- CAA. CAP 393 Air Navigation - The Order and the Regulations, Fourth Edition, 2015 (CAA, 2015);
- MoD Obstruction Lighting Guidance (MoD, 2014); and
- The Wind Energy, Defence and Civil Aviation Interests Working Group's 2002 Report on 'Wind Energy and Aviation Interests: Interim Guidelines' (WED&CAIWG, 2002). This report details both military and independent airport operator issues and consultation procedures.

Available Information

8.66 Other data sources and guidance considered as part of the desktop review of the baseline situation include the following:

- CAA, Visual Flight Rules Chart 2015;
- CAA, CAP 032, UK Integrated Aeronautical Information Package (UKIAIP). The UKIAIP is the main resource for information and flight procedures at all licensed UK airports as well as airspace, en-route procedures, charts and other air navigation information 2015;
- CAA, CAP 168, Licensing of Aerodromes 2014 (CAA, 2014b);
- Military Aeronautical Information Publication (Mil AIP) 2015; and
- MoD UK Low-Flying System (UKLFS) Priority Area Map 2011.

Consultation

8.67 No consultation has been undertaken in the Scoping phase. To inform the EIA process, consultation may be required with the following agencies:

- Civil Aviation Authority (CAA);
- Highlands and Islands Airports Limited (HIAL);
- Maritime Coastguard Agency (MCA) (Search and Rescue (SAR) and Lighting requirements);
- Ministry of Defence (MoD);
- National Air Traffic Services (NATS); and
- Oil and Gas Industry (Helicopter operators).

Study Area

8.68 A study area encompassing the Site and associated export cable and the wider Pentland Firth has been considered in the section in order to sufficiently describe the existing civil and military aviation receptors (both onshore and offshore) that might be potentially affected by the offshore elements of the Project. For the purposes of this section, the zones are defined as:

- Local – specifically within the Site;
- Regional – that is the wider Pentland Firth area; or
- International – the airspace within 250 km of the Site boundary.

Surveys and Studies Carried Out to Date

8.69 No site-specific surveys or studies with regards to other users in the marine environment have been carried out to date.

Description of the Current Environment

8.70 The airspace above the Site is used by civil and military aircraft, which can be tracked by radar systems operated by NATS and the MoD. Airspace and air traffic surveillance and management infrastructure is comprised of the following systems, which may be affected by wind turbines:

- Primary Surveillance Radar (PSR);
- Secondary Surveillance Radar (SSR);
- Precision Approach Radar (PAR);
- Air Defence Radar (ADR);
- Meteorological Radar; and
- Other aeronautical communication and navigation systems.

8.71 The presence of wind turbines has the potential to interfere with these radar systems by way of causing interference, blocking signals or causing false positive 'hits'. There are the following radar systems within operational range of the Project:

Primary Surveillance Radar Systems

- PSR systems at Allanshill approximately 151 km south-east of the Site and at Perwinnes approximately 191 km south-east of the Site. The Site is within the operational ranges of the two radar systems. Preliminary analysis indicates that the wind turbines within the Site are unlikely to be detectable by these systems.
- Inverness Airport PSR at approximately 125 km and Aberdeen Airport at approximately 185 km which utilises the Allanshill and Perwinnes PSR systems. Preliminary analysis indicates that the wind turbines within the Site are unlikely to be detectable by Inverness or Aberdeen PSR system.
- Wick Airport is located at a distance of 47 km from the Site and Kirkwall Airport is located 63 km from the Site. The Dounreay Airstrip is disused and will therefore not taken forward for further assessment.
- RAF Lossiemouth PSR, located 110 km to the south-east. Initial analysis indicates that the wind turbines within the Site are unlikely to be detectable by Lossiemouth PSR system.

Precision Approach Radar Systems

- RAF Lossiemouth Precision Approach Radar (PAR) system. The system is utilised to provide precision guidance to aircraft on approach to a runway and is safeguarded to a range of 20 nm from the end of operational runways and therefore will not be affected, as such will not be considered further in completing the EIA.

MoD Air Defence Operations

- The MoD has AD radar stations in operation at Benbecula on the Isle of North Uist at a distance of 247 km from the Site and at Buchan in Aberdeenshire at a distance of 180 km. The Site is within the operational ranges of the two radar systems. Preliminary analysis indicates that the wind turbines within the Site are unlikely to be detectable by these systems.

Secondary Surveillance Radar Operations

- There are no SSR installations within 10 km of the Site boundary; consequently, SSR will not be affected and not considered further in completing the EIA.

Other Aviation Communication and Navigation Systems

- There are no Communication and Navigation System (CNS) installations within 34 km of the Site boundary; consequently, other CNS systems will not be affected and therefore will not be considered further in completing the EIA.

Other MoD Aviation Activities

- The Site is located in Low Flying Area (LFA) 14, which covers Scotland to the north of the Scottish central belt. Specifically however, the Site is not considered to be in an area of particular low-flying sensitivity for the MoD with regard to the development of wind energy; the MoD is not expected to raise concerns.
- Temporary Reserved Area (TRA) 008B above the Site is active from Flight Level (FL) 195 up to FL245 (approximately 19,500ft up to 24,500ft). In addition, the Northern Managed Danger Area (MDA) complex (D712 Areas A-D) is located above the Site and when active, operate from FL245 up to FL660.
- The Cape Wrath and Garvie Island complex (D801/2/3) are located approximately 35 km to the west of the Site and are active from the surface up to 55,000ft. Live firing, bombing and Unmanned Aerial Vehicle activities take place within these areas.

Meteorological Office Radar

- The closest Met Office radar systems are Druim a'Starraig located near Stornoway, Isle of Lewis and Hill of Dudwick near Ellon, Aberdeenshire and are both located a significant distance away from the Site (146 km and 174 km respectively) and are highly unlikely to be affected and as such these will not be considered further in completing the EIA.

Helicopter Support to Offshore Oil and Gas Industry Operations

- Helicopters operating between Aberdeen and the Atlantic Rim oil platforms west of the Shetland Islands use a network of Main Helicopter Routes (MHR) established to transport personnel and logistics to offshore oil and gas industry installations. The routes of MHRs X-Ray and Yankee are located approximately 10 nm and 4 nm to the north-east of the Site boundary.
- HMRs have no defined lateral dimensions, although 2 nm either side of the route centreline should ideally be kept obstacle free. However, it is not mandatory for helicopters to use established HMRs. When operating in good weather conditions, helicopters may route direct to their destination point. The offshore helicopter operators are not expected to raise concerns.

Search and Rescue Operations

- When on an operational mission, Search and Rescue (SAR) aircraft are not constrained by the normal rules of the air, and operate in accordance with their Aircraft Operator Certificate (AOC), which allows them total flexibility to manoeuvre using pilot's best judgement.
- An Emergency Response Co-operation Plan (ERCoP) will be compiled in conjunction with the MCA and would be in place for the construction, operation and decommissioning phases of the Project. The ERCoP will detail specific marking and lighting of the wind

turbine generators. The SAR helicopter bases will be supplied with an accurate Project GPS position. The MCA will also receive the hydrographic office information for the Project.

Minimum Sector Altitude

- The Minimum Sector Altitude (MSA) is the lowest altitude which may be used which will provide a minimum clearance of 1,000 ft above all objects located in the area contained within a sector of a circle of 46 km (25 nm) radius centred on a radio aid to navigation. Wick Airport has a number of Instrument Flight Procedures (IFP) established which allow aircraft operating to use the airport in poor weather conditions without the provision of support from radar.

Aviation Lighting and Marking Requirements

- There is expected to be a requirement for Aviation Obstruction Lighting on all or individual wind turbines within Zone, this will be determined via consultation.
- There is a CAA requirement in the UK for all structures over 300 ft high to be charted on civil aviation maps and documentation (the MoD uses a lower threshold height). Consequently, the developer will be required to provide details of the development to the Defence Geographic Centre (DGC).

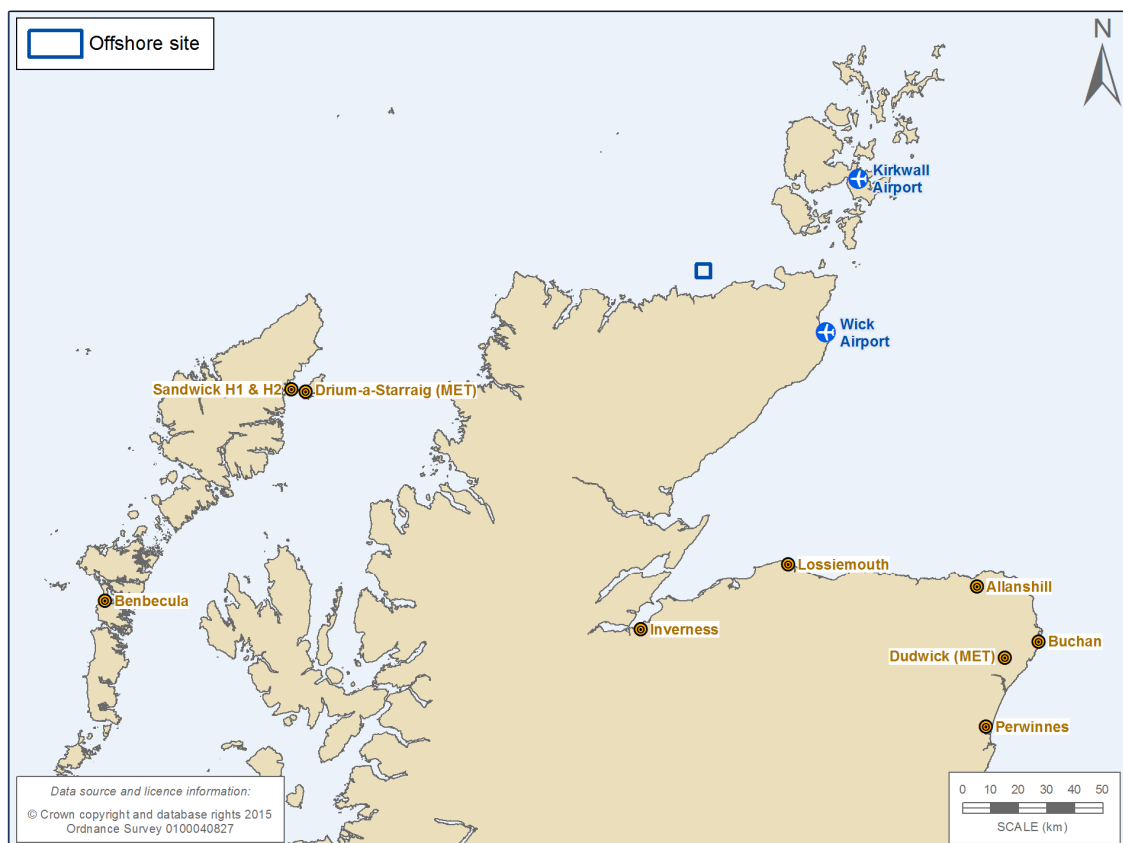


Figure 8-5 Key airports and radar installations

Table 8-4 Aviation and Radar interests of relevance to the Project including local ATC radars within 100 km of any turbine and En-route radars within 250 km of the edge of the Site.

Aviation stakeholder	Type	Approximate distance to the wind farm	Approximate bearing to the wind farm
Aberdeen Airport	Civil airport (utilising the Allanshill and Perwinnes radar systems)	185 km	148°
Allanshill (also utilised by Aberdeen airport)	En-route PSR/SSR	151 km	138°
Benbecula	ADR/SSR	247 km	239°
Buchan	ADR/SSR	180 km	137°
Druim a'Starraig	Met Office Radar	146 km	251°
Hill of Dudwick	Met Office Radar	174 km	141°
Inverness Airport	Civil Airport with PSR/SSR	125 km	186°
Kirkwall Airport	Civil Airport without Radar	63 km	058°
RAF Lossiemouth	Aerodrome with PSR/SSR/PAR	110 km	164°
MoD	UK Low Flying System – LFA 14	N/A	N/A
Oil and Gas Industry	Helicopter Support Operations	N/A	N/A
Perwinnes (also utilised by Aberdeen Airport)	En-route PSR/SSR	191 km	147°
Sandwick 1 and 2	SSR	156 km	252°
Search and Rescue Operations		N/A	N/A
Wick Airport	Civil Airport without Radar	49 km	118°

Identification of Potential Impacts

- 8.72 The key sensitivities for civil and military aviation within the study area are considered to be operational impacts on Civil Airports, En-route radar systems and on MoD radar systems and flying operations. The potential impacts on these systems will be fully considered in the EIA process.

- 8.73 The relative distances to operational aerodromes are, on preliminary analysis considered to be sufficient for the wind farm to avoid direct impacts upon airport operations in terms of Obstacle Limitation Surface infringements¹⁰. In addition, wind farm physical obstruction impacts on regional aviation operations will be considered as part of the EIA process.
- 8.74 A range of potential impacts on civil and military aviation related activities within the Project area may occur during each phase (construction, operation and decommissioning) of the development and will therefore need to be considered as part of the EIA process, as detailed in Table 8-5.

Cumulative Impacts

- 8.75 There is the potential for cumulative impacts on radar operations and this will be taken forward to the assessment phase.
- 8.76 Table 8-5 summarises the potential impacts.

Table 8-5 Potential impacts associated with aviation during construction, operations and maintenance and decommissioning of the Project based on preliminary analysis

Potential impacts during construction		
Impacts	High level impact summary and justification	Scoped in/out
Interference with civil, military and meteorological radar systems	No significant infrastructure is necessary during the construction phase e.g. high cranes. No overlap with radar systems.	Scoped out
Interference with MoD Air Defense Operations	Preliminary analysis indicates that the wind turbines within the Site are unlikely to be detectable by these systems.	Scoped out
Interference with helicopter support to oil and gas operations	No significant infrastructure is necessary during the construction phase e.g. high cranes. No overlap with radar systems.	Scoped out
Interference with SAR operations	No significant infrastructure is necessary during the construction phase e.g. high cranes. No overlap with radar systems.	Scoped out
Potential impacts during operations and maintenance		
Impacts	High level impact summary and justification	Scoped in/out
Interference with civil en-route operations	Analysis indicates no LOS to Civil En-route PSR systems; therefore no effect on operations anticipated.	Scoped out
Interference with civil airport operations	Analysis indicates no LOS to Inverness Airport PSR system. The wind farm may present a physical obstruction and effect regional airport operations.	Scoped in

¹⁰ The rules governing obstacles near aerodromes are outlined in the CAA document CAP 168 and MAA Regulatory Article 3016.

Interference with MoD aerodrome operations	Analysis indicates no LOS to MoD Aerodrome PSR systems; therefore, no effect on operations anticipated.	Scoped out
Interference with MoD air defence operations	Analysis indicates no LOS to MoD ADR systems; therefore, no effect on operations anticipated.	Scoped out
Interference with civil/military SSR	There are no SSR installations within 10 km of the Site boundary; consequently, SSR systems will not be affected.	Scoped out
Interference with low flying operations	The Project may present a physical obstruction and effect operations of Military Low Flying aircraft.	Scoped in
Interference with Met Office radar	The Site is not within the consultation zone whereby impacts to Met Office radar may be encountered; therefore, Met Office radar systems are highly unlikely to be affected.	Scoped out
Interference with helicopter support to oil and gas operations	The wind farm may present a physical obstruction and affect operations of Low Flying aircraft supporting the Offshore O&G industry.	Scoped in
Interference with SAR operations	The wind farm may present a physical obstruction and affect SAR operations.	Scoped in
Potential impacts during decommissioning		
Impacts are considered to be the same as those arising in the construction phase.		Scoped out
Potential cumulative impacts		
The potential for cumulative impacts will be assessed during the EIA process. Other projects in the area that are likely to cumulatively impact upon civilian and/or military aviation will be identified during the EIA process.		Scoped in

Project Level Surveys and Studies

- 8.77 Ongoing consultation as detailed above will continue to inform the EIA process. The EIA will build on the data collected as part of the scoping process, updated as necessary. No surveys are considered necessary.

Assessment Methodology

- 8.78 A desk based study will be undertaken in the assessment phase to identify the potential impacts on those receptor groups scoped in. The study will incorporate a review and summary of the aviation consultation including an overview of the key concerns gathered from the industry regarding the potential development of the Site and present proposals for mitigation measures where likely significant impacts have been identified.

Conclusions and Next Steps

- 8.79 In conclusion, interference with civil airport operations, low flying operations, helicopter support to oil and gas operations and SAR operations are considered to be potential impacts

arising from the operational phase of the project. And will be taken forward to the assessment phase. There is not considered to be any potential impact during the construction phase due to the lack of tall structures or construction equipment necessary to install the Project infrastructure and impacts during this phase are scoped out.

8.4 Seascape, Landscape and Visual Amenity

Introduction

- 8.80 This section of the Offshore Scoping Report considers the offshore aspects of the Dounreay Tri Project – the ‘Project’ by characterising the seascape, landscape and visual environment in and around the Site and describing the key sensitivities and potential visual impacts arising from the Project. This section also presents a summary of the relevant UK guidance, methodologies and best practice that will be applied in completing the EIA. The section outlines the proposed scope of surveys and studies that will be completed and that will be subject to consultation with relevant consultees.
- 8.81 The Site is considered to be the offshore area delineated in Figure 5-1 in blue and referred to as the ‘Site’, the export cable corridor area of search is marked in orange on the same figure and referred to as the ‘export cable corridor’.

Guidance and Legislation

- 8.82 As a matter of best practice, the Seascape, Landscape and Visual Impact Assessment (SLVIA) will be undertaken with regard to the following published guidance (this is not a comprehensive list and the EIA will take note of all relevant guidance):
- Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3) (LI and IEMA, 2013);
 - Guidelines for Landscape Character Assessment (Countryside Agency and Scottish Natural Heritage, 2002);
 - Offshore Renewables – guidance on assessing the impact on coastal landscape and seascape (SNH, 2012b); and
 - Assessing the Cumulative Impact of Onshore Wind Energy Developments (March 2012) (SNH, 2012a).
- 8.83 It should be noted that revisions to several of the best practice guidance documents outlined above may be published during the preparation of the EIA and if the revised documents overlap with the production of the SLVIA, then the revised version will be used in place of the current version.
- 8.84 In addition, the relevant planning policy will be considered and followed where necessary, including Scottish Planning Policy, 2014.
- 8.85 The term SLVIA is commonly used to refer to seascape, landscape and visual impact assessment, however the process of landscape and visual impact assessment remains the accepted methodology underpinning the assessment and thus this approach will be followed in the EIA.

Available Information

- 8.86 This section has been primarily informed by detail presented in the following information sources:

- Commissioned Report No. 103: An assessment of the sensitivity and capacity of the Scottish seascape in relation to wind farms (SNH, 2005);
- Caithness and Sutherland Landscape Character Assessment (SNH, 1998);
- Orkney Landscape Character Assessment (SNH, 1998);
- Assessment of Highland Special Landscape Areas (THC and SNH, 2014); and
- The special qualities of the National Scenic Areas (SNH, 2010).

Consultation

- 8.87 Consultation has been undertaken with Scottish Natural Heritage (SNH) and The Highland Council (THC) in the Scoping phase to inform the assessment methodology. Consultation with stakeholders is an important part of the EIA process and as such consultation with the as named stakeholders will continue throughout the EIA process with meetings scheduled as necessary. Discussions have included consideration of the scope of the surveys and studies used to inform the EIA as well as issue resolution.

Study Area

- 8.88 A core study area defined by a 45 km radius from the outer edge of the Site is proposed for the SLVIA (see Figure 8-6). This will provide the focus for the assessment of potential seascape, landscape and visual impacts and is in line with current EIA best practice including the guidance set out in the recently published Landscape and Visual Impact Assessment Third Edition (GLVIA3) (Land Institute (LI) and Institute of Environmental Management and Assessment (IEMA), (LI and IEMA, 2013).
- 8.89 The proposed study area is not intended to identify the outer limit of visibility of the wind turbines but to focus attention on where 'likely significant impacts' are liable to occur.
- 8.90 An Extended Study Area of 60 km radius from the outer edge of the Site will also be adopted to consider the potential for visual impacts from particularly sensitive landscape areas, such as nationally designated National Scenic Areas (NSAs), Special Landscape Areas (SLAs), Wild Land Areas (WLAs) (illustrated in Figure 8-6 and Figure 8-7).
- 8.91 As with the Core Study Area, the final Extended Study Area for the offshore array will reduce in size compared to the worst-case scenario set out in Figure 8-6. As the extent of the offshore array reduces from the notional full extent of the Site, the area covered by the 60 km radius from the array will proportionally decrease.

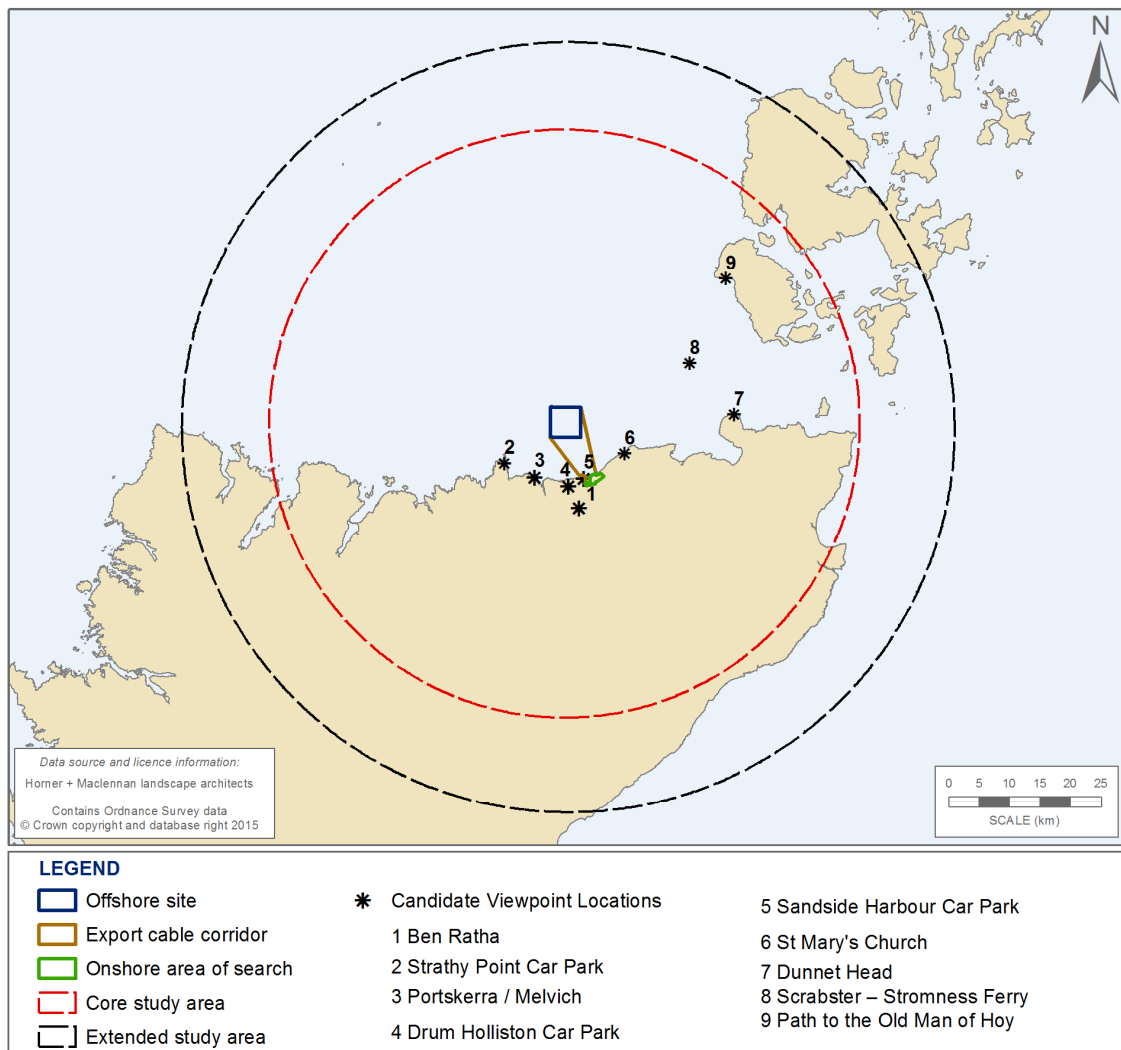


Figure 8-6 SLVIA proposed core and extended study area and candidate viewpoint locations

Surveys and Studies Carried Out to Date

8.92 To date no site-specific characterisation surveys relevant to SLVIA have been undertaken for the Project. However, a number of studies are proposed. In addition, a document detailing the proposed methodology for the offshore SLVIA (henceforth referred to as SLVIA Proposed Methodology Report) has been developed and circulated for consultation with SNH and The Highland Council. The methodology sets out the proposed approach to the preparation of the SLVIA for the Project. The SLVIA Proposed Methodology Report is appended in Appendix B.

Description of the Current Environment

8.93 Caithness and Sutherland and the Orkney Islands have a great variety of valued and sensitive scenic countryside including National Scenic Areas, Special Landscape Areas, Wild Land Areas, and Gardens and Designed Landscapes (G&DLs) (Historic Scotland Inventory of Gardens and Designed Landscapes) (Figure 8-7).

8.94 The following National Scenic Areas lie within the wider 60 km study area:

- Hoy and West Mainland;
- Kyle of Tongue; and

- North-west Sutherland.

8.95 There are nine Special Landscape Areas within 60 km of the Project:

- | | |
|---|--|
| • Oldshoremore, Cape Wrath and Durness (1); | • The Flow Country and Berriedale Coast (6); |
| • Eriboll East and Whiten Head (2); | • Ben Griam and Loch nan Clar (7); |
| • Farr Bay, Strathy and Portskerra (3); | • Ben Klibreck and Loch Choire (8); and |
| • Dunnet Head (4); | • Loch Fleet, Loch Brora and Glen Loth (9). |
| • Duncansby Head (5); | |

8.96 The following Wild Land Areas lie within the wider 60 km study area:

- | | |
|--------------------------------------|------------------------------|
| • Ben Klibreck - Armine Forest (35); | • East Halladale Flows (39); |
| • Causeymire - Knockfin Flows (36); | • Cape Wrath (40); and |
| • Foinaven - Ben Hee (37); | • Hoy (41). |
| • Ben Hope - Ben Loyal (38); | |

8.97 The following Gardens and Designed Landscapes are located within the wider 60 km the study area:

- Dunbeath Castle;
- Kildonan Lodge;
- Langwell Lodge;
- Melsetter House, Hoy;
- Skaill House;
- Tongue House; and
- Castle of Mey (Barrogill Castle).

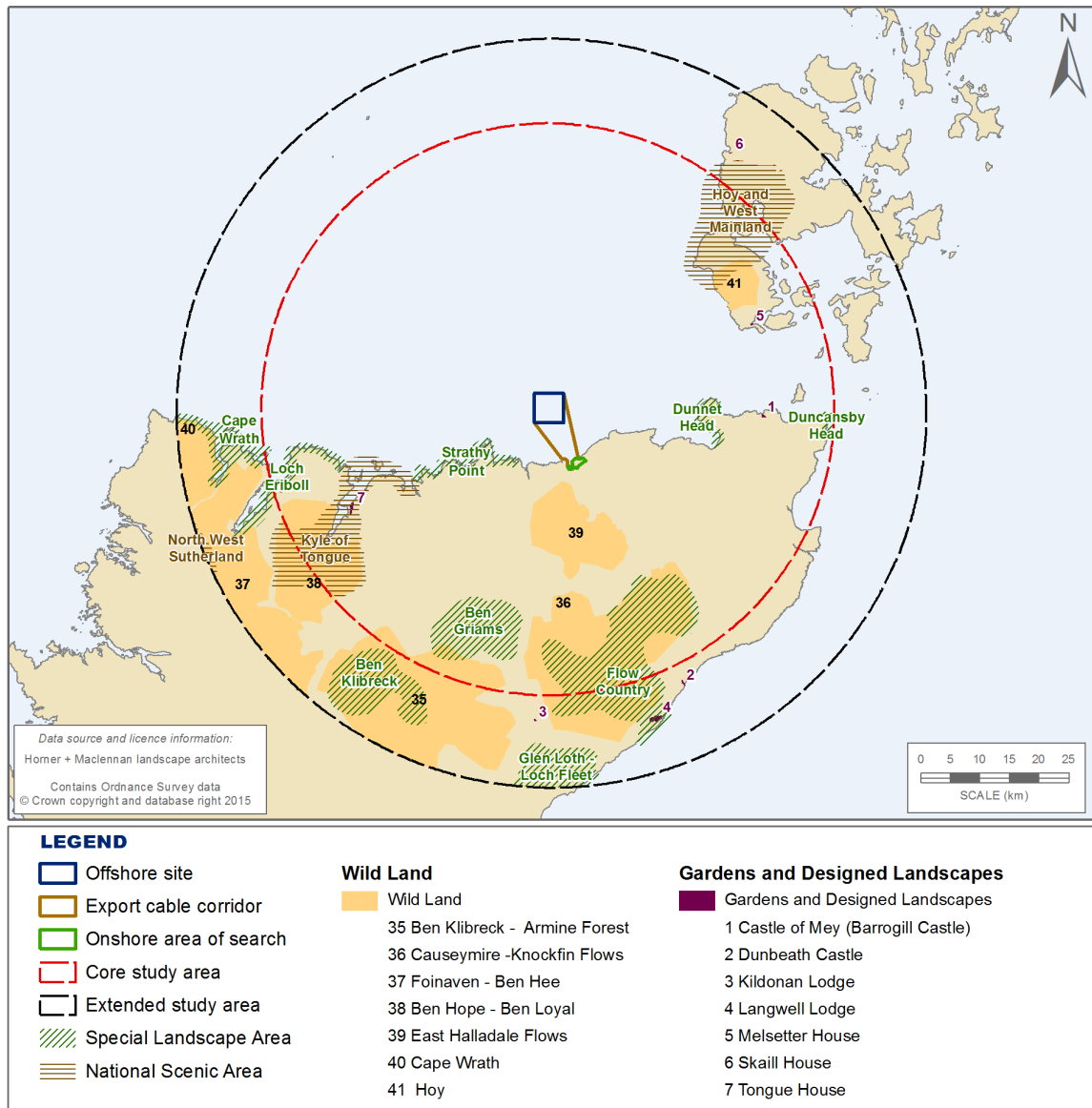


Figure 8-7 SLVIA proposed core study area, extended study area and landscape designation

- 8.98 The seascape and landscape character along the stretch of coast adjacent to the Site comprises long sandy beaches backed by dunes and low lying pastures, remote high cliffs and headlands, rocky coastlines with open sea views and kyles and sea lochs with a hinterland of pasture, flat peatland and the dramatic peaks in north-west Sutherland.
- 8.99 Views offshore vary from intimate and closed from within the small sheltered bays, to open and expansive with very long open views out to sea.
- 8.100 In order to characterise the baseline environment with respect to seascape, landscape and visual receptors it is necessary to identify relevant visual receptors, landscape character areas and seascape character types.
- 8.101 For the purposes of clarity, landscape is defined as, 'An area perceived by people, the character of which is the result of the action and interaction of natural and/or human factors' (LI and IEMA, 2013).

8.102 Seascape is defined as, 'Landscapes with views of the coast or seas and adjacent marine environments with cultural, historical and archaeological links with each other.' (LI and IEMA, 2013).

8.103 Visual amenity is defined as, 'The overall pleasantness of the views people enjoy of their surroundings, which provides an attractive visual setting or backdrop for the enjoyment of activities of the people living, working, recreating, visiting or travelling through an area.' (LI and IEMA, 2013).

8.104 Landscape Character Areas (LCAs) (SNH, 1998a) with coastal components located inshore of the Site include the following:

- Coastal Shelf;
- Harbour;
- High Cliffs and Sheltered Bays;
- Long Beaches, Dunes and Links;
- Mixed Agriculture and Settlement;
- Moorland Slopes and Hills;
- Open Intensive Farmland; and
- Sweeping Moorland.

8.105 The main seascape character types and associated protected/designated landscapes inshore of the Site are listed in Table 8-6.

Table 8-6 Seascape Character Types inshore of the Project (SNH, 2005)

Location	Description	Associated designated landscapes
Remote High Cliffs Whiten Head –to Tongue Bay Caol Raineach to Sandside Head North and West Hoy West Orkney Mainland Dunnet Head St John's Point Duncansby Head	High cliffs, often over 200 m tall, with occasional small sandy or stony bays at their base, contained by rocky headlands. Stacks, caves and collapsed cliffs are often features of this coastline. There is a strong contrast of line and form arising between the sheer verticality of cliffs and wide horizontal expanse of the sea. This type usually has a high moorland, or occasionally, mountainous, hinterland where semi-natural heathland is the dominant landcover. Settlement is generally absent although occasional small villages can be found tucked in bays and inlets or extensive crofting on tops within Highland areas. Lighthouses can be prominent features on headlands. This type has a remote, wild character due to the absence of roads and settlement. Where roads exist they are aligned parallel to the coast, for example, the North Sutherland coast. Access and views to the coast from the hinterland are restricted due to the cliffs. Wide elevated views are directed along the coast and out to open sea,	Hoy and West Mainland NSA Eriboll East and Whiten Head SLA Farr Bay, Strathy Point and Portskerra SLA Dunnet Head SLA Duncansby Head SLA

Location	Description	Associated designated landscapes
	although views of other islands are possible from parts of Orkney. Views of rigs or boats can be a focus within the maritime component of this type. The Northern quality of light often gives intense clarity in views.	
Rocky Coastline/Open Sea Views Sandside bay to Dunnet Bay Dunnet Head to St John's Point St John's point to Duncansby Head Duncansby Head to Sinclair's Bay	<p>Long straight stretches of coastline with cliffs rising to some 30 metres height and often with a raised beach edge. There are few significant headlands although geological differences create variety with softer sandstone forming an indented coast with bays and inlets, arches and caves; harder volcanic rocks producing a more resistant coastline of promontories, low cliffs and rocky shoreline. Notable blow holes occur on the north-east coast. Productive arable farming occurs up to the cliff edge and tree cover is minimal.</p> <p>Compact fishing villages are found located at the base of cliffs in small bays while castles and cliff top forts occur on dramatic headland locations and are highlighted against the simple sea backdrop. These settlements and built features appear to be spaced at even intervals and thus provide a visual rhythm of foci along the coast. Views over the North Sea are generally wide and open, although parts of the Caithness coast have views to Hoy across the Pentland Firth. Shipping is a common feature seen out to sea. Some isolated industry occurs along this coast.</p>	Hoy NSA Castle of Mey Garden and Designed Landscape
Mainland Deposition Coasts/Open views Dunnet Bay Sinclair's Bay	<p>Low sections of coast comprising long, sweeping curved sandy beaches, often backed by dunes and forming a soft linear edge to the sea. This type tends to have a simple horizontal visual composition of sky, sea and land. Grassland and gorse occurs behind dunes and this is backed in turn by flat, mixed or arable farmland. Golf courses occur within this type and settlements are located within farmland.</p> <p>Views are long and expansive along beaches and uninterrupted, although low level, views occur over the North Sea. Ships are commonly seen at sea.</p>	
Kyles and Sea Lochs Loch Eriboll Kyle of Tongue	This type occurs on the deeply indented coastline of North Sutherland, forming a transition between the open sea and the glens and straths which extend from an interior landscape of large scale mountains and moorland. The sea lochs tend to form a narrow inlet of water, strongly enclosed by steep high hills. Kyles tend to be broader, surrounded by a low and	Kyle of Tongue NSA Eriboll East and Whiten Head SLA Tongue House

Location	Description	Associated designated landscapes
	<p>gently sloped landform. The kyles are quite densely populated along their shores with small settlements concentrated at bridging points at the inlet mouth and forming a key focus in the landscape/seascape. Access routes are aligned around the shoreline or over the kyles via causeways. This landscape tends to penetrate into areas of moorland slopes and hills and its open central water space offers views of mountains.</p> <p>Funnelled views along the kyle or sea loch to open sea are also a feature although, islands can sometimes restrict views. Fish farms have significant impacts within this type forming foci within coastal waters.</p>	Garden and Designed Landscape
<p>Deposition Coasts of Islands</p> <p>East Hoy and islands in Scapa Flow</p> <p>Southern Mainland Orkney</p> <p>Islands in the Pentland Firth</p>	<p>Long sandy beaches backed by dunes and low lying machair or pastures and with crofting or farms set back from coast. An open, low lying, largely treeless and windswept landscape with views of the Atlantic Ocean or North Sea, although dunes can often screen views of open sea and coast inland. Sparsely settled, low key land management and lack of coastal development.</p>	Melsetter House Garden and Designed Landscape

8.106 The nature of the Project also requires consideration of the baseline environment with respect to key onshore and offshore visual receptors, which will need to be identified and considered in detail within the EIA and in consultation with the relevant stakeholders. The key potential visual receptors include (but may not be limited to):

- Residents, including those in towns, villages and dispersed properties;
- Road users, particularly those using coastal roads inshore of the Site;
- Recreational resources including footpaths, beaches, golf courses;
- Scenic viewpoints, particularly those referred to in local development plans and annotated on maps;
- Recreational sailors, including people following identified cruising routes;
- Passengers on commercial ferries or similar vessels;
- People engaged in work activities, such as those on commercial fishing vessels, within the extractive industries including aggregates, passing cargo vessels and other marine users; and
- Other key destinations and attractions e.g. heritage sites, visitor centres, parks and gardens.

8.107 This list will be further developed as the Project progresses and in response to comments made during consultation.

Identification of Potential Impacts

8.108 There is potential for the Project to have an impact on the character and visual amenity value of the area for both offshore and onshore receptors including, but not limited to:

- Recognised sensitive and/or designated landscapes;
- Coastal settlements and areas of high population;
- Adjacent beaches and areas of high amenity value;
- Recreational walkers/tourists; and
- Cultural heritage.

8.109 Key sensitivities when considering SLVIA are anticipated to comprise:

- Designated landscapes (NSAs, SLAs, WLAs and G&DLs);
- Seascape and landscape character areas; and
- Onshore and offshore visual receptors.

8.110 It is important to note that the significance of any potential direct or indirect impacts (positive or negative) is also influenced by a number of factors such as site selection, distance from shore, weather and visibility conditions and development configuration, some of which will be determined at a later stage and will be considered during the assessment process.

8.111 Considering the key sensitivities associated with seascape and landscape, Table 8.6 provides detail on the potential impacts that will form the basis of the EIA.

Cumulative Impacts

8.112 There is the potential for cumulative impacts with other wind farms in the area. This will be assessed in the EIA phase.

Table 8-7 Potential impacts associated with SLVIA during construction, operations and maintenance and decommissioning of the Project

Potential impacts during construction		
Impacts	High level impact summary and justification	Scoped in/out
Potential impacts on landscape character during construction	Mainly coastal areas would experience indirect, temporary impacts on perceptual qualities, during the construction phase. The assessment is likely to include consideration of impacts upon both designated and undesignated landscapes.	Scoped in
Potential impacts on seascape character during construction	The visual impact of the construction activities would have a direct effect on the seascape character units in those character areas where the activities are located. Impacts on other seascape character areas would be indirect.	Scoped in
Potential impacts	During the construction phase, receptors at land-based	Scoped in

on visual receptors during construction	viewpoints are likely to experience visual impacts during the day and night. Construction vessels will be working continuously and will be lit at night. The assessment of these impacts is likely to include consideration of views from designated and undesignated landscapes, coastal paths and other Public Rights of Way and publically accessible land. Visual impacts are also likely on sea based receptors.	
Visual impacts associated with presence of marine construction plant and vessels	There will be a potential visual impact arising from marine construction plant that will be used to construct and erect the offshore components of the wind farm. Other potential impacts may result from increased vessel movements in the area as plant, materials and personnel are moved to and from the Site. A further source of visual impact is possible from night-time lighting during the construction period.	Scoped in
Potential impacts during operations and maintenance		
Impacts	High level impact summary and justification	Scoped in/out
Potential impacts on landscape character during operation	Mainly coastal areas would experience indirect, temporary impacts on perceptual qualities. The assessment is likely to include consideration of impacts upon both designated and undesignated landscapes.	Scoped in
Potential impacts on seascape character during operation	The implementation of the wind farm in the Site would place a significant new feature into the seascape.	Scoped in
Potential impacts on visual receptors during the operation	The turbines would be at least 6km from the coast at the closest point and therefore most views at this distance are from land based receptors. Turbines will be lit at night in accordance with navigational safety and aviation requirements. The assessment is likely to include consideration of views from designated and undesignated landscapes, coastal paths and other Public Rights of Way and publically accessible land. There is potential for a visual impact from the operational phase of the Project upon sensitive receptors, including designated areas, with a further potential visual impact associated with increased vessel movements as a result of operation and maintenance activities and night-time lighting of the wind farm structures.	Scoped in
Potential impacts during decommissioning		
Potential impacts arising during the decommissioning phase are expected to		Scoped in

be similar to but not exceeding those arising during the construction phase, and would be temporary.	
Potential cumulative impacts	
The potential for cumulative impacts will be assessed during the EIA process. The EIA will consider the impacts of the construction, operation and decommissioning of the Project cumulatively with other offshore wind farm projects and other relevant projects and activities. The most relevant projects for consideration of cumulative impacts to SLVIA are likely to be other wind farm projects and any significant development or activity in the marine or coastal environments.	Scoped in

Project Level Surveys and Studies

8.113 The SLVIA Proposed Methodology Report has been developed by Dounreay Trì Limited for consultation with the SLVIA stakeholders and is currently in discussion. As part of this exercise a preliminary ZTV has been generated based on potential turbine locations notionally located around the boundary of the Site and is part of an initial scoping exercise to allow identification of potential sensitive land based receptors.

8.114 The methodology document also includes nine proposed photomontage locations (viewpoints), which have been chosen to represent a variety of distances, elevations and orientations from the wind turbine array and to reflect different types of visual receptor

8.115 Table 8-8).

Table 8-8 Proposed Viewpoints

VP	Name	Approx OS ref	Approx. Elevation	Key Reasons for selection
Mainland				
1	Ben Ratha	NC94972, 61078	251 m	Hill Walkers
2	Strathy Point car park	NC82774, 68503	62 m	Visitors/tourists Representative of Farr Bay, Strathy Point and Portskerra SLA
3	Portskerra/Melvich	NC87745, 66118	25 m	Residents Visitors/tourists Local and regional road users on key coastal road A836 Cyclists on NCR1 Representative of Farr Bay, Strathy Point and Portskerra SLA
4	Drum Holliston Car Park	NC93261, 64623	90 m	Residents Local and regional road users on key coastal road A836 Cyclists on NCR1
5	Sandside Harbour Car Park	NC95777, 65913	10 m	Visitors/tourists

VP	Name	Approx OS ref	Approx. Elevation	Key Reasons for selection
6	St Mary's Chapel , Forss	ND02504, 70078	11 m	Visitors, tourist
7	Dunnet Head	ND20557, 76518	127 m	Recognised VP on OS map Visitors Representative of Dunnet Head SLA
8	Scrabster – Stromness Ferry	ND13206, 84983	15 m	Ferry passengers
Orkney				
9	Path to the Old Man of Hoy	ND19147, 98988	140 m	Walkers Representative of Hoy and West Mainland NSA

8.116 To determine the potential for impacts on visual resources an SLVIA will be undertaken. Full details of the proposed methodology for the SLVIA are presented in the Methodology Report (Appendix B).

Conclusions and Next Steps

8.117 SLVIA impacts are scoped in and are taken forward to the assessment phase.

8.5 Archaeology and Cultural Heritage

Introduction

8.118 This section considers the potential impact on existing marine archaeology and cultural heritage by the development of the Dounreay Trì Project – the 'Project' by considering the presence of marine and maritime sites and the potential for prehistoric landscapes, which may be affected by the Project.

8.119 This section also presents a summary of the relevant UK guidance, methodologies and best practice that will be applied in completing the EIA. The section outlines the proposed scope of surveys and studies that will be completed and that will be subject to consultation with relevant consultees.

8.120 The Site is considered to be the offshore area delineated in Figure 5-1 in blue and referred to as the 'Site', the export cable corridor area of search is marked in orange on the same figure and referred to as the 'export cable corridor'.

Guidance and Legislation

8.121 The EIA will take account of all relevant legislation and guidance, including:

- The Protection of Wrecks Act 1973;
- The Ancient Monuments and Archaeological Areas Act 1979;
- The Protection of Military Remains Act 1986;
- The Merchant Shipping Act 1995;

- The Marine (Scotland) Act 2010;
- The Annex to the UNESCO Convention on the Protection of the Underwater Cultural Heritage 2001;
- The UK Government (and constituent administrations): Marine Policy Statement (2011);
- Scotland's National Marine Plan: A Single Framework for Managing Our Seas (2015), Scottish Government and Marine Scotland;
- The Scottish Government: (2014) Scottish Planning Policy (SPP) 2014;
- Historic Scotland: Scottish Historic Environment Policy (SHEP 2011);
- The Scottish Government: Planning Advice Note (PAN 2/2011): Planning and Archaeology, July 2011;
- Historic Scotland: The Marine Historic Environment: Strategy for the Protection, Management and Promotion of Marine Heritage 2012 - 15 (March 2012);
- Firth, A. (2013) Historic Environment Guidance for Wave and Tidal Energy. Published by Fjodr Ltd on behalf of English Heritage, Historic Scotland and Cadw;
- The Joint Nautical Archaeology Policy Committee and The Crown Estate's Maritime Cultural Heritage & Seabed development: JNAPC Code of Practice (2006);
- Wessex Archaeology Ltd: Historic Environment Guidance for the Offshore Renewable Energy Sector (2007), commissioned by COWRIE Ltd;
- COWRIE Ltd: Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy (2008) by Oxford Archaeology & George Lambrick Archaeology and Heritage;
- The Nautical Archaeology Society: Underwater Archaeology: The NAS Guide to Principles and Practice (2nd edn, 2008);
- Wessex Archaeology (2010) Protocol for Archaeological Discoveries: Offshore Renewables Projects. Prepared on behalf of the Crown Estate;
- Gribble, J. and Leather, S. for EMU Ltd. (2011). Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector. Commissioned by COWRIE Ltd (project reference GEOARCH- 09);
- Wessex Archaeology (2011) Assessing Boats and Ships (presented in three period reports: 1860 - 1913, 1914 - 1938 and 1939 - 1950);
- The Crown Estate (2014a) Protocol for Archaeological Discoveries: Offshore Renewables Projects, Wessex Archaeology Ltd on behalf of The Crown Estate; and
- The Crown Estate (2014b) Model clauses for Archaeological Written Schemes of Investigation: Offshore Renewables Projects, Wessex Archaeology Ltd (Ref 73340.05) for The Crown Estate.

Other Sources of Information

8.122 This section has been primarily informed by detail presented in the information sources listed below and also utilises SeaZone data.

- Strategic Environmental Assessment (SEA) 4 (Flemming, 2003);
- The National Monuments Record of Scotland, using the Canmore and Pastmap database websites; and

- Statutory lists, registers and designated areas, including List of Scheduled Ancient Monuments, Designated Wrecks and Historic Marine Protected Areas.

8.123 Although no specific reports are available which describe the impacts on archaeology and cultural heritage receptors, the guidance documents and experience in the industry highlight the importance of early consultation to fully understand the impacts of offshore wind farms on marine archaeology and cultural heritage.

Consultation

8.124 There has not been any direct consultation undertaken for the purpose of the Scoping phase. Historic Scotland and The Highland Council have been identified as potential consultees who will be consulted with during the assessment phase.

Study Area

8.125 A study area encompassing the Site and export cable corridor has been considered in this section in order to sufficiently describe the existing marine historic environment that might be potentially affected by the Project. Some leeway is allowed for identifying assets outside, but close to these areas, in order to capture sites where the listed position is unverified and descriptions of the circumstance of loss indicate there is potential that they could be located within the study area.

Surveys and Studies Carried Out to Date

8.126 Marine Scotland conducted a Multibeam EchoSounder (MBES) marine geophysical survey between the Kyle of Tongue and 8 miles west of Thurso with the Marine Scotland Science vessel the MRV *Scotia* in 2014. This surveyed area includes the Site and export cable route. This will be examined during the baseline assessment for evidence of marine historic environment assets.

Description of the Current Environment

8.127 The marine historic environment encompasses not only shipwrecks, but also other evidence of human exploitation of maritime resources, such as shipyards, piers, fish traps, anchor sites and submerged landscapes where human beings and early hominids previously lived or hunted on terrain which was at that time dry land, or where they exploited fish and shellfish on the coast which is now submerged (Marine (Scotland) Act 2010, Section 73, paragraph 5). Obstructions and foul ground areas can also represent wrecks that have not been classified due to lack of investigation.

8.128 Marine cultural and archaeological remains are located on and below the seabed and can include wrecks and wreckage of historical, archaeological or artistic importance designated under the Protection of Wrecks Act (1973), wrecks, areas and deposits of national importance designated as an Historic Marine Protected Area (HMPA) under the Marine (Scotland) Act (2010) and military (including human) remains designated under the Protection of Military Remains Act (1986). It is an offence to cause damage to protected historic remains and in some cases where a restricted zone exists around the remains, a licence is required before any works or salvage can be undertaken within this zone.

8.129 Her Majesty's Government *UK Marine Policy Statement* (2011) states heritage assets should be conserved through marine planning in a manner appropriate and proportionate to their significance. The absence of designation for such assets does not necessarily indicate lower significance and the marine planning authority should consider them subject to the same policy principles as designated heritage assets (include those outlined) based on information and advice from the relevant regulator and advisors. The Scottish Historic Environment Policy

(SHEP) 2011 outlines the principles that underpin the designation of HMPAs, including that marine historic assets from all parts of the Scottish marine protection area are equally worthy of study and consideration for statutory protection. The Scottish Government's Planning Advice Note (PAN 2/2011): Planning and Archaeology state that for all developments, the principles (in Scottish Planning Policy 2014 and SHEP 2011) of preservation in situ, or mitigation where necessary equally apply to sites on land or underwater.

8.130 There are no HMPAs or designated wrecks and military remains in the area.

8.131 There may be at least six 18th to 19th century wrecks in Sandside Bay. There is also the possibility that HMD *Orsino*, which was sunk by U-boat in 1916, could be in the study area. Its actual position remains unknown. It is variously listed as 'Between Loch Eribol And Stromness'; 'Between Loch Eriboll And The Islands'; 'Pentland Firth' (CANMORE ID 214438). If identified, this vessel is of high importance as none of the six men killed in the attack were recovered and the vessel would be considered a war grave.

8.132 There is potential that there may be evidence of the historic environment and for human activity in the area in terms of submerged landscapes, submerged peat and postglacial tsunami deposits in the sheltered waters of Sandside Bay and beneath the intertidal sands.

Identification of Potential Impacts

8.133 The key potential impacts on archaeology and cultural heritage within the study area are considered to be direct and/or indirect physical disturbance to or loss of known and unknown assets of potential archaeological and cultural significance.

8.134 As described in the guidance documents *Historic Environment Guidance for the Renewable Energy Sector* (Wessex Archaeology, 2007) and *Historic Environment Guidance for Wave and Tidal Energy* (Fjordr Ltd, 2013, on behalf of English Heritage, Historic Scotland and Cadw), there may be direct and indirect impacts upon cultural heritage receptors preserved offshore from offshore renewable energy developments. These potential impacts are paraphrased below:

- direct impacts on cultural heritage features, artefacts, wrecks and submerged landscapes due to, for example, intrusive site investigations, dredging and clearance, anchoring of construction and support vessels, embedment/gravity anchors, seabed-laid moorings, seabed-laid connecting cables, seabed laid cable hub, trenching or ploughing/jetting in of export cable; and
- indirect or secondary impacts on cultural heritage features, artefacts, wrecks and submerged landscapes from, for example, scouring around anchors, moorings, cable hub, connecting and export cables, changes to sediment transport and deposition, changes to the wave energy regime, changes to the setting of coastal historic environment assets.

8.135 Direct impacts generally occur during the installation, maintenance and decommissioning of the anchors, moorings and cable infrastructure. Indirect impacts may develop via a number of varied processes. The associated impacts arising from the key sensitivities on the relevant receptors are detailed in Table 8-9.

Cumulative Impacts

8.136 Cumulative impacts on cultural heritage features, artefacts, wrecks and submerged landscapes from, for example, the number of devices deployed, from further phases of development within the lease area, or other marine development projects in the vicinity are considered in the assessment phase.

8.137 Table 8-9 summarises the potential impacts.

Table 8-9 Potential impacts on archaeology and cultural heritage during construction, operations and maintenance and decommissioning of the Project

Potential impacts during construction		
Impacts	High level impact summary and justification	Scoped in/out
Direct physical disturbance to or loss of marine archaeological features	Seabed preparation, the installation of the anchors, the use of scour protection and the construction of associated infrastructure and cables could directly disturb or damage known or potential artifacts of cultural importance or affect sites of archaeological interest. Such impacts may also arise from activities associated with the construction activity such as vessel anchoring.	Scoped in
Indirect physical disturbance to marine and coastal archaeological features	Changes to currents, sediment transport and erosion patterns during the construction period have the potential to impact on sites, deposits or artifacts even where direct physical contact from construction activities does not occur.	Scoped in
Potential impacts on historic landscapes and monuments	All impacts to historic landscapes, monuments and designations result from changes within the setting of heritage assets during the construction phase and as such, impacts would be fully reversible, however this will be considered fully in the EIA process	Scoped in
Potential impacts during operations and maintenance		
Impacts	High level impact summary and justification	Scoped in/out
Direct physical disturbance to marine and coastal archaeological features	Although no new disturbance of the seabed is likely to take place during the operational phase, some activities associated with maintenance (for example, positioning of cable maintenance) may give rise to direct physical disturbance.	Scoped in
Indirect physical disturbance to marine and coastal archaeological features	Indirect changes to the hydrodynamic and sedimentary regimes could occur, resulting in disturbance to archaeological features through sediment transport, scouring or deposition.	Scoped in
Potential impacts on historic landscapes and monuments	The visual impacts of the Project on onshore historical and cultural heritage features and designations will be considered as part of the archaeology and cultural heritage chapter of the ES. Identification and assessment of potential impacts will include consideration of the setting of listed buildings, scheduled monuments, registered parks	Scoped in

	and gardens and historically important landscapes.	
Potential impacts during decommissioning		
Potential impacts arising during the decommissioning phase are expected to be similar to but not exceeding those arising during construction.		Scoped in
Potential cumulative impacts		
The potential for cumulative impacts will be assessed during the EIA process. The EIA will consider the impacts of the construction, operation and decommissioning of the Project cumulatively with other offshore wind farm projects and other projects and activities. The other projects for consideration for impacts to archaeology and cultural heritage are likely to be any activities that could incrementally reduce the quality or number of archaeological features and sites such as aggregate extraction or spoil disposal.		Scoped in

Assessment Methodology

- 8.138 The marine historic environment baseline identified by desk based assessment and analysis of geophysical and geotechnical survey data will be used to produce an assessment of potential direct, indirect, and cumulative impacts on the known and as yet undiscovered marine archaeology and cultural heritage resources.
- 8.139 Appropriate mitigation strategies and monitoring requirements will be formulated that will be agreed upon by the client and the statutory authorities. Once mitigation measures have been agreed, a Written Scheme of Investigation (WSI) will be developed in consultation with the statutory authorities and in line with relevant guidance that will set out the design and implementation of mitigation with regard to both known and potential archaeological and cultural heritage assets during the course of the Project.

Project Level Surveys and Studies

- 8.140 It is currently envisaged that the following surveys and studies will be undertaken in order to characterise the study area:
- A detailed marine historic environment desk based survey of the study area will be undertaken, including a review of known wrecks and archaeological potential, and detailed assessment of Marine Scotland's Multibeam EchoSounder (MBES) marine geophysical survey data and any geotechnical survey data; and
 - Targeted geophysical surveys (Sidescan Sonar, Magnetometer, Sub-Bottom Profiler) to appropriate standards may be proposed for the preferred anchor locations and export cable corridor and assessed for historic environment assets. These may be proposed as management strategies rather than conducted as part of the pre-planning application process.

Conclusions and Next Steps

- 8.141 It is proposed that archaeology and cultural heritage is taken forward to the assessment phase.

8.6 Other Users of the Marine Environment

Introduction

- 8.142 This section characterises other human activities that occur in the marine environment within the vicinity of the Dounreay Trì Project – the ‘Project’ by considering diverse interests such as utilities, military activity, oil and gas activities, marine renewables, waste disposal and aggregate extractions.
- 8.143 The Site is considered to be the offshore area delineated in Figure 5-1 in blue and referred to as the ‘Site’, the export cable corridor area of search is marked in orange on the same figure and referred to as the ‘export cable corridor’.
- 8.144 Other human receptors in the marine environment such as commercial fisheries, recreational interests, shipping and navigation are addressed in Sections 8.3, 8.6 and 8.2 respectively.

Guidance and Legislation

- 8.145 The following guidance and legislation will be referenced in the preparation of this section:
- Marine Scotland, Scottish Government, Aecom and Metoc (2012). Pentland Firth and Orkney Waters Marine Spatial Plan Framework & Regional Locational Guidance for Marine Energy: Final Report;
 - SgurrEnergy Ltd (2014). RenewableUK Offshore wind and marine energy health and safety guidelines. 2014 (issue 2) [online]. Available at: <http://www.renewableuk.com/en/publications/index.cfm>; and
 - The MoD can regulate and restrict the use of sea areas temporarily or in some cases permanently for the purposes of national defence using by-laws under the provisions of the following acts:
 - Military Lands Act 1892 and 1900; and
 - Land Powers Defence Act 1958.

Available Information

- 8.146 The following available information was used in the preparation of this section:
- Spatial data on other users of the marine environment on National Marine Plan Interactive (Marine Scotland, 2015a); and
 - Information on Joint Warrior exercised (Royal Navy 2015).

Consultation

- 8.147 There has not been any consultation undertaken for other users in the Scoping Phase. Key stakeholders will include the following agencies who will be consulted in the assessment phase:
- Highlands and Islands Enterprise (HIE);
 - Ministry of Defence (MoD);
 - Scottish Hydro Electric Transmission (SHE-T); and
 - Dounreay Site Restoration Ltd (DSRL).

Study Area

- 8.148 The study area covers the Site, export cable corridor and general north coast of Scotland to identify any users that may directly interact with the project area and its components or interact with project vessels transiting to the Site during construction, operations and maintenance and decommissioning activities.

Surveys and Studies Carried Out to Date

- 8.149 No site-specific surveys or studies with regards to other users in the marine environment have been carried out to date.

Description of the Current Environment

Other Marine Renewable Energy Projects

- 8.150 There are several marine renewable energy (MRE) projects either in development or undergoing the consenting process within the Pentland Firth and Orkney Waters strategic area (PFOW). The only project to have been consented to date is Phase 1 (86 MW, limited to 6 devices for the first stage) of MeyGen Limited's Inner Sound 398 MW tidal energy project, 20 nm to the east of the Site.
- 8.151 There are several proposed tidal arrays in the PFOW including the Brims Tidal Array and Ness of Duncansby both of which are at least 16.3 nm from the Site. It is not currently known where potential construction or operation and maintenance locations would be located.
- 8.152 Farr Point Wave Farm was a proposal for up to ten Pelamis wave energy converters situated 9.7 nm west of the Site. This project has undergone scoping but the technology developer has since gone into administration and there are currently no new proposals to continue development of this site. This project is not considered further.
- 8.153 The proposed Dounreay Demonstration Centre (DDC), located directly adjacent to the Site (0.3 nm), received a Screening Opinion in February 2015 but has not yet been submitted for Scoping Opinion¹¹. The Dounreay Tri Limited continue to engage with HIE to collaborate where appropriate and ensure objectives of both projects are met through the development of an MOU (Chapter 3: Site Selection and Engagement to Date).

Military Activity and Unexploded Ordnance (UXO)

- 8.154 The Ministry of Defence (MoD) operates in Scotland's coastal areas and adjacent seas where they carry out maritime and aerial training activities and surveillance of potential threats to the country's offshore interests. Defence activities include the operation of naval vessel aircraft, navigational interests, underwater acoustic ranges, maritime exercise areas, amphibious exercises, coastal training ranges and coastal test and evaluation ranges.
- 8.155 The offshore area of search is approximately 19 nm west of the Cape Wrath Firing Range military exercise area and its Firing Danger Area. There is also a practice and exercise area (PEXA) within Loch Eriboll, Sutherland (within the Cape Wrath Firing Range area).
- 8.156 The firing ranges are not always in use and access to these areas for appropriate activities is permitted where compatible with operational requirements. Temporal and spatial restrictions may be in place in these areas and where other military exercises are carried out.
- 8.157 Twice a year, Europe's largest military exercise, Joint Warrior is undertaken off the north, north-east and north-west coasts of Scotland. Joint Warrior involves the three Armed Forces

¹¹ At time of Dounreay Tri Scoping submission

and aircraft, navy vessels, submarines and army personnel and occurs in March/April and October each year over a period of 10 - 15 days.

8.158 There are no current or historical military munitions disposal sites within the vicinity of the Site and it is considered that the potential for unexploded ordnance (UXO) is low.

8.159 Aerial military activity is discussed in Section 8.3: Aviation.

Licensed Spoil Disposal Sites

8.160 There are no dredge disposal sites located within the vicinity of the Site. One marine aggregate disposal site is located approximately 5.7 nm east off Dounreay. A Dounreay microsite is located adjacent to the export cable corridor.

Aggregate Extraction

8.161 There are no marine aggregate extraction sites within the vicinity of the Site. A construction aggregate site for sand is located at least 8.1 nm east of the development area.

Subsea Cables and Utilities

8.162 There are no cables or pipelines that intersect with the offshore Site or export cable corridor. There are two active telecommunication cables located east of the Site; one from Dunnet Bay to Bay of Skail on Orkney and another connecting Dunnet Bay to the Faroe islands. Two active unburied power cables (a 33 kV line and 33 kV cable) also run north, 6.2 nm east of the Site from Murkle Bay near Thurso to Rackwick Bay, Hoy in Orkney.

8.163 New transmission infrastructure is required between Orkney and Caithness to enable the export of electricity from renewable energy generation in Orkney into the national grid. SSE Transmission is planning to develop a 70 km 220 kV subsea electricity transmission connection from the existing connection site at Dounreay to the Bay of Skail on the west coast of Orkney (SSEPD, 2014). Construction of this new network is expected in 2018/19 however this is subject to the progress of current wave and tidal energy generation sites in Orkney and dependent on the submission of a needs case and approval by OFGEM.

8.164 The current area of search for the landfall location for the Orkney-Caithness interconnector is within the export cable corridor landfall and there is therefore the potential for interaction during construction at the landfall or cable corridor installation offshore.

Oil and Gas Activity and Carbon Capture and Storage

8.165 There are no UK Continental Shelf (UKCS) licensed blocks for oil and gas activities within the vicinity of the Site (O&GA, 2015). The majority of oil and gas activities are undertaken offshore beyond territorial waters and are particularly concentrated further north and along eastern offshore waters. Pipelines are therefore directed to Shetland, Orkney and the east coast of Scotland.

8.166 There is one isolated area of 'significant discovery not yet developed' at least 200 km west of the Site in licensing block 154/1. There are no known plans to develop this area.

8.167 The nearest potential carbon capture and storage (CCS) sites are located in the Moray Firth and North Sea east of the Scottish mainland and therefore not likely to interact with the Project.

Dounreay Nuclear Facility

8.168 Dounreay Site Restoration Limited (DSRL) is the licence company responsible for the decommissioning of the Dounreay nuclear facility. As a result of operational standards in

reprocessing during the 1960s and 1970s, some radioactive particles were released into the sea via an active discharge pipeline in a subsea tunnel that extends approximately 600 m offshore. A number of radioactive particles have been discovered on the seabed close to the old discharge point. An extensive programme of remediation activity has been undertaken by DSRL to detect and retrieve hazardous particles from a 60 hectare area of seabed near the outfall using remotely operated vehicles (ROVs), clean-up vehicles and divers. Sandside Bay is routinely monitored for particles and other contamination (DSRL, 2015). This remediation work is currently ongoing.

Telecommunications

8.169 Due to the production of low levels of electromagnetic radiation, wind turbines can have an effect on communication systems that utilise electromagnetic waves as their means of transmission. The rotating blades of wind turbines can also cause interference through reflection and shadowing of electromagnetically propagated radio signals such as terrestrial fixed microwave links, terrestrial radio telemetry links and television broadcasts. Therefore, it is necessary to ensure a suitable separation distance between telecommunications links and wind turbines.

8.170 Telecommunications considered will include:

- Microwave communications;
- Television reception;
- Radio reception; and
- Cellular telephone service.

8.171 The scope of the assessment presented in the EIA will be finalised, based on site-specific sensitivities, and in consultation with Ofcom, JRC, Atkins and Arquiva. If necessary, further modelling of potential impacts on telecommunications systems will be carried out in consultation with the relevant stakeholders and operators to provide a quantitative assessment of risk to those facilities.

Identification of Potential Impacts

8.172 The potential for interaction with, and therefore impact on, other sea users arising from the Project is considered to focus on obstruction and exclusion from areas under construction. The presence of additional vessels in the area during the construction phase and during any planned and unplanned maintenance operations may impact on existing sea users. The physical presence of the floating platform during the operational phase may also impact on sea users.

Cumulative Impacts

8.173 There is the potential for cumulative impacts arising with the potential Orkney-Caithness interconnector project.

8.174 Impacts are summarised in Table 8-10.

Table 8-10 Potential impacts upon other users of the marine environment during construction, operations and maintenance and decommissioning of the Project

Potential impacts during construction		
Impact	High level impact summary and justification	Scoped in/out
Obstruction of MRE (specifically HIE's DDC) activities due to the presence of safety zones and construction vessels during installation activities	Most of the proposed MRE sites are a considerable distance from the Site, however it is possible that ports utilised for construction or operation and maintenance bases could be located within proximity to Dounreay Tri activities. Any impacts on capacity at ports will be addressed in Section 8.8: Socio-economics, Recreation and Tourism. Impacts to navigation of vessels associated with these developments will be addressed in the NRA. HIE's DDC is directly adjacent to the Site and there is therefore potential for interaction during all project phases. All other MRE projects are therefore scoped out as potential receptors to impacts from the Project.	Scoped in
Obstruction of military activities due to the presence of safety zones and construction vessels during installation activities	There is potential for the Project to interact with military activities and further consultation may be required to ensure impacts are minimised.	Scoped in and addressed in Section 8.4: Aviation
Obstruction of spoil disposal activities or aggregate extraction due to the presence of safety zones and construction vessels during installation activities	No potential impacts are anticipated due to the distance of these activities from the Site. Any impacts relating to the safe navigation of vessels carrying material to and from these sites are addressed in chapter 8.2 Shipping and Navigation and the PHA (Appendix A).	Scoped out
Obstruction of electricity cable installation activities due to the presence of safety zones and construction vessels during installation activities	There are no anticipated impacts in relation to existing cables, however the proposed landfall location for the SSE Orkney-Caithness interconnector overlaps with the project cable landfall and there is potential for interaction.	Scoped in
Obstruction of oil, gas and CCS activities due to the presence of safety zones and construction vessels during installation activities	There are no current or planned activities within close proximity to the Site. Any impacts relating to the safe navigation of operational vessels associated with these activities are addressed in Section 8.2 Shipping and Navigation and associated PHA.	Scoped out

Disruption to DSRL remedial and monitoring activities due to the presence of safety zones and construction vessels during installation activities	DSRL remedial activities are undertaken within the export cable corridor and there is therefore potential for disruption.	Scoped in
Telecommunications	No tall structures considered during the construction phase.	Scoped out
Potential impacts during operations and maintenance		
Impact	High level impact summary and justification	Scoped in/out
Obstruction of MRE (specifically DDC) activities due the presence of the floating structure and associated moorings; and the presence of safety zones and vessels during maintenance activities	As construction impacts.	Scoped in
Obstruction of military activities due to the presence of the floating structure and associated moorings; and the presence of safety zones and vessels during maintenance activities	As construction impacts.	Scoped in
Obstruction of spoil disposal activities or aggregate extraction due the presence of the floating structure and associated moorings; and the presence of safety zones and vessels during maintenance activities	As construction impacts.	Scoped out
Obstruction of cable installation activities due to the presence of the floating structure and associated moorings; and the presence of safety zones and vessels during maintenance activities	As construction impacts.	Scoped in
Obstruction of oil, gas and CCS activities due to the	As construction impacts.	Scoped out

presence of the floating structure and associated moorings; and the presence of safety zones and vessels during maintenance activities		
Obstruction of DSRL remedial and monitoring activities due to the presence of the floating structure, associated moorings and export cable; and the presence of safety zones and vessels during maintenance activities	As construction impacts.	Scoped in
Obstruction of adverse impact on telecommunication systems in operation in the region	Potential impact on services.	Scoped in
Potential impacts during decommissioning		
Potential impacts arising during the decommissioning phase are expected to be similar to, but not exceeding, those arising during the construction phase.		As construction
Potential cumulative impacts		
Impact	High level impact summary and justification	Scoped in/out
Obstruction of DSRL remedial and monitoring activities	Due to construction and presence of the project/Site and the Orkney-Caithness interconnector export cable and landfall.	Scoped in
Obstruction of military activities		
Obstruction of other MRE activities		

Data Gaps

8.175 It is proposed that the baseline conditions can be further refined and potential impacts assessed by obtaining the following information:

- MRE activities: Liaison with HIE and other developers to establish the nature, timing and duration of development activities and determine whether any significant impacts expected;
- Use of the offshore Site and export cable corridor by military vessels: Project AIS data will be gathered to inform the Navigational Risk Assessment (NRA) and will provide some

information about military vessel activity. Further consultation with the MoD may be required as military vessels have some dispensations regarding switching off their AIS tracks and jamming GPS during some exercises therefore vessel tracking data will not always be available. Such consultation will likely form part of consultation workshops for the Shipping and Navigation receptors (refer to Section 8.2 and Appendix A Preliminary Hazard Analysis (PHA)) and NRA to identify vessel traffic activity in the vicinity of the Site;

- Liaison required with relevant SSE departments to establish the nature, timing and duration of electricity cable development activities and determine whether any significant impacts expected; and
- Baseline information regarding Dounreay Site Restoration Ltd (DSRL) remedial and monitoring activities will be gathered to establish boundaries and timing of activities. Will require consultation with DSRL to determine requirements/approach.

Assessment Methodology

- 8.176 A desk based assessment will be undertaken augmented by the consultation described above. Where necessary specific impacts will be addressed in other sections, such as impacts on military activities (Section 8.6: Other Users of the Marine Environment).

Project Level Surveys and Studies

- 8.177 It is anticipated that no surveys will be required to complete baseline characterisation and the impact assessment for other users of the marine environment. Consultation with various stakeholders will be sufficient to fill any data gaps.

Conclusions and Next Steps

- 8.178 It is recommended that disposal sites, aggregate extraction areas and oil, gas and carbon capture and storage (CCS) activities are scoped out if the EIA as it is considered unlikely for any significant impacts on their activities to arise a result of the Project.
- 8.179 The following other marine users are recommended to be scoped in for an environmental impact assessment and further consultation will be required to clearly define the nature, spatial extent and timing of activities within the study area: MRE projects; military activity; electricity cables and DSRL remedial activity.

8.7 Socio-Economics, Recreation and Tourism

Introduction

- 8.180 This section characterises socio-economics, recreation and tourism in the vicinity of the Dounreay Trì Project – the ‘Project’ and outlines the proposed approach to assessment.
- 8.181 The Site is considered to be the offshore area delineated in Figure 5-1 in blue and referred to as the ‘Site’, the export cable corridor area of search is marked in orange on the same figure and referred to as the ‘export cable corridor’.

Guidance and Legislation

- 8.182 Although there are no specific guidance documents for assessing the socio-economics of an offshore wind farm, there are existing data sources and literature including:
- Visit Scotland;
 - Economy and employment data from Highland Council Ward Statistics;

- National Census data;
- Scottish Renewables Economic Impact Report (Scottish Renewables, 2007);
- Tourist Attitudes Towards Wind Farms, (Scottish Renewables and British Wind Energy Association, 2002); and
- ESC (Economic and Social Research Centre Data archive).

Available Information

8.183 In addition to the above cited data sources, relevant information gathered from desk studies, feedback from consultation and appraisal of the most up to date research studies to establish the relevant baseline and likely potential impacts (negative and positive) will be utilised to provide sufficient information relating to the socio-economic assessment.

8.184 Publically available, regional and local information sources have been used to inform this section. The key information sources are listed below:

- ONS data;
- Key employment sectors;
- Census details;
- A review of the potential impacts of wave and tidal energy development on Scotland's marine environment (Aquatera, 212);
- Population surveys; and
- Walking routes, core paths.

Consultation

8.185 No consultation has been carried out to inform the Scoping phase for socio-economics, recreation and tourism. It is proposed that the following agencies be consulted during the assessment phase:

- The Highland Council (THC);
- Dounreay nuclear facility; and
- Highland and Islands Enterprise (HIE).

Study Area

8.186 Socio-economic impacts have the potential to spread far beyond the fixed boundaries of the Project Site. It is proposed to assess the impact at a local (Highlands), regional (Scotland) and national (United Kingdom) level.

Surveys and Studies Carried Out to Date

8.187 No site-specific surveys or studies with regards to other users in the marine environment have been carried out to date.

Description of the Current Environment

8.188 Whilst Sutherland is largely rural in nature, Caithness benefits from a large centre of employment at the Dounreay nuclear facility. The main population centres are the ward of Thurso, and the ward of Wick. Traditional industries such as farming, quarrying and fishing account for approximately 13% of employment (Foundation Scotland, 2013). The largest employment sector, however, is public administration, education and health.

- 8.189 The Caithness region has a mostly seasonal tourist industry. Walking is popular along the coastline and there are numerous published routes in the study area. Water sports and sea angling are also popular.
- 8.190 The Site lies within a Royal Yachting Association (RYA) medium recreational cruising route which passes along the north coast of Scotland. There is also a RYA light recreational cruising route between Scrabster and Stromness. The closest marinas are at Scrabster, Stromness and Kirkwall.
- 8.191 There are surfing beaches located all along the north coast of Scotland.
- 8.192 A number of other recreational activities occur in the study area, such as water skiing, wakeboarding, small craft, motor cruising, power boating and personal watercraft. Beaches are used for walking, swimming camping and general recreation.
- 8.193 Wildlife watching is promoted as a tourist and recreational activity throughout the Pentland Firth and Orkney Waters (PFOW). It is particularly known for seals, whales and birds including the Atlantic puffin and other seabirds which nest abundantly on the sea cliffs in the area.
- 8.194 The village of Reay is located at Sandside Bay approximately 2 km to the west of the proposed substation location.

Identification of Potential Impacts

- 8.195 Impacts arising from the Project can be negative or positive. Socio-economic impacts are likely to involve job creation and localised investment and expenditure. The following impacts are anticipated.
- 8.196 There is significant cross-over with the following Sections and specific impacts will be addressed there as appropriate:
- Section 8.1: Commercial fisheries with regard any loss of fishing grounds or facilities;
 - Section 8.2: Shipping and Navigation with regard any sea restrictions or port congestion;
 - Section 8.4: Seascape, Landscape and Visual Impact if this has a positive or negative affect on tourist amenity; and
 - Section 8.6: Other Users of the Marine Environment where specific recreation pursuits are discussed out with this section.

Cumulative Impacts

- 8.197 There is the potential for positive cumulative impact to arise particularly during the construction phase.
- 8.198 Table 8-11 summarises the impacts.

Table 8-11 Potential impacts on socio-economics, tourism and recreation during construction, operations and maintenance and decommissioning of the Project

Potential impacts during construction		
Impact	High level impact summary and justification	Scoped in/out
Positive impact on local economy	Positive impact on employment through creation of local jobs and increased spend in local area.	Scoped in
Direct impact on tourism	Potential for impact on tourism where visitors are deterred from visiting due to disruption.	Scoped in
Direct impact on recreation	Direct impact on access to amenities in the vicinity of the cable landfall and offshore cable route	Scoped in
Direct impact on access to amenities	Direct impact on access to amenities in the vicinity of the cable landfall and offshore cable route.	Scoped in
Potential impacts during operations and maintenance		
Direct impact on tourism	Direct impact on tourism whereby visitors are attracted or deterred from visiting due to the presence of the wind farm.	Scoped in
Direct impact on recreation	Direct impact on access to amenities in the vicinity of the cable landfall and offshore cable route.	Scoped in
Direct effect on local economy	Direct effect from increased local spend during planned maintenance.	Scoped in
Potential impacts during decommissioning		
Potential impacts arising during the decommissioning phase are expected to be similar to, but not exceeding, those arising during the construction phase. Following removal of structures opportunities for habitat recovery in the former location of foundations may arise.		As construction
Potential cumulative impacts		
There is the potential for cumulative impacts.		Scoped in

Data Gaps

8.199 Currently it is anticipated that there will not be any data gaps while using the listed data sources.

Assessment Methodology

8.200 A desk based assessment will be undertaken. Consultation will be key to determining and quantifying potential impact and will be a significant element of the data gathering phase in the EIA.

Project Level Surveys and Studies

8.201 No surveys are anticipated. Following early consultation it is possible that targeted consultation events and meetings will be required to further ground truth the assessment conclusions.

Conclusions and Next Steps

8.202 Socio-economic is scoped in to the assessment phase and will be covered in the EIA.

9 Onshore Physical Environment

Introduction

9.1 This Section considers the impact of the onshore elements of the Dounreay Tri Project – the ‘Project’ – on the following physical environment receptors:

- Land use;
- Soils;
- Flood risk;
- Hydrology;
- Rainfall;
- Surface sediment;
- Physical processes; and
- Geology.

9.2 The onshore study area is considered to be the onshore cable search area (from Mean High Water Springs (MHWS)), cable jointing infrastructure and associated substation site. Collectively these will be referred to as the ‘onshore study area’ delineated in Figure 9-1 in green.

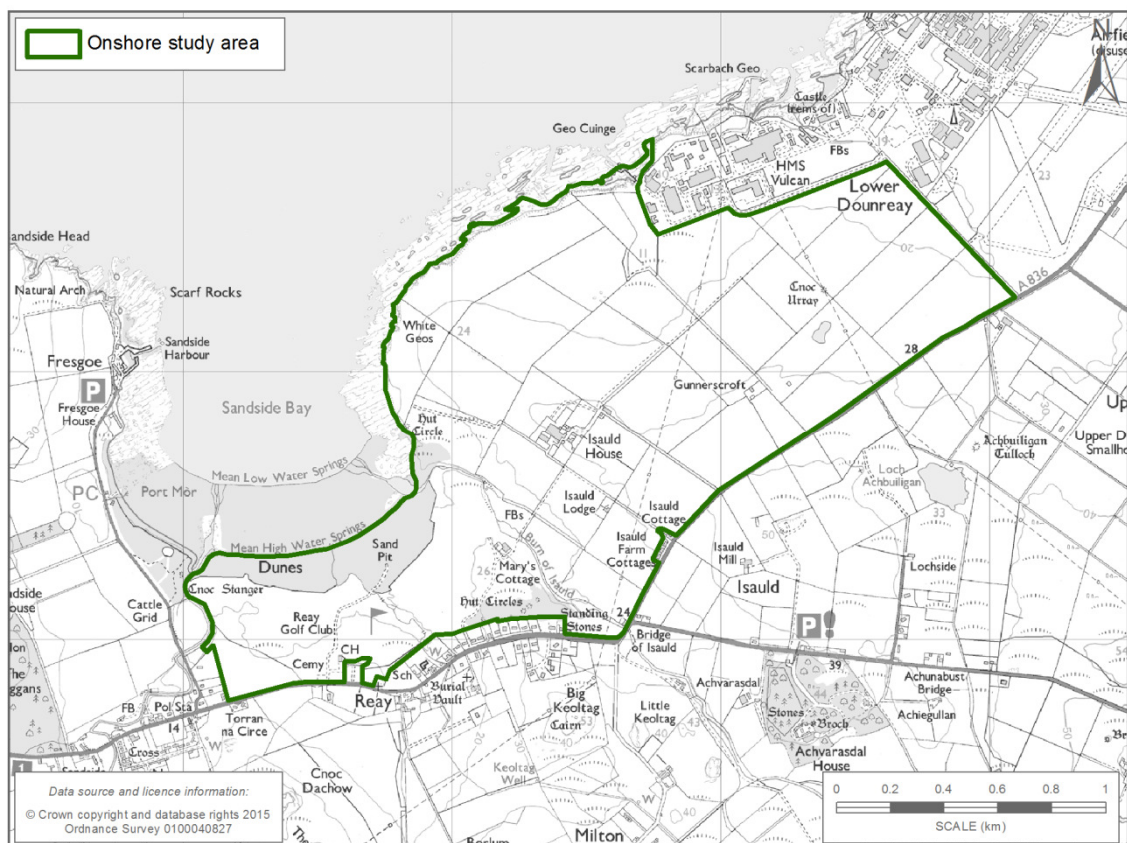


Figure 9-1 Onshore study area

9.3 This Section provides an overview of the physical environment within the onshore study area and how this fits within the regional geological and physical environment, along with the anticipated impacts, impact assessment strategy and where applicable mitigation and monitoring.

9.1 Geology, Physical Processes, Hydrology and Land Use

Introduction

- 9.4 This Section describes the key sensitivities and potential changes to the physical environment comprising the geology, hydrology and land use within the study area arising from the onshore aspects of the Project.

Guidance and Legislation

- 9.5 The assessment of impacts on water resources, hydrology and flood risk will be carried out in line with relevant legislation and standards, as well as the following guidance:
- Scottish Environment Protection Agency (SEPA) Pollution Prevention Guidelines;
 - SEPA Regulatory Position Statement – Developments on Peat (2010);
 - Nitrate vulnerable zones guidance from the Scottish Government;
 - Scottish Environment Protection Agency (SEPA) guidance on flood risk and pollution prevention;
 - Technical Flood Risk Guidance for Stakeholders (SEPA, 2009); and
 - National planning policy on agriculture is set out in the Scottish Government's Scottish Planning Policy (SPP).

Available Information

- 9.6 Publically available, regional and local information sources have been used to inform this Section. The key information sources are listed below:
- British Geological Survey (BGS) Maps and Reports. Available at: <http://www.bgs.ac.uk/>. [Accessed 24 September 2015];
 - British Geological Survey (BGS). [online] Available at: <http://www.bgs.ac.uk/downloads/browse.cfm?sec=1&cat=5>. [Accessed 24 September 2015];
 - Geology of Britain viewer. British Geological Survey (BGS). [online] Available at: <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>. [Accessed 24 September 2015]; and
 - Soil Survey of Scotland, Staff. (1981). Soil maps of Scotland at a scale of 1:250 000. Macaulay Institute for Soil Research, Aberdeen. Scotland's Soils. 2015. Soil maps - Scotland's Soils. [online] Available at: <http://www.soils-scotland.gov.uk/data/soil-survey>.
- 9.7 In addition, it is known that additional, information is available from The Highland Council on public and private water courses, SEPA on surface water quality and flood maps, and soil quality information from publically available soil maps, all of which will be consulted during the assessment phase.

Consultation

- 9.8 There has not been any consultation undertaken specifically relating to the physical environment. The following have been identified as relevant stakeholders and will be consulted during the EIA phase as appropriate:
- The Highland Council (THC);
 - Scottish Water; and

- Scottish Environment Protection Agency.

Study Area

- 9.9 The onshore study area lies on the north coast of mainland Scotland (Figure 9-2) in north-west Caithness, Highland Region. The nearest town is Thurso, some 12 km to the east, and the village of Reay is about 1 km to the south.
- 9.10 The onshore study area for this Section is defined as (Figure 9-2):
- District – Onshore study area (containing cable landfall, onshore cable and substation) marked as (C).

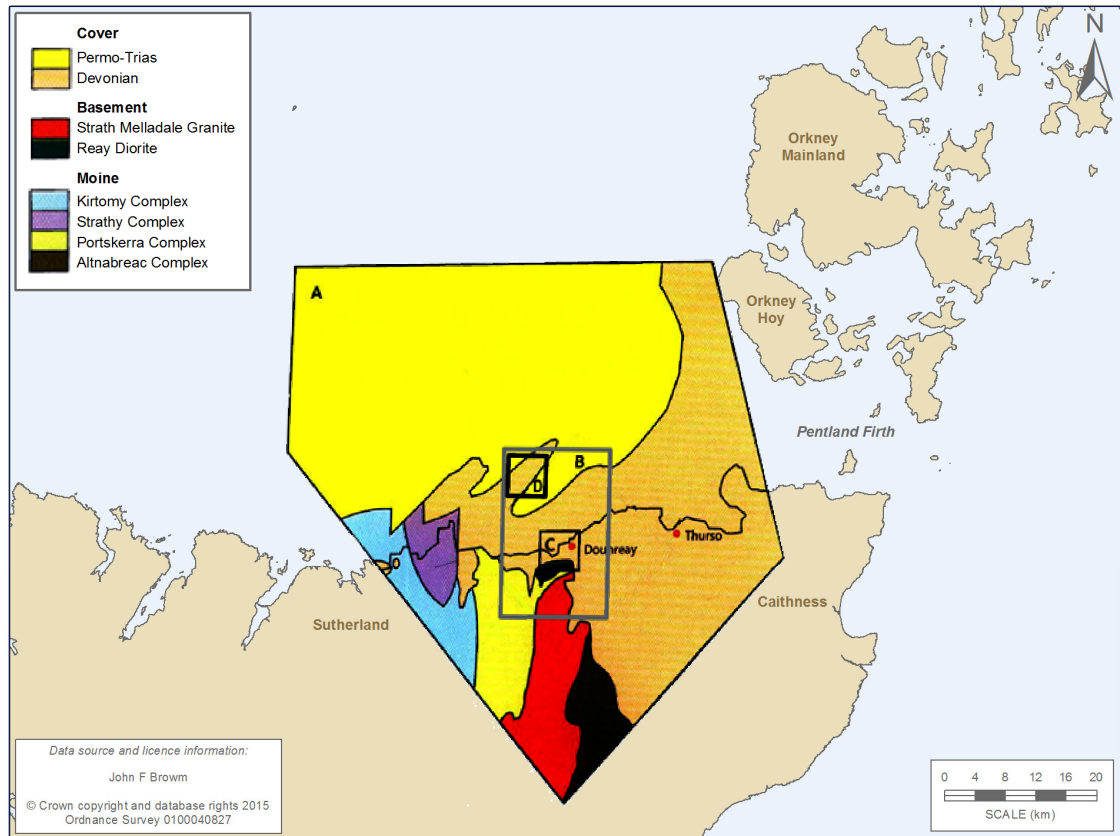


Figure 9-2 Onshore physical environment study area

- 9.11 Also delineated are:
- The offshore 'Site' (D) containing up to 2 floating wind turbine generators (WTG);
 - Region – Main Study Region (B) including Onshore and Offshore Districts; and
 - Area – Contextual environment for all studies (A).

Surveys and Studies Carried Out to Date

- 9.12 No studies have been carried out to date for this topic. The Scoping Report has been developed using existing data.

Description of the Current Environment

Geology

- 9.13 The onshore and offshore physical geology of the area is the same. As such, this Section mirrors that described in Section 6.2: Geology, Bathymetry and Physical Conditions.

- 9.14 The geology of the North of Scotland involves rocks of Lewisian age (2.5 billion years old), the Caledonian mountain chain which formed about 450 million years ago through to the Quaternary (2.2 million years ago). The Caledonian mountains formed when two major continents Laurentia, in the west and Baltica in the east collided. This long mountain chain stretched from Alabama through New York, Ireland, Scotland and up to northern Norway and Greenland. When the region experienced pull-apart tectonics in the early Devonian, 400 million years ago, rift valleys and half-graben basins formed. These also filled with coarse immature sediments until a low relief, flat, broad and elongate basin resulted. This intramontane basin eventually stopped having major tectonic movements and slowly filled with fine-grained lacustrine sediment of the middle Devonian Orcadian Basin. This lake basin, Lake Orcadie, lasted for some 10 million years.
- 9.15 In Caithness and eastern Sutherland the rocks tend to decrease in age from south-west to north-east. The Caledonian metamorphic basement intruded by large igneous intrusions (Strath Halladale granite, Reay diorite and Helmsdale granite) is overlain by lower Devonian (Lower Old Red Sandstone) conglomerates and breccia. These pass up into the middle Devonian (Middle Old Red Sandstone) lower and upper Caithness flagstone groups separated by the Achanarras fish bed. The uppermost rock sequence is the fluvial sandstones with occasional aeolian sand of the John O'Groats and Dunnet Head sandstone possibly of upper Devonian age (Upper Old Red Sandstone).
- 9.16 The shore sections are often complicated by many small faults and high cliffs. Several major faults have been traced, mainly from the coast into the interior and confirmed by seismic section. Smaller faults undoubtedly exist but are not exposed. These faults include: normal faults, reverse faults and wrench faults. Because of the abundance of these faults simple geometry cannot be used to estimate stratigraphic thicknesses.
- 9.17 The Reay area lies on the western margin of the Orcadian Basin. The Devonian sedimentary rocks (flagstones) rest on the crystalline basement rocks. The Reay landfall also lies south of the margin of the offshore West Orkney Basin of Permo-Triassic and younger sedimentary rocks resting on the Devonian and basement rocks. This basin contains oil fields west of Shetland. At Dounreay, crystalline basement rocks lie below Devonian sedimentary rocks. The top of the basement rocks is at a depth of 300 - 600 m below surface.
- 9.18 Quaternary deposits occur over much of the Dounreay area and have a variable thickness, ranging up to 70 m offshore and 50 m onshore (Michie 1994). They are usually absent from a narrow strip in the immediate coastal zone, but there are some drift filled valleys which reach the coast (Ballantyne and Hall, 2008; Brown, 2011; Hurst, 2009).
- 9.19 The plain of Caithness east and south-east of the study area has been significantly modified by the passage of ice sheets to give a strongly lineated terrain. The main ridges run SE-NW, parallel to ice flow, and are separated by shallow valleys and depressions excavated in zones of weakness and elongate lochans within the Flow Country to the south-east of the study area. The depressions are rock gouges now smothered by till. The streamlining of the terrain is picked out by the south to north orientation of lakes filling rock basins on the plain of Caithness. It is only on the basement rocks and conglomerates that classic ice-roughened terrain is developed. The widely-spaced vertical joints in these hard rocks allow plucking to generate cliffs on the lee sides of rock bumps, allowing the formation of roche moutonnées. Good examples occur south of Reay, where there is a marked change in the terrain moving off the Old Red Sandstone. An outstanding example of ice-roughened scenery is found just over the county border at the mouth of Strath Halladale, where the granite hills show a succession of cliffs facing north (Ballantyne and Hall, 2008; Hall and Quaternary Research, 1996; Phillips *et al.*, 2008).

Physical Processes

- 9.20 The following physical process characteristics are considered relevant to describing potential impacts arising from the Project during construction, operations and maintenance, and decommissioning phases.

Surface Sediment

- 9.21 The BGS superficial deposits "surface sediments" recognise a number of different subsoil sediment types related to different physical processes. These sediment types in part, control the type of overlying soils in this area. These deposits are alluvium, blown sand, glacial sand and gravel (reworked till), peat, raised marine deposits and till (diamictites). This latter surficial deposit is the dominant type in the study area.

Rainfall

- 9.22 The 1968 rainfall data (from "Caithness Climate") shows that Dounreay was slightly wetter than Wick during this year. The average annual rainfall at Wick between 1916 and 1950 was 762 mm. Examination of the monthly figures shows May and June to be the driest months with half the rainfall of other months. July through December are the wettest months with 63 - 76 mm. Rainfall figures for a single year are not normally reliable for flood prediction which requires a much longer historical record and data collected on a daily basis.

Hydrology

- 9.23 Only six burns enter the sea on the landward side of the cable corridor, from west to east they are:
- Allt Achadh na Gaodha;
 - Lady's Well Burn;
 - Sandside Burn;
 - Reay Burn;
 - Burn of Isauld; and
 - Dounreay Burn.
- 9.24 The above watercourses are small and have correspondingly low volumes of water draining agricultural land comprising improved arable, improved grazing and rough grazing and as such are not expected to carry pollutants into the marine environment.
- 9.25 The different geological units in the region interact to control the movement of groundwater. Surface sediments, particularly base of the boulder clay (till) where it lies on frost shattered bed rock form the major water transport layers. Surface runoff relates to the slope steepness, however the burns are the major water transport mechanism..

Aquifers

- 9.26 The geological units such as boulder clay, middle Devonian flagstones, lower Devonian conglomerates and basement rocks (along with fracturing associated with faults and structure of these rocks) form a framework for the study of the hydrogeology of the area. The hydrogeology defines the pattern of groundwater flow (aquifers) beneath the site. The area of immediate hydrogeological significance extends from a watershed some 10 km to the south of the study area.
- 9.27 The different geological units in the region interact to control the movement of groundwater which is considered to be the dominant mechanism for transport of radionuclides from the

ground to the surface. It is therefore important to understand if the project will impact these flow patterns.

Flood Risk

- 9.28 The flood maps indicate where flooding may happen and enables a more sustainable approach to managing flood risk by considering where natural flood management could be most effective. The flood maps are only indicative based on a regional approach to the analysis. Therefore local understanding of the general risk will help consideration of local risk associated with any individual development at the detailed design stage. Flood risk on coastal sites comes from the potential of sea-level rise and also changes in the rainfall pattern within the watershed. The onshore study area lies between the two major river basins of the Forss Water and the Strath Halladale river system and is backed by a major wetland catchment which may slow the response of short-term heavy rainfall reaching the lower reaches of the burns and the ocean.

Soils

- 9.29 Utilising the 1:250 000 scale National Soil Map of Scotland a limited number of soil types are present in the area of interest namely peat, podzols, brown earth, gleys and calcareous soil which is found on top of the shell rich dunes system stretching from the beach at Sandside Bay into the middle of the village of Reay. The soil map was derived from a mixture of new soil survey work undertaken between 1978 and 1981 and a simplification of more detailed mapping undertaken between 1947 and 1978. The soil map units are mainly soil 'complexes' based on a limited number of repeated landforms found throughout Scotland and, as such, often comprise of more than one particular soil type.
- 9.30 The protection of soils, prevention of diffuse pollution and controls over application of nutrients to soils are part of the remit of agencies such as SNH and SEPA. Relevant guidance from these bodies, for example relating to Nitrate Vulnerable Zones and Controlled Activities Regulations would also be taken into account in the assessment of impacts on land use and soils.

Land Use

- 9.31 Land use in this area is predominantly improved arable, improved grazing and rough grazing (Figure 9-3).

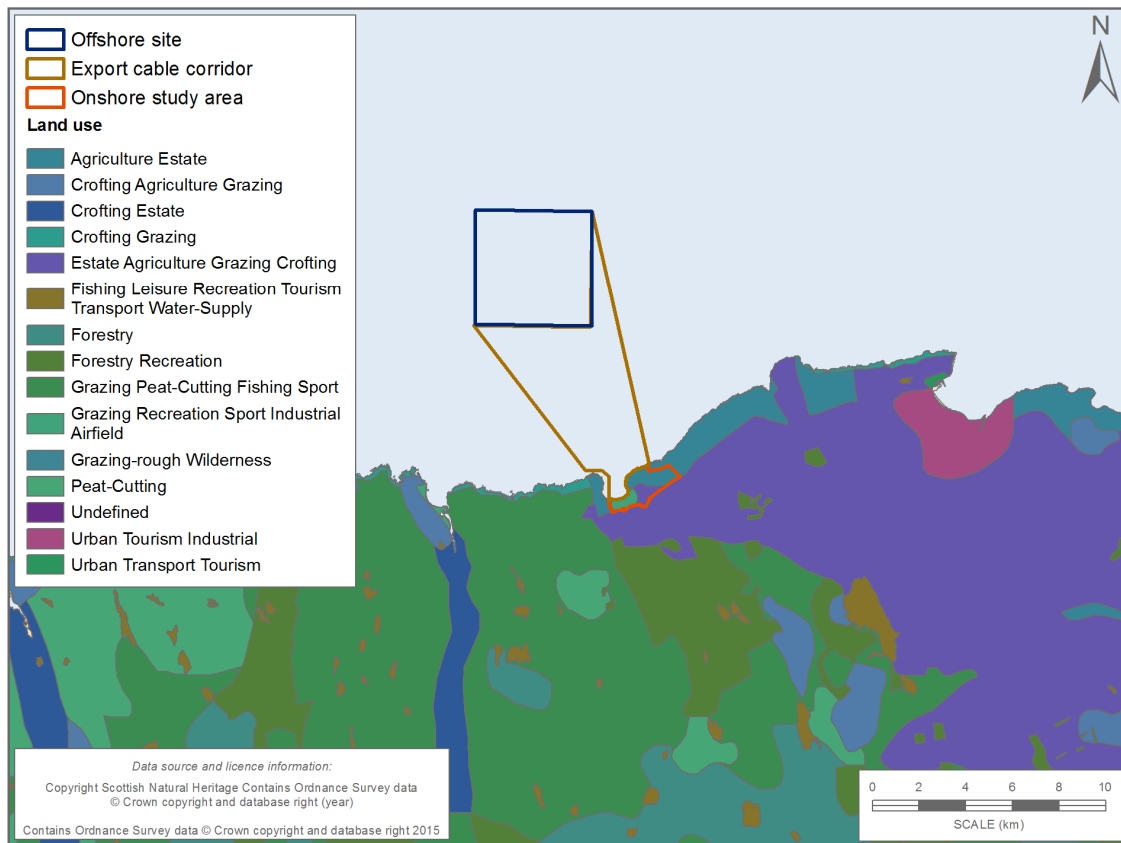


Figure 9-3 Land use

Identification of Potential Impacts

- 9.32 There is the potential that localised onshore geology and hydrogeology may be impacted during the cable laying operation. These impacts will relate to construction work involved in cable landfall across the beach and dunes and trenching of the cable from landfall to Dounreay substation.
- 9.33 Construction activities may potentially impact other sediments (soil, sand and till) in the area causing loose sediments to enter the streams affecting water quality as well as impacting the local wetland habitats at or below the water table. Addition of fine sediment to the hydrological environment could affect the transmissibility of local aquifers and lead to potential flooding.
- 9.34 Depending on the cable installation methods, there is the potential that existing drainage processes may be impacted. In addition disturbance of dune and riverbank sediments during construction could lead to slope disequilibrium and therefore local landslip potential with consequent changes to stream channels.
- 9.35 During the operations and maintenance phase it is considered that the presence of the cable and onshore substation may permanently impact on localised water and drainage flows. There is also the potential that localised pollution or water quality issues may arise as a result of onshore works during scheduled or emergency maintenance.

Cumulative Impacts

- 9.36 No cumulative impacts are anticipated on the physical environment.
- 9.37 Table 9-1 summarises the potential impacts.

Table 9-1 Potential impacts on geology, hydrogeology and physical conditions

Potential impacts during construction		
Impact	High level impact summary and justification	Scoped in/out
Impact on geology	Landfall will cut across geology as will the onshore cable route. Geology considers the surface sediments, dunes, Quaternary glacial sediments and soils and as such is scoped in for further assessment.	Scoped in
Impact on hydrogeology	Interaction with streams and water table causing modifications to natural drainage patterns and potential increase in flood risk.	Scoped in
Impact on surface sediments	Distribution of Quaternary deposits in the study area resulting in modifications to natural drainage patterns and potential increase in flood risk.	Scoped in
Damage to river banks	Change to river banks and water channel form due to the operation of machinery during construction and operation of the onshore works.	Scoped in
Impact on aquifers	Pollution of surface water due to disturbance of sediments and/or accidental spills from construction machinery.	Scoped in
Impact on land use	Construction works may impact on localised land use via direct loss of agricultural land, indirect changes to soil quality and changes to access.	Scoped in
Potential impacts during operations and maintenance		
Impact	High level impact summary and justification	Scoped in/out
Impact on ground conditions	Localised heating impacts arising from the buried cable.	Scoped in
Impact on hydrogeology	Interaction with streams and water table causing modifications to natural drainage patterns and potential increase in flood risk.	Scoped in
Impact on water quality	Interaction with water courses, private and public water supplies and the natural water table resulting in pollution or a reduction in water quality.	Scoped in
Impact on soil/sediment quality	Pollution or contamination of soils from chemical spills and erosion.	Scoped in
Damage to river banks	Depending on the construction methods and long term protection methods, the cable may	Scoped in

	impact on river banks causing localised erosion or drainage impacts.	
Impact on land use	Construction works may impact on localised land use via direct loss of agricultural land, indirect changes to soil quality and changes to access.	Scoped in
Potential impacts during decommissioning		
Potential impacts arising during the decommissioning phase are expected to be similar to, but not exceeding, those arising during the construction phase		As construction section
Potential cumulative impacts		
It is not considered that there is any potential for cumulative impacts affecting the physical environment.		Scoped out

Data Gaps

- 9.38 No site surveys have been undertaken and it is assumed that existing data for the onshore study area will be sufficient.

Method of Assessment

- 9.39 The principle sources of data characterising the area are the British Geological Survey mapping and regional reports. The principle method to be employed is careful examination of the available data where of sufficient detail. Available wind, hydrology and landscape maps will also inform the study.
- 9.40 Quantifying the local watershed will involve a preliminary risk screening and determination of all potential aquifers in the area. The detailed risk assessment will involve a survey of the location use and environmental status (if relevant) of wells, boreholes, springs marshes, bogs and surface water systems both natural and man-made within the area of interest and the surrounding countryside. An assessment of groundwater levels, flow direction, soil characteristics and land profiles will be employed. We will use detailed surface topography (DEM) maps with watershed analysis and flow vectors showing surface water movement. The created water table elevation map with watershed analysis and flow vector study will also be derived. Proprietary interpretation method will be used to map the areas above and below the water table, this can then be integrated with regional habitat mapping. Flood risk from rising sea-level and from catchment area rainfall and flooding will be assessed.

Proposed Project Level Surveys and Studies

- 9.41 There are no surveys proposed for this topic.

Conclusions and Next Steps

- 9.42 Due to the small scale of the Project the potential impact on the physical environment is not considered to be significant. Potential impacts associated with changes to the water table, water quality, impacts to soil and sediment quality and increased flood risk are scoped in and will be taken forward to the assessment phase.

10 Onshore Biological Environment

Introduction

- 10.1 This Section considers the impact of the onshore elements of the Dounreay Tri Project – the ‘Project’ – on the following terrestrial biological receptors:
- Terrestrial ornithology;
 - Terrestrial ecology; and
 - Nature designations.
- 10.2 An overview of the relevant baseline environment is provided for each along with the anticipated impacts, a baseline characterisation strategy, impact assessment strategy and where applicable, possible mitigation and monitoring measures.

10.1 Terrestrial Ornithology

Introduction

- 10.3 This Section characterises the terrestrial avian ecology in the onshore study area and appropriate buffer zones through consideration of use for breeding, wintering and foraging.
- 10.4 The onshore Project area is considered to be the onshore cable search area (from Mean High Water Springs (MHWS)), cable jointing infrastructure and associated substation site. Collectively these will be referred to as the ‘onshore study area’ delineated in Figure 9-1.
- 10.5 This Section provides a high level description of the terrestrial avian ecology (including breeding, wintering and foraging use) in the onshore study area and appropriate buffers. It also highlights the key sensitivities and potential impacts arising from the onshore aspects of the Dounreay Tri Project – the ‘Project’, presents a summary of the relevant UK guidance and details of the methodology which will be applied to the EIA.

Guidance and Legislation

- 10.6 In addition to those described in Chapter 2: Legislative Context and Regulatory Requirements, the following guidance and legislation will be taken in to consideration as part of the assessment of potential impacts on terrestrial ecology:
- Directive 2009/147/EC on the Conservation of Wild Birds (the codified version of Council Directive 79/409/EEC as amended) (*Birds Directive*);
 - The Conservation (Natural Habitats, &c.) Regulations 1994;
 - Wildlife and Countryside Act 1981 (as amended);
 - Nature Conservation (Scotland) Act 2004;
 - The Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2007;
 - Wildlife and Natural Environment (Scotland) Act 2011;
 - 2020 Challenge for Scotland’s Biodiversity. A strategy for the conservation and enhancement of biodiversity in Scotland (2013);
 - Scotland’s Biodiversity: It’s In Your Hands. A strategy for the conservation and enhancement of biodiversity in Scotland (2004);
 - Highland Biodiversity Action Plan 2015-2020;

- Caithness Biodiversity Action Plan 2003 - 2013;
- The Highland Council Supplementary Guidance. Highland's Statutorily Protected Species (2011);
- A Handbook on Environmental Impact Assessment (SNH, 2009);
- Guidelines for Ecological Impact Assessment in the United Kingdom (Institute of Ecology and Environmental Management [IEEM], 2006);
- Guidelines for Preliminary Ecological Appraisal (Benatt, 2013);
- Birds of Conservation Concern 2009 (Eaton *et al.*, 2009);
- Survey Methods for Use in Assessing the Impacts of Onshore Wind Farms on Bird Communities (SNH, 2014);
- Bird Monitoring Methods (Gilbert *et al.*, 1998);
- Raptors: A Field Guide to Survey and Monitoring (Hardey *et al.*, 2009);
- Barn Owl Survey Techniques (Barn Owl Trust, 2001);
- Barn Owl Conservation Handbook (Barn Owl Trust, 2012); and
- Handbook of Biodiversity Methods (Hill *et al.*, 2005).

Available Information

10.7 Data search requests have been made with the organisations listed in Table 10-1, which also indicates whether data has been provided in response. Data provided by these organisations will be referenced in the creation of this Section. In addition, the following data sources will be also be used:

- SNH information about designated sites, their qualifying interests and conservation status, available from SNHi Information Service (<http://www.snh.gov.uk/publications-data-and-research/snhi-information-service/>);
- Greenland White-fronted Geese: Land use and conservation at small wintering sites in Scotland (Francis *et al.*, 2011);
- Mapping the distribution of feeding Pink-footed and Icelandic Greylag Geese in Scotland (Mitchell, 2012); and
- Survey of the feeding areas, roosts and flight activity of qualifying species of the Caithness Lochs Special Protection Area, 2011/12 and 2012/13. Scottish Natural Heritage Commissioned Report No. 523b (Patterson *et al.*, 2013).

Table 10-1 Terrestrial ornithology data search summary (requests made on 19 April 2015)

Data Provider	Response Received	Details
Scottish Natural Heritage (SNH)	Yes	Provided data and information relating to designated sites only.
Royal Society for the Protection of Birds (RSPB)	Yes	Provided data relating to all bird species of conservation concern.
BTO	Yes	Provided data relating to all bird species. Also provided Wetland Bird Survey (WeBS) core count data for Sandside Bay from winter 2009/10 until winter 2013/14.
Wildfowl and Wetlands trust (WWT)	Yes	Provided information relating to goose and swan species except Greenland white-fronted geese.
Greenland White-fronted Goose Study (GWfGS)	Yes	Provided information relating to Greenland white-fronted geese.
Highland Raptor Study Group	Yes	Did not hold any data relating to breeding eagles within 6 km of the onshore search area, or within 2 km for other Schedule 1 raptor and owl species.
The Highland Biological Recording Group (HBRG)	Yes	Provided data relating to all bird species of conservation concern.

Consultation

- 10.8 Consultation was carried out with SNH, who agreed that all the major onshore natural heritage sensitivities had been identified and appropriate survey methods selected.

Study Area

- 10.9 The study area for potential impacts on terrestrial ornithology is defined as the onshore study area (Figure 10-1). Surveys were completed within appropriate buffers (SNH, 2014).

Surveys and Studies Carried Out to Date

- 10.10 A series of terrestrial ornithology surveys have been completed for the Project, and others are ongoing until December 2015. These are summarised in Table 10-2 below. Surveys have been designed with reference to relevant guidance.

Table 10-2 Terrestrial Ornithology Surveys

Survey	Status	Methodology
Foraging goose survey	Ongoing	<p>A survey of foraging geese will be undertaken during winter to establish the number of geese foraging in the surrounding areas. The survey methodology has been designed with reference to SNH guidance, and involves driving the wider area and selecting vantage points to observe fields within at least 3 km of the onshore search area (SNH, 2014). The survey area exceeds the recommended 500 m (SNH, 2014) buffer area in order to provide a robust dataset to allow the assessment of impacts on geese associated with Caithness Lochs Special Protection Area (SPA).</p> <p>Foraging goose surveys would normally be undertaken every two weeks between September and mid-May. Due to the project timeframe it will only be possible to complete three visits from mid-April to mid-May 2015 and fortnightly visits between September and December 2015. However, given the low and temporary nature of the impact of the Project (underground cable), the shorter survey period combined with an assessment of habitat suitability and historic data should provide adequate data for an assessment, and is unlikely to present a significant data gap.</p>
Breeding bird survey	Complete	<p>The breeding bird survey was completed within a 500 m buffer of the onshore search area, and followed the modified Brown and Shepherd methodology recommended by SNH guidance (SNH, 2014) and based upon the methods detailed in Gilbert <i>et al.</i>, (1998). This methodology is used to census upland breeding birds, which may use more open habitats surrounding the site. Four survey visits were made between April and July 2015, in line with SNH guidance (2014) and Calladine <i>et al.</i>, (2009). Each 500 m x 500 m quadrat of open land was surveyed for 20-25 minutes. Details of bird behaviour were noted using standard BTO CBC notation (see Gilbert <i>et al.</i>, 1998). All areas will be approached within 100 m.</p> <p>The survey focussed on breeding waders, in accordance with SNH guidance (SNH, 2014). However, all species seen or heard were recorded.</p> <p>The purpose of the breeding bird survey is to map the territories of breeding birds and breeding bird density in order to allow an assessment of potential displacement impacts, particularly for waders.</p>
Breeding raptor, owl and seabird surveys	Complete	<p>Breeding raptor and seabird surveys were completed within a 2 km buffer around the search area. Walkovers and short VP watches of all suitable areas were carried out in order to establish whether any protected raptors and seabirds breed within or close to the onshore search area, following</p>

Survey	Status	Methodology
		<p>methodologies detailed in Hardey <i>et al.</i>, (2009) and Gilbert <i>et al.</i>, (1998) in accordance with SNH guidance (SNH, 2014). Target species included Annex I (EU Birds Directive) and Schedule 1 (Wildlife and Countryside Act) listed species, as well as species associated with north Caithness Cliffs Special Protection Area (SPA), although observations of buzzards, kestrels and sparrowhawks were also noted. When recording seabirds, the number of nests or individual birds (in the case of species which form dense colonies) was recorded for each distinct colony observed during survey visits, as appropriate (Gilbert <i>et al.</i>, 1998).</p> <p>All areas of suitable breeding habitat were visited monthly between April and August during the breeding season to determine occupancy of territories.</p> <p>In addition, potential barn owl nest sites were identified within 1 km of the search area. Potential nest sites were visited once in the breeding season to search for evidence of occupancy. This survey is based upon the methodology recommended in Hardey <i>et al.</i>, (2009) and by the Barn Owl Trust (2001 and 2012).</p> <p>The purpose of this survey is to map the territories of breeding raptors and owls and identify seabird colonies in order to allow an assessment of potential displacement impacts.</p>
Wetland Bird Survey (WeBS)	Ongoing	<p>Surveys will follow the standard Wetland Bird Survey (WeBS) Core Counts methods (Gilbert <i>et al.</i>, 1998). All waders and wildfowl species using the shore in the onshore search area and within a 500 m buffer will be recorded. Counts will be made using telescopes from VPs selected to avoid disturbance to birds. Routes between VPs will also be carefully selected so as to avoid disturbance to birds. If birds move during a count, this will be recorded to avoid double counting. All counts will be completed within a seven hour period commencing 3.5 hours before the advertised time of low water and finishing 3.5 hours after low water.</p> <p>This survey would normally be completed monthly between September and March inclusive. Due to the project timeframe it will only be possible to complete the September to December 2015 visits. However, given the low and temporary nature of the impact of the Project (underground cable), the shorter survey period should provide adequate data for an assessment, and is unlikely to present a significant data gap. Furthermore, data provided by BTO includes counts for January and February from previous years, which will provide an indication of use of Sandside Bay by waders in these months.</p>

Survey	Status	Methodology
Winter bird walkover survey	Ongoing	The site and a 500 m buffer will be surveyed following the same methods as the breeding bird survey described above, to assess the use of these areas by wintering birds (SNH, 2010). All areas will be approached within 200 m. Three visits will be made between September and December 2015.

Description of the Current Environment

- 10.11 Consultation and a search of available digital datasets indicate that there are statutory designations of European importance (e.g. Special Protected Areas (SPA)) and national importance (e.g. Sites of Special Scientific Interest (SSSI)) within the search area. Table 10-3 provides details of statutory designations of European importance within 20 km and biological SSSIs with ornithological features within 5 km of the search area. Special Protection Areas (SPA) within 20 km are shown in Figure 10-1, and SSSIs within 5 km in Figure 10-2. Full citations for statutory designated sites can be obtained at <http://www.snh.org.uk/snhi/>. Potential impacts on these sites will be considered alongside the relevant species.

Table 10-3 Designated sites relevant to terrestrial ornithology

Designation(s)	Site name	Distance (km)	Qualifying feature
Special Protected Areas	North Caithness Cliffs	Onsite	<p>Supports peregrine falcon populations of European importance.</p> <p>Supports nationally important assemblage of breeding seabirds, including internationally important populations of northern fulmar, black-legged kittiwake, razorbill, common guillemot and Atlantic puffin.</p> <p>It is possible that these species may be disturbed by construction activities if completed during the breeding season. It is also possible that nesting habitat may be lost depending on the selected cable route.</p>
Sites of Special Scientific Interest	Red Point Coast	0.9 km NW	<p>Supports a nationally important aggregation of breeding common guillemot.</p> <p>It is possible that breeding guillemot may be disturbed by construction activities if completed during the breeding season. It is also possible that nesting habitat may be lost depending on the selected cable route.</p>

Designation(s)	Site name	Distance (km)	Qualifying feature
Special Protected Areas	Caithness and Sutherland Peatlands	1.7 km SW	<p>Supports an internationally important population of dunlin.</p> <p>Supports a wide range of nationally important populations including:</p> <ul style="list-style-type: none"> • Red-throated diver; • Black-throated diver; • Hen harrier; • Golden eagle; • Merlin; • Golden plover; • Wood sandpiper; and • Short-eared owl. <p>It is possible that raptors and owls associated with these breeding populations may forage over the site. This may result in temporary loss of foraging habitat during construction, but is unlikely to result in a significant negative impact as there are ample alternatives in the local area.</p>
Ramsar	Caithness and Sutherland Peatlands	1.7 km SW	<p>Supports internationally important populations of breeding dunlin and greylag goose. Also supports an important breeding bird assemblage. At this distance from the Ramsar site the Project will have no direct or indirect impact on these species.</p>
Sites of Special Scientific Interest	East Halladale	1.7 km SW	<p>Supports nationally important populations of breeding dunlin and golden plover. Also supports a nationally important breeding bird assemblage including:</p> <ul style="list-style-type: none"> • Waders and wildfowl; • Red-throated diver; • Black-throated diver; • Greylag goose; • Common scoter; • Golden eagle; • Peregrine falcon; and • Merlin. <p>It is possible that raptors associated with these breeding populations may forage over the site. This may result in temporary loss of foraging</p>

Designation(s)	Site name	Distance (km)	Qualifying feature
			habitat during construction, but is unlikely to result in a significant negative impact as there are ample alternatives in the local area.
Special Protected Areas and Ramsar	Caithness Lochs	6.1 km SE	Supports internationally important populations of wintering Greenland white-fronted geese, greylag geese and whooper swans. It is possible that wildfowl associated with this site may forage within the search area. This may result in temporary loss of foraging habitat during construction, but is unlikely to result in a significant negative impact as there are ample alternatives in the local area.

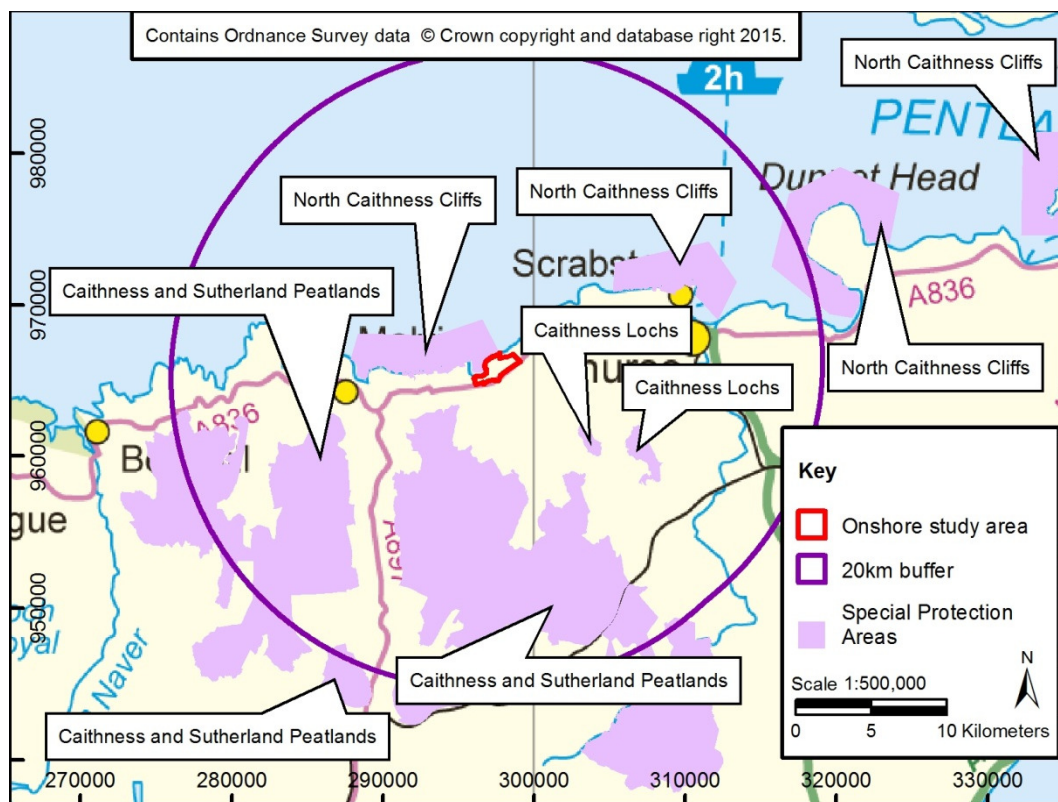


Figure 10-1 SPAs relevant to terrestrial ornithology

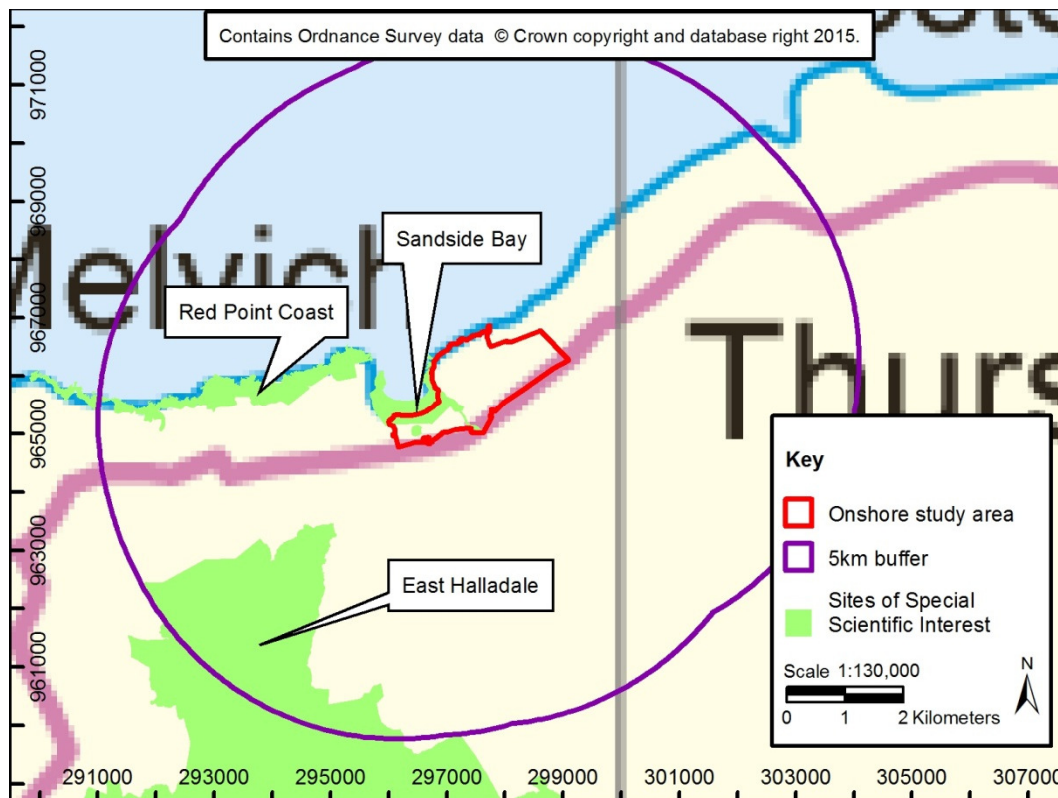


Figure 10-2 SSSIs relevant to terrestrial ornithology and ecology

- 10.12 Wintering wildfowl represent a potential significant ornithological sensitivity for the onshore search area. The nearby Caithness Lochs SPA supports an internationally important proportion of the population of wintering Greenland white-fronted geese, greylag geese and whooper swans (Table 10-3). While the onshore search area does not offer suitable roosting habitat, it is possible that birds associated with this SPA may forage within the search area.
- 10.13 Greenland white-fronted geese have never been recorded feeding in the search area or wider area (based on GWFGS data and Francis *et al.*, 2011). The nearest record of foraging Greenland white-fronted geese is from Balmore in 1979, on the east side of Dounreay Nuclear Facility (based on GWFGS data). However, Greenland white-fronted geese tend to forage in fields around Forss Water, and do not normally feed at coastal sites except during particularly cold winters (Tony Fox, pers. comm.).
- 10.14 Greylag geese are known to forage in the fields around Gunnerscroft, to the east of Sandside Bay (based on RSPB data; BTO data; Mitchell, 2012; Patterson *et al.*, 2013).
- 10.15 Whooper swans have been recorded to the south of the search area, and have also been known to roost at Loch Achbuiligan (based on RSPB and BTO data).
- 10.16 In addition, pink-footed geese and barnacle geese have been recorded foraging onsite (based on RSPB and BTO data). These species are both Amber Listed in Birds of Conservation Concern 2009 (Eaton *et al.*, 2009).
- 10.17 However, the search area offers only limited foraging opportunities for geese and swans, and there is ample alternative foraging habitat of higher quality in the surrounding area. Furthermore, the search area was not found to be used for foraging by Greenland white-fronted geese, greylag geese, pink-footed geese or whooper swans during winter 2011/12 and 2012/13 (Patterson *et al.*, 2013).
- 10.18 Ongoing foraging goose surveys will provide a more detailed baseline for use of the area by wildfowl.

- 10.19 Several species of breeding seabird were recorded within the study area and buffer which may be considered to be associated with North Caithness Cliffs SPA. These include fulmar (total peak count of 537 nests within 2 km – Figure 10-3), guillemot (total peak count 730 individual birds within 2 km – Figure 10-4), kittiwake (total peak count of 890 individual birds within 2 km – Figure 10-5) and razorbill (total peak count of 154 individual birds within 2 km – Figure 10-6). Puffins were also recorded during surveys, although no breeding behaviour was observed. The cliffs within the search area and wider area do, however, offer potentially suitable nesting habitat for this species. There are also historic records of small numbers of puffins nesting in the wider area (based on BTO data and SNH data).

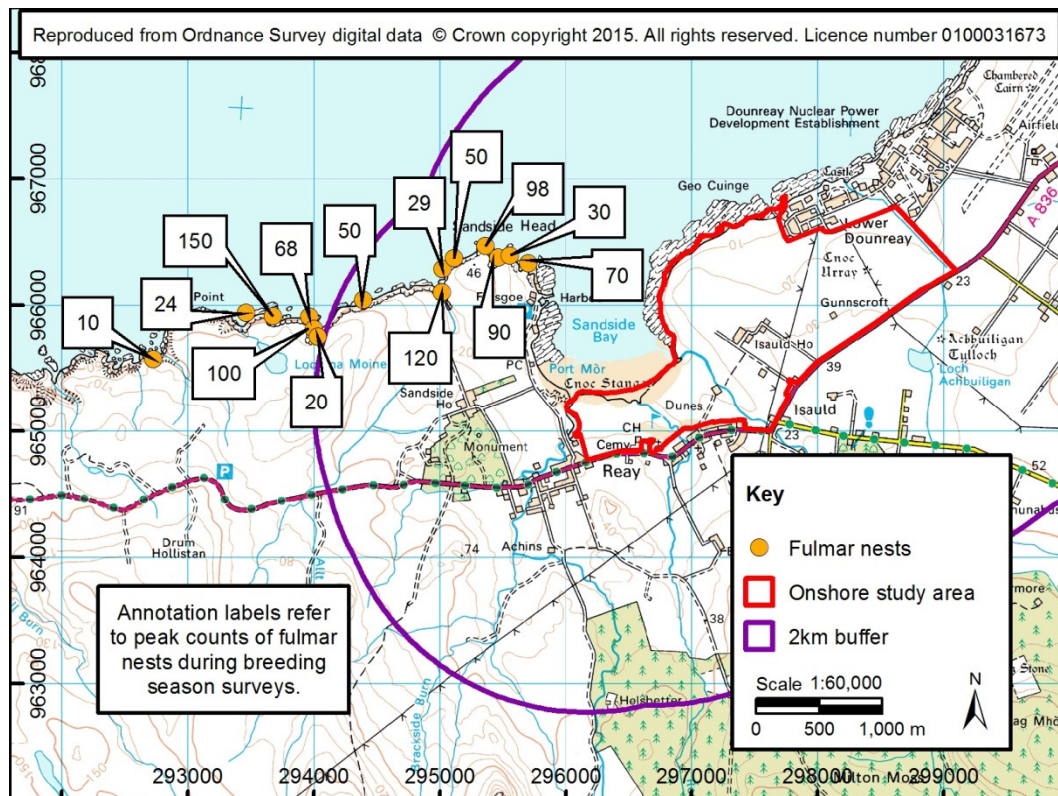


Figure 10-3 Breeding fulmar

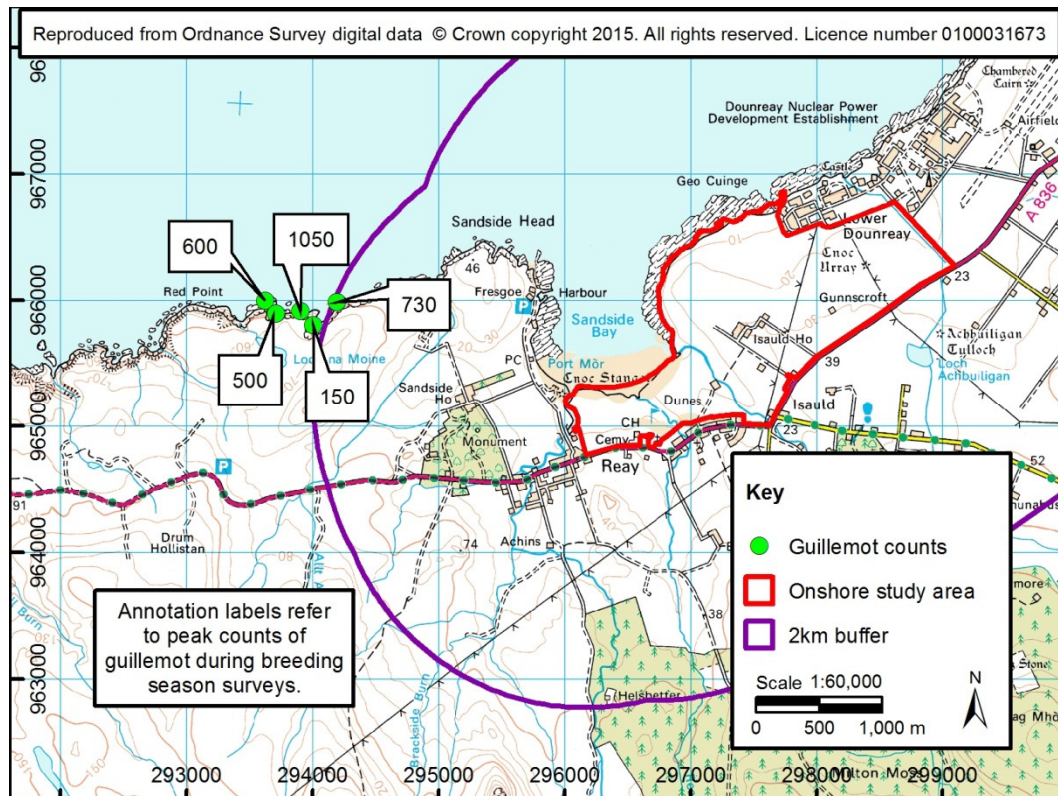


Figure 10-4 Breeding guillemot

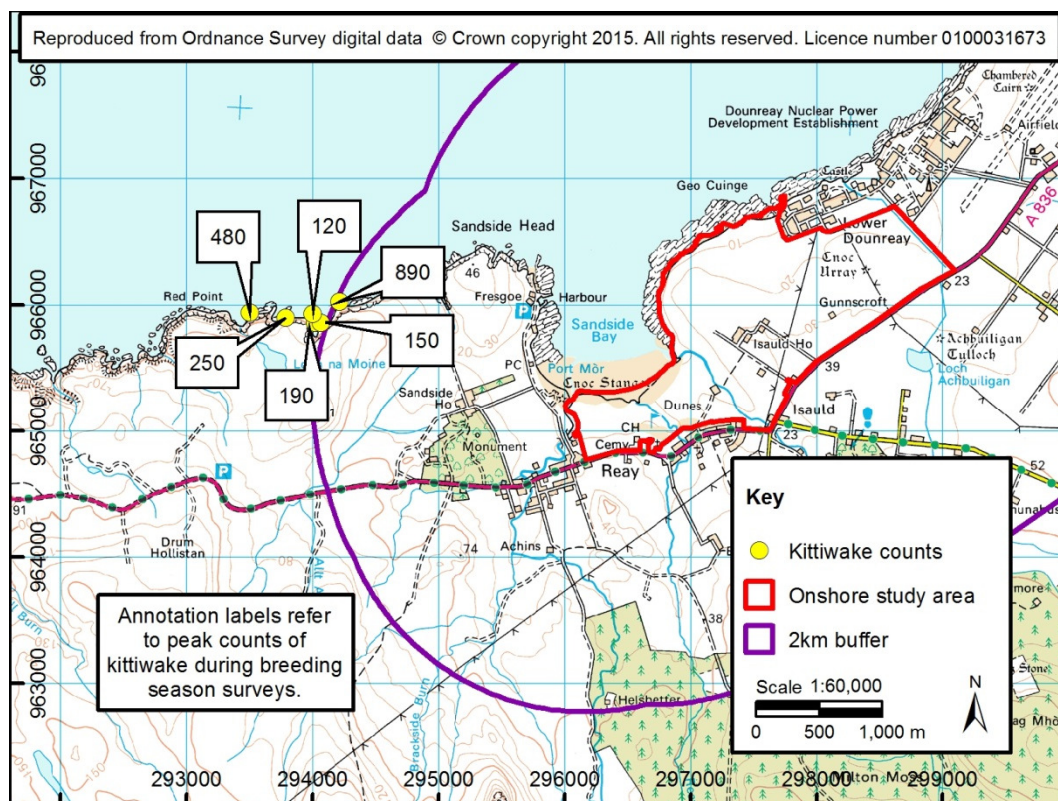


Figure 10-5 Breeding kittiwake

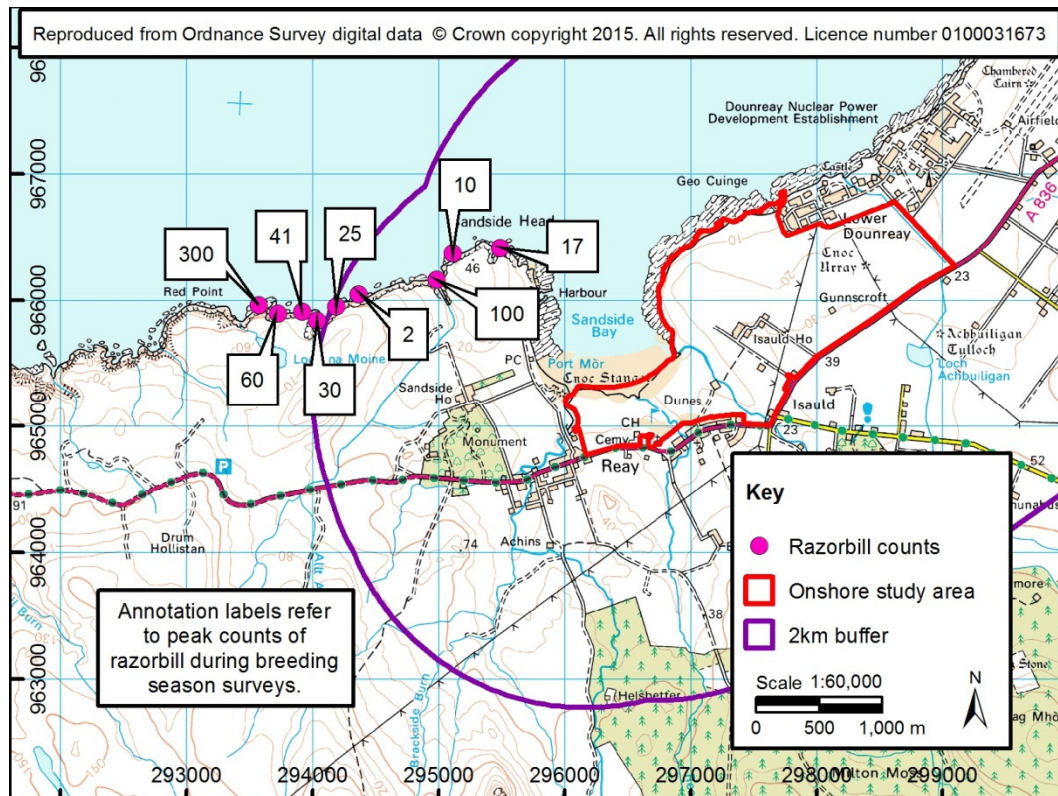


Figure 10-6 Breeding razorbill

- 10.20 A number of other species of breeding seabirds were also recorded within the study area and buffer. These include black guillemot (Amber Listed – individual bird recorded alarming in suitable nesting habitat within 2 km – Figure 10-7), shag (Amber Listed – total peak count of 10 nests within 2 km – Figure 10-8), herring gull (Red Listed – total peak count of 10 nests, beyond 2 km – Figure 10-9) and great black-backed gull (Amber Listed – total peak count of two nests, beyond 2 km – Figure 10-9).

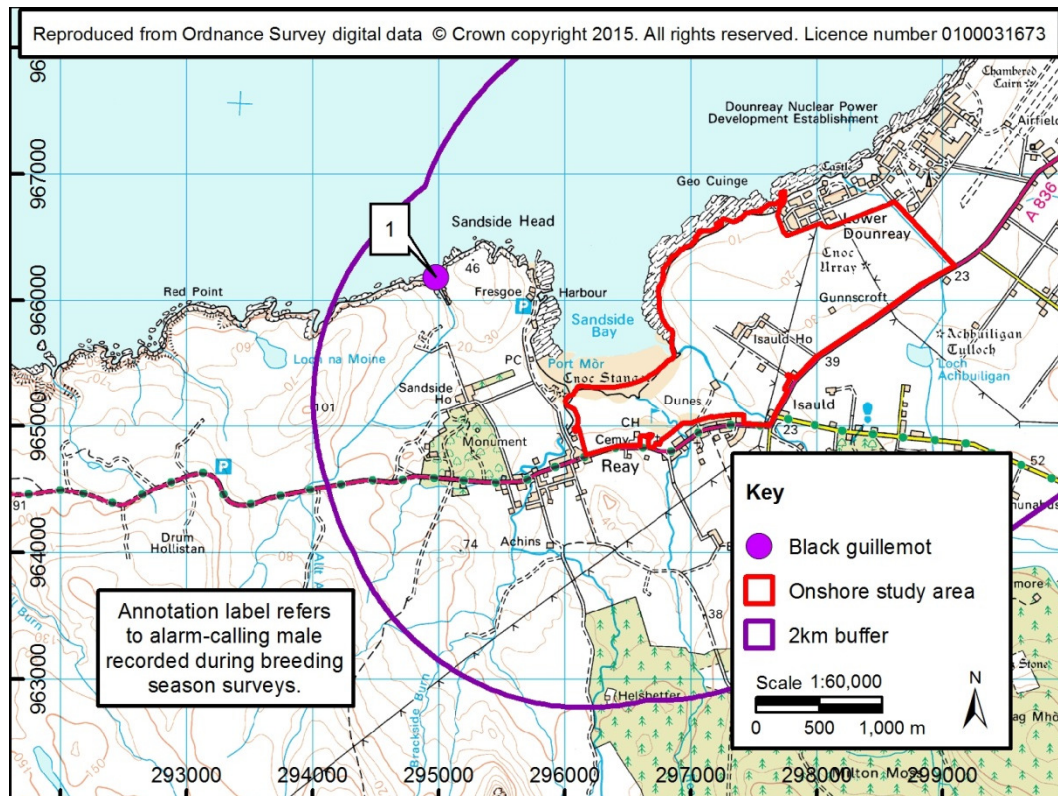


Figure 10-7 Breeding black guillemot

- 10.21 Breeding seabirds were all located outside the onshore search area, to the west (in Red Point Coast SSSI / North Caithness Cliffs SPA).
- 10.22 Several other species of seabirds were also recorded, although no evidence of breeding was observed. Red-throated diver and great northern diver were recorded during the seabird survey, and both are included under Schedule 1 and are Amber Listed. The search area and buffer does not offer suitable breeding habitat for red-throated diver while great northern diver are only passage migrants around mainland Scotland during the breeding season (Forrester *et al.*, 2007). Arctic skua (Red Listed), arctic tern (Amber Listed), black-headed gull (Amber Listed), common tern (Amber Listed), cormorant, eider (Amber Listed), gannet (Amber Listed), great skua (Amber Listed), and shelduck (Amber Listed) were recorded during the breeding seabird survey. No breeding behaviour was observed for these species.
- 10.23 There are also historic records of breeding arctic tern, common tern, eider and great skua within the search area and buffer (based on SNH and BTO data).
- 10.24 Small numbers of arctic terns are known to occasionally breed on the seaward edge of unvegetated sea cliffs similar to those found here, and occasionally in pastureland (Forrester *et al.*, 2007). The onshore search area does offer potentially suitable breeding habitat for the other species in isolated areas. It is therefore possible that these species may breed within the search area in future.

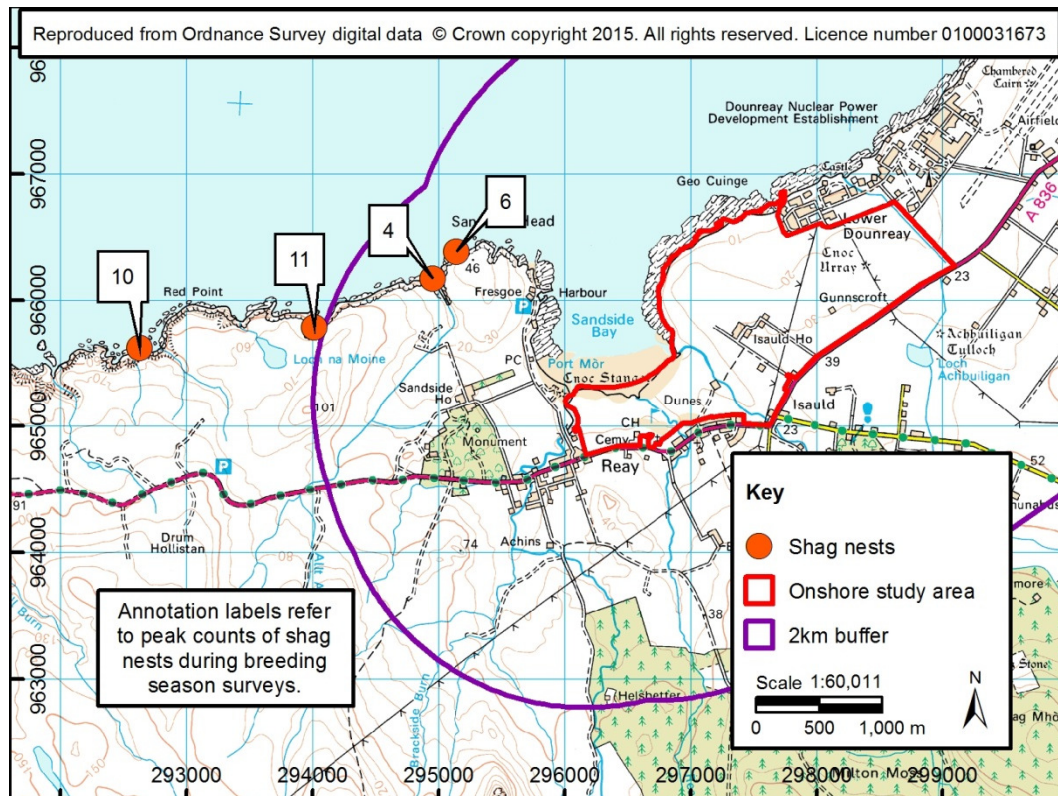


Figure 10-8 Breeding shag

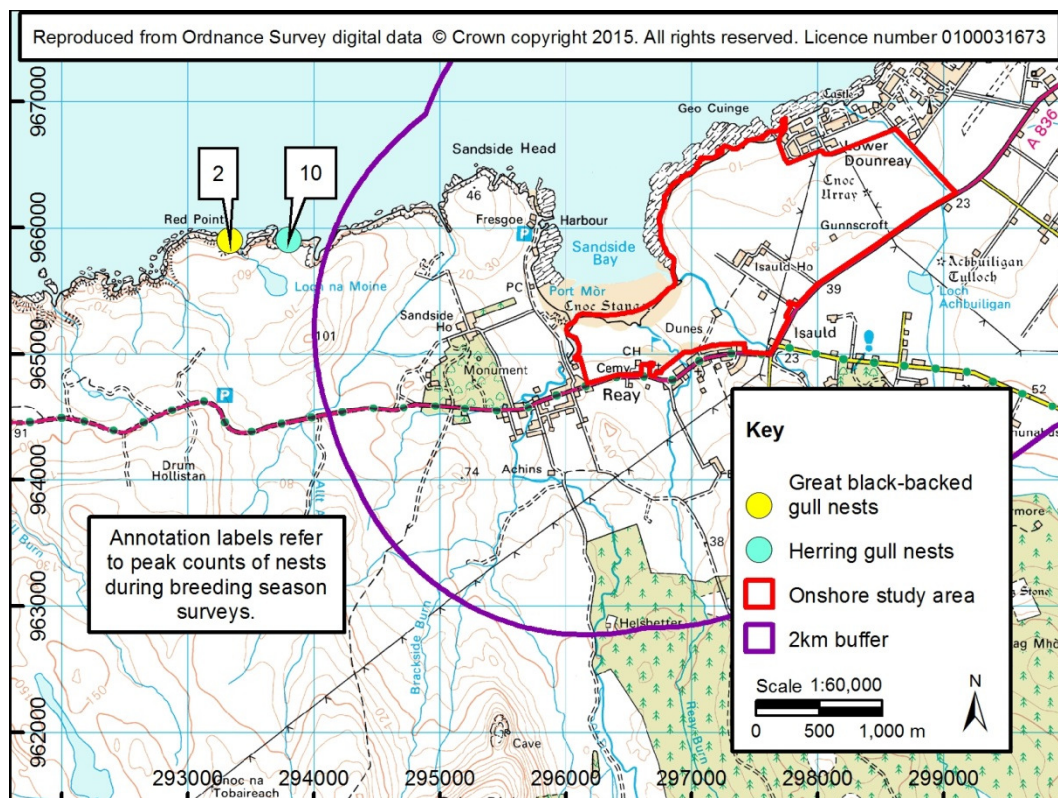


Figure 10-9 Breeding gulls

10.25 Peregrine were recorded during the breeding raptor survey although no breeding behaviour was observed. Peregrine have been recorded within the onshore search area during the winter non-breeding season based on historic data. The cliffs within the search area and wider

area offer potentially suitable nesting habitat for this species, while the seabird colonies offer prey. Peregrine are listed on Schedule 1, and breeding birds may be associated with North Caithness Cliffs SPA.

- 10.26 A barn owl territory was recorded during surveys, as was a buzzard territory. Barn owls are listed under Schedule 1, while buzzards are not of particular conservation concern.
- 10.27 Several other raptor and owl species were recorded within the onshore search area and buffer although no breeding territories were identified. These included hen harrier (Schedule 1), merlin (Schedule 1), kestrel (Amber Listed) and sparrowhawk. The onshore search area does not offer suitable breeding habitat for hen harrier or merlin.
- 10.28 The breeding bird survey found four species of wader and four species of passerine to hold territories within the survey area (onshore search area and 500 m buffer). These included curlew (Amber Listed – four territories), lapwing (Red Listed – seven territories), oystercatcher (Amber Listed – five territories), redshank (Amber Listed – one territory), skylark (Red Listed – 22 territories), meadow pipit (Amber Listed – up to 139 territories), sedge warbler (one territory) and wren (four territories). The majority of wader, skylark and meadow pipit territories were located in the fields at the east of the onshore search area. Breeding wader and passerine territories are shown in Figures 10-10 and 10-11, respectively.

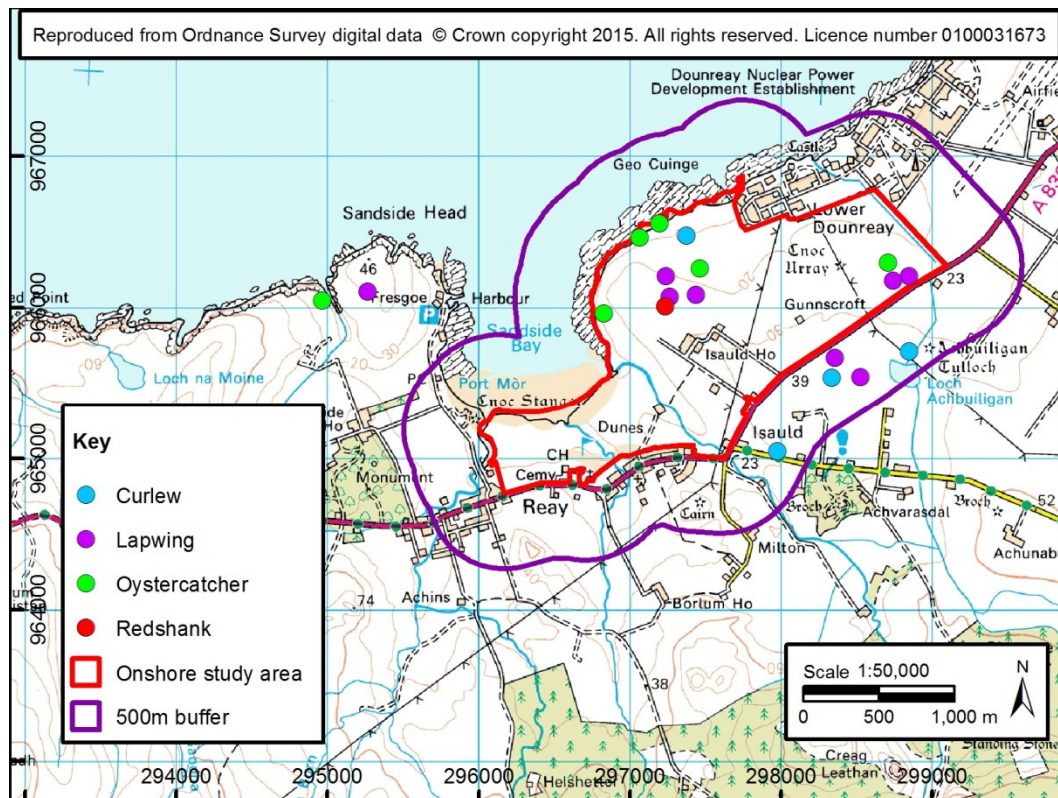


Figure 10-10

Breeding wader territories

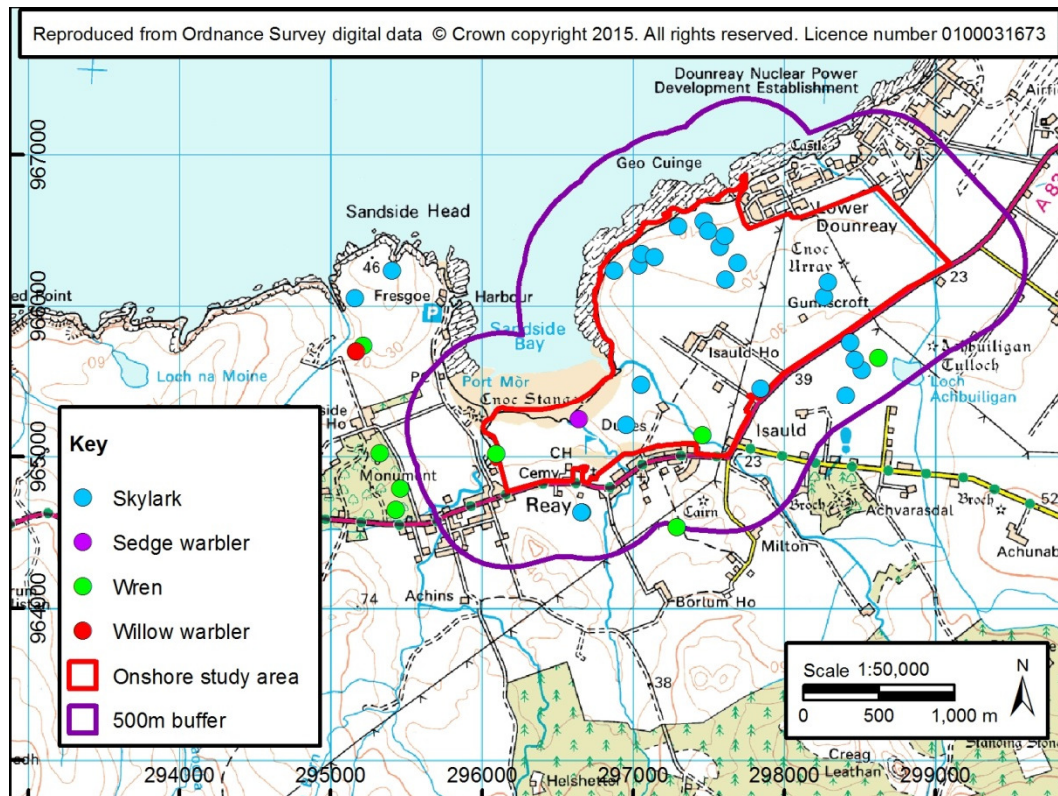


Figure 10-11 Breeding passerine territories

- 10.29 Common sandpiper, ringed plover, sanderling, turnstone and whimbrel were also recorded during the survey, although none of these species were found to breed.
- 10.30 Winter bird surveys have not yet been completed. However, BTO Wetland Bird Survey (WeBS) data indicates that Sandside Bay is used by a variety of wetland bird species during winter.

Identification of Potential Impacts

- 10.31 There is potential for the loss of habitat, individuals or breeding territories through construction work within the onshore study area. This may affect species associated with North Caithness Cliffs SPA.
- 10.32 Disturbance to or displacement of birds in proximity to the site through construction activities. Construction activities during the non-breeding season may affect species associated with Caithness Lochs SPA and construction activities during the breeding season may affect species within the North Caithness Cliffs SPA.
- 10.33 Species associated with North Caithness Cliffs and/or Caithness Lochs SPA in proximity to maintenance activities, may be displaced or disturbed depending upon cable route selection and timing of maintenance activity within the onshore study area.
- 10.34 Table 10-4 provides a summary of potential impacts on terrestrial ornithology that have been identified at this stage.

Cumulative Impacts

- 10.35 The context in which cumulative impacts are considered depends upon the ecology of the species or habitat in question. Therefore, a cumulative impact assessment must investigate the impacts of the development:

- On its own;

- Cumulatively with relevant existing and consented developments; and
- Cumulatively with relevant existing and consented developments as well as those at the application stage.

10.36 In order to undertake a cumulative impact assessment it is necessary to define:

- The species where the Project may result in significant cumulative impacts; and
- The relevant developments for which cumulative impacts must be considered.

10.37 Upon defining these, a Cumulative Impact Assessment (CIA) is undertaken by summing the impacts identified for each species by each project EIA.

10.38 The purpose of the cumulative impact assessment is to determine whether impacts are likely to affect the Favourable Conservation Status of an ornithological interest feature. Where the species is associated with a SPA or other designated site, impacts are assessed in context with this population or area. Where species are not associated with a SPA, impacts are assessed in a *regional* context. The appropriate regional bio-geographic unit has been identified as the Natural Heritage Zone (NHZ) by SNH. NHZ classifications represent areas with a high level of bio-geographic coherence, and are unrelated to administrative boundaries. At this stage, little data is available for the majority of ornithological receptors at NHZ level. The constraints of available data therefore make assessment at NHZ level difficult. The Project lies within the North Caithness and Orkney NHZ, and regional impacts will be assessed within this area as far as is practicable.

10.39 SNH guidance recognises that cumulative impact assessments can be expensive and time consuming, and it is therefore necessary to focus on likely significant impacts which could affect the planning decision (SNH, 2012; Masden *et al.*, 2010). It is also important that any potential cumulative impacts on Natura sites (e.g. SPAs) are considered so as to inform a HRA. As it is not practical to undertake a comprehensive cumulative impact assessment for all species, this assessment will focus on receptors identified as of 'High Sensitivity' which also have either a measurable impact predicted or those receptors for which a significant negative impact of moderate magnitude or higher is predicted.

Table 10-4 Potential impacts on terrestrial ornithology during construction, operations and maintenance, and decommissioning of the Project

Potential impacts during construction		
Impact	High level impact summary and justification	Scoped in/out
Loss of habitat, individuals or breeding territories through construction work at the onshore study area	<p>This may affect species associated with North Caithness Cliffs SPA.</p> <p>The level and type of impact will depend on the cable route selected, the methods used and timing of construction.</p> <p>It is likely that best practice during construction and appropriate mitigation will reduce the level of such impacts, particularly given the low impact and temporary nature of the construction activities.</p> <p>This will be considered further during the EIA.</p>	Scoped in
Disturbance to or displacement of birds in proximity to the site through construction activities	<p>This may affect species associated with Caithness Lochs SPA.</p> <p>The level and type of disturbance will depend on the cable route selected, the methods used and timing of construction.</p> <p>It is likely that best practice during construction and appropriate mitigation will reduce the level of such impacts, particularly given the low impact and temporary nature of the Project.</p> <p>This will be considered further during the EIA.</p>	Scoped in
Potential impacts during operations and maintenance		
Impact	High level impact summary and justification	Scoped in/out
Disturbance to or displacement of birds in proximity to the site through maintenance activities	<p>This may affect species associated with North Caithness Cliffs and/or Caithness Lochs SPA depending on the cable route selected and timing of maintenance works. However, the level of disturbance would be extremely temporary and only occur rarely. Furthermore, depending on the selected cable route, maintenance may represent only a minor increase in human activity over the existing land use baseline.</p> <p>This will be considered further during the EIA.</p>	Scoped in
Potential impacts during decommissioning		
Potential impacts arising during the decommissioning phase are expected to be similar to, but not exceeding, those arising during the construction phase, with the exception that habitat is likely to be restored and displaced species able to return to abandoned areas.		As construction
Potential cumulative impacts		
The need to consider cumulative impacts will be determined during the formal assessment of impacts as part of the EIA (see below) once the final cable route has been selected.		

Data Gaps

- 10.40 Due to the project timeline, it is not possible to complete foraging goose surveys and Wetland Bird Surveys (WeBS) within the recommended periods. However, given the low and temporary nature of the impact of the Project (underground cable), habitat present and availability of historic data, the shorter survey period should provide adequate data for an assessment, and is unlikely to present a significant data gap (Table 10-2).
- 10.41 It was not possible to access Dounreay Nuclear Facility and HMS Vulcan, although these areas were surveyed at a distance using magnification. However, given the low and temporary nature of the impact of the Project, this is unlikely to present a significant data gap.
- 10.42 Access to search the interior of all structures within 1 km of the search area for barn owls was not possible. However, all structures within the search area were assessed, and as the recommended disturbance distance for barn owls is only 100 m, this is unlikely to present a significant data gap provided appropriate pre-construction surveys are undertaken and mitigation employed (Ruddock and Whitfield, 2007; Whitfield *et al.*, 2008).

Method of Assessment

- 10.43 Data collected during novel surveys described in Table 10-2 will be considered alongside historic data so as to identify potential impacts. An assessment of potential impacts will be completed, following best practice guidance (IEEM, 2006). Mitigation and/or compensation will be developed where appropriate.

Conclusions and Next Steps

- 10.44 Ongoing ornithology surveys will be completed in December 2015. An assessment of potential impacts will then be completed, after a cable route has been selected.

10.2 Terrestrial Ecology

Introduction

- 10.45 This Section characterises the non-avian terrestrial ecology in the onshore study area and appropriate buffer zones through consideration of use for breeding, wintering and foraging.
- 10.46 The onshore Project area is considered to be the onshore cable search area (from Mean High Water Springs (MHWS)), cable jointing infrastructure and associated substation site. Collectively these will be referred to as the 'onshore study area' delineated in Figure 9-1.
- 10.47 This Section provides a high level description of the non-avian terrestrial ecology (protected mammals, reptiles, amphibians, invertebrates, flora and habitats) in the onshore study area and appropriate buffers. It also highlights the key sensitivities and potential impacts arising from the onshore aspects of the Dounreay Tri Project – the 'Project', presents a summary of the relevant UK guidance and details of the methodology which will be applied to the EIA.

Guidance and Legislation

- 10.48 In addition to those described in Chapter 2: Legislative Context and Regulatory Requirements, the following guidance and legislation will be taken in to consideration as part of the assessment of potential impacts on terrestrial ecology:
- Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Flora and Fauna (*Habitats Directive*);
 - The Conservation (Natural Habitats, &c.) Regulations 1994;

- Wildlife and Countryside Act 1981 (as amended);
- Nature Conservation (Scotland) Act 2004;
- The Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2007;
- Wildlife and Natural Environment (Scotland) Act 2011;
- The Protection of Badgers Act 1992;
- 2020 Challenge for Scotland's Biodiversity. A Strategy for the conservation and enhancement of biodiversity in Scotland (2013);
- Scotland's Biodiversity: It's In Your Hands. A strategy for the conservation and enhancement of biodiversity in Scotland (2004);
- Highland Biodiversity Action Plan 2015-2020;
- Caithness Biodiversity Action Plan 2003-2013;
- The Highland Council Supplementary Guidance. Highland's Statutorily Protected Species (2011);
- A Handbook on Environmental Impact Assessment (SNH, 2009);
- Guidelines for Ecological Impact Assessment in the United Kingdom (Institute of Ecology and Environmental Management [IEEM] 2006);
- Guidelines for Preliminary Ecological Appraisal (Benatt, 2013);
- Scotland's Wildlife: Badgers and Development (SNH, 2001);
- Bat Mitigation Guidelines (Mitchell-Jones, 2004);
- Bat Conservation Trust Bat Surveys Good Practice Guidelines (Hundt, 2012);
- Land Use Planning System SEPA Guidance Note 4: Planning Guidance on Windfarm Developments (SEPA, 2012);
- Guidance on the identification of groundwater dependent terrestrial ecosystems (UKTAG, 2003);
- Guidance on the identification of groundwater dependent terrestrial ecosystems: Annex I – NVC plant communities and dependency on groundwater (UKTAG, 2009);
- Handbook for Phase 1 Habitat Survey: a technique for environmental audit (JNCC, 2007);
- National Vegetation Classification: Users' Handbook (Rodwell, 2006); and
- Handbook of Biodiversity Methods (Hill *et al.*, 2005).

Available Information

- 10.49 Data search requests have been made with the organisations listed in Table 10-5, which also indicates whether data has been provided in response. Data provided by these organisations will be referenced in the creation of this Section. In addition, the following data sources will be also be used:
- 10.50 SNH information about designated sites, their qualifying interests and conservation status, available from SNH Information Service (<http://www.snh.gov.uk/publications-data-and-research/snhi-information-service/>);
- *Primula scotica* survey in Caithness and Sutherland 2007-2008. Scottish Natural Heritage Commissioned Report No. 312 (Morris, 2009); and

- Sand dune vegetation survey of Scotland: North West. Scottish Natural Heritage Research, Survey and Monitoring Report No. 126. Vols. 1 -3 (Dargie, 1998).

Table 10-5 Terrestrial ecology data search summary (requests made on 19 April 2015)

Data Provider	Response Received	Details
Scottish Natural Heritage	Yes	Provided data and information relating to designated sites only.
The Highland Biological Recording Group (HBRG)	Yes	Provided data relating to all species of conservation concern.
National Biodiversity Network Gateway	Yes	Advised that their records were available on National Biodiversity Network Gateway, and gave permission for their use on this project if relevant.
Scottish Badgers (SB)	Yes	Did not hold any records of badgers within 2 km of the onshore search area, with the nearest records being located at Bettyhill to the west and Thurso to the east. However, the area is considered to be under-recorded and as the search area includes similar habitat to the Bettyhill and Thurso records novel surveys were advised.
Amphibian and Reptile Conservation (ARC)	Yes	Did not hold any records that they were able to share, but confirmed that adders are known to be present within 2 km of the onshore search area.
Botanical Society of the British Isles (BSBI)	No	No response received to date.

Consultation

- 10.51 Consultation was carried out with SNH, who agreed that all the major onshore natural heritage sensitivities had been identified and appropriate survey methods selected.

Study Area

- 10.52 The study area for potential impacts on terrestrial ecology is defined as the onshore search area (Figure 9-1). Surveys were completed within appropriate buffers.

Surveys and Studies Carried Out to Date

- 10.53 A series of terrestrial ecology surveys have been completed for the project, and others are ongoing until December 2015. These are summarised in Table 10-6 below. Surveys have been designed with reference to relevant guidance as described above.

Table 10-6 Terrestrial ecology surveys

Survey	Status	Methodology
Phase 1 Habitat Survey	Complete	Standard Phase 1 habitat mapping methodology was used to identify habitat areas of ecological importance within the onshore search area, particularly those listed under Annex I of the Habitats Directive. Methodology followed that outlined in the Handbook for Phase 1 habitat survey published by the JNCC (2007). This survey was completed in July 2015.
National Vegetation Classification (NVC) survey	Complete	<p>A full NVC survey was completed within the onshore search area in order to identify any areas of habitat which may be included under Annex I of the Habitats Directive. This survey also ensured that any potential groundwater dependent terrestrial ecosystem (GWDTEs) were identified in accordance with guidance (SEPA, 2012; UKTAG, 2003; UKTAG 2009). The process of identifying wetlands was also informed by the methodology published in SNIFFER (2009).</p> <p>The NVC survey was completed following the methods described in Rodwell (2006). Communities were compared with the published descriptions given in Rodwell <i>et seq.</i> (1991).</p> <p>Aerial photos were reviewed to give an overview of the site and to identify broad distributions of vegetation types and an initial site walkover was undertaken, noting the main NVC communities and mosaics present. Where appropriate 2 m x 2 m quadrats were used to collect data for comparison with published species accounts. Where the collection of quadrat data was found to be impractical, i.e. where the habitat was fragmented or occupied a very small area, the DAFOR dominance scale (Dominant, Abundant, Frequent, Occasional, Rare) was used to record habitats. This data can also be used for comparison with published species accounts. The NVC communities identified were then mapped and community accounts provided, making particular reference to communities of conservation concern.</p> <p>This survey was completed between June and July 2015.</p>

Survey	Status	Methodology
Scottish primrose survey	Complete	<p>All locations where Scottish primrose plants were recorded in 2007 (Morris, 2009) were revisited, and other potential habitat (coastal grassland and heathland, including areas between 5 m and 10 m of sea cliffs) was also surveyed within the onshore search area in order to detect any new or unrecorded populations. A count of flowering and non-flowering Scottish primrose plants was made at each location. Physical counts of individual plants were to be made up to 200. Where populations exceeded 200 individual Scottish primrose plants, the total was to be estimated based on density and extent.</p> <p>This survey was completed between June and July 2015.</p>
Protected species survey	Complete	<p>A protected species survey was undertaken within the search area and 250 m buffer. This survey targeted pine marten (<i>Martes martes</i>), otter (<i>Lutra lutra</i>), and badger (<i>Meles meles</i>). Habitat was also assessed as to its suitability to support bats (Chiroptera). All signs and sightings were recorded on large scale maps, and locations marked using hand held GPS devices.</p> <p>Suitable habitat was also noted for reptiles.</p> <p>This survey was completed in July 2015.</p>

Description of the Current Environment

- 10.54 Consultation and a search of available digital datasets indicates that there are statutory designations of national importance (e.g. Sites of Special Scientific Interest (SSSI)) within the search area. Table 10-7 provides details of statutory designations of European importance (e.g. Special Areas of Conservation (SAC)) within 20 km and biological SSSIs with non-avian features within 5 km of the search area. SACs within 20 km are shown in Figure 10-12, and SSSIs within 5 km in Figure 10-2. Full citations for statutory designated sites can be obtained at <http://www.snh.org.uk/snhi/>. Potential impacts on these sites will be considered alongside the relevant species and habitats.

Table 10-7 Designated Sites Relevant to Terrestrial Ecology

Designation(s)	Site name	Distance (km)	Qualifying feature
Sites of Special Scientific Interest	Sandside Bay	Onsite	<p>Supports a nationally important example of sand dunes.</p> <p>It is possible that sand dune habitat associated with the SSSI may be lost depending on the cable route selected and mitigation employed.</p>
Sites of Special Scientific Interest	Red Point Coast	0.9 km NW	<p>Supports a nationally important population of Scottish primrose.</p> <p>It is possible that Scottish primrose associated with the SSSI population may be more widespread onsite, and may be lost depending on the cable route selected and mitigation employed.</p>
Special Areas of Conservation and Ramsar	Caithness and Sutherland Peatlands	1.7 km SW	<p>Supports a range of internationally important habitats listed under Annex I of the Habitats Directive including:</p> <ul style="list-style-type: none"> • Depressions on peat substrates; • Blanket bog; • Wet heathland; • Wet mires; • Acid peat-stained lakes and ponds; and • Clear-water lakes with aquatic vegetation and poor to moderate nutrient levels. <p>Also supports internationally rare species listed under Annex II of the Habitats Directive, including:</p> <ul style="list-style-type: none"> • Otter; and • Marsh saxifrage. <p>It is possible that otters associated with this SAC may forage within the Project site, although any negative impacts should be avoided by employing appropriate mitigation.</p> <p>As the Project will have no direct or indirect impact on the site or adjacent habitat, there is no pathway for impact on other features as identified in this report.</p>
Sites of Special	East Halladale	1.7 km SW	Supports nationally important blanket bog habitat.

Designation(s)	Site name	Distance (km)	Qualifying feature
Scientific Interest			As the Project will have no direct or indirect impact on the site or adjacent habitat, there is no pathway for impact as identified in this report.
Special Areas of Conservation	Broubster Leans	6.1 km SE	Supports internationally important mire habitat. As the Project will have no direct or indirect impact on the site or adjacent habitat, there is no pathway for impact as identified in this report.
Special Areas of Conservation	River Thurso	11.9 km E	Supports an internationally important population of Atlantic salmon (listed under Annex II of the Habitats Directive). As the Project will have no direct or indirect impact on this site, there is no pathway for impact on other features as identified in this report.
Special Areas of Conservation	Strathy Point	12.6 km W	Supports internationally important vegetated sea cliff habitat. As the Project will have no direct or indirect impact on the site or adjacent habitat, there is no pathway for impact as identified in this report.

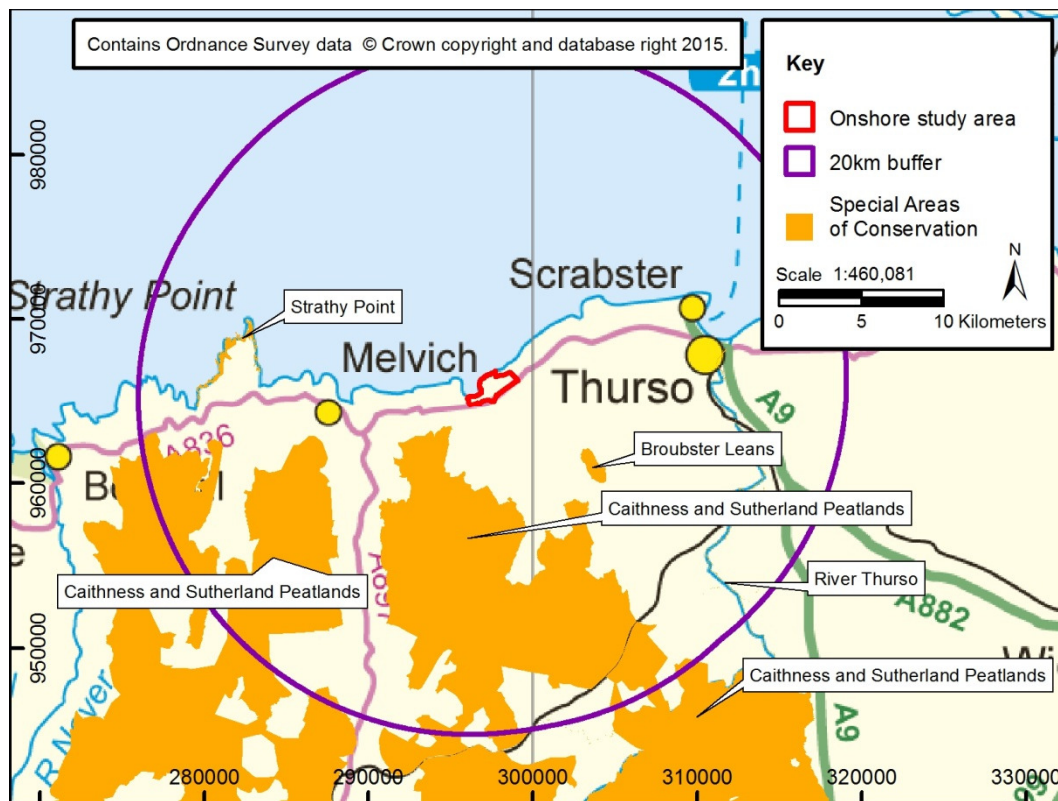


Figure 10-12 SACs relevant to terrestrial ecology

- 10.55 Overall, 16 habitats were identified and mapped during the Phase 1 Habitat Survey. The features J2.4 Fence and J5 Other (mainly buildings, tracks and roads) are not considered as habitats, but are included here for completeness. These habitats are shown on Figure 10-13 and Figure 10-14. The results indicated the need for a more detailed NVC survey due to the presence of sensitive habitats.
- 10.56 The results of the novel NVC survey show that the composition of the habitats around and in Sandside Bay have remained broadly similar to that found during the previous survey (Dargie, 1998) (Figure 10-14). The strandline and bare, shifting sand above MHWs level on Sandside Bay contains very small areas of the sand dune communities of the NVC types SD2 *Honkenya peploides* – *Cakile maritima* strandline community and SD4 *Elymus farctus* foredune community. The area of these communities is less than several square metres in total.
- 10.57 Behind the beach lies the main area of sand dunes. The dunes area is fronted by the pioneering SD6 *Ammophila arenaria* mobile dune community. As the dunes become more fixed, this community is replaced by the SD7 *Ammophila arenaria* – *Festuca rubra* semi-fixed dune community. Areas of SD6 mobile dune community persist in the more fixed dunes where disturbance and the collapse of dune structures exposes more bare sand. SD7 semi-fixed dune communities form a mosaic with and are gradually replaced by the SD8 *Festuca rubra* – *Galium verum* fixed dune grassland where the dunes become more stable and erosion and the accretion of sand ceases; here the sward becomes grassier (Rodwell, 2000). Also forming the mosaic on the large fixed dunes is the mesotrophic grass community MG1 *Arrhenatherum elatius* grassland, dominated by large grasses and umbellifers. The golf course itself primarily consists of SD8 fixed dune grassland with less cultivated areas of taller dunes comprising of SD7, SD8 and MG1. A small area of flushed wet ground occurs in the centre of the golf course and consists of areas of M10 *Carex dioica* – *Pinguicula vulgaris* mire with SD8 colonising the drier patches within the wet ground.

- 10.58 This vegetation pattern occurs along the front of the bay from the minor road leading to the parking area at Fresgoe to the Burn of Isauld. North of the burn mouth the sand dune communities persist where the pattern is repeated. A tiny area of SD2 and SD4 occurs on the loose sand immediately north of the burn's mouth. Behind this the succession of SD6 into SD7 and SD8 is repeated. The SD8 fixed dune grassland is then succeeded by mesotrophic grasslands. A narrow strip of dunes no more than 5 m wide runs north from here toward White Geos above low cliffs and sea washed rocks.
- 10.59 The coastal strip north and east of the bay above low cliffs is colonised by a strip of the NVC type MC10 *Festuca rubra* – *Plantago* spp. maritime grassland. Small areas of H7 *Calluna vulgaris* – *Scilla verna* heath also occur up to 80 m from the cliff edge.
- 10.60 The remainder of the search area consists of agricultural fields of mesotrophic grasslands and arable fields. The fields are primarily of MG7 *Lolium perenne* improved grassland with MG6 *Lolium perenne* - *Cynosurus cristatus* grassland in less intensively grazed areas. A small number of trampled areas have rank assemblages of grasses dominated by *Urtica dioica* (stinging nettle) closely resembling the OV25 *Urtica dioica* - *Cirsium arvense* community. MG1 *Arrhenatherum elatius* grassland lines the banks of the field margins and burns of the search area. Small wooded areas of planted conifers (no NVC designation) with some *Alnus glutinosa* – *Fraxus excelsior* woodland occur around the periphery of the plantations.
- 10.61 NVC communities SD2, SD6, SD7, SD8, M10, M15 and H7 identified within the onshore search area are listed under Annex I of the Habitats Directive. In addition, NVC community M10 is considered to be a highly groundwater dependent GWDTE, and MG10 moderately groundwater dependent.

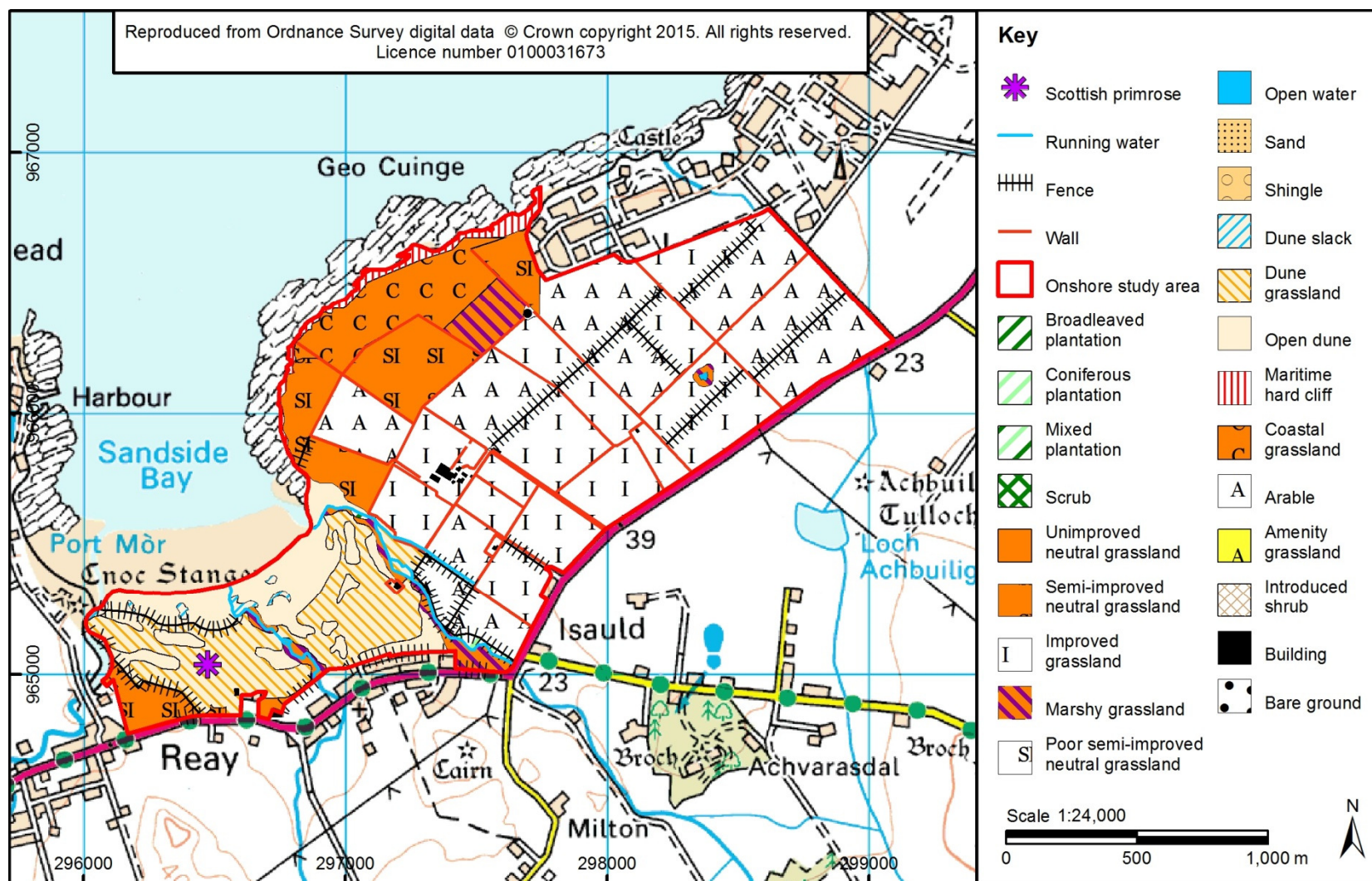
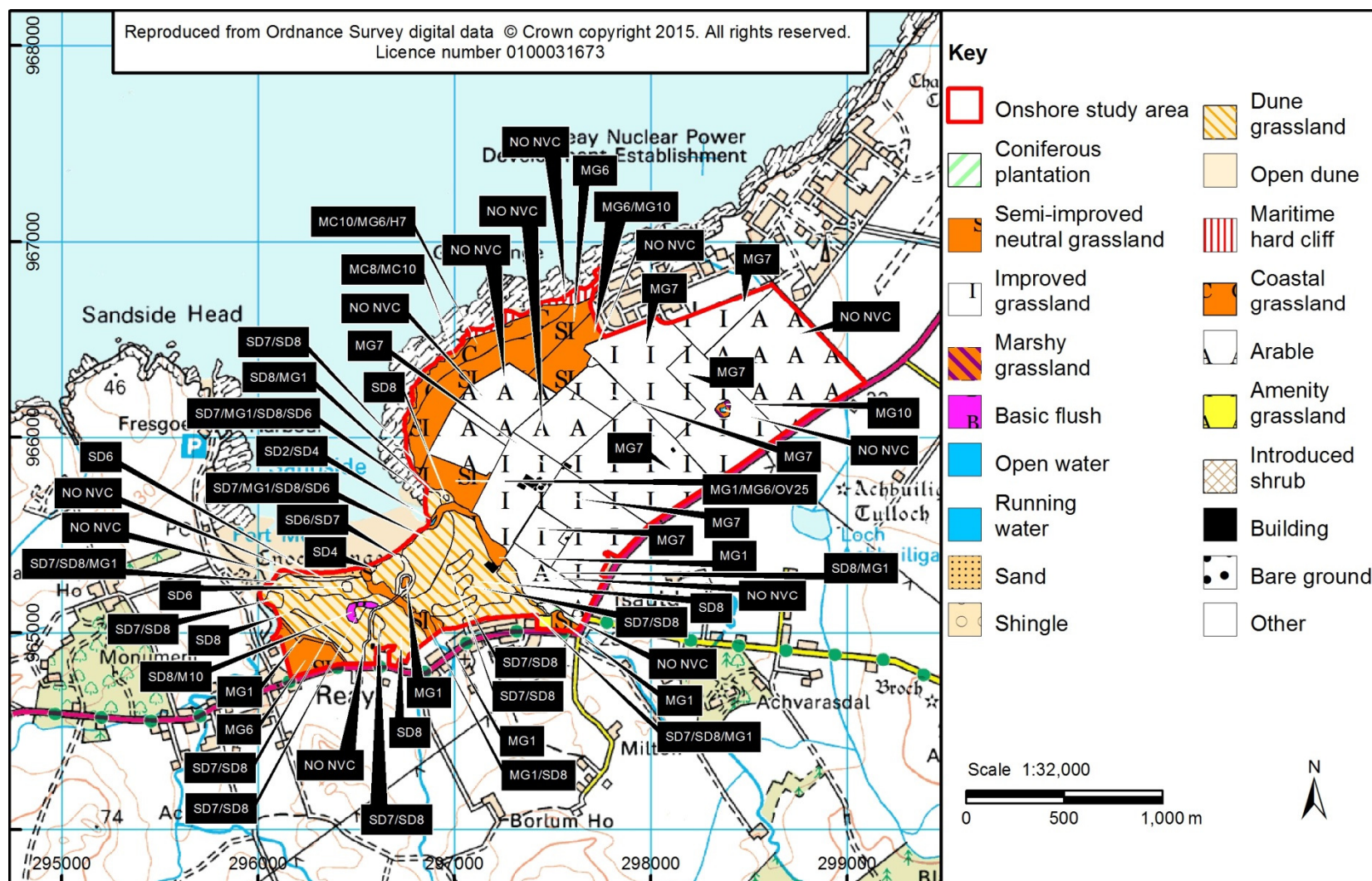


Figure 10-13 Phase 1 habitats and Scottish primrose



- 10.62 An individual Scottish primrose (*Primula scotica*) plant was found on Reay Golf Course (Figure 10-13). This represents a fall in numbers from the previous survey which found three plants here in 2007 (Morris, 2009). Large populations of Scottish primrose have been found at Sandside Head (Morris, 2009). However these populations fall outside the onshore search area. The area of suitable habitat along the coast north east of Sandside Bay was searched and no Scottish primrose found. Therefore development on this side of the search area is unlikely to impact the species.
- 10.63 No evidence of otter, pine marten or badger was found during the protected species survey. Two historic records exist of pine marten within 2 km of the onshore search area, one of which relates to a confirmed breeding den (based on HBRG data). However, the export cable corridor search does offer suitable foraging habitat for all of these species, and it is likely they will use the area on occasion. Otters are listed under Annex II of the Habitats Directive and Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and are qualifying species of Caithness and Sutherland Peatlands SAC. Pine martens are protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). Badgers are protected under the Protection of Badgers Act 1992.
- 10.64 Both brown long-eared and common pipistrelle bats have been recorded within 2 km (based on HBRG data). One of these records, from 2006, relates to a confirmed pipistrelle roost. The onshore search area offers potential roost sites for bats. The farm and outbuildings at Isauld House, buildings at Gunnerscroft, Mary's Cottage, HMS Vulcan, Dounreay and around Reay and New Reay may offer roosting opportunities. The woodland around New Reay also contains mature broadleaved trees which offer further opportunities. The search area also offers potentially suitable foraging habitat for bats. However, there will be only a temporary loss of a small area of foraging habitat during construction, and no suitable roosting habitat will be affected by a cable route within the onshore study area. All bat species are protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and are listed on Annex II of the Habitats Directive.
- 10.65 Reptiles were not recorded during surveys and there are no historic records of reptiles relevant to the search area. However, both adders and slow-worms are known from the wider area, based on HBRG and ARC data. The search area does offer suitable habitat for these species, and for common lizards. Adders, slow-worms and common lizards are protected from intentional and reckless harm under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended).
- 10.66 The great yellow bumblebee (*Bombus distinguendus*) has been recorded to the west, outwith the onshore search area (two records from 2009 based on HBRG data). The great yellow bumblebee is a Scottish Biodiversity List species.
- 10.67 Other bumblebee species, all included on the Caithness Local Biodiversity Action Plan (LBAP), have also been recorded within the onshore search area and wider area (based on HBRG data), including small garden bumblebee (*Bombus hortorum*), broken-belted bee (*Bombus soroeensis*), common carder bee (*Bombus pascuorum*), northern white-tailed bumblebee (*Bombus magnus*) and early bumblebee (*Bombus pratorum*). In addition, several butterfly species included on the Caithness Local Biodiversity Action Plan have been recorded within the search area and wider area (based on HBRG data) including red admiral (*Vanessa atalanta*), common blue (*Polyommatus icarus*), meadow brown (*Maniola jurtina*) and small tortoiseshell (*Aglais urticae*). As only a small area of habitat would be temporarily disturbed before being fully restored following standard mitigation, there is unlikely to be any significant impact on these species.

Identification of Potential Impacts

- 10.68 There is likely loss of sand dune habitat feature of Sandside Bay SSSI, as well as Annex I habitats and GWDTEs depending up cable route and construction route selection.
- 10.69 Cable construction may result in the loss of Scottish primrose plants or populations. Red Point Coast SSSI supports a nationally important population of Scottish primrose. It is possible that Scottish primrose associated with the SSSI population may be more widespread onsite, and may be lost depending on the cable route selected and mitigation employed.
- 10.70 Mortality, displacement or disturbance to otter a protected species associated with Caithness and Sutherland Peatlands SAC may occur as a result of cable construction. Pine marten, badger and reptiles are also likely to be in proximity to cable routes, and possible within the onshore study area during construction and maintenance.
- 10.71 The impact of the Project's operations and maintenance activities upon otter from Caithness and Sutherland Peatlands SAC will also be considered.
- 10.72 There is only a small area of invertebrate habitat that would be temporarily disturbed during construction of the Project.
- 10.73 The Project does not affect any features with the potential to support bat roosts within the onshore study area.
- 10.74 Table 10-8 provides a summary of potential impacts on terrestrial ecology that have been identified at this stage and justification for scoping in or out.

Cumulative Impacts

- 10.75 Cumulative impacts would not be detected when considering the Project in isolation, but become significant in combination with other impacts. The context in which cumulative impacts are considered depends upon the ecology of the species or habitat in question. Therefore, a cumulative impact assessment must investigate the impacts of the Project:
- On its own;
 - Cumulatively with relevant existing and consented developments; and
 - Cumulatively with relevant existing and consented developments as well as those at the application stage.
- 10.76 In order to undertake a cumulative impact assessment it is necessary to define:
- The species where the Project may result in significant cumulative impacts; and
 - The relevant developments for which cumulative impacts must be considered.
- 10.77 Upon defining these, a cumulative impact assessment is undertaken by summing the impacts identified for each species by each project EIA.
- 10.78 The purpose of the cumulative impact assessment is to determine whether impacts are likely to affect the Favourable Conservation Status of an ecological interest feature. Where the species is associated with an SAC or other designated site impacts are assessed in context with this population or area. Where species are not associated with an SAC impacts are assessed in a *regional* context. The appropriate regional bio-geographic unit has been identified as the NHZ by SNH. NHZ classifications represent areas with a high level of bio-geographic coherence, and are unrelated to administrative boundaries. At this stage, little data is available for the majority of ecological receptors at NHZ level. The constraints of available data therefore make assessment at NHZ level difficult. The Project lies within the North

Caithness and Orkney NHZ, and regional impacts will be assessed within this area as far as is practicable.

- 10.79 SNH guidance recognises that cumulative impact assessments can be expensive and time consuming, and it is therefore necessary to focus on likely significant impacts which could affect the planning decision (SNH, 2012; Masden *et al.*, 2010). It is also important that any potential cumulative impacts on Natura sites (e.g. SACs) are considered so as to inform a HRA. As it is not practical to undertake a comprehensive cumulative impact assessment for all species, this assessment will focus on receptors identified as of 'High Sensitivity' which also have either a measurable impact predicted or those receptors for which a significant negative impact of moderate magnitude or higher is predicted.

Table 10-8 Potential impacts on terrestrial ecology during construction, operations and maintenance, and decommissioning of the Project

Potential impacts during construction		
Impact	High level impact summary and justification	Scoped in/out
Loss of habitat	<p>This may affect the sand dune habitat feature of Sandside Bay SSSI, as well as Annex I habitats and GWDTEs.</p> <p>The level of impact will depend on the cable route selected and the methods used in construction.</p> <p>It is likely that best practice during construction and appropriate mitigation will reduce the level of such impacts, particularly given the low impact and temporary nature of the Project.</p> <p>This will be considered further during the EIA.</p>	Scoped in
Loss of Scottish primrose plants or populations	<p>The level of impact will depend on the cable route selected, the methods used and timing of construction.</p> <p>Red point Coast SSSI supports a nationally important population of Scottish primrose. It is possible that Scottish primrose associated with the SSSI population may be more widespread onsite, and may be lost depending on the cable route selected and mitigation employed.</p> <p>This will be considered further during the EIA.</p>	Scoped in
Mortality of protected species (otter, pine marten, badger, reptiles) through construction activities	<p>This may affect otters, which are associated with Caithness and Sutherland Peatlands SAC.</p> <p>The level of impact will depend on the cable route selected, the methods used and timing of construction.</p> <p>It is likely that best practice during construction and appropriate mitigation will reduce the level of such impacts, particularly given the low impact and temporary nature of the Project.</p> <p>This will be considered further during the EIA.</p>	Scoped in
Disturbance to or	This may affect otters, which are associated with	Scoped in

displacement of protected species (otter, pine marten, badger, reptiles) in proximity to the site through construction activities	<p>Caithness and Sutherland Peatlands SAC.</p> <p>The level and type of disturbance will depend on the cable route selected, the methods used and timing of construction.</p> <p>It is likely that best practice during construction and appropriate mitigation will reduce the level of such impacts, particularly given the low impact and temporary nature of the Project.</p> <p>This will be considered further during the EIA.</p>	
Loss of bat roosts	The cable will not affect any features with the potential to support bat roosts.	Scoped out
Loss of habitat important for invertebrate populations of conservation concern	As only a small area of habitat would be temporarily disturbed before being fully restored following standard mitigation, there is unlikely to be any significant impact on these species.	Scoped out
Potential impacts during operations and maintenance		
Impact	High level impact summary and justification	Scoped in/out
Disturbance to or displacement of protected species (otter, pine marten, badger, reptiles) in proximity to the site through maintenance activities	<p>This may affect otters, which are associated with Caithness and Sutherland Peatlands SAC.</p> <p>However, the level of disturbance would be extremely temporary and only occur rarely.</p> <p>Furthermore, depending on the selected cable route, maintenance may represent only a minor increase in human activity over the existing land use baseline.</p> <p>This will be considered further during the EIA.</p>	Scoped in
Potential impacts during decommissioning		
Potential impacts arising during the decommissioning phase are expected to be similar to, but not exceeding, those arising during the construction phase, with the exception that habitat is likely to be restored and displaced species able to return to abandoned areas.		As construction
Potential cumulative impacts		
The need to consider cumulative impacts will be determined during the formal assessment of impacts as part of the EIA (see below) once the final cable route has been selected.		

Data Gaps

- 10.80 It was not possible to access Dounreay Nuclear Facility and HMS Vulcan, although these areas were surveyed at a distance using magnification. However, given the low and temporary nature of the impact of the Project, this is unlikely to present a significant data gap.

Method of Assessment

- 10.81 Data collected during novel surveys described in Table 10-6 will be considered alongside historic data so as to identify potential impacts. An assessment of potential impacts will be completed, following best practice guidance (IEEM, 2006). Mitigation and/or compensation will be developed where appropriate.

Conclusions and Next Steps

- 10.82 An assessment of potential impacts will be completed after a cable route has been selected.

10.3 Nature Conservation Designations

Introduction

- 10.83 This Section identifies nature conservation designations that could potentially be affected by the onshore components of the Dounreay Tri Project – the ‘Project’.
- 10.84 The onshore Project area is considered to be the onshore cable search area (from Mean High Water Springs (MHWS)), cable jointing infrastructure and associated substation site. Collectively these will be referred to as the ‘onshore study area’ delineated in Figure 9-1.
- 10.85 Reference should also be made to individual Sections (Section 10.1: Terrestrial Ornithology, Chapter 10.2: Terrestrial Ecology) for details of all species and habitats of conservation interest that could potentially be affected by the Project.
- 10.86 This Section provides a high level description of nature conservation designations which are relevant to the onshore study area. It also highlights the key sensitivities and potential impacts arising from the onshore aspects of the Project, presents a summary of the relevant UK guidance and details of the methodology which will be applied during the assessment phase.

Guidance and Legislation

- 10.87 The following legislation is relevant to these proposals:

Council Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna (EU Habitats Directive) 1992

- 10.88 The Habitats Directive (Council Directive 92/43/EEC) promotes the maintenance of biodiversity by requiring Member States to take measures to maintain or restore natural habitats and wild species listed on the Annexes to the Directive at a favourable conservation status, introducing robust protection for those habitats and species of European importance. Member states are required to contribute to a coherent European ecological network of protected sites by designating Special Areas of Conservation (SACs) for habitats listed in Annex I and for species listed in Annex II of the Directive.

The Council Directive on the Conservation of Wild Birds (EU Birds Directive)

- 10.89 The Birds Directive (2009/147/EC) provides measures for the identification and classification of Special Protection Areas (SPAs) for rare or vulnerable species listed in Annex I of the Directive, as well as for all regularly occurring migratory species.

Conservation (Natural Habitats, &c) Regulations 1994 (as amended)

- 10.90 In Scotland, the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended), commonly known as the Habitats Regulations implement the species protection requirements

of the Habitats Directive in Scotland on land and inshore waters out to 12 nautical miles. The Habitats Regulations require that where a plan or project has the potential to significantly affect a 'Natura' site, it must be subject to an 'Appropriate Assessment' by the competent authority. A Habitats Regulations Appraisal (HRA) may be required for this Project in relation to birds and is currently being prepared

Wildlife and Countryside Act 1981 (as amended)

- 10.91 The Wildlife and Countryside Act 1981 provides for the notification and confirmation of Sites of Special Scientific Interest (SSSIs); these sites are identified for their flora, fauna, geological or physiographical features.

Nature Conservation (Scotland) Act 2004

- 10.92 The Nature Conservation (Scotland) Act 2004 sets out a series of measures which are designed to conserve biodiversity and to protect and enhance the biological and geological natural heritage of Scotland. The Act increases protection for SSSIs and strengthens wildlife enforcement legislation.

Available Information

- 10.93 The key information sources that will be used to inform the assessment are listed below:
- Scottish Natural Heritage (SNH) Sitelink website for detailed information on Natura 2000 sites (SPAs, SACs and Ramsar sites) and SSSIs (www.snh.org.uk/snhi); and
 - Scientific papers.

Consultation

- 10.94 Consultation advice regarding the natural heritage interests within the onshore cable corridor area of search was provided to Caledonia Conservation by SNH (email, Sian Haddon, 18 May 2015). This included information on SSSI and SPA designations within the area of search and for which connectivity with features is likely.
- 10.95 Consultation will be undertaken with the following stakeholders to ensure that all designated sites considered relevant to the Project have been identified in the assessment phase:
- The Highland Council;
 - SNH; and
 - Royal Society for the Protection of Birds (RSPB).

Study Area

- 10.96 The study area for this Section comprises any designated sites with natural heritage interests that have potential connectivity with the onshore components of the Project (e.g. direct overlap with the area, or sites with qualifying features that may overlap or be affected by the Project). All sites with potential connectivity to the Project will be identified in the HRA.

Surveys and Studies Carried Out to Date

- 10.97 A detailed desk study and consultation will provide the necessary baseline information regarding designated sites.

Description of the Current Environment

European Nature Conservation Designations

- 10.98 All European sites within 20 km of the onshore study area have been fully considered (Table 10-9, 10-10 and 10-11).
- 10.99 A summary of the European nature conservation sites and qualifying interests considered relevant to the Project is shown in Table 10-9 and Figure 10-15. North Caithness Cliffs SPA is located adjacent to the onshore study area. This site is designated for its internationally important breeding populations of seabirds and peregrine falcon (see Table 10-9). Caithness and Sutherland Peatlands SPA, SAC and Ramsar site is approximately 1.7 km to the south at its closest distance. Caithness and Sutherland Peatlands SPA is designated for breeding populations of several raptors and short-eared owl which could forage within the onshore study area (Table 10-9). Caithness and Sutherland SAC is designated for habitats and otter *Lutra lutra*. Due to the distance from the SAC, the Project is unlikely to affect any of the habitats of the SAC however there is the potential for otter to be present. None of the qualifying features of Caithness and Sutherland Peatlands Ramsar site could potentially be affected by the Project therefore this site has been scoped out. Caithness Lochs SPA and Ramsar site is designated for wintering populations of geese and whooper swans which could potentially forage within the onshore study area.

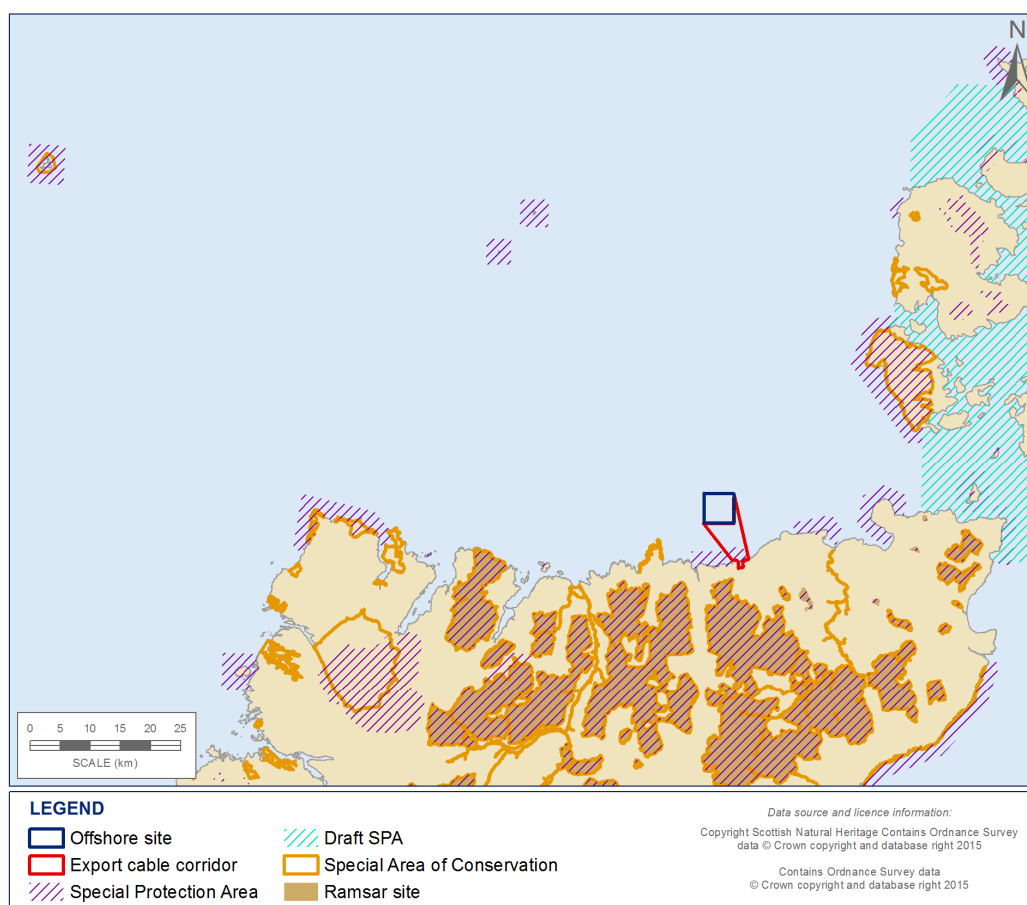


Figure 10-15

European nature conservation designated sites

- 10.100 All SPAs and SACs with qualifying features with potential connectivity to the Project will be identified and considered in the Habitats Regulations Appraisal (HRA).

Table 10-9 Summary of European designations considered relevant to the Project

Site name	Distance (km)	Qualifying features considered relevant	Justification for scoping in
North Caithness Cliffs SPA	0.04 km	Breeding populations of: Northern fulmar <i>Fulmar glacialis</i> ; Kittiwake <i>Rissa tridactyla</i> ; Common guillemot <i>Uria aalge</i> ; Razorbill <i>Alca torda</i> ; Atlantic puffin <i>Fratercula arctica</i> ; seabird assemblage, Peregrine <i>Falco peregrinus</i> .	Works during the breeding season has the potential to affect these species.
Caithness and Sutherland Peatlands SPA	1.7 km	Breeding populations of: Hen harrier <i>Circus cyaneus</i> ; Merlin <i>Falco columbarius</i> ; Short-eared owl <i>Asio flammeus</i>	It is possible that birds from these breeding populations may forage over the site.
Caithness and Sutherland Peatlands SAC	1.7 km	Otter <i>Lutra lutra</i> ;	It is possible that otter may be present within the Onshore study area
Caithness Lochs SPA and Ramsar	6.1 km	Greenland white-fronted geese <i>Anser albifrons flavirostris</i> , greylag geese and whooper swan <i>Cygnus cygnus</i>	It is possible that some birds may forage within the Onshore study area.

National Conservation Designations: National Nature Reserves (NNRs)

- 10.101 There are no national nature reserves relevant to the onshore components of the Project.

Sites of Special Scientific Interest (SSSIs)

- 10.102 All national sites within 5 km of the onshore study area have been fully considered (see Table 10-10).
- 10.103 The onshore study area overlaps with Sandside Bay SSSI which lies just north of Reay and has been designated for sand dune habitat. Red Point Coast SSSI 90 m to the west of Sandside Bay is listed for breeding common guillemot, and Scottish primrose *Primula scotica*. The geological interests of Red Point Coast SSSI are considered in Section 6.2: Geology, Bathymetry and Physical Conditions and in Section 12.2: Geology, Physical Processes, Hydrology and Land Use. No guillemots were recorded breeding within the onshore study area therefore this species can be scoped out of the assessment.

Table 10-10 Summary of national designations considered relevant to the Project

Site name	Distance (km)	Notified interest considered relevant	Justification for scoping in
Sandside Bay SSSI	0 km	Sand dunes	This site overlaps with the onshore study area. There is potential for works to affect this site.
Red Point Coast SSSI	0.09 km	Scottish primrose <i>Primula scotica</i>	Supports a nationally important population of Scottish primrose. It is possible that Scottish primrose associated with the SSSI population may be more widespread onsite, and may be lost depending on the cable route selected and mitigation employed.

Local Designations

- 10.104 There are no local designations that could potentially be affected by the onshore components.

Identification of Potential Impacts

- 10.105 Installation activities associated with the cable landfall and onshore cable route could directly affect the sand dune habitat within Sandside Bay SSSI with the potential for loss of habitat. Potential impacts on *Primula scotica* within the nearby Red Coast SSSI will also be considered.
- 10.106 If installation activities are timed to occur during the breeding season, there is the potential for noise and visual disturbance from construction activities to affect breeding seabirds from Caithness Cliffs SPA. Works during the non-breeding season would have no impact on the qualifying species.
- 10.107 There is the potential for otters from the nearby Caithness and Sutherland Peatlands SAC to be present within the onshore study area if suitable otter habitat is present. If any otters or otter shelters are found to be present within the Project site there is the potential for disturbance to occur if appropriate mitigation is not implemented.
- 10.108 Construction of the substation is not anticipated to result in any adverse impacts on nature conservation designations as the Project is immediately adjacent to the large industrial complex that is Dounreay Nuclear Facility. No potential impacts are anticipated from the operation phase as the cable will be buried and the substation is located immediately adjacent to Dounreay Nuclear Facility.
- 10.109 It is likely that best practice during construction and appropriate mitigation will reduce the level of such impacts.

Cumulative Impacts

- 10.110 Any cumulative impacts on Natura sites will be considered in the HRA which is currently being prepared. Any cumulative impacts on SSSIs will be considered in the EIA. These will be identified once the final cable route has been selected.

Table10-11 Potential impacts of the Project on nature conservation designations

Potential impacts during construction		
Impact	High level impact summary and justification	Scoped in/out
Loss of habitat, individuals or breeding territories through construction activities	This may affect species from North Caithness Cliffs SPA. The level and type of impact will depend on the cable route selected, methods used and timing of construction.	Scoped in (see Section 10.1: Terrestrial Ornithology).
Loss of habitat	Construction activities associated with the cable landfall installation and onshore cable route has the potential to affect sand dune habitats within Sandside Bay SSSI and <i>Primula scotcia</i> within the nearby Red Coast SSSI. The level of impact will depend on the cable route selected and methods used in construction.	Scoped in (see Section 10.2: Terrestrial Ecology).
Disturbance to or displacement of birds in proximity to the site through construction activities	Construction activities during the breeding season have the potential to affect seabirds breeding on nearby cliffs within the North Caithness Cliffs SPA. Construction activities during the non-breeding season have the potential to affect wintering geese and swans from Caithness Lochs SPA and Ramsar. The level of impact will depend on the cable route selected, the methods used and timing of construction.	Scoped in (see Section 10.1: Terrestrial Ornithology).
Mortality of otter through construction activities	This may affect otter from Caithness and Sutherland Peatlands SAC. The level of impact will depend on the cable route selected and methods used in construction.	Scoped in (see Section 10.2: Terrestrial Ecology).
Disturbance to or displacement of otter through construction activities	This may affect otter from Caithness and Sutherland Peatlands SAC. The level of impact will depend on the cable route selected, the methods used and timing of construction.	Scoped in (see Section 10.2: Terrestrial Ecology).
Potential impacts during operations and maintenance		
Impact	High level impact summary and justification	Scoped in/out
Disturbance to or displacement of birds in proximity to the site through maintenance activities	This may affect species from North Caithness Cliffs SPA and/or Caithness Lochs SPA depending on the cable route selected and timing of the works. The level of disturbance would be extremely temporary and only occur rarely. Furthermore, depending on the selected cable route, maintenance may represent only a minor increase in	Scoped in (see Section 10.1: Terrestrial Ornithology).

Potential impacts during construction		
Impact	High level impact summary and justification	Scoped in/out
	human activity over the existing land use baseline.	
Disturbance to or displacement of otter through maintenance activities	<p>This may affect otter from Caithness and Sutherland Peatlands SAC.</p> <p>The level of disturbance would be extremely temporary and only occur rarely.</p> <p>Furthermore, depending on the selected cable route, maintenance may represent only a minor increase in human activity over the existing land use baseline.</p> <p>This will be considered further in the EIA.</p>	Scoped in (see Section 10.2: Terrestrial Ecology).
Potential impacts during decommissioning		
Potential impacts arising during the decommissioning phase are expected to be similar to, but not exceeding, those arising during the construction phase.		As construction section
Potential cumulative impacts		
Any cumulative impacts on Natura sites will be considered in the HRA. Any cumulative impacts on SSSIs will be considered in the EIA.		Scoped out

Data Gaps

- 10.111 At this stage there are not considered to be any data gaps.

Method of Assessment

- 10.112 The ES chapter will provide details of the baseline conditions based on desk-based study, review of survey data and consultation with relevant stakeholders where necessary. The EIA will identify and assess the potential impacts of the Project on nature conservation sites in accordance with the prevailing guidance from the Institute of Ecology and Environmental Management (IEEM 2006). A cumulative impact assessment will be undertaken to assess the potential impacts of the Project along with other proposed and existing projects in the wider area. The list of projects to be considered in the cumulative assessment will be agreed in consultation with Marine Scotland.
- 10.113 Due to the proximity of the Project to a number of SPAs and SACs in the wider vicinity, it is anticipated that a Habitats Regulations Appraisal (HRA) will be required and this document is currently being prepared.

Conclusions and Next Steps

- 10.114 In conclusion, potential impacts on nature conservation designations will be considered in the assessment within the relevant Sections.

11 Onshore Human Environment

Introduction

- 11.1 This Section considers the impact of the onshore elements of the Dounreay Trì Project – the ‘Project’ – on the following human environment receptors:
- Archaeology and cultural heritage;
 - Electro-magnetic fields (EMF);
 - Air quality;
 - Landscape and visual amenity; and
 - Traffic and transport.
- 11.2 It is not considered possible to separate socio-economics for the onshore and offshore environment. A combined socio-economics scoping Section is presented in Section 8.8: Socio-Economics, Recreation and Tourism.
- 11.3 An overview of the relevant baseline environment is provided for each along with the anticipated impacts, a baseline characterisation strategy, impact assessment strategy and where applicable, possible mitigation and monitoring measures.

11.1 Onshore Archaeology and Cultural Heritage

Introduction

- 11.4 This Section considers existing known archaeology and cultural heritage by considering the potential direct, indirect, and cumulative impacts on known archaeology and cultural heritage assets and their setting that may be caused by the Dounreay Trì Project – the ‘Project’. The potential for as yet unknown archaeological finds and cultural heritage assets will also be identified.
- 11.5 The onshore Project area is considered to be the onshore cable search area (from Mean High Water Springs (MHWS)), cable jointing infrastructure and associated substation site. Collectively these will be referred to as the ‘onshore study area’ delineated in Figure 9-1.

Guidance and Legislation

- 11.6 The EIA will take account of all relevant legislation and guidance, including:
- The European Convention on the Protection of the Archaeological Heritage (2000) (Valletta Convention);
 - The European Landscape Convention (2006);
 - The Ancient Monuments and Archaeological Areas Act (1979);
 - The Planning (Listed Buildings and Conservation Areas) (Scotland) Act (1997);
 - Historic Environment (Amendment) (Scotland) Act 2011;
 - The Town and Country Planning (Scotland) Act (1997) and amendments;
 - The Scottish Planning Policy (2014);
 - Scottish Historic Environment Policy (2011);
 - Planning Advice Note (PAN) 1/2013: Environmental Impact Assessment;

- Planning and Archaeology (Planning Advice Note (PAN) 2/2011);
- The Highland-wide Local Development Plan (adopted 2012);
- Caithness and Sutherland Local Development Plan (in prep);
- The Highland Council Standards for Archaeological Work (2012);
- The Chartered Institute for Archaeologists. Standard and guidance for historic environment desk-based assessment (2014);
- Historic Scotland. Managing Change in the Historic Environment Guidance Note: Setting (2010);
- COWRIE Ltd. Historic Environment Guidance for the Offshore Renewable Energy Sector (Wessex Archaeology Ltd, 2007); and
- COWRIE Ltd. Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy (Oxford Archaeology and George Lambrick Archaeology & Heritage, 2008).

Available Information

- 11.7 The existing knowledge base will be combined with site specific data to inform the EIA. Existing data from previous archaeological investigations have been considered and will be referenced within the EIA to further enhance the baseline and describe the potential impacts on archaeology and cultural heritage receptors. Guidance documents and professional expertise will highlight the importance of early consultation to fully understand the impacts of the Project's terrestrial aspects.
- 11.8 The primary sources of information used to inform the Scoping Report were The Highland Council's Historic Environment Record (HER) and the National Monuments Record of Scotland via the Canmore and Pastmap database websites. These sources contain findspot locations, undesignated heritage assets, Scheduled Monuments, Listed Buildings, Inventories of Gardens and Designed Landscapes, Historic Battlefield sites and local authority Conservation Areas.

Consultation

- 11.9 No specific consultation has been undertaken to date. The following stakeholders have been identified and will be consulted in the assessment phase:
- Historic Scotland; and
 - The Highland Council.

Study Area

- 11.10 An onshore study area from Dounreay to Fresgoe, encompassing Sandside Bay and Reay is considered in order to establish a historic environment baseline, identifying known sites within this and to determine the potential for unidentified sites and landscapes that could potentially be affected by the Project.

Surveys and Studies Carried Out to Date

- 11.11 To date no site specific surveys or studies relevant to the onshore archaeology and cultural heritage have been undertaken. However, a number of previous archaeological investigations have been undertaken within the vicinity of the onshore study area that will be referenced in the baseline report where appropriate.

Description of the Current Environment

- 11.12 Archaeological sites and monuments are an important and finite resource that should be protected and preserved in-situ whenever possible (SPP 2014). The relative importance of the historic environment is recognised on an International, National, Regional and Local level. The historic environment needs to be considered throughout the development process in order to prevent, reduce and offset any adverse impacts resulting from a proposed development (The European Convention on the Protection of the Archaeological Heritage (2000), The European Landscape Convention (2006). The setting of Scheduled Monuments, Listed Buildings, Inventoried Gardens or Designated Landscapes and Inventoried Historic Battlefield sites are of material consideration as well (The Town and Country Planning (Scotland) Act 1997). The historic environment includes undesignated archaeological and cultural heritage assets, that can be as important as designated assets and should therefore be protected and enhanced in an appropriate setting (SPP 2014).
- 11.13 The Highland Council's Historic Environment Team highlighted in their pre-application advice pack that the terrestrial cable route may impact on historic environment assets, as there are a number of known archaeological sites within the onshore study area with the potential for more to be identified during a walkover survey. The cultural heritage potential of the onshore study area will be assessed as part of the EIA process and a discussion of potential impacts will be supported by a robust baseline survey. Following this, an appropriate mitigation strategy will be formulated where it is thought that adverse impacts are unavoidable.
- 11.14 Historic Scotland (HS) commented that the Scheduled Cnoc Stanger cairn 730 m east of Sandside House (Index No. 458), Cnoc Urray, broch 400 m north/north-east of Gunnscroft (Index No. 564), Dounreay Castle (Index No. 6401), Achunabust broch (Index No. 513), Reay, burial ground, old church and cross slab (Index No 615), two carved stones at Sandside House (Index No. 616) and Cnoc Freiceadain long cairns (Index No. 90078, also a Property in Care of Scottish Ministers) as well as the Category A Listed Buildings of Sandside (HB No. 14988), Sandside House (HB No. 14986) and Reay Parish church and enclosure wall (HB No. 14992) have the potential to be affected by the Project. Historic Scotland is unclear how significant these impacts may be. HS advised that the direct, indirect and cumulative impacts of the Project on the historic environment should be assessed as part of the EIA process.
- 11.15 The area around and to the east of Sandside Bay contains numerous recorded cultural heritage assets of national, regional and local importance that date from the prehistoric to more modern times. Within the onshore study area are three Scheduled Monuments that range in date from the prehistoric (a cairn and broch) to the medieval Reay Church, six Listed Buildings and around 99 undesignated cultural heritage assets. Due to the prevalence of known archaeological features within the area, it is likely that unrecorded archaeological features are present within the onshore study area.

Identification of Potential Impacts

- 11.16 The key potential impacts on the onshore archaeology and cultural heritage within the onshore study area are considered to be direct and/or indirect, cumulative and residual physical disturbance to known archaeological finds, features and/or landscapes of cultural significance and potentially as well as of yet unknown cultural heritage aspects.
- 11.17 Direct physical impacts are those that would produce a physical impact on heritage assets and archaeological features. Direct impacts may be caused by a range of activities associated with the installation, maintenance and decommissioning of the onshore aspects of infrastructure.
- 11.18 Indirect impacts are those that would produce an impact on the historical landscape and setting of identified cultural heritage sites and resources. Indirect impacts may relate to the

Project affecting views to, or from, cultural heritage features with important landscape settings, or may result from increased noise or vibration. Such impacts are likely to persist throughout the operational phase of the Project.

Cumulative Impacts

11.19 Cumulative impacts have been scoped in and will be taken forward to the assessment phase.

11.20 Table 11-1 summarises the impacts.

Table 11-1 Potential impacts on onshore archaeology and cultural heritage during construction, operations and maintenance, and decommissioning of the Project

Potential impacts during construction		
Impact	High level impact summary and justification	Scoped in/out
Direct physical disturbance to or loss of known onshore cultural heritage assets and disturbance to or potential loss of any unknown sub-surface archaeological features	The construction of landfall areas, equipment laydown, working areas, and temporary construction compounds could directly disturb or damage known or potential archaeological sites or features of significance. Such impacts may also arise from the open cut trench of directional drilling for the landfall export cable.	Scoped in
Indirect impacts that affect the setting of Scheduled Monuments, Listed Buildings and other designated archaeological and cultural heritage assets	The impacts on setting of archaeological and cultural heritage assets during the construction phase should be fully reversible; however, this will be considered fully in the EIA process	Scoped in
Potential impacts during operations and maintenance		
Impact	High level impact summary and justification	Scoped in/out
Direct physical disturbance to or loss of known onshore cultural heritage assets and disturbance to or potential loss of any unknown sub-surface archaeological features	No new disturbance that would affect cultural heritage assets would be anticipated during the operational phase, However, some activities, such as maintenance may give rise to physical disturbance.	Scoped in
Indirect impacts that affect the setting of Scheduled Monuments, Listed Buildings and other designated archaeological and cultural heritage assets	The impacts of the Project on the setting of onshore cultural heritage assets will be considered within the ES. The potential impacts on the setting of Scheduled Monuments, Listed Buildings, gardens and designed landscapes, Inventoried Battlefields, and Word Heritage Sites will be identified and assessed.	Scoped in

Potential impacts during decommissioning	
Potential impacts arising during the decommissioning phase are expected to be similar to but not exceeding those arising during the construction phase.	Scoped in
Potential cumulative impacts	
The potential for cumulative impacts will be assessed during the EIA process. The EIA will consider the impacts of the construction, operations and maintenance, and decommissioning of the Project cumulatively with other relevant projects that have been consented and are yet to be constructed as well as relevant projects for which an application has been submitted but which are not yet consented. Other projects for consideration for impacts to archaeology and cultural heritage are likely to be any activities that could incrementally reduce the quality or number of archaeological features and sites such as wave and tidal energy projects, aquaculture, onshore wind energy projects and on and offshore infrastructure projects.	Scoped in

Data Gaps

- 11.21 The data gaps identified in the Scoping phase will be filled following the site walk over survey.

Proposed Project Level Surveys and Studies

- 11.22 A detailed review of the existing data will be undertaken, building on the information gathered and filling in any identified desk-based data gaps in the Scoping responses.
- 11.23 A walkover survey of the onshore study area will be undertaken in order to assess any known sites identified during the desk-based assessment and to determine any previously unknown archaeological and/or cultural heritage sites.

Method of Assessment

- 11.24 The historic environment baseline identified by desk-based assessment and walkover survey will be used to produce an assessment of potential direct, indirect, and cumulative impacts on the known and as yet undiscovered onshore archaeology and cultural heritage resources.
- 11.25 Appropriate mitigation strategies and monitoring requirements will be formulated that will be agreed by the Project and statutory authorities. Once mitigation measures have been agreed, a Written Scheme of Investigation (WSI) will be developed, that will set out the design and implementation of mitigation with regard to both known and potential archaeological and cultural heritage assets during the course of the Project.

Conclusions and Next Steps

- 11.26 In conclusion, direct and indirect impacts on archaeology and cultural heritage are scoped in and will be taken forward to the assessment phase.

11.2 Electric and Magnetic Fields

Introduction

- 11.27 This Section provides an overview of the electric and magnetic fields (EMF) associated with the onshore components of the Dounreay Tri Project – the ‘Project’.
- 11.28 The electric and magnetic fields associated with the export of electricity from the wind turbine generators to the substation needs to be understood.
- 11.29 The onshore Project area is considered to be the onshore cable search area (from Mean High Water Springs (MHWS)), cable jointing infrastructure and associated substation site. Collectively these will be referred to as the ‘onshore study area’ delineated in Figure 9-1.

Guidance and Legislation

- 11.30 The International Commission on Non-Ionizing Radiation Protection (ICNIRP) provides guidelines on exposure levels to electric and magnetic fields (ICNIRP, 1998). The occupational exposure limits included within the guidelines will become enforceable in the UK from 2016, in line with the EU Directive on Occupational Exposure to EMF passed in 2013. UK policy is to comply with the public exposure guideline levels.

Available Information

- 11.31 The World Health Organisation website provides information on EMF and their health impacts (WHO, 2015a). In addition the Health and Safety Executive provides information on EMF and their impacts (HSE, 2015).

Consultation

- 11.32 No consultation has been carried out, more information regarding the existing power cables and substations in the area may be sought from SHE-Transmission Ltd in order to better understand the baseline situation.

Study Area

- 11.33 The area in the immediate vicinity of the cable route.

Surveys and Studies Carried Out to Date

- 11.34 To date, no specific surveys or studies relating to EMF in or around the Project area have been undertaken.

Description of the Current Environment

Electric Fields

- 11.35 Electric field strength is an expression of the intensity of an electric field at a particular location. The standard unit is the volt per meter. Field strength of 1 v/m represents a potential difference of one volt between points separated by one meter. Electric fields are produced by voltage. The cables are Alternating Current (AC) voltages only. AC voltages produce alternating electric fields.
- 11.36 Electric fields rapidly decrease with distance and are easily screened by earth, trees and buildings. Building structures can act as a Faraday cage i.e. an earthed metal box and provide an effective screen for electric fields generated within substations. When cables are buried the electric fields at the surface are hardly detectable (World Health Organisation, 2015a).

Magnetic Fields

- 11.37 Magnetic fields are produced by electric current flow. Like electric fields, magnetic fields are strongest close to their origin and rapidly decrease at greater distances from the source magnetic fields are not easily screened and can pass through building and cable screens.
- 11.38 AC currents produce alternating magnetic fields and DC currents produce static magnetic fields. Magnetic fields cancel within relatively short distances. For example, if the AC cable includes three phase AC cores the magnetic fields will cancel out.
- 11.39 Magnetic fields are measured in Tesla (symbolized T) is the standard unit of magnetic flux density.
- 11.40 Existing potential sources of electric and magnetic fields in the area include; the existing Dounreay substation and associated overhead electricity cables, both of which are AC. The electric fields produced by the substation are likely to be screened by the building structure.
- 11.41 Existing overhead AC cables will give rise to localised magnetic fields, these dissipate quickly with distance from the lines (within 50 - 100 m) (World Health Organisation, 2015b).

Identification of Potential Impacts

- 11.42 During operations the cables and substation/switch gear will create electric and magnetic fields.
- 11.43 The design of the Projects' electrical infrastructure will ensure that no potential impact occurs. Relevant design elements are as follows;
- Electrical cables will be buried and hence earthed, such that there will be no issues at the surface of the ground;
 - The electrical cables are 3 phase and as such the magnetic field will cancel out;
 - The substation/switch gear will be housed within a building which will act as a faradays cage and hence screen the electrical field; and
 - Magnetic fields within the substation and switch gear will cancel out to some degree. Any remaining field will dissipate rapidly.

Cumulative Impacts

- 11.44 No change to the existing sources of electric and magnetic fields in the area are predicted.
- 11.45 Table 11-2 summarises the potential impacts and provides a justification for scoping in or out.

Table 11-2 Potential impacts on EMF during construction, operations and maintenance, and decommissioning of the Project

Potential impacts during construction		
Impact	High level impact summary and justification	Scoped in/out
There should be no significant sources of electric or magnetic fields onsite during construction works.		Scoped out
Potential impacts during operations and maintenance		
Impact	High level impact summary and justification	Scoped in/out
Electric field associated with the cable.	The cable is buried, and as such earthed; it will therefore not give rise to an electric field at the surface.	Scoped out
Magnetic field associated with the cable.	Presuming a cable containing 3 phase cores are utilised then the magnetic fields will cancel out.	Scoped out
Electric field associated with the substation/ switch gear	Electric field generated by electrical installation. The substation/switch gear will be in a building which will act as a Faradays cage and hence screen the environment from electrical impacts.	Scoped out
Magnetic field associated with the substation/ switch gear	Magnetic field generated by electrical installation. All 3 phases will be present in the substation and as such will cancel out to some degree. Any remaining fields will dissipate rapidly over a short distance.	Scoped out
Potential impacts during decommissioning		
There should be no significant sources of electric or magnetic fields onsite during construction works.		Scoped out
Potential cumulative impacts		
None identified.		Scoped out

Data Gaps

- 11.46 The electrical connect requirements to export power from the Project via the existing substation are not as yet designed. A new substation or switch gear may be required, these may or may not be in a building.

Proposed Project Level Surveys and Studies

- 11.47 A desk based assessment of potential EMF levels will be carried out based on the design of the electrical components associated with electricity export.

Proposed Assessment Methodology

- 11.48 Impacts will be compared against the ICNIRP exposure guidance and the EU directive to understand the severity of the impacts.

Conclusions and Next Steps

- 11.49 All electric and magnetic field impacts are scoped out of the EIA process as there will be no significant impacts.

11.3 Air Quality

Introduction

- 11.50 This Section considers onshore construction activities that could impact localised air quality within the onshore study area.
- 11.51 The onshore Project area is considered to be the onshore cable search area (from Mean High Water Springs (MHWS)), cable jointing infrastructure and associated substation site. Collectively these will be referred to as the 'onshore study area' delineated in Figure 9-1.
- 11.52 One of the main attractions of wind energy technology is the fact that it is a sustainable source of power and does not give rise to emissions to air. There is a potential for a positive environmental impact with regard to carbon saving and avoidance of gaseous discharges associated with global climate change. The lack of emissions from the technology means the assessment will focus on the generation of dust especially in dry and windy conditions.

Guidance and Legislation

- 11.53 The offshore elements of the project below the MHWS are within 12 nautical miles (nm) of the Scottish Coastline, hence they fall within the remit of the Marine (Scotland) Act 2010. The Scottish National Marine Plan (NMP) covering inshore waters was adopted earlier this year; this was as a requirement of the act. The NMP lays out Scottish Minister's policies for the sustainable development of Scotland's seas (Scottish Government, 2015). The NMP provides General Planning Principles (GEN). GEN 14 is relevant to air quality:
- GEN 14 Air quality: Development and use of the marine environment should not result in the deterioration of air quality and should not breach any statutory air quality limits.
- 11.54 Relevant methodologies for the assessment and monitoring of dust include:
- Assessment of dust from demolition and construction (IAQM, 2014); and
 - Air Quality Monitoring in the Vicinity of Demolition and Construction Sites (IAQM, 2012).
- 11.55 Relevant guidance with regard to the control of construction noise includes:
- Assessment of dust from demolition and construction (IAQM, 2014); and
 - Pollution Prevention Guidelines 6 (PPG6): Working at Construction and Demolition Sites (Scottish Environment Protection Agency (SEPA) *et al.*, 2012).

Available Information

- 11.56 The only Air Quality Management Area in The Highland Council Area is in Inverness City Centre approximately 100 miles south of the onshore study area. The Highland Council only have three automatic air quality monitoring sites; these are in Inverness, Fort William and Strath Viach. Through 2012 there was an additional 10 non-automatic monitoring sites for Nitrogen

Dioxide utilising passive diffusion tubes in Inverness and Dingwall (The Highland Council, 2013). All of The Highland Council monitoring locations are too far from the onshore study area to be representative. However, the lack of monitoring would suggest that there are no air quality issues in the area.

- 11.57 The nuclear sites of Vulcan and Dounreay in the immediate vicinity of the onshore elements of the project will be subject to air quality monitoring of their discharges. In addition due to their move into decommissioning Dounreay Site Restoration Ltd (DSRL) have a series of dust monitors installed around the site to measure dust levels. The results of which will be requested to inform the baseline assessment.

Consultation

- 11.58 No consultation has been undertaken for air quality in the Scoping Phase.
- 11.59 Discussion with the neighbouring nuclear sites will be required to understand their programme of works. This is to identify whether cumulative impacts could result through decommissioning activities with the potential to give rise to dust, being conducted concurrently with the Project's onshore construction activities.

Study Area

- 11.60 Air quality impacts associated with dust will be localised around the onshore cable and construction areas. A 1 km buffer around the onshore study area has been assumed for the purpose of the assessment.
- 11.61 Climate change issues associated with carbon dioxide are on a global scale, hence no specific study area has been defined.

Surveys and Studies Carried Out to Date

- 11.62 No specific studies have been carried out with regard to the Project.

Description of the Current Environment

- 11.63 The onshore study area is currently farmland and as such is assumed to have a relatively high air quality level.
- 11.64 The Dounreay and Vulcan nuclear sites are within 1 km of the development. Dounreay Site Restoration Limited (DSRL) is undergoing a programme of decommissioning including building demolition, which could give rise to dust. The Vulcan submarine test reactor shut down in July 2015 for the final time and as such it can be presumed that this site will also be moving into a decommissioning phase, and could give rise to dust associated with demolition activities.

Identification of Potential Impacts

- 11.65 Construction of the substation/switch gear building and access road will include groundworks, aggregates and cements all of which can be sources of dust.
- 11.66 Excavation works associated with the cable installation have the potential to give rise to dust impacts.
- 11.67 There is a carbon cost of construction associated with materials utilised and their transport. During operations the wind turbines will produce low carbon power, reducing the need for fossil fuel burning and hence provide a carbon saving.
- 11.68 The substation/switch gear building has not as yet been designed hence the scale is unclear, however there is a potential for significant dust impacts, if mitigation is not implemented.

- 11.69 Due to the length of the onshore cable run the excavation volumes may be significant and hence have the potential to give rise to a significant environmental impact if mitigation is not implemented. Similarly the area of ground potentially uncovered during the construction of the new access road is such that dust impacts are potentially significant if mitigation is not implemented.
- 11.70 The overall carbon saving associated with the project have the potential to be significant positive environmental impact, this will be scoped in to the EIA.

Cumulative Impact

- 11.71 The neighbouring nuclear sites of Vulcan and Dounreay may start demolition works while the Project is being constructed, demolition works can give rise to dust hence if they are being undertaken at the same time there is a potential for cumulative impacts.
- 11.72 Cumulative impacts associated with dust depending of timing of activities on neighbour site have the potential to be significant and hence are scoped in to the EIA.
- 11.73 Table 11-3 summarises the impacts.

Table 11-3 Potential impacts on air quality during construction, operations and maintenance, and decommissioning of the Project

Potential impacts during construction		
Impact	High level impact summary and justification	Scoped in/out
Dust (onshore construction)	Ground works and the use of aggregates and cements on the sub-station/switch gear construction site has the potential to give rise to local dust issues.	Scoped in
Dust (onshore cable laying)	Onshore cable laying will involve excavations, if stored spoil becomes dry then it can give rise to dust.	Scoped in
Dust (access road)	Ground works and the use of aggregates associated with the construction of a temporary access road has the potential to give rise to local dust issues.	Scoped in
Carbon cost	Carbon dioxide is the primary greenhouse gas emitted through human activities. The use of materials such as cement and steel, and their transport to the development site, has an associated carbon cost.	Scoped in
Potential impacts during operations and maintenance		
Impact	High level impact summary and justification	Scoped in/out
Carbon saving	The wind turbines will produce electricity with a minimal carbon cost, and reduce the consumption of fossil fuels.	Scoped in
Potential impacts during decommissioning		
Dust	As per construction there is a potential for dust to be created during the decommissioning of the sub-station/switch gear, especially if the floor is to be removed as it will need to be broken up. Similarly if the onshore cable is to be removed then the excavation of	Scoped in

	soil could give rise to dust.	
Carbon cost	The carbon cost of decommissioning will primarily be associated with fuel for vehicle and vessel movements. The recycling of materials could help to minimise the lifecycle carbon cost of the project.	Scoped in
Potential cumulative impacts		
Dust (construction)	Potential demolition works being carried out at the adjacent nuclear sites could give rise to cumulative impacts.	Scoped in

Data Gaps

- 11.74 No significant data gaps have been identified.

Proposed Project Level Surveys and Studies

- 11.75 No surveys or studies are proposed.

Method of Assessment

Dust

- 11.76 Dust can be managed using standard construction management techniques, such as those discussed in Pollution Prevention Guidelines 6 (PPG6): Working at Construction and Demolition Sites (Environment Agency 2012). As such with mitigation no significant impact is predicted.
- 11.77 It is proposed that an assessment of dust impacts is carried out utilising the Institute of Air Quality Management (IAQM) Assessment of Dust from Demolition and Construction Sites (IAQM, 2012) methodology. The methodology will assist in ensuring that appropriate mitigation methods are identified and if appropriate, monitoring is to be employed to check its effectiveness.

Carbon Dioxide

- 11.78 An estimate of the carbon cost of the construction and decommissioning of the project will be made based on the proposed construction materials, quantities and published carbon equivalences where available. The carbon cost of transport will be estimated, taking account of where the components are to be transported from and how they will be moved.
- 11.79 The carbon saving associated with the electricity production will also be estimated.
- 11.80 The costs and savings carbon information will then be combined to identify the overall carbon benefit of the Project.

Conclusions and Next Steps

- 11.81 The Project has the potential to give rise to dust during construction and decommissioning activities, due to the area of groundworks and potential for cumulative impacts, there is a potential for this to have a significant impact in EIA terms. Dust can however be mitigated to reduce impacts, appropriate mitigation will be identified as part of the EIA process.
- 11.82 As a renewable energy project, this Project could give rise to a carbon saving which will have a beneficial environmental impact, this will be assessed within the EIA.

11.4 Landscape and Visual Amenity

Introduction

- 11.83 This Section characterises the landscape and visual environment and describes the key sensitivities and considers the potential landscape and visual impact caused by the construction of the onshore components of the Dounreay Tri Project – the ‘Project’. Primarily the construction and presence of the onshore substation.
- 11.84 This Section also outlines the proposed scope of surveys and studies that will be completed and that will be subject to consultation with relevant consultees.
- 11.85 The onshore Project area is considered to be the onshore cable search area (from Mean High Water Springs (MHWS)), cable jointing infrastructure and associated substation site. Collectively these will be referred to as the ‘onshore study area’ delineated in Figure 9-1.
- 11.86 The impacts of the offshore infrastructure is described in Section 8.5: Seascape, Landscape and Visual Impact but included in the cumulative assessment in this Section.

Guidance and Legislation

- 11.87 As a matter of best practice, the landscape and visual impact assessment (LVIA) will be undertaken with regard to the following published guidance (this is not a comprehensive list and the EIA will take note of all relevant guidance):
- Land Institute and the Institute of Environmental Management and Assessment (2013). Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3);
 - Countryside Agency and Scottish Natural Heritage (2002). Guidelines for Landscape Character Assessment; and
 - Scottish Natural Heritage (2012). Assessing the Cumulative Impact of Onshore Wind Energy Developments.
- 11.88 It should be noted that revisions to several of the best practice guidance documents outlined above may be published during the preparation of the EIA and if the revised documents overlap with the production of the LVIA, then the revised version will be used in place of the current version. In addition, the relevant planning policy will be considered and followed where necessary, including Scottish Planning Policy, 2014.

Available Information

- 11.89 The existing knowledge base will be combined with site-specific data and modelling to inform the EIA. The guidance documents and experience in the industry highlight the importance of early engagement to fully understand the impacts of offshore wind farms on seascape, landscape and the visual environment. This Section has been primarily informed by detail presented in the following information sources:
- Scottish Natural Heritage (1998). Caithness and Sutherland Landscape Character Assessment; and
 - The Highland Council (2014). Assessment of Highland Special Landscape Areas.

Study Area

- 11.90 A core study area defined by a 10 km radius is proposed for the onshore landscape and visual impact assessment (Figure 11-1). This will provide the focus for the assessment of potential landscape and visual impacts and is in line with current EIA best practice including the guidance set out in the recently published Landscape and Visual Impact Assessment Third

Edition (GLVIA3) (Land Institute (LI) and Institute of Environmental Management and Assessment (IEMA), (LI and IEMA, 2013). The proposed study area is not intended to identify the outer limit of visibility of the substation or switch gear but to focus attention on where 'likely significant impacts' could occur.

- 11.91 The assessment undertaken to understand the potential impacts on landscape and visual amenity is referred to throughout this Section as a Landscape and Visual Impact Assessment (LVIA).

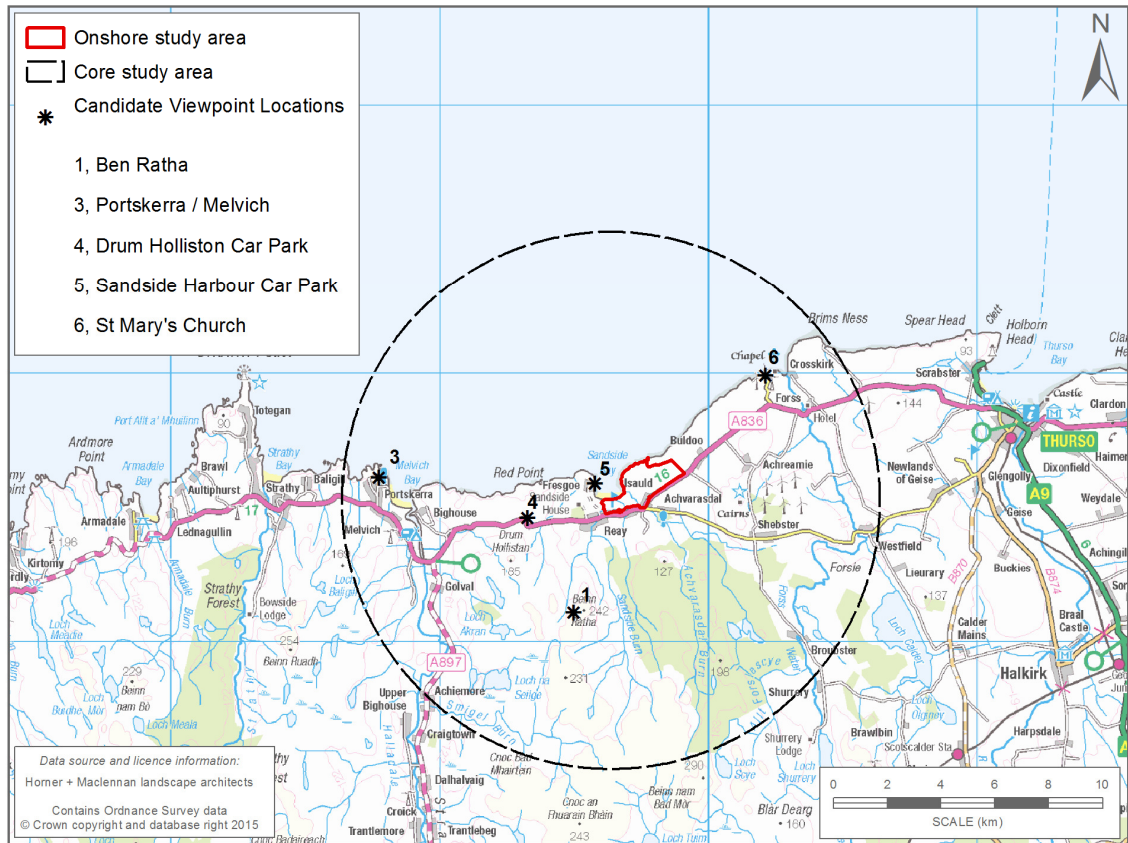


Figure 11-1 LVIA proposed study area and Candidate Viewpoint locations

Consultation

- 11.92 Consultation with stakeholders is an important part of the EIA process. Early consultation has been held with Scottish Natural Heritage and The Highland Council specifically on the assessment methodology. It is proposed that additional consultation is held in the assessment phase with the same consultees.

Surveys And Studies Carried out to Date

- 11.93 To date no site-specific characterisation surveys relevant to LVIA have been undertaken. However, a number of studies are proposed which are outlined below. In addition, a document detailing the proposed methodology for the offshore SLVIA and onshore LVIA (henceforth referred to as SLVIA Proposed Methodology Report) has been circulated for consultation with Scottish Natural heritage and The Highland Council. The methodology sets out the proposed approach to the preparation of the SLVIA for the Project and the LVIA methodology for the onshore electrical infrastructure and is appended in Appendix B.

Description of the Current Environment

- 11.94 Caithness has a great variety of valued and sensitive scenic countryside including National Scenic Areas (NSA), Special Landscape Areas (SLA), Wild Land Areas (WLA), and Gardens and Designed Landscapes (GDL) (Historic Scotland Inventory of Gardens and Designed Landscapes).
- 11.95 There are no NSAs within the study area.
- 11.96 There is one LSA partly within 10 km of the Project:
- 3. Farr Bay, Strathy and Portskerra.
- 11.97 There is one WLA partly within the 10 km onshore study area:
- 39. East Halladale Flows.
- 11.98 There are no GDLs within the onshore study area.
- 11.99 The landscape character along the stretch of coast adjacent to the Project comprises enclosed sandy beaches backed by dunes and low lying pastures, remote high cliffs and headlands and rocky coastlines with open sea views with a hinterland of pasture and flat peatland.
- 11.100 To the immediate east of the Project lies the large scale buildings and structures at the Dounreay Nuclear Facility which are prominent in views in the Caithness landscape. At Dounreay, management at the site is now focussed on decommissioning of the reactors, ancillary nuclear facilities and the restoration of the environment. The detail and extent of decommissioning at Dounreay aims to complete site closure by 2030.
- 11.101 In order to characterise the baseline environment with respect to landscape and visual receptors it is necessary to identify relevant landscape character areas and visual receptors.
- 11.102 For the purposes of clarity, landscape is defined as, 'An area perceived by people, the character of which is the result of the action and interaction of natural and / or human factors' (LI and IEMA, 2013).
- 11.103 Visual amenity is defined as, 'The overall pleasantness of the views people enjoy of their surroundings, which provides an attractive visual setting or backdrop for the enjoyment of activities of the people living, working, recreating, visiting or travelling through an area.' (LI and IEMA, 2013).
- 11.104 Landscape character areas (LCAs) (SNH, 1998) within the study area are:
- Flat Peatland;
 - High Cliffs and Sheltered Bays;
 - Long Beaches, Dunes and Links;
 - Moorland Slopes and Hills;
 - Open Intensive Farmland;
 - Small Farms and Crofts; and
 - Sweeping Moorland.
- 11.105 Coniferous Woodland and Inland Lochs are also identified in the SNH Landscape Character Assessment. These categories will not be assessed as landscape character types.
- 11.106 Landscape character types and associated protected/designated landscapes to be included in the assessment are listed In Table 11-4.

Table 11-4 Landscape character types inshore of the Project (SNH, 2005)

Location	Key Characteristics	Associated designated landscapes
Flat Peatland	<ul style="list-style-type: none"> • Flat or gently undulating; • Vast openness on plateau; • Dominance of sky with extreme exposure and panoramic visibility; • Few visual foci except distant hills on horizon; • Water forms a dominant element with lochs, water channels, dubh lochans, and wet, spongy vegetation; • Cloths of coniferous plantation; • Inhabited by distinct flora and fauna (esp. insects and birds); • Historic features; • Snow barriers; and • Railway. 	WLA – 39. East Halladale Flows
High Cliffs and Sheltered Bays	<ul style="list-style-type: none"> • Long stretches of high cliff interrupted by the location of a bay; • Strong linear edge; • Dominated by sea/land edge; • Stacks, caves, pebbles, and collapsing cliffs; • Sandy, sheltered bays; • Short mat of vegetation – grazing and walking; • Soaring and nesting seabirds; • Wandering sheep; • Rigs, boats; • Prominent cliff top buildings – lighthouse; • Harbours; • Roads and tracks; • Small settlements and local facilities; and • Car parks and tourist/visitor facilities. 	SLA – Farr, Strathy Point and Portskerra
Long Beaches, Dunes and Links	<ul style="list-style-type: none"> • Soft linear edge with smooth surface and gentle curve; • Wide open space with extensive visibility and exposure; • Simple composition of sky/sea/land; • Inter-relationship between sea, weather and light patterns create dynamic landscape; • Exposed sand dunes and marram grass; • Areas of short grazed and trampled grass; • Wetland and scrub occasionally in hollows • Edge of beach often covered by woodland or 	

Location	Key Characteristics	Associated designated landscapes
	<p>merging into rich agricultural land;</p> <ul style="list-style-type: none"> • Seabirds are intrinsic characters; • Golf links; • Recreational landscape – walkers; • Visitor facilities; • Camp and caravan sites; • Hotels and B&B's; • Settlements; • Roads, rail, and airstrips; and • Industrial units. 	
Moorland Slopes and Hills	<ul style="list-style-type: none"> • Sloping, open moorland gradually undulating and rising to form broad hills; • The convex character of the slopes limits distant visibility and views of the hill tops from their base; • The tops of hills or plateau tend to be spaced far apart and of a similar height with massive proportions - their bases appearing wider than their height; • The sloping landform sometimes creates plateau, shelves and basins; • Varied ground cover relating to geology, drainage patterns and microclimates; • Ground cover ranges from rock to dense heather cover to moorland grasses and bog - peat haggings; • Rocky crags and outcrops on hilltops and glen sides with deposits on lower slopes; • Lochs and dubh lochans; • Fragments of dense, wind pruned broadleaf woodland associated with inaccessible and ungrazed locations; • Coniferous plantations located close to access routes and on foot slopes; • Towns, estates, crofts and farms, and infrastructure routes tend to be concentrated along the straths and coastline and at the edge of this LCT; and • The interior is largely uninhabited, typically inaccessible to vehicles and grazed by deer. 	WLA – 39. East Halladale Flows
Open Intensive Farmland	<ul style="list-style-type: none"> • Wide plain of simple ordered landscape; • Open and flat or gently undulating; • Extreme exposure and extensive visibility; 	

Location	Key Characteristics	Associated designated landscapes
	<ul style="list-style-type: none"> • Smooth, open sky above agricultural land; • Ordered pattern of fields; • Shelterbelts and hedgerows; • Wetlands and lochs; • Roads and access tracks; • Fence lines and dykes; • Buildings; • Historic features; • People and machinery; • Large commercial farms; and • Estate properties. 	
Small Farms and Crofts	<ul style="list-style-type: none"> • Variable landform; • Moorland or coastal areas; • Open moorland; • Fragments of broadleaf woodland; • Woodlots; • Single trees; • Cultivated fields and grazing land; • Grassland; • Coastal areas/harbours; • Open space and dominance of sky; • Rough grassland; • Grazing land; • Ordered crofts; • Open and fairly rich, small farms; • New 'kit' housing/holiday homes; • Ruined properties; • Roads and access tracks; • Fences, walls; • Power lines; • Machinery; • Local facilities; • Sparse habitation; • Croft ruins; and • Ancient structures. 	
Sweeping Moorland	<ul style="list-style-type: none"> • Wide open and flat landscape; • Gently sloping or undulating landforms eroded by watercourses to form shallow glens; • Predominantly grouse and upland species, lacking in distinctive features; 	WLA – 39. East Halladale Flows

Location	Key Characteristics	Associated designated landscapes
	<ul style="list-style-type: none"> • Influenced by weather and light conditions; • Punctuated by watercourses - lochs, juvenile streams, and mature, meandering rivers; • Peatland, coarse, damp and mossy vegetation cover; • Ribbons of broadleaf woodland; • Coniferous plantations; • Pockets of improved grazing land; • Ruined buildings; • Field boundaries and drainage channels; • Small settlements; • Estates; • Roads, rail, vehicle tracks and wheel markings; • Power lines; • Peat cuttings and haggings; and • Grouse management. 	

11.107 The nature of the Project also requires consideration of the baseline environment with respect to key onshore visual receptors, which will need to be identified and considered in detail within the EIA and in consultation with the relevant stakeholders. The key potential visual receptors include (but may not be limited to):

- Residents, including those in towns, villages and dispersed properties;
- Road users, particularly those using coastal roads;
- Recreational resources including footpaths, beaches, golf courses etc.;
- Scenic viewpoints, particularly those referred to in local development plans and annotated on maps;
- People engaged in work activities, such as those on commercial fishing vessels, within the extractive industries including aggregates, passing cargo vessels and other marine users; and
- Other key destinations and attractions e.g. heritage sites, parks and gardens, visitor centres etc.

11.108 This list will be further developed in response to comments made during consultation.

Identification of Potential Impacts

11.109 During construction and operation there is potential for mainly coastal areas to experience direct and indirect impacts on perceptual qualities. There is also potential for receptors at land-based viewpoints to experience visual impacts.

11.110 During decommissioning, the potential impacts are expected to be similar to but not exceeding those arising during the construction phase.

- 11.111 The most relevant projects for consideration of cumulative impacts in LVIA are likely to be other wind farm and overhead electricity line projects in the vicinity.

Cumulative Impacts

- 11.112 The potential for cumulative impacts will be assessed during the EIA process. The most relevant projects for consideration of cumulative impacts to LVIA are likely to be wind farm and overhead electricity line projects in the vicinity and any significant development or activity in the coastal environment.
- 11.113 Table 11-5 summarises the impacts.

Table 11-5 Potential impacts associated with LVIA during construction, operations and maintenance, and decommissioning of the Project

Potential impacts during construction		
Impact	High level impact summary and justification	Scoped in/out
Potential impacts on landscape character during construction	Mainly coastal areas would experience direct, indirect, temporary impacts on perceptual qualities, during the construction phase. The assessment is likely to include consideration of impacts upon both designated and undesignated landscapes.	Scoped in
Potential impacts on visual receptors during construction	During the construction phase, receptors at land-based viewpoints are likely to experience visual impacts during the day and night. The assessment of these impacts is likely to include consideration of views from designated and undesignated landscapes, coastal paths and other Public Rights of Way and publically accessible land.	Scoped in
Potential impacts during operation		
Impact	High level impact summary and justification	Scoped in/out
Potential impacts on landscape character during operation	Mainly coastal areas would experience indirect, temporary impacts on perceptual qualities. The assessment is likely to include consideration of impacts upon both designated and undesignated landscapes.	Scoped in
Potential impacts on visual receptors during the operation	The assessment is likely to include consideration of views from designated and undesignated landscapes, coastal paths and other Public Rights of Way and publically accessible land. There is potential for a visual impact from the operational phase of the Project upon sensitive receptors, including designated	Scoped in

	areas.	
Potential impacts during decommissioning		
Potential impacts arising during the decommissioning phase are expected to be similar to but not exceeding those arising during the construction phase, and would be temporary.		Scoped in
Potential cumulative impacts		
The potential for cumulative impacts will be assessed during the EIA process. The EIA will consider the impacts of the construction, operations and maintenance, and decommissioning of the Project cumulatively with other offshore wind farm projects and other relevant projects and activities.		Scoped in

Table 11-6 Proposed Viewpoints

VP	Name	Approx OS ref	Approx. Elevation	Key Reasons for selection
1	Ben Ratha	NC94972, 61078	251 m	Hill Walkers
3	Portskerra/Melvich	NC87745, 66118	25 m	Residents Visitors/tourists Local and regional road users on key coastal road A836 Cyclists on NCR1 Representative of Farr Bay, Strathy Point and Portskerra SLA
4	Drum Holliston Car Park	NC93261, 64623	90 m	Residents Local and regional road users on key coastal road A836 Cyclists on NCR1
5	Sandside Harbour Car Park	NC95777, 65913	10 m	Visitors/tourists
6	St Mary's Chapel , Forss	ND02504, 70078	11 m	Visitors, tourist

Proposed Project Level Surveys and Studies

- 11.114 The SLVIA Proposed Methodology Report (Appendix B) outlines the proposed assessment and survey methodology. Tables relating to Landscape and Visual Sensitivity and Magnitude will apply to the assessment of the onshore electrical infrastructure. Five proposed photomontage locations (viewpoints) have been chosen to represent a variety of distances, elevations and orientations from the Project and to reflect different types of visual receptor. The viewpoint numbers are consistent with those identified for the offshore proposal.

Assessment Methodology

- 11.115 To determine the potential for impacts on visual resources an LVIA will be undertaken. Full details of the proposed methodology for the LVIA are presented in Appendix B: SLVIA Proposed Methodology Report.

Conclusions and Next Steps

- 11.116 In conclusion, landscape and visual impacts are scoped in and are taken forward to the assessment phase.

11.5 Traffic and Transport

Introduction

- 11.117 This Section considers the potential traffic and transport impact caused by the construction of the onshore components of the Dounreay Tri Project – the ‘Project’.
- 11.118 The onshore Project area is considered to be the onshore cable search area (from Mean High Water Springs (MHWS)), cable jointing infrastructure and associated substation site. Collectively these will be referred to as the ‘onshore study area’ delineated in Figure 9-1. The roads leading to the onshore study area are considered within this Section.
- 11.119 During the construction, operations and maintenance, and decommissioning of the Project both materials and personnel will need to travel to the site, hence it is important to understand whether or not this will have a significant impact on traffic and transport in the area.

Guidance and Legislation

- 11.120 The main EIA guidance for traffic assessment is:
- The Institute of Environmental Assessment (IEA) publication Guidance Notes No. 1: Guidelines for the Environmental Assessment of Road Traffic 1993.

Available Information

- 11.121 A temporary access road to the substation is likely to be required; the routing for this is not as yet known, however it is assumed that it will have a junction with the A836, somewhere close to the existing Dounreay Substation.
- 11.122 With regard to traffic and vehicle types required for the construction the full details are yet to be developed however some initial worst case assumptions can be made, these are provided in Table 11-7.
- 11.123 During operations there will be minimal traffic associated with maintenance activities. Decommissioning traffic levels are assumed to be no higher than those associated with construction.
- 11.124 The main source of traffic on the A836 is associated with people travelling to and from the Dounreay and Vulcan Nuclear sites for work. Hence the start and finish times for the shift patterns will provide a good understanding of when peak traffic flows occur. Buses are timed to coincide with shifts.
- 11.125 The Department of Transport collate traffic movement data relevant information from which has been considered. In addition the www.CrashMaps.co.uk provides information on road traffic accidents, this has also been reviewed.

Table 11-7 Initial traffic and vehicle types required for the construction

Activity	Timescale	Workforce Numbers**	Vehicle Movement Needs	Assumptions	Source	Maximum Daily Movements			
						Car/LGV from west	HGV from west	Car/LGV from east/south	HGV from east/south** *
Cable landfall Installation	1 - 2 months	10-20	Staff commuting to work each day	Assume worse case 20 staff all drive to and from work in own vehicles.	The majority of the workforce will travel from the east (Thurso/Wick) a small number from the west.	8		32	
	5 days*		Delivery of duct and other materials.	Materials will be delivered in a short space of time and stored for use. Maximum of 5 vehicles per day	Material will be delivered by sea/rail or road from the south.				10
	4 days*		Delivery and Removal of heavy machinery/drilling rig.	Heavy equipment will be delivered at start of works on low loaders for example and remain on site until works are completed. Up to 4 deliveries and subsequent removals required (16 movements).	Heavy Equipment will be delivered by road from the south.				4
Underground Cable System	1 - 2 months	8-10		Single excavation team. Assume worse case all staff drive to work in own vehicles.	The majority of the workforce will travel from the east (Thurso/Wick) a small number from the west.	4		16	
	15 days*		Delivery of the Cable, junction boxes and other	Smaller components may be delivered by LGV. Materials will be delivered as required.	Material will be delivered by sea/rail or road			2	4

Activity	Timescale	Workforce Numbers**	Vehicle Movement Needs	Assumptions	Source	Maximum Daily Movements			
						Car/LGV from west	HGV from west	Car/LGV from east/south	HGV from east/south**
			materials.		from the south.				
	4 days*		Delivery and Removal of heavy machinery/drilling rig.	Heavy equipment will be delivered at start of works on low loaders for example and remain on site until works are completed. Up to 4 deliveries/removals required.	Heavy Equipment will be delivered by road from the east or south.				4
Onshore Substation	12 -18 months	20-50		Workforce numbers will vary through the construction works. Assume worse case 50 staff all drive to work in own vehicles.	The majority of the workforce will travel from the east (Thurso/Wick) a small number from the west.	10		90	
	4 days*		Delivery and Removal of heavy machinery/drilling rig.	Heavy equipment will be delivered at start of works on low loaders for example and remain on site until works are completed. Up to 4 deliveries/removals required.	Heavy Equipment will be delivered by road from east or the south.				4
	5 days*		Aggregate deliveries	Assumed deliveries are just in time, not stock piled, hence less likely to have lots of deliveries at one time.	Assumed from west, could be east, as that is the closest source.		40		
	5 days*		Cement deliveries	Assumes cement is brought in as ready mix. If batching onsite then delivery or dry products will require less	Assumed from west, could be east as that is the closest source.		60		

Activity	Timescale	Workforce Numbers**	Vehicle Movement Needs	Assumptions	Source	Maximum Daily Movements			
						Car/LGV from west	HGV from west	Car/LGV from east/south	HGV from east/south**
				vehicles in total and fewer on any given day. Aggregate will have to be in place prior to cement being poured hence not possible to have them at the same time.					
	100 days*		Equipment deliveries.	Smaller components may be delivered by LGV. Equipment will be delivered as required.	Equipment may come by sea, rail or road. Road deliveries will primarily be from the east.	4		8	10
Maximum on any one day taking account of parallel working.						26	60	148	14

* Days may not be consecutive.

** Assumed 20% of workforce from west. 5% from Scrabster, 50% from Thurso and 20% from further east and 5% from further south.

*** Assumed that there are a maximum of 10 movements in any one day by road from south of the Train Station at Georgemas Junction.

Consultation

- 11.126 Consultation with Dounreay Site Restoration Limited (DSRL) with regard to shift patterns and the associated buses may assist in the assessment and potentially identification of mitigation for traffic and transport impacts.

Study Area

- 11.127 It is presumed that the majority of the equipment and materials will come from the east of the development site. However there is a potential for personnel and materials, including concrete, and aggregate to come from the west of the site (Quarry at Melvich).
- 11.128 The study area focuses primarily on the A836 both east and west of the development from Thurso to Melvich and the A9.
- 11.129 Materials can either be sourced locally or brought to Caithness by sea, rail or road. Scrabster is the closest harbour to the onshore study area as such it has been assumed that materials brought by sea would be offloaded here and travel south on the A9 prior to joining the A836.
- 11.130 If rail were to be utilised to transport any components then it would be brought by train to Georgemas Junction where there is the facility to offload materials. It would then travel by road north on the A9 to join the A836 for the trip west to Thurso.
- 11.131 Materials coming by road from the south would travel up the A9.

Surveys and Studies Carried Out to Date

- 11.132 Average Daily Traffic Flows (ADTFs) for 2000 to 2014 is available from the Department for Transport (2015a) for various points on the A836 and the A9. This data provides a daily average flow of the number of vehicles passing a point in the road network each day, calculated in accordance with the Department of Transport Guidance (2015b).
- 11.133 The traffic count points (CP) providing relevant ADTF data is summarised in Table 11-8.

Table 11-8 ADTF traffic count points

Count Point Number	Location (OS Grid Reference)	Road	Section Covered	Relevant to
40935	NC8420 6510	A836	The Cross roads in Bettyhill to the junction with the A897.	Vehicles coming from Melvich and the west.
10934	ND0470 6897	A836	The junction with the A897 to the junction with the A9.	Vehicles coming from the east.
20801	ND1040 6920	A9	Scrabster Ferry terminal to the junction with the A836.	Deliveries coming by sea.
40800	ND110 6880	A9	Junction with the A836 to the B874 Princess Street	Deliveries coming by train, and vehicles from Thurso, the south or east.
40956	ND118 6815	A9	Junction with B874 Princess street to the junction with the A836	Deliveries coming by train, and vehicles from Thurso, the south or east.

Count Point Number	Location (OS Grid Reference)	Road	Section Covered	Relevant to
10800	ND1465 6550	A9	Junction with the A836 to the junction with the A882.	Deliveries coming by train, and vehicles from the south or east (Wick)
10959	ND1796 4300	A9	Junction with the B870 to the junction with the A99	Deliveries coming from the south
50719	ND0660 1990	A9	Junction with the A99 to the junction with the A897	Deliveries coming from the south

- 11.134 The history of traffic incidents which occurred along the main routes to site was examined using the website CrashMaps.co.uk, between 2010 to present. This website provides details of the location, time and severity of traffic incidents occurring on UK roads, with severity divided into 3 categories of; slight, serious, and fatal.
- 11.135 When the A836 between Melvich in the west and the A836-A9 junction in Thurso to the east was analysed, 15 traffic incidents occurred over the 5 year period, 1 of which was fatal, 2 were serious and the remaining 12 slight. One incident hotspot was identified, with 4 slight incidents occurring at the junction between the A836 and Borrowston Mains, 3 out of 4 which incidents occurred during the commuting periods of 07:00 - 10:00, and 15:00 - 1800. Two other sections of the A836 where multiple incidents occurred at the same site were identified; 2 incidents occurred at crossroads with a single track road west of Thurso (ND086 694), and 2 incidents including 1 fatality occurred at the bends west of Reay (NC934 643). Neither of the additional two multiple incident locations showed links to commuter traffic, or other common cause.
- 11.136 The A9 from Thurso to the Dornoch Bridge was also considered, to account for deliveries originating in the south. This stretch of road is single carriage way, and includes steep gradients, and numerous bends. As such there is a relatively high traffic incident rate, with over 100 incidents over the past 5 years.

Description of the Current Environment

- 11.137 The ADTF's for the relevant traffic count points are provided in Table 11-9, the average ADTF's for the last 5 years and the most recent year's data (2014) is provided.
- 11.138 The A836 and the A9 through Thurso is on the National Cycle Network. The route is popular in the summer months for those doing John O'Groats to Land's End, and year round by commuters to Dounreay. The commuters utilise the route in the mornings and evening to tie in with shift patterns whereas the leisure cyclists tend to pass Dounreay between mid-morning to early afternoon, having left John O'Groats 50 km away in the morning, or starting their last day of the trip in Tongue, Bettyhill or Melvich on their way north.

Table 11-9 ADTF Data for relevant traffic count points

Count Point Number	5 Year Average/ Year	Pedal Cycles	Motorcycles	Cars & Taxis	Buses & Coaches	Light Goods Vehicles	All HGVs	All Motor Vehicles
40935	2014	11	44	505	9	113	18	690
	2010/2014	5	30	470	17	107	23.2	648
10934	2014	6	41	1859	92	284	57	2333
	2010/2014	7	38	1854	83	256	53	2284
20801	2014	7	72	3012	30	596	177	3886
	2010/2014	9	67	3005	27	537	154	3789
40800	2014	8	6	2446	71	449	140	3111
	2010/2014	8	6	2468	71	453	141	3140
40956	2014	17	55	8548	126	1681	251	10661
	2010/2014	22	51	8615	121	1567	257	10611
10800	2014	0	13	2241	51	558	155	3019
	2010/2014	0	12	2236	46	503	147	2944
10959	2014	0	4	499	4	268	135	911
	2010/2014	0	4	498	3	242	124	872
50719	2014	4	18	1341	25	425	193	2002
	2010/2014	6	17	1338	23	383	180	1940

Identification of Potential Impacts

- 11.139 The Institute of Environmental and Assessment (IEA) publication Guidance Notes No. 1: Guidelines for the Environmental Assessment of Road Traffic 1993 sets out a methodology for assessing traffic and transport related environmental impacts. The IEA guidelines identify the following rules by which to undertake an assessment of potentially significant traffic and transport related environmental impacts:
- Rule 1: Include roads where traffic flows are predicted to increase by more than 30% (or where the number of HGVs are predicted to increase by more than 30%); and
 - Rule 2: Include any specifically sensitive areas where traffic flows are predicted to increase by 10% or more.
- 11.140 The following definition of a Specifically Sensitive Area has been applied: Medium to large rural settlements, containing some community and public services and facilities (particularly schools, churches, hospitals, areas of high pedestrian activity), areas with traffic control signals, waiting and loading restrictions, traffic calming measures and minor rural roads not constructed to accommodate frequent use by HGV.
- 11.141 Based on the traffic movements identified in Table 11-7 and associate assumptions, the percent change to traffic flow for the various road sections has been calculated; the results of which are shown in Table 11-10.
- 11.142 During up to 10 days of the Project construction period, there is a potential for an increase of more than 30% of HGV movements to the west of the development site. Taking into account that this is a comparison of worst case daily movements with ADFT's, the short period involved and that the total number of movements is well below 30%, this is not deemed to have the potential to be a significant impact.
- 11.143 As shown in Table 11-10 even with the pessimistic assumption that there will be no car sharing or use of public transport and assuming maximum levels; the increase traffic movements are below the 30% and 10% trigger level for all movements to the east and south of the site as such there is no potential for significant impact.

Table 11-10 Construction percentage change in traffic flow

Count Point Number	Specifically Sensitive Area	5 Year Average/ Year	Maximum No. of HGV's per Day	Maximum No. of Vehicles per Day	% Increase in HGV's per Day	% Increase in All Vehicles per Day
40935	No	2010/2014	60	86	260.9%	13.3%
10934 (West of Development)	No	2010/2014	60	86	113.2%	3.8%
10934 (East of Development)	No	2010/2014	14	162	26.4%	7.1%
20801	No	2010/2014	14	22	9.1%	0.6%
40800	Yes	2010/2014	14	144	9.9%	4.6%

Count Point Number	Specifically Sensitive Area	5 Year Average/ Year	Maximum No. of HGV's per Day	Maximum No. of Vehicles per Day	% Increase in HGV's per Day	% Increase in All Vehicles per Day
	(Thurso)					
40956	Yes (Thurso)	2010/2014	14	64	5.4%	0.6%
10800	No	2010/2014	14	64	9.5%	2.2%
10959	No	2010/2014	10	18	8.1%	2.1%
50719	No	2010/2014	10	18	5.6%	0.9%

Cumulative Impact

- 11.144 There are no known proposals in the area which will have traffic impacts, during the Project's onshore construction period.
- 11.145 Table 11-11 summarises the potential impacts.

Table 11-11 Potential impacts on traffic and transport during construction, operations and maintenance, and decommissioning of the Project

Potential impacts during construction		
Impact	High level impact summary and justification	Scoped in/out
HGV Movements (west)	Movements as described in Table 11-7. Large movement number on up to 10 days, are not enough to increase the annual daily average levels, hence no potential to be significant.	Scoped out
All Vehicle Movements (west)	Movements as described in Table 11-7. Maximum number of daily movements is well below the 30% increase in average daily movement levels hence no potential to have a significant impact.	Scoped out
HGV Movements (east and south)	Movements as described in Table 11-7. Maximum number of daily movements is well below the 30% increase in average daily movement levels and below 10% in specifically sensitive areas, hence no potential to have a significant impact.	Scoped out
All Vehicle Movements (east)	Movements as described in Table 11-7. The maximum number of daily movements is well below a 10% increase in average daily movements hence no potential to have a significant impact.	Scoped out

Potential impacts during operations and maintenance		
Impact	High level impact summary and justification	Scoped in/out
HGV Movements	HGV movements will only be required in event of equipment failure where a large component needs replaced. As such there is no potential of a significant impact to occur.	Scoped out
All Vehicle Movements	Vehicle movements associated with operations will mainly be associated with personnel carrying out maintenance activities. Number of people involved will be limited and as such will not give rise to significant vehicle movements, no potential significant impacts area predicted.	Scoped out
Potential impacts during decommissioning		
Potential impacts arising during the decommissioning phase are expected to be similar to, but not exceeding, those arising during the construction phase. As such no significant impacts are predicted.		Scoped out
Potential cumulative impacts		
No known cumulative impacts.		Scoped out

Data Gaps

- 11.146 The exact route of the temporary access road and junction with the A836 has not as yet been defined.
- 11.147 The traffic movements associated with the development are not as yet fully understood in terms of routes and numbers. This will be better understood as the project progresses into the detailed design and procurement phases. Enough information with regard to the scale of movements is however available to allow scoping to be completed.

Proposed Project Level Surveys and Studies

- 11.148 No additional surveys and studies are proposed as part of the EIA process.

Proposed Assessment Methodology

- 11.149 Traffic and transport impacts arising as a direct result of traffic associated with the Project have been scoped out for further assessment. Cumulative impacts arising through the interaction of traffic associated with the project and other, as yet unknown, traffic has been scoped in and will be taken forward to the assessment phase. The assessment will be desk based and utilise publically available data and consultation.

Conclusions and Next Steps

- 11.150 It has been concluded that there is not the potential for a significant environmental impact associated with traffic and transport in EIA terms. This does not however mean that steps will not be implemented to minimise impacts. There is scope for car sharing and public transport use to reduce the vehicle movements associated with the Project and this should be

encouraged. The accident blackspot on the A836 can be highlighted to all drivers along with precautions to be taken when driving the A9 especially in adverse weather conditions.

- 11.151 The Highland Council has requested that a Transport Statement is submitted with the planning application. This will ensure that issues such as abnormal loads and the need for a temporary junction with the A836 are adequately addressed through the planning process. It will also assist in the identification of good practice measures to be adopted by the project especially during the construction process to minimise impacts.

12 Summary and Next Steps

- 12.1 Tables 12-1 and 12-2 summarise the potential impacts offshore and onshore, respectively. Subject to the scoping opinion, these impacts shall be taken forward into the Environmental Impact Assessment.

Table 12-1 Summary of offshore potential impacts

Description of Impact	Construction Phase		O&M Phase		Decommissioning Phase		Cumulative Impacts
	Scoped In	Scoped out	Scoped In	Scoped out	Scoped In	Scoped out	
Potential impacts on geology, bathymetry and physical conditions							
Impact of geology		X				X	None anticipated
Changes to bathymetry		X				X	
Seabed scour	X				X		
Localised change to currents	X				X		
Increase in suspended sediments	X				X		
Disturbance to contaminated sediment	X				X		
Removal or creation of seabed features such as sand waves			X				
Impact on sediment regime			X				
Changes to wave regime				X			
Potential impacts on offshore noise							
Airborne noise on human receptors onshore		An assessment may still be carried out to comply with		X		X	Scoped in

Description of Impact	Construction Phase		O&M Phase		Decommissioning Phase		Cumulative Impacts
	Scoped In	Scoped out	Scoped In	Scoped out	Scoped In	Scoped out	
		ETSU-R- 97.					
Airborne noise on human receptors offshore		An assessment may still be carried out to comply with ETSU-R- 97.		X		X	
Airborne noise on biological receptors				X			
Underwater noise affects marine mammals and fish	X		X		X		
Potential impacts of radiation							
Disturbance of sediments containing radioactive particles	X				X		None anticipated
Hydrodynamic changes leading to seabed scour around subsea infrastructure (including mooring cables as result of movement with wave and tides)				X			
Potential impacts on intertidal ecology							
Loss of habitat or species through work at the cable landfall	X				X		Scoped in
Disturbance to or displacement of fauna in proximity to the Site through construction activities	X				X		
Creation of new habitats and introduction of species			X				

Description of Impact	Construction Phase		O&M Phase		Decommissioning Phase		Cumulative Impacts
	Scoped In	Scoped out	Scoped In	Scoped out	Scoped In	Scoped out	
Potential impacts on benthic ecology							
Damage from placement of infrastructure (cables, moorings, anchors) on the seabed	X				X		Scoped in
Installation of subsea infrastructure in inshore waters	X				X		
Disturbance of contaminated sediments	X				X		
Hydrodynamic changes leading to scour around subsea infrastructure (including mooring cables as result of movement with wave and tides)			X				
Damage to habitat or species due to pollution from routine and accidental discharges			X				
Introduction of marine non- natives			X				
Colonisation of subsea infrastructure, scour protection and support structures			X				
Impact to benthic communities from any thermal load or EMF arising from the cables during operation			X				
Potential impacts on fish and shellfish ecology							
Disturbance or damage to sensitive species due to underwater noise generated from construction activities	X				X		Scoped in

Description of Impact	Construction Phase		O&M Phase		Decommissioning Phase		Cumulative Impacts
	Scoped In	Scoped out	Scoped In	Scoped out	Scoped In	Scoped out	
Direct habitat loss due to disturbance of spawning and nursery grounds during the installation of export cables and placement of anchors on seabed	X				X		
Effects of increased sedimentation / smothering on fish and shellfish during placement of anchors and export cable		X				X	
Habitat loss of spawning and nursery grounds due to presence of anchors and export cable on the seabed			X				
Effects of electromagnetic fields from subsea and dynamic cables on sensitive species			X				
Barrier effects on migratory fish from the presence of the floating platform and associated infrastructure				X			
Effects of operational noise on sensitive species			X				
Fish aggregation around the floating structure and associated infrastructure			X				
Entanglement with mooring lines and dynamic cables			X				
Ghost fishing due to lost fishing gear becoming entangled in moorings and				X			

Description of Impact	Construction Phase		O&M Phase		Decommissioning Phase		Cumulative Impacts
	Scoped In	Scoped out	Scoped In	Scoped out	Scoped In	Scoped out	
cables							
Potential impacts on marine mammals, turtles and basking sharks							
Disturbance to marine mammals due to vessel traffic during construction and installation	X						Scoped in
Disturbance and auditory injury from underwater noise generated during construction (particularly piling)	X						
Change in abundance or distribution of prey species			X				
Risk of entanglement in mooring lines			X				
Potential impacts on ornithology							
Disturbance of birds due to vessel traffic during construction and installation	X						Scoped in
Displacement of birds due to presence of platform			X				
Disturbance of birds during operation of platform and service vessels			X				
Mortality risk from collision with wind turbine blades			X				
Change in abundance or distribution of prey species			X				
Potential impacts on nature conservation designations							

Description of Impact	Construction Phase		O&M Phase		Decommissioning Phase		Cumulative Impacts
	Scoped In	Scoped out	Scoped In	Scoped out	Scoped In	Scoped out	
Disturbance to SPA qualifying interests due to vessel traffic during construction and installation	X				X		Scoped in
Disturbance and auditory injury from underwater noise generated during construction (particularly piling) to SAC qualifying interests (seals, salmon)	X				X		
Mortality risk to SPA qualifying interests from collision with wind turbine blades			X				
Displacement of SPA qualifying interests from foraging areas due to presence of the Project			X				
Disturbance as a result of increased vessel activity at the site (physical presence and noise-related) (SAC qualifying interests – seals and Atlantic salmon)			X				
Impacts of electromagnetic fields (EMF) on sensitive species (SAC qualifying interest – Atlantic salmon)			X				
Impacts of operational noise on Atlantic salmon			X				
Potential impacts on commercial fisheries							
Loss of access to fishing grounds due to the presence of vessels and safety zones	X				X		Scoped in

Description of Impact	Construction Phase		O&M Phase		Decommissioning Phase		Cumulative Impacts
	Scoped In	Scoped out	Scoped In	Scoped out	Scoped In	Scoped out	
Obstruction of regular fishing vessel transit routes due to the presence of vessels and safety zones	X				X		
Change in abundance or distribution of target species	X				X		
Loss of access to fishing grounds due to the presence of floating platform and associated moorings			X				
Displacement to other fishing grounds resulting in increased pressure on resources or conflict with other sea users			X				
Obstruction of regular fishing vessel transit routes due to the presence of floating platform and associated moorings			X				
Potential for fishing gear to become entangled with floating and subsea structures, resulting in damage to or loss of fishing gear			X				
Change in abundance or distribution of target species			X				
Potential impacts on shipping and navigation							
Potential for vessel-to-structure collision risk	X				X		Scoped in
Potential for vessel-to-vessel collision risk	X				X		

Description of Impact	Construction Phase		O&M Phase		Decommissioning Phase		Cumulative Impacts
	Scoped In	Scoped out	Scoped In	Scoped out	Scoped In	Scoped out	
Project vessel in difficulties whilst at sea			X				
Vessel instability during heavy lifting operations			X				
Displacement of vessels from main routes			X				
Impacts on established shipping routes and additional steaming times			X				
Changes to availability of adverse weather routes			X				
Displacement of vessels from main routes			X				
Potential for vessel-to-installation collision risk			X				
Potential for vessel-to-vessel collision risk			X				
Potential impacts from subsea cables on ship, anchoring or fishing activity			X				
Potential impacts on marine radar communications and positioning systems			X				
Potential impacts on SAR			X				
Impacts on existing or proposed Aids to Navigation (AtoNs) and VTS or vessel TSS			X				

Description of Impact	Construction Phase		O&M Phase		Decommissioning Phase		Cumulative Impacts
	Scoped In	Scoped out	Scoped In	Scoped out	Scoped In	Scoped out	
Impacts on other marine users			X				
Potential impacts on recreational craft and commercial fishing activity			X				
Potential impacts on aviation							
Interference with civil, military and meterological radar systems		X				X	Scoped in
Interference with MoD Air Defense Operations		X				X	
Interference with helicopter support to oil and gas operations		X				X	
Interference with SAR operations		X				X	
Interference with civil en-route operations				X			
Interference with civil airport operations			X				
Interference with MoD aerodrome operations				X			
Interference with MoD air defence operations				X			
Interference with civil/military SSR				X			
Interference with low flying operations			X				
Interference with Met Office radar				X			

Description of Impact	Construction Phase		O&M Phase		Decommissioning Phase		Cumulative Impacts
	Scoped In	Scoped out	Scoped In	Scoped out	Scoped In	Scoped out	
Interference with helicopter support to oil and gas operations			X				
Interference with SAR operations			X				
Potential impacts on seascape, landscape and visual amenity							
Potential impacts on landscape character	X		X		X		Scoped in
Potential impacts on seascape character	X		X		X		
Potential impacts on visual receptors	X		X		X		
Visual impacts associated with presence of marine construction plant and vessels	X				X		
Potential impacts on archaeology and cultural heritage							
Direct physical disturbance to or loss of marine archaeological features	X		X		X		Scoped in
Indirect physical disturbance to marine and coastal archaeological features	X		X		X		
Potential impacts on historic landscapes and monuments	X		X		X		
Potential impacts on other users of the marine environment							
Obstruction of MRE (specifically HIE’s DDC) activities due to the presence of safety zones and construction vessels	X				X		Scoped in

Description of Impact	Construction Phase		O&M Phase		Decommissioning Phase		Cumulative Impacts
	Scoped In	Scoped out	Scoped In	Scoped out	Scoped In	Scoped out	
during installation activities							
Obstruction of military activities due to the presence of safety zones and construction vessels during installation activities	X				X		
Obstruction of spoil disposal activities or aggregate extraction due to the presence of safety zones and construction vessels during installation activities		X				X	
Obstruction of electricity cable installation activities due to the presence of safety zones and construction vessels during installation activities	X				X		
Obstruction of oil, gas and CCS activities due to the presence of safety zones and construction vessels during installation activities		X				X	
Disruption to DSRL remedial and monitoring activities due to the presence of safety zones and construction vessels during installation activities	X				X		
Telecommunications		X				X	
Obstruction of MRE (specifically DDC) activities due the presence of the floating structure and associated			X				

Description of Impact	Construction Phase		O&M Phase		Decommissioning Phase		Cumulative Impacts
	Scoped In	Scoped out	Scoped In	Scoped out	Scoped In	Scoped out	
moorings; and the presence of safety zones and vessels during maintenance activities							
Obstruction of military activities due to the presence of the floating structure and associated moorings; and the presence of safety zones and vessels during maintenance activities			X				
Obstruction of spoil disposal activities or aggregate extraction due the presence of the floating structure and associated moorings; and the presence of safety zones and vessels during maintenance activities				X			
Obstruction of cable installation activities due to the presence of the floating structure and associated moorings; and the presence of safety zones and vessels during maintenance activities			X				
Obstruction of oil, gas and CCS activities due to the presence of the floating structure and associated moorings; and the presence of safety zones and vessels during maintenance activities				X			
Obstruction of DSRL remedial and monitoring activities due to the presence of the floating structure, associated moorings and export			X				

Description of Impact	Construction Phase		O&M Phase		Decommissioning Phase		Cumulative Impacts
	Scoped In	Scoped out	Scoped In	Scoped out	Scoped In	Scoped out	
cable; and the presence of safety zones and vessels during maintenance activities							
Obstruction of adverse impact on telecommunication systems in operation in the region			X				
Potential impacts on socio-economics, tourism and recreation							
Positive impact on local economy	X				X		Scoped in
Direct impact on tourism	X		X		X		
Direct impact on recreation	X		X		X		
Direct impact on access to amenities	X				X		
Direct effect on local economy			X				

Table 12-2 Summary of onshore potential impacts

Description of Impact	Construction Phase		O&M Phase		Decommissioning Phase		Cumulative Impacts
	Scoped In	Scoped out	Scoped In	Scoped out	Scoped In	Scoped out	
Potential impacts on geology, hydrogeology and physical conditions							
Impact on geology	X				X		None anticipated
Impact on hydrogeology	X				X		
Impact on surface sediments	X				X		
Damage to river banks	X				X		
Impact on aquifers	X				X		
Impact on land use	X		X		X		
Impact on ground conditions.			X				
Impact on hydrogeology.			X				
Impact on water quality.			X				
Impact on soil/sediment quality.			X				
Damage to river banks.			X				
Impact on land use.			X				
Potential impacts on terrestrial ornithology							
Loss of habitat, individuals or breeding territories through construction work at the onshore study area	X				X		The need to consider cumulative impacts will be

Description of Impact	Construction Phase		O&M Phase		Decommissioning Phase		Cumulative Impacts
	Scoped In	Scoped out	Scoped In	Scoped out	Scoped In	Scoped out	
Disturbance to or displacement of birds in proximity to the site through construction activities	X				X		determined during the formal assessment of impacts as part of the EIA once the final cable route has been selected.
Disturbance to or displacement of birds in proximity to the site through maintenance activities			X				
Potential impacts on terrestrial ecology							
Loss of habitat	X				X		The need to consider cumulative impacts will be determined during the formal assessment of impacts as part of the EIA once the final cable route has been selected.
Loss of Scottish primrose plants or populations	X				X		
Mortality of protected species (otter, pine marten, badger, reptiles) through construction activities	X				X		
Disturbance to or displacement of protected species (otter, pine marten, badger, reptiles) in proximity to the site through construction activities	X				X		
Loss of bat roosts		X				X	
Loss of habitat important for invertebrate populations of conservation concern		X				X	
Disturbance to or displacement of protected species (otter, pine marten, badger, reptiles) in proximity to the site through maintenance activities	X						

Description of Impact	Construction Phase		O&M Phase		Decommissioning Phase		Cumulative Impacts
	Scoped In	Scoped out	Scoped In	Scoped out	Scoped In	Scoped out	
Potential impacts of the Project on nature conservation designations							
Loss of habitat, individuals or breeding territories through construction activities	X				X		Any cumulative impacts on Natura sites will be considered in the HRA. Any cumulative impacts on SSSIs will be considered in the EIA.
Loss of habitat	X				X		
Disturbance to or displacement of birds in proximity to the site through construction activities	X				X		
Mortality of otter through construction activities	X				X		
Disturbance to or displacement of otter through construction activities	X				X		
Disturbance to or displacement of birds in proximity to the site through maintenance activities	X		X				
Disturbance to or displacement of otter through maintenance activities	X		X				
Potential impacts on onshore archaeology and cultural heritage							
Direct physical disturbance to or loss of known onshore cultural heritage assets and disturbance to or potential loss of any unknown sub-surface archaeological features	X				X		X
Indirect impacts that affect the setting of Scheduled Monuments, Listed Buildings and other designated	X				X		X

Description of Impact	Construction Phase		O&M Phase		Decommissioning Phase		Cumulative Impacts
	Scoped In	Scoped out	Scoped In	Scoped out	Scoped In	Scoped out	
archaeological and cultural heritage assets							
Direct physical disturbance to or loss of known onshore cultural heritage assets and disturbance to or potential loss of any unknown sub-surface archaeological features.			X				X
Indirect impacts that affect the setting of Scheduled Monuments, Listed Buildings and other designated archaeological and cultural heritage assets.			X				X
Potential impacts on EMF							
Electric field associated with the cable.		X	X			X	None anticipated
Magnetic field associated with the cable.		X	X			X	
Electric field associated with the substation/ switch gear		X	X			X	
Magnetic field associated with the substation/ switch gear		x	X			X	
Potential impacts on air quality							
Dust (onshore construction)	X				X		None anticipated
Dust (onshore cable laying)	X				X		
Dust (access road)	X				X		

Description of Impact	Construction Phase		O&M Phase		Decommissioning Phase		Cumulative Impacts
	Scoped In	Scoped out	Scoped In	Scoped out	Scoped In	Scoped out	
Carbon cost	X		x		X		
Potential impacts associated with LVIA							
Potential impacts on landscape character during construction	X				X		X
Potential impacts on visual receptors during construction	X				X		X
Potential impacts on landscape character during operation			X				X
Potential impacts on visual receptors during the operation			X				X
Potential impacts associated with traffic and transport							
HGV Movements (west)		X					None anticipated
All Vehicle Movements (west)		X					
HGV Movements (east and south)		X					
All Vehicle Movements (east)		X					
HGV Movements				X			
All Vehicle Movements				X			

13 Suggested Structure of the Environmental Statement

- 13.1 This chapter proposes a structure for the Environmental Statement (ES) which would be prepared by Dounreay Tri Limited in support of a request for consent to construct and operate the Project.
- 13.2 Dounreay Tri Limited propose to adopt a single ES comprising of 3 distinct parts, comprising:
- Part 1: Introduction and background (offshore and onshore);
 - Part 2: Offshore environmental statement; and
 - Part 3: Onshore environmental statement and appendices.
- 13.3 Each technical chapter will begin with a description of relevant baseline conditions and assess the potential impacts of the Project on that baseline, including any potential cumulative impacts.
- 13.4 The suggested structure for the ES is set out below in Table 13-1:

Table 13-1 Suggested structure of the ES

Chapter	Title
	Non-Technical Summary
Part 1: Introduction and Background	
1	Introduction
2	Legislative Context and Regulatory Requirements
3	Site selection and the consideration of alternatives
4	Project Description
5	Environmental Impact Assessment Methodology
Part 2: Offshore Environment	
6	Offshore Physical Environment
6.1	<i>Geology, Bathymetry and Physical Processes</i>
6.2	<i>Offshore Noise</i>
6.3	<i>Radioactivity</i>
7	Offshore Biological Environment
7.1	<i>Intertidal Ecology</i>
7.2	<i>Benthic Ecology</i>
7.3	<i>Fish and Shellfish Ecology</i>
7.4	<i>Marine Mammals, Turtles and Basking Sharks</i>
7.5	<i>Ornithology</i>
7.6	<i>Nature Conservation Designations</i>
8	Offshore Human Environment
8.1	<i>Commercial Fisheries</i>
8.2	<i>Shipping and Navigation</i>
8.3	<i>Aviation</i>

Chapter	Title
	Non-Technical Summary
8.4	<i>Seascape, Landscape and Visual Amenity</i>
8.5	<i>Archaeology and Cultural Heritage</i>
8.6	<i>Other Users of the Marine Environment</i>
8.8	<i>Socio-economics, Recreation and Tourism</i>
10	Summary and Next Steps
11	References
Part 3: Onshore Environment	
12	Onshore Physical Environment
12.1	<i>Geology, Physical Processes, Hydrology and Land Use</i>
13	Onshore Biological Environment
13.1	<i>Terrestrial Ornithology</i>
13.2	<i>Terrestrial Ecology</i>
13.3	<i>Nature Conservation Designations</i>
14	Onshore Human Environment
14.1	<i>Onshore Archaeology and Cultural Heritage</i>
14.2	<i>Air Quality</i>
14.3	<i>Landscape and Visual Amenity</i>
15	Summary and next steps
16	Summary of Mitigation
15	References
	Appendices

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