



Environmental Statement – Non-Technical Summary

Dounreay Trì Floating Wind Demonstration Project

Dounreay Trì Limited
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1. Introduction

- 1.1 Hexicon AB is a Swedish design and engineering company that has developed a floating 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 Tri Limited” for the sole purpose of developing, financing, constructing and demonstrating this technology within a site approximately 6km off Dounreay, Caithness (“the Site”).
- 1.3 Dounreay Tri Limited (“the Applicant”) is proposing to demonstrate a floating offshore wind farm called Dounreay Tri (“the Project”) which shall consist of:
 - A two turbine offshore wind farm with an installed capacity of between 8 to 12 megawatts (MW), subject to final approval of The Crown Estate, approximately 6 km off Dounreay, Caithness;
 - A single export cable to bring the power to shore immediately to the west of the Dounreay Restoration Site fence line; 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 existing Dounreay 132/33/11kV substation.

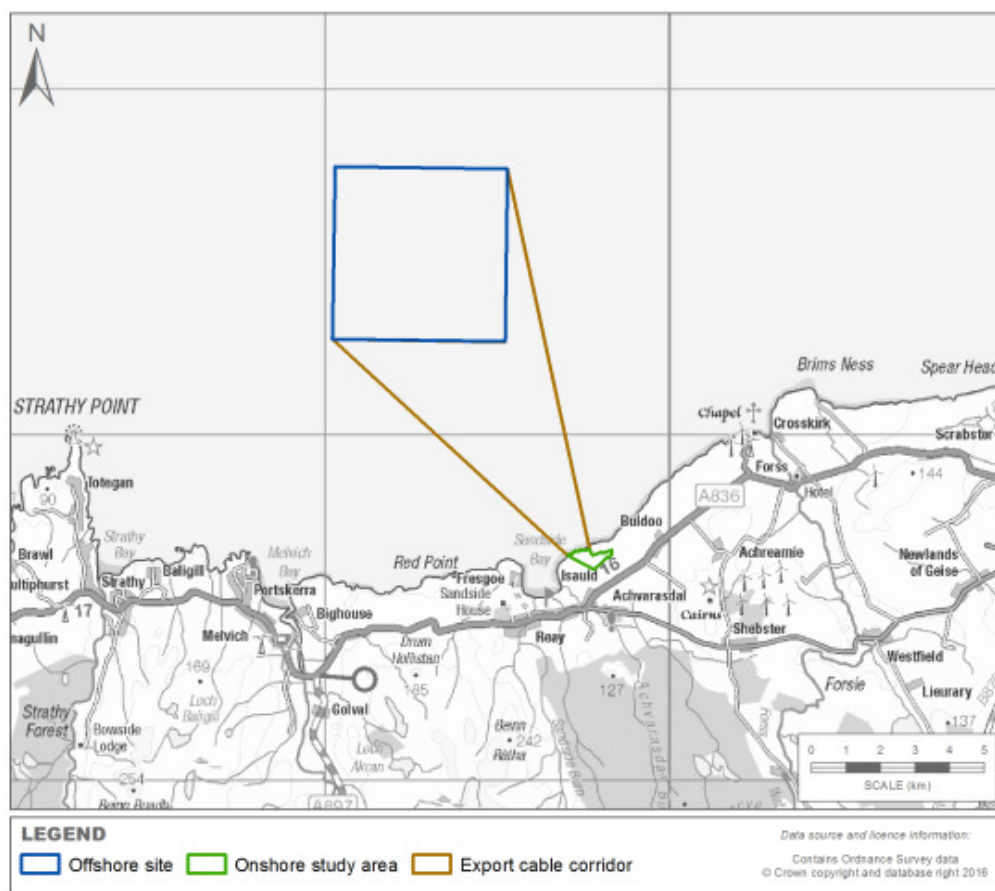


Figure 1-1 Offshore site, export cable corridor and onshore study area

- 1.4 Figure 1-1 depicts the offshore Site, the export cable corridor and the onshore study area.
- 1.5 Figure 1-2 depicts the onshore study area which includes two cable landfall options, two potential locations for the onshore substation and indicative onshore cable corridors to connect the landfall and substation options. The exact location of the onshore infrastructure will be agreed with Scottish Ministers, in consultation with The Highland Council, once an onshore construction contractor is appointed. The onshore construction contractor would not be appointed until, and unless, deemed planning is granted by Scottish Ministers. Nevertheless it is possible to identify suitable cable landfall options and substation options.

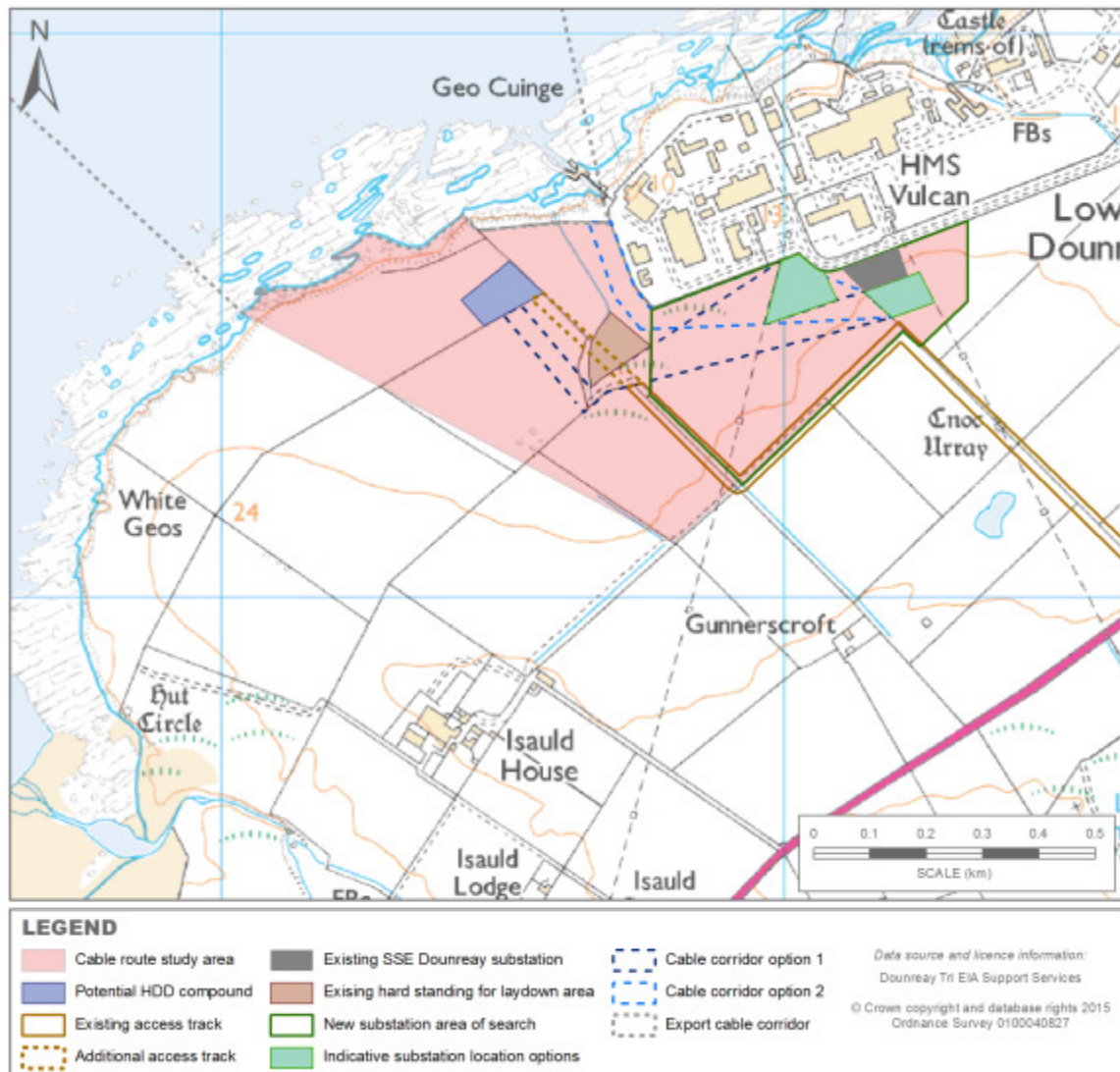


Figure 1-2 Onshore study area - including indicative landfall options, substation options and cable corridors

- 1.6 The Dounreay Tri Floating Wind Demonstration 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 overseas; and

- **Economic:** Verification of the economic return through this demonstration project shall provide a base for more reliable estimations for utility scale projects overseas. This full scale demonstration project is an important step towards developing a commercially competitive product.
- 1.7 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 12 megawatts (MW), subject to final approval of The Crown Estate, approximately 6 km off Dounreay, Caithness;
 - A single export cable to bring the power to shore immediately to the west of the Dounreay Restoration Site fence line; 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 existing Dounreay substation.
- 1.8 The Growth and Infrastructure Act (2013) allows for the Scottish Ministers 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 from the Scottish Ministers as part of the Section 36 application. The Highland Council will continue to liaise with the Applicant and Scottish Ministers.

2. Legislative Context and Regulatory Requirements

- 1.9 At the Paris climate conference (COP21) in December 2015, 195 countries adopted the first-ever universal, legally binding global climate deal. The Paris Agreement sets out a global action plan to put the world on track to avoid dangerous climate change by limiting global warming to well below 2°C.
- 1.10 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.
- 1.11 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.
- 1.12 The challenges of climate change, energy security and affordability are driving renewable energy policy. There are now a significant number of national and international policies, strategies, action plans and regulations relating to climate change and the development of renewable energy in Europe, the UK and Scotland.
- 1.13 The Project intends to demonstrate an innovative multi-turbine floating wind demonstration project. Accelerating, encouraging and demonstrating innovative technology is relevant to curbing global emissions. This demonstration project shall allow Hexicon to test and refine

their technology, including fabrication methods and design of the moorings and anchors. The Project will contribute up to 12MW installed capacity from wind energy and will make a contribution to achieving Scotland's policy aims and aligns with the Paris Agreement.

1.14 Dounreay Tri Limited (the Applicant) has requested:

- Two Marine Licences pursuant to Section 20 of the Marine (Scotland) Act (the "2010 Act") for the deposit of substances and objects and the construction, alteration or improvements of works within the Scottish Marine Area in relation to the Windfarm; and
- Consent under Section 36 of the Electricity Act 1989 (the "1989 Act") for the construction and operation of a Generating Station ("Section 36 Consent"); and
- A Direction Under Section 57 Of The Town And Country Planning (Scotland) Act 1997 (As Amended) That Planning Permission For The Ancillary Onshore Development Be Deemed To Be Granted; and
- A declaration, pursuant to Section 36A of the Electricity Act to extinguish public rights of navigation so far as they pass through those places within the Scottish Marine Area where the single structure forming part of the offshore Windfarm is to be.

3. Site Selection and Engagement to Date

1.15 In August 2014, Hexicon sought a site in Scottish waters to demonstrate their multi-turbine platform. Marine Scotland had identified eleven sites which were considered suitable for floating wind. Accordingly, each site was reviewed according to Hexicon's criteria. Only three of the eleven sites met Hexicon's criteria, those were:

- Southern Moray Firth;
- North East Aberdeen; and
- North Coast (Dounreay).

1.16 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.

1.17 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 this site so it would be difficult to install the marine cable successfully. The Southern Moray Firth Site is also intensively fished and is within an area which is designated for the protection of marine mammals.

1.18 The North East Aberdeen Site lay approximately 23km 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 presented a significant risk for a project which is reliant on only one export cable.

1.19 Hexicon chose the Dounreay site which lies south of the shipping traffic. The Dounreay site was selected for the following reasons:

- The Dounreay 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 and thus better suited to drag embedment anchors;

- The average wind speed is good and has been calibrated with data from the Forss Wind Farm, thus negating the need for an offshore anemometer mast;
- On the basis of discussions with Scottish Fishermen's Federation (2014), the Dounreay site appeared to lie out-with intensively fished areas; and
- Marine Scotland completed a detailed seabed survey during the summer of 2014, which provided a clear, up-to-date understanding of the water depths and seabed conditions.

1.20 The Scoping Report (2015) identified a potential landfall option which would have involved trenching across the east of Sandside Bay. This alternative has since been excluded because:

- A cable landfall at on the eastern flank of Sandside Bay would be complicated by the orientation of the proposed landfall site (facing across as opposed to straight out the bay) and presence of exposed rock in the foreshore area;
- Storm events are known to periodically expose the bedrock at Sandside Bay and could therefor expose/damage the export cable (*pers comm.* 2016);
- Access to beach is limited (narrow access track at far western end of the bay) and thus it is likely that a temporary access track would need to be established to allow vehicle access;
- There appear to be features of archaeological interest immediately to the east of Sandside Bay;
- Sandside Bay and the land to the east above MHWS is a Site of Special Scientific Interest (SSSI). Part of the SSSI includes the foreshore and the banks of the Burn of Isauld – i.e. the land immediately to the east of Sandside Bay. Consequently, SNH (2016) stated a preference for either the HDD or pinning options rather than trenching; and
- Historic radioactive particles have been found on the beach at Sandside Bay. Works within this area could unearth additional particles. Whilst the probability of coming into contact with a relevant particle at Sandside Bay is one in 80 million (DSRL, 2016). It seemed unnecessary to continue with an option which was already technically and environmentally unfavourable (see points above).

Stakeholder Consultation

1.21 A stakeholder drop-in session was held on the 2nd of February 2016 between 10am and 8pm at Caithness Horizons, Thurso.

1.22 57 stakeholders representing tourism and recreation, commercial fisheries, local industry and community interests were invited to the drop-in session. Seven stakeholders attended the event and one responded afterwards, via email.

1.23 Those whom attended or responded noted:

- The monitoring and clean-up of particles at Sandside Bay and offshore;
- The “no take” fishing zone around the Dounreay cooling water outfall;
- Project timescales, including the selection of any operations and maintenance facilities;
- Possible sites of archaeological interest on the eastern flank of Sandside Bay;

- Sea kayaking routes, which tend to hug the coast, start at Sandside Bay and head west; and
- Yachting routes, which presented no concern but cautioned that vessels used during construction might want to avoid the waters just off Dounreay during large swell and at low tide as the seabed is saw toothed and larger vessels could become trapped.

Pre-Application Consultation

- 1.24 A pre-application, public consultation event was held on the 9th April 2016 between 10am and 5pm at Caithness Horizons, Thurso. The event was advertised in both the John O’Groats Journal and the Caithness Courier.
- 1.25 The public event displayed details of the proposed development through a series of display boards throughout the room, including projections of the visual aspects of the offshore and onshore infrastructure from key vantage points.
- 1.26 Three representatives from Dounreay Trì Ltd were present to answer specific questions about the development.
- 1.27 There were only two attendees and there have been no subsequent emails to the Dounreay inbox (as of 31st August 2016). The first attendee was a student from Toronto who asked how the platform is tethered and how it operates. The second attendee was from Caithness and noted that another demonstration project would fit in with the local heritage given the first fast breeder reactor was demonstrated at Dounreay in the 1950s. Locating the onshore electrical infrastructure adjacent to the existing industrial landscape at the Dounreay Restoration Site, as opposed to a “green field” site was considered positive.

4. Project Description

- 1.28 Dounreay Trì Limited is proposing to demonstrate a floating offshore wind farm called Dounreay Trì which shall consist of:
 - A two turbine offshore wind farm with an installed capacity of between 8 to 12 megawatts (MW), subject to final approval of The Crown Estate, at least 6km off Dounreay, Caithness;
 - A single, 33kV, export cable to bring the power to shore immediately to the west of the Dounreay Restoration Site fence line; 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 existing substation at Dounreay.
- 1.29 The main offshore components will include:
 - Two offshore wind turbines;
 - A floating foundation;
 - Mooring clump weight;
 - Mooring chain and/or steel lines
 - Drag embedment anchors;
 - One cable to bring the renewable electricity ashore; and
 - Scour protection for the anchors and the export cable, where necessary.

1.30 The onshore infrastructure shall comprise of:

- A cable landfall immediately to the west of the Dounreay Restoration Site fence line;
- A cable joint transition bay, where the offshore and onshore cables are spliced together;
- The onshore cable, buried to a depth of approximately 1m, 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.

5. Environmental Impact Assessment Methodology

1.31 EIA is an iterative process, carried out in parallel with project design, where the emphasis is on identifying and preventing potential impacts where possible and suggesting adequate mitigation measures if not.

The Design Envelope

1.32 The EIA process makes use of the Design Envelope, an approach to assessment applied where the final design cannot be confirmed ahead of the assessment. This approach is permitted in law and has been adopted in connection with other offshore and marine renewable consent applications where a level of flexibility is required in the Project Description.

1.33 The Design Envelope describes the limits of design proposed for the development, providing both minimum and maximum parameters within which the realistic worst case scenario will be assessed.

Approach

1.34 Broadly, the IEEM Guidelines for Ecological Impact Assessment (IEEM 2010) have been followed. To add clarity, the terms impact and effect are not used interchangeably as seen in the Guidance but rather hold clear and consistent meaning in this EIA process and ES.

Defining impacts and effects

1.35 In this Environmental Statement (ES), an effect is defined as a physical change in the environment as a result of an action or activity related to the development and an impact is defined as the consequence of that change. For example, dredging the seabed resulting in increased suspended sediment locally would be considered an effect, the impact of this would depend on the particular receptor but may include smothering of sessile benthic organisms.

1.36 All impacts will be measured to identify a degree of “significance”. The classifications for magnitude and vulnerability will be defined on a topic by topic basis, i.e., the level or limit that is considered to be ‘high’, ‘moderate’, ‘low’ or ‘negligible’. Through this, significance can be defined through expert judgement for specific topics.

1.37 Those impacts assessed as ‘moderate’ or ‘major’ significance are considered to require mitigation measures to be applied.

Cumulative Impact Assessment

- 1.38 Cumulative Impact Assessment (CIA) is necessary to understand the potential impact arising as a result of interaction between this Project and others. This interaction may occur between projects at great distances if the receptor considered is migratory or wide ranging, or receptors originate from multiple sites.
- 1.39 The 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.
- 1.40 The projects considered in each cumulative assessment are described in the specific chapter as the potential for interaction is specific to each given receptor. The projects which may be considered in this assessment are detailed below:
- Orkney-Caithness interconnector cable;
 - HIE Dounreay Demonstration Centre (DDC);
 - Brims Tidal Array, Brims Ness;
 - MeyGen, Inner Sound;
 - DP Energy, Westray South;
 - Scotrenewables, Lashy Sound;
 - The decommissioning of Dounreay and HMS Vulcan; and
 - Onshore wind farms on Caithness .

6. Physical and Coastal Processes

- 1.41 A multibeam survey of the north coast of Scotland between the Kyle of Tongue and 8 miles west of Thurso was surveyed by the Marine Scotland Science vessel, the MRV Scotia in 2014. Video-based monitoring of the benthic environment located in the same area was also conducted in 2014. The data from this survey were used to inform the desk based assessment of potential impacts arising from the Project on physical and coastal processes.
- 1.42 The offshore site and cable route are made up of Pre-Quaternary bedrock covered by varying depths sediments. 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 offshore site and at its shallowest reaches approximately 0.1 m. Sediment cover reduces to zero in the near-coast parts of the cable corridor.
- 1.43 The wind and wave regime follows a seasonal pattern with highest wind speeds and wave heights being recorded in the winter months. Average winds speeds are 7 m/s -10 m/s with mean significant wave heights of 1.5 m - 2.0 m. Tidal currents in the area range between 0.10 m/s and 0.75 m/s.
- 1.44 The radioactive particles released by historic activities at the Dounreay Nuclear installation are primarily clustered on the seabed northwest of the outfall which is located approximately 0.5 km west of the cable corridor boundary but numerous less-hazardous particles have been recorded in the coastal zone extending between Sandside Bay and Brims Ness to the east. There are no other water or sediment quality concerns in the area.

- 1.45 All temporary and permanent changes in seabed characteristics, ranging from minor physical disturbances to the smothering of the existing seabed with deep deposits of gravel and/or rock, will be restricted to the immediate vicinity of the deployed infrastructure. Based on the worst case scenario, the maximum total footprint of potential seabed change is estimated as 0.2 km² (approximately 0.4% of the total area of the offshore site [25 km²] and cable corridor [24 km²]). These impacts can therefore be considered as having a negligible impact on the overall seabed characteristics of the area.
- 1.46 The highest concentration of suspended sediments will likely be generated by cable trenching via jetting (if used). This potential impact will be both localised around the working area and transient due to the rapid re-settlement of the relatively coarse sediment particles present in typical surface sediments and has therefore been considered as having negligible magnitude. HDD is now the preferred method removing the potential impact completely.
- 1.47 Based on the available survey data reported by DSRL (Section 6.9) it is highly unlikely that potentially harmful radioactive particles would be encountered during export cable installation activities (the particle density has been estimated as being less than one per hectare in the cable corridor area) and there is no evidence to suggest particles are present within the offshore site
- 1.48 All routine discharges will be rapidly dispersed by water currents and will have no significant reduction in the sediment or water quality in the development area and surroundings.
- 1.49 There is no evidence of any major mobile seabed features in the Study Area. The sediment transport processes within the offshore Site and the cable corridor are not expected to be modified significantly by the presence of the anchors or cables. Any effects are likely to be limited to localised areas of scouring and accretion (within a few metres) around seabed anchors, mooring lines and export cable protection from either physical abrasion or due to increased water turbulence.
- 1.50 The area potentially impacted will remain small (0.20 km²) in comparison to the total offshore Site and therefore the overall magnitude of changes in sediment transportation can be considered as being negligible.
- 1.51 All impacts were assessed as having negligible significance. No significant impacts to the physical environment have been identified in the assessment of potential impacts at any stage of the Project construction, operation, and maintenance or decommissioning.
- 1.52 Project wide mitigation measures will be implemented to further reduce all assessed impacts as described above.

7. Intertidal Ecology

- 1.53 The predicted impacts of the Project on the Intertidal Ecology are all assessed as not significant. The impact assessment was based on an intertidal survey that was carried out prior to assessment (See Appendix 7.1 Intertidal Survey Report). The survey was carried out on a larger intertidal area than which is now being considered following the revision of the project description.
- 1.54 The intertidal habitat will only be impacted by the Project as a result of the installation of the export cable. There are two options for the landfall of the export cable: Option 1 is Horizontal Directional Drilling (HDD) and Option 2 is pinning the cable to existing water cooler channel at the Dounreay Nuclear Site. If HDD is used then the intertidal area will not be impacted at all. Therefore, for the purposes of this assessment, only the impacts of Option 2 (pinning) have been assessed.

- 1.55 There are eleven different biotopes present in the intertidal Study Area. The only species of conservation interest encountered in the intertidal area was dog whelk *Nucella lapillus* which is on the OSPAR List of Threatened and/or Declining Species and Habitats. This was a common species found in the intertidal area. Although this is a protected species, the dog whelk is a common species in the UK and is not included on SNH's list of Priority Marine Features or any other conservation legislation, as Scottish populations are not considered to be under threat or declining.
- 1.56 Part of the rocky shore area consisted of intertidal under-boulder communities, which is a habitat on The UK Biodiversity Action Plan list of priority habitats (JNCC, 2015b). This is due to the fact that they are a functional habitat for many species and are threatened by human activity such as searching for bait. Despite this, this habitat is not considered to be under threat in Scotland (JNCC, 2008). Six UK BAP Priority habitats were recorded at the Study Area during the intertidal survey. However these habitats are widespread in the UK and are not included on the Scottish list of Priority Marine Features. The potential impacts identified as a result of construction are loss of habitat, disturbance of fauna and introduction of new species. These impacts were assessed as negligible or minor. The potential impact identified during operation and maintenance is habitat creation. The creation of habitat was assessed as negligible but positive.
- 1.57 The cumulative effects on the intertidal ecology are assessed as negligible as any developments are a sufficient distance away that there will be no increase in the magnitude of impacts.
- 1.58 There are no significant impacts anticipated on the intertidal environment.

8. Benthic and Shellfish Ecology

- 1.59 All potential impacts of the Project on Benthic and Shellfish Ecology are assessed as negligible or minor. In terms of Benthic and Shellfish Ecology, the effects arising from the development are considered to be associated mainly with the presence of the infrastructure on the seabed, the changes to water quality and how this may directly or indirectly affect the existing benthic and shellfish ecology and habitat.
- 1.60 Two dominant seabed biotopes (JNCC, 2015) were recorded in the offshore area, SS.SSa.CFiSa (Circalittoral fine sand) and SS.SMx.CMx (Circalittoral mixed sediment). Sandy sediment habitats typically support a diverse range of infauna (animals living in the sediment) including polychaetes and bivalves. In mixed sediment areas where hard substrata are present, a range of epifaunal species including hydroids, bryozoans and echinoderms are also typically found.
- 1.61 The export cable corridor extends from the intertidal zone to the southern boundary of the offshore area in water depths of approximately 60 m- 110 m. The seabed characteristics within the cable corridor vary from homogeneous sandy sediment near the deeper-water, offshore area, through areas of mixed sediment types and rocky seabed located closer to the coast (McBreen et al., 2011).
- 1.62 The rocky reef area observed within the export cable corridor in water depths of 20 and 40 m during the 2014 seabed survey (biotopes CR.MCR.EcCr.FaAlCr.Pom and CR.MCR.EcCr.FaAlCr.Flu) may be classified as an EU Habitats Directive Annex I protected habitat. However, it should be noted that rocky reef communities are widespread throughout the Pentland Firth area and around the coast of the UK; it is therefore considered unlikely that the relatively small area occurring within the export cable corridor would be formally designated as an area of Annex I habitat.

- 1.63 The only Priority Marine Feature definitively identified in the offshore area is the ocean quahog *Arctica islandica* - a long-lived and large burrowing bivalve living in medium to fine sands and mud from the extreme lower shore down to the circalittoral seabed. The European spiny lobster *Palinurus elephas* is a PMF species that has been historically abundant along the west and north coasts of Scotland, but has undergone significant reduction in population size in Scottish waters (Howson et al., 2012). The spiny lobster prefers rocky, exposed subtidal areas in the circalittoral zone therefore it is possible that this species may be present in rocky seabed areas within the export cable corridor. It also is likely that areas of kelp bed (classified as a PMF habitat) will occur within the export cable corridor on infralittoral rocky seabed in water depths of less than 20 m.
- 1.64 In addition, there are a number of commercially important shellfish species present in the Study area including brown crab, velvet crab, European lobster, periwinkles, green crab, common whelks, Norway lobster and queen scallop.
- 1.65 Those potential impacts during construction that were assessed include habitat loss, increased suspended sediment and release of radioactive particles. The magnitude of these impacts was considered low or negligible, and when combined with medium or low vulnerability of the receptor, the overall significance of these impacts was assessed as minor or negligible.
- 1.66 Those potential impacts during operation and maintenance that were assessed include scour, pollution, introduction of non-native species, creation of habitat and electromagnetic fields. (EMF). Due to the location and footprint of the proposed development in a dynamic environment and the distribution of similar habitat in the surrounding area, as well as the low magnitude of the impacts (e.g. EMF) these impacts have been assessed as minor.
- 1.67 Impacts during decommissioning were assessed as being similar to, but not exceeding those arising during the construction phase.
- 1.68 Cumulative effects were assessed in relation to nearby developments that could increase the magnitude of the impacts discussed above. Those developments were SHE-T: The Orkney-Caithness interconnector cable; HIE Dounreay demonstration centre (DDC); Brims Tidal Array, Brims Ness; Meygen, Inner Sound; Scotrenewables, Lashy Sound; and DP Energy, Westray South. The consideration of projects that could result in potential cumulative impacts is assessed based on the results of the impact assessment, together with expert judgement of the specialist consultants. There were no significant cumulative impacts as these other developments are a sufficient distance from this Project or have such minor impacts associated with them.

9. Fish Ecology

- 1.69 All predicted impacts of the Project on Fish Ecology are assessed as minor and not significant. Impact assessment was focused on diadromous migratory fish species, pelagic species, demersal species and elasmobranch species.
- 1.70 This baseline description prioritises those species which are protected by conservation legislation or guidance. Those species protected by the SACs described above are of primary conservation importance in the Study Area.
- 1.71 Both sea trout and Atlantic salmon are host to species of freshwater pearl mussel which is protected by legislation due to its conservation importance. Sea trout and Atlantic salmon must be given special consideration at the Project Site. European Eel *Anguilla anguilla* is also considered here as a diadromous species of conservation importance.

- 1.72 In addition, those pelagic, demersal and elasmobranch species that are of conservation importance or have spawning or nursery grounds in the Study Area have been given special consideration in the impact assessment. Those pelagic species include Atlantic herring, Atlantic mackerel, European sprat and horse mackerel. Those demersal species include sandeel, haddock, cod, lemon sole, blue whiting, monkfish, whiting, saithe, plaice, hake and ling.
- 1.73 Elasmobranch species were given special consideration due to their conservation status and their increased sensitivity to EMF. Those species considered included common skate, spurdog, tope shark, thornback ray, spotted ray, blue shark, porbeagle shark, Portuguese dogfish, sandy ray.
- 1.74 Those potential impacts during construction that were assessed include noise, habitat loss and smothering caused by increased sedimentation. The openness of the area and the amount of similar habitat surrounding the platform as well as the existing levels of disturbance means that these impacts have been assessed to be minor.
- 1.75 Those potential impacts during operation and maintenance that were assessed include loss of habitat, Electromagnetic fields (EMF), noise, fish aggregation effect and entanglement. Again, due to the location and footprint of the proposed development, the distribution of similar habitat in the surrounding area, and project commitments that will be made to mitigate these impacts, these impacts have been assessed as minor.
- 1.76 Impacts during decommissioning were assessed as being similar to, but not exceeding those arising during the construction phase.
- 1.77 Cumulative effects were assessed in relation to nearby developments that could increase the magnitude of the impacts discussed above. Those developments were SHE-T: The Orkney-Caithness interconnector cable; HIE Dounreay demonstration centre (DDC); Brims Tidal Array, Brims Ness; Meygen, Inner Sound; Scotrenewables, Lashy Sound; and DP Energy, Westray South. The consideration of projects that could result in potential cumulative impacts is assessed based on the results of the impact assessment, together with expert judgement of the specialist consultants. There were no significant cumulative impacts as these other developments are a sufficient distance from this Project or have such minor impacts associated with them.

10. Marine Mammals, Turtles and Basking Sharks

- 1.78 This chapter is informed by data collected during site specific surveys commissioned specifically for the Project. This consisted of aerial video surveys for marine mammals, turtle and basking shark.
- 1.79 In the case of marine mammals underwater noise and collision/entanglement has the potential to cause the greatest impact. No significant impacts to marine mammals, basking sharks or turtles have been identified during the construction, operation and maintenance or decommissioning of this Project. Any impacts related to vessel collisions and disturbance will be mitigated through the implementation of a vessel management plan which limits vessel speeds and designates a navigational route for vessel traffic. This vessel management plan will minimise any potential for collisions and disturbance to marine mammals, basking sharks or turtles as a result of increased vessel traffic at the Project site. As a result of this mitigation, the impact significance were assessed as Negligible to Minor.
- 1.80 There are a large number of uncertainties associated with the cumulative assessment. These are largely driven by the lack of information available on the final project designs or

timescales, the methods of construction or the impacts of the developments to be used in this cumulative impact assessment. Therefore, the impact assessment is limited in its quantitative detail. Despite this, none of the cumulative impacts were assessed as having a significant impact on marine mammals, basking sharks or turtles.

11. Marine Ornithology

- 1.81 This Chapter has described the marine ornithological interest within and around Dounreay Trí project, concentrates on those species that are known to or are likely to occur within the Dounreay Trí site and off the North Coast of Scotland, with particular focus on those species recorded during the surveys undertaken to inform this assessment.
- 1.82 Those site specific surveys ultra-high resolution digital video aerial marine megafauna, ornithological and human activity surveys were undertaken by HiDef Aerial Surveying Limited between January and December 2015, on a monthly basis, although two (2) surveys were successfully completed in June 2015.
- 1.83 The survey methodology was designed to provide information suitable to support an EIA of the potential effects of a floating wind demonstrator, for which an accurate assessment of abundance and distribution of seabirds and marine mammals is required.
- 1.84 The Dounreay Trí project is located near to a number of important bird sites which have been classified as SPA under 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 and an internationally important breeding assemblage of seabirds including fulmar, kittiwake, razorbill and puffin. These seabird species are likely to use the waters in and around the Dounreay Trí project for feeding.
- 1.85 A total of 4960 birds of 14 species were recorded during thirteen surveys from January to December 2015. The identification rate to species level was in excess of 97%.
- 1.86 The impact assessment was able to conclude that the effects of disturbance and displacement during construction on all species can be considered negligible.
- 1.87 The impact assessment also concluded that this held true for the operation phase.
- 1.88 Collision risk modelling demonstrated that the effects of the project on all species was negligible.
- 1.89 As a result of the impact assessment, no receptor specific mitigation measures were required.
- 1.90 Impacts arising through the decommissioning phase of the Dounreay Trí project have been considered similar to assessed under the construction phase.

12. Commercial Fisheries

- 1.91 This chapter presents the assessment of the impacts of the Project on commercial finfish and shellfish fisheries within the vicinity of the Project boundaries.
- 1.92 There are no active finfish or shellfish marine aquaculture sites within the vicinity of the proposed development. Impacts on marine aquaculture sites have therefore been scoped out of this assessment. There is a low intensity fixed engine fishery located in Melvich Bay where the River Halladale enters the Pentland Firth, at least 8 km south west of the offshore Project boundaries. Due to the distance from the proposed development, this fishery has also been scoped out of this assessment.

- 1.93 Four key fisheries have been identified in relation to the Project Site and Study Area: a low intensity pelagic fishery targeting herring; a low intensity mixed demersal fishery, primarily landing haddock and monkfish; a low intensity scallop dredging fishery; and a low intensity inshore creel fishery, predominantly composed of the under 10 m fleet, targeting crab and lobster.
- 1.94 No significant impacts to the pelagic, demersal and scallop fisheries have been identified as arising from the Project proposals in terms of loss of fishing grounds, obstruction of fishing transit routes, displacement to other fishing grounds or indirect impacts on the fisheries resource due to the low intensity of activity, small operational footprint of the Project (up to 2.3 km²) and availability of fishing grounds in the wider sea area.
- 1.95 There is the potential for moderate impacts to individuals in the inshore creel fishery in terms of loss of access to fishing grounds during operation, given the small-scale and localised nature of their fishing activity and greater sensitivity to change in available fishing grounds.
- 1.96 Where there is potential for fishing grounds to be impacted for any of the four fisheries, to a moderate or minor degree, these will be mitigated through the development and implementation of a Fisheries Management Plan (FMP) and appointment of a Fisheries Liaison Office (FLO) to ensure any concerns of fisheries are raised and addressed appropriately. The FMP will aim to minimise potential loss of important fishing grounds, avoid displacement to other grounds or unnecessary obstruction of fishing vessel transit routes for access to other fishing grounds. The FLO will ensure that all fisheries sectors operating in the area are aware of planned and ongoing construction activities to reduce potential periods of disruption or allow affected fisheries to plan fishing activity elsewhere or at different times.
- 1.97 Potential moderate impacts were identified for all four fisheries from the risk of gear damage or loss as a result of snagging gear on project infrastructure, however this will be mitigated through the application and monitoring of an operational safety zone (discussed further in the NRA). A Cable Burial Plan and Cable Protection Monitoring will also ensure that the export cable remains buried, any protection material remains in place and that the cable is not vulnerable to snagging or damage from fishing gear or anchors and that no debris hazardous to fishing activity.
- 1.98 All residual impacts have subsequently been assessed as minor or negligible.
- 1.99 No significant cumulative or in-combination impacts on Commercial Fisheries have been identified, particularly due to the lack of connectivity between projects and spatial coverage of the inshore under 10 m fleet, most likely to be affected by the Project proposals but tend to fish in local, coastal waters.

13. Shipping and Navigation

- 1.100 The Navigation Risk Assessment (NRA) followed the Maritime and Coastguard Agency (MCA) and Department of Energy and Climate Change (DECC) Guidance for such assessments. This included extensive baseline data collection to obtain information on the vessel activities in the vicinity of the Project, including 28 days of seasonally-weighted maritime survey data, a year's worth of AIS data, desk-based research and consultation with local stakeholders/experts.
- 1.101 This identified that the area is transited by an average of less than one vessel per day, comprising a mixture of cargo ships, fishing vessels, recreational vessels, tugs, passenger vessels and tankers to/from Scapa Flow, with a small number of other vessel types transiting the Study Area.

- 1.102 The potential hazards to this vessel activity posed by all phases of the Project have been assessed based on consultation, a Hazard Review Workshop involving a cross-section of local stakeholders and qualitative risk assessment. Based on this assessment it is considered that the risks over the life of the Project are broadly acceptable or tolerable with appropriate mitigation. Mitigation will include chart depiction, information circulation (notices to mariners) and a nominated guard vessel being present during installation. This conclusion takes into account the mitigation embedded within the Project design, including, construction safety zones of 500m and application of the developers Safety Management System. Furthermore, Dounreay Tri Ltd has employed an Independent Verification Body (IVB), American Bureau of Shipping (ABS) who will ensure the floating platform complies with floating wind design standards.
- 1.103 Further consultation with regulators and stakeholders is planned to finalise the mitigation strategy and ensure navigational risks are minimised.

14. Aviation and Radar

- 1.104 This Chapter provides a summary of the analysis of the potential for effects to civil and military aviation with respect to the offshore aspects of the Project. The analysis considered the proximity to and operations of civil airports, the types of radar operating around the north Scottish coast, helicopter operations and MOD operations in the region.
- 1.105 The analysis was conducted in accordance with Civil Aviation Authority (CAA) – Civil Air Publication (CAP) 764, Policy and Guidelines on Wind Turbines (CAA, 2013). Potential aviation stakeholders were identified and for each receptor, the physical obstruction and/or radar effect, and then subsequently the operational effects were evaluated.
- 1.106 Consideration was given to any aviation operation or infrastructure that is within operational range of the Site. Operational range varies with radar type or operations and therefore the study areas are defined on a case by case basis in this respect. The radar line of sight analysis is a limited and theoretical desk based study and is designed to give an indication of the likelihood of the turbine being detected such that the operational significance of the wind farm's detectability relative to nearby aviation stakeholders can be assessed.
- 1.107 The Project was assessed not to be in Line of Sight to any Primary Surveillance Radar or Air Defence Radar and there are no Secondary Surveillance Radar systems within 10km of the Site. The Site is not in an area of priority with regard to the effects of wind energy development on military low flying operations. It is considered that the MOD is therefore unlikely to raise concerns with regard to military Low Flying activities with turbines within the Zone boundary.
- 1.108 The Site is not in an area requiring consultation with any meteorological radar operations and is also outside of any helicopter main routes. However, helicopter SAR operations can be required in any location; therefore, notification and lighting will be agreed with the appropriate agencies. The Site is considered to be within the operational range of a number of civil and military radar systems. However, analysis indicated that the Site would not theoretically be detectable by any of the systems due to distance and substantial intervening terrain. The Site is also considered not to affect operations at any regional civil and military aerodromes.
- 1.109 No significant impact is anticipated on military or radar operations and systems.

15. Seascape, Landscape and Visual Amenities

- 1.110 Baseline surveys were undertaken within a core 45 km radius study area (measured from the outer edge of the Project boundary), extended to a 60 km radius to include the full extent of the Hoy and West Mainland, and Kyle of Tongue National Scenic Areas. A total of 69 seascape, landscape, and visual receptors were identified by the baseline study, the most sensitive of which include seascape and landscape character units, nationally and regionally designated Landscape Areas, Wild Land Areas, and key viewpoints and routes used by tourists. The potential effects on the receptors are all indirect only, due to visibility of the turbines and platform, as distinct from direct physical effects.
- 1.111 The Project will be located at distances ranging from approximately 7 km to a maximum of 60 km from the receptors, and their visibility will vary widely with weather conditions, and in daylight or night time.
- 1.112 The assessment predicted that the Project will result in significant effects on four seascape receptors: on three remote stretches of the coastline in the vicinity of The Old Man of Hoy, and on the Sandside Bay unit, close to the Project. One further significant effect was assessed, on the Farr Bay, Strathy and Portskerra Special Landscape Area. The assessment found that there would be no significant visual effects, either at static viewpoints or on roads or cycle routes.
- 1.113 The primary determinant of the assessments related to the magnitude of the predicted effects, which due to their relatively small size or scale, limited geographical extent, or a combination of these factors, was considered to be less than moderate for all other receptors.
- 1.114 Potential cumulative effects in conjunction with an agreed list of 47 onshore and offshore projects were also assessed. None of the predicted cumulative effects were found to be significant.

16. Archaeology and Cultural Heritage

- 1.115 In order to evaluate the potential significant impacts to the marine historic environment, a desk based assessment (DBA) of relevant data sources was undertaken in combination with a review and interpretation of geophysical survey data of the Project area, providing a baseline for impact assessment. The assessment of the Project impacts considers the potential effects and the significance of impact on the marine historic environment. The direct and indirect impacts during the construction, operating and decommissioning phases of the project were considered.
- 1.116 There are no Historic MPAs or designated wrecks and military remains in the Site. There are no known charted ship or aircraft wreck sites in the area. Eleven potential shipwreck sites were identified during the DBA. Their positions are unknown, derived from the unverified location of loss indicated in Whittaker (1998) so there is the potential that some remains could be within the Site and export cable corridor, especially in the area of Sandside Bay. One shipwreck (HMT Orsino) would be considered of high importance as it is a war grave (lost during World War I).
- 1.117 There could be unknown wrecks, aircraft and unexploded wartime ordnance in the area. However, none is known and none has been identified in the available limited survey data. Unrecorded vessels may be present but not visible in the geophysical data, due to their materials of construction or magnetic returns or being buried beneath the surface of the seabed. Two MBES anomalies were observed in the geophysical assessment (MBES01 and MBES02) that fall within the Site, one of which may be of interest.

- 1.118 There is low potential for the preservation/identification of submerged landscapes and prehistoric sites in the area of the Site, which is located in waters deeper than 50 m. However, the Cable Corridor AoS has depths shallower than 50 m and therefore has the potential for preservation of submerged prehistoric artefacts and palaeo-landscape remains. Further marine geotechnical data would inform on sediment depths, and tell how the substrate might affect the preservation of any cultural heritage remains, or if there is potential for remains or palaeo-landscape deposits to be buried below the seabed surface.
- 1.119 The mitigation strategy should be informed by results from further geophysical survey of the Project area that should be undertaken to fill the data gaps (in terms of techniques and in areas not surveyed). The results from these will inform detailed design.
- 1.120 The mitigation strategy will be based on avoidance, all sites of high importance and, sites of potential archaeological or cultural heritage importance will be avoided, or where this is not possible impacts will be reduced to an acceptable level that they are no longer significant. Geophysical anomalies identified from only a single type of response may be given an avoidance buffer of 20m, while anomalies identified from further geophysical surveys may be given an avoidance buffer of 50m. This is in order to take account of a potential debris scatter field around a wreck, or a multiple response representing the tip of a wreck that extends further than the core location of the anomaly.
- 1.121 Specific measures that are considered to be suitable and practical for a site of this nature will be implemented such as layout redesign to avoid highly sensitive remains and targeted very high resolution remote sensing survey to identify the nature, extent and potential importance/sensitivity of any remains. Subsequent appropriate management and mitigation strategies will be developed in consultation with the statutory authorities (Marine Scotland, Historic Environment Scotland, The Highland Council). The mitigation strategy will include a written scheme of investigation, inductions on any marine historic environment assets to avoid and an agreed reporting protocol for the accidental discovery of cultural remains.
- 1.122 Implementation of the suggested management and mitigation strategies will eliminate, reduce or manage any significant impacts to an acceptable level, resulting in no significant residual impacts.

17. Other Users of the Marine Environment

- 1.123 The assessment of the impacts on human activities other than the main users in the marine environment within the vicinity of the Project considers diverse interests such as subsea cables and utilities (including electrical and telecommunications), military activity, oil and gas activities, marine renewables, waste disposal and aggregate extractions.
- 1.124 The scope of the assessment includes consideration of effects of construction, operational and decommissioning activities associated with the Project on other marine users operating in the immediate and surrounding sea space. It also assesses the effects of the Project proposals in combination and cumulatively with other projects in the area.
- 1.125 The following marine users and activities have been scoped out of the EIA due to their distance from the Project or absence of pathway for effects:
- Spoil disposal sites (at least 1 km east of the Offshore Site);
 - Aggregate extractions (at least 10 km east of the Offshore Site);
 - Oil and gas activity and carbon capture and storage (CCS) (the nearest pipeline, well or licence block is at least 50 km from the Offshore Site);

- Dounreay Nuclear Facility seabed and coastal remedial activity (1.5 km south-west of the Offshore Site); and
- Telecommunications, as there are no offshore microwave links in the vicinity of the Offshore Site or cause for interference to radio link infrastructure operated by the local electricity utility and Scotia Gas Networks; BT's current and presently planned radio networks; or current charted infrastructure.

Marine renewable energy activities

- 1.126 There are several marine renewable energy projects either in development or undergoing the consenting process within the Pentland Firth and Orkney waters Strategic Area (PFOWSA).. All proposed and consented wave and tidal energy projects in the PFOWSA are a considerable distance from the proposed project boundaries (at least 30 km), such that no impacts arising from the proposals on the location or activities to support these developments are likely to occur.
- 1.127 Highlands and Islands Enterprise's Dounreay Demonstration Centre (DDC) for floating offshore wind is proposed in an area adjacent to the Project site, however the DDC is not progressing to the same timetable as the Dounreay Tri Project, consequently the projects are very unlikely to be constructed simultaneously. At this time, no developer has publically stated an interest in deploying a floating technology at the DDC.
- 1.128 Construction activities associated with the Project are unlikely to overlap with DDC's own installation activities, nevertheless the potential footprint of restricted area is relatively small, navigable and will be for a temporary period.

Military activities

- 1.129 There are not expected to be any effects on the Cape Wrath Firing Range and Danger Areas which lie approximately 35 km west of the Offshore Site. Joint Warrior activity, conducting in March/April and October every year, tends not to overlap with the proposed Offshore Site; however MoD and associated NATO member vessels may navigate through the Offshore Site during the exercise period.
- 1.130 The MoD is accustomed to operating alongside day to day marine activities, with due regard for other sea users and the presence of structures at sea. The Offshore Site and surrounding area is currently of limited use by the MoD for military activities, is not within a charted sea use area, with key exercise areas located some distance west of the Offshore Site. The MoD is therefore likely to have capacity to adapt to any changes to this local marine area and Military vessels will be able to navigate around the Offshore Site.

Subsea cables and utilities

- 1.131 There are no existing subsea cables or pipelines that intersect with the Offshore Site or export cable corridor. The nearest existing cables are at least 6 nm (11 km) east of the Project Site.
- 1.132 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. Scottish Hydro Electric-Transmission (SHE-T) is planning to develop a 70 km 220 kV subsea electricity transmission connection from Dounreay to the Bay of Skail on the west coast of Orkney. The current area of search for the landfall location for the Orkney to Caithness interconnector is within the proposed area of search for the Project's landfall and export cable at East Sandside in Reay, however alternative routes are also being considered and there are no proposed construction dates for the project.

Summary and conclusions

- 1.133 The temporary nature of construction activities and relatively small footprint of the operational infrastructure mean that no significant impacts to other users of the marine environment or their associated activities (marine renewable energy, military and electricity cable installation) have been identified as arising from any phase of the Dounreay Trì Project proposals.
- 1.134 Where there is potential for overlap of Project infrastructure or construction activity with proposed developments in the area i.e. SHE-T Orkney-Caithness interconnector and HIE'S DDC for offshore floating wind, these will be mitigated through consultation and collaboration with developers to ensure there is no significant conflict or disruption to activities. Any temporary disruption to the activity of other marine users will be mitigated through liaison and adequate notification of intended activities to minimise disruption.
- 1.135 All residual impacts have subsequently been assessed as minor and no significant cumulative impacts on other users of the marine environment have been identified.

18. Socio-economics, Recreation and Tourism

- 1.136 This chapter discusses three separate, but related topics. Firstly, the potential socio-economic benefits and issues resulting from the Project, including increases in employment and other financial and quality of life benefits that could potentially arise throughout all phases of the Project are discussed. Secondly, the potential impacts on recreation and tourism interests in the onshore and offshore area, relevant to the Project and the potential impacts on tourism in Caithness with a particular focus on the local area of Reay are considered.

Potential socio-economic benefits and issues

- 1.137 The locations of the construction and operation and maintenance (O&M) bases have not yet been defined. Locations for these activities will be finalised during the detailed design phase of the Project, therefore the specific locality of any positive or negative impacts are not yet known and the potential impacts have to be discussed over a wider area. Socio-economic impacts have the potential to spread far beyond the fixed boundaries of the Project Site. The impact was assessed at a local (Caithness), regional (Highland) and national (Scotland) level.
- 1.138 Socio-economic impacts were assessed as largely positive with direct and indirect economic effects such as job creation, value added and income generated in the local, regional and national economy, the key impact being the creation of local employment and business opportunities throughout all stages of the Project.
- 1.139 Employment is a key factor in gaining socio-economic benefits from this type of project and although the actual numbers of jobs that the Project will create will not be known until the plans are more fully developed; the estimates show that around 240 construction jobs have the potential to be created. The operation and maintenance phase is estimated to create around 11 jobs for the 25 year lifespan of the Project.
- 1.140 The only potential negative impacts identified within the assessment were associated with conflicts arising from the use of piers which would be mitigated by good port management resulting in no significant adverse effects.
- 1.141 The key findings of the socio-economic assessment are:
- The majority of socio-economic impacts from the Project are positive. This is true nationally, regionally and locally;

- The impacts will be more significant in the more rural areas but the majority are positive impacts;
- The consultees within the assessment were all supportive of the Project;
- The positive comments received all assume that the construction or operations base will be situated locally;
- The Project fits into the national aspirations as well as regional and local economic development strategies;
- There would be a lasting benefit from the Project in whichever area the operation and maintenance base is located and these benefits will be more significant in the more rural and remote areas; and
- There are some business opportunities for the local supply chain from the Project.

Potential impacts on recreation and tourism interests

- 1.142 The waters around Caithness are regularly utilised for various types of recreation; particularly sailing, angling, sea kayaking and surfing. Sailing, surfing and angling are important contributors to the local economy and draw large numbers of visitors to the area throughout the year, particularly in the summer months.
- 1.143 Surfing is an important recreational activity in the region. It has been practiced in the area for over forty years with the first Scottish Surfing Championships being held at Bettyhill near Thurso in 1973, with numerous other championships being held since. These surfing competitions attract visitors from all over and are a source of income to the local economy. The north coast also supports several rivers of importance of which several are designated for Atlantic salmon and sea trout.
- 1.144 Impacts on offshore recreational activity are likely to be limited to the construction phase of the Project and are considered minor or negligible. There may be some exclusion during the construction phase that would require recreational vessels to avoid the site, but due to the limited numbers of vessels that this will affect the impact will be negligible.
- 1.145 Impacts on onshore recreational activity (e.g. walking) as a result of the construction of the onshore substation, which for example, could cause disruption to core paths, is expected to be minor after mitigation measures are put in place.
- 1.146 Tourism is identified as one of Scotland's key growth sectors in the Government's Economic Strategy and is one of the most important industries for the Highlands (The Highland Council, 2013). Figures from 2011 indicate that overnight tourism in Caithness and Sutherland is worth £86.85 million and drives business generation in the area for construction, suppliers and supports local facilities such as shops, leisure facilities and transport routes which may otherwise not be sustainable based on local usage alone.
- 1.147 Impacts to tourism in the area include:
- Potential for impacts on tourism where visitors are deterred from visiting due to disruption throughout the construction and decommissioning phase;
 - Industrialisation of the local seascape reducing tourists' visual amenity during construction works; and
 - Direct impact to tourism whereby visitors are attracted or deterred from visiting the area due to the presence of the windfarm.

- 1.148 Impacts to tourism are expected to be negligible due to the small scale of the Project and the temporary nature of the main impacts which are considered to be during the construction phase.

19. Geology and Hydrology

- 1.149 The assessment of impacts on geology, hydrology and hydrogeology for the onshore Project has considered the potential for the construction and development of a cable landfall, onshore cable route, new electrical substation and associated infrastructure (potentially including an HDD compound) to affect geology and geomorphology, surface water and groundwater resources.
- 1.150 The assessment has taken account of the different methods of landfall and cable construction within the onshore cable route study area. It has drawn on information about the proposed onshore works construction methods and on information on site geology, hydrology and hydrogeology drawn from site visits and published sources of information.
- 1.151 There are no geologically designated sites within the study area boundary. Sandside Bay Site of Special Scientific Interest (SSSI) is located 800m to the south west of the study area. Whilst this is not designated specifically for its geological interests, the sand dunes present are fundamental to the plant species found at this location for which the site has been notified.
- 1.152 Superficial geology comprises glacial till over the whole of the study area. British Geological Survey (BGS) trial pit records for the study area recorded bedrock close to the surface (generally 1 m to 2 m below ground level) across the site. Bedrock comprises sedimentary rocks including sandstone and siltstone, the upper strata recorded as being highly weathered.
- 1.153 Other than a field drain, there are no watercourses present within the cable route study area. The nearest watercourses are the Dounreay Burn, which flows in a north westerly direction, approximately 350 m to the north east of the site boundary (within the Dounreay Nuclear Complex) and the Burn of Isauld, which flows in a north westerly direction approximately 800 m to the south west of the boundary of the site. Both of these watercourses have a good overall status of water quality.
- 1.154 There is no identified major aquifer present below the site. Geological conditions indicate that groundwater flows will be mainly between the base of the glacial till deposits and the weathered surface of the bedrock, with some movement also in fissures and cracks within the bedrock.
- 1.155 No Private Water Supplies have been identified either within or in close proximity to the site boundary.
- 1.156 A review of SEPA flood mapping indicates that the site is at very limited risk of flooding.
- 1.157 The main impacts associated with construction activities are predicted to be associated with pollution of watercourses and disruption to groundwater flow. Mitigation measures will be implemented and a Construction Environmental Management Document (CEMD) will be developed by the contractor, agreed with the relevant authorities, and strictly followed, such that no significant residual impacts are predicted from construction activities.
- 1.158 A Drainage Strategy will be developed and agreed prior to construction beginning, and will be critical to ensure that there are no adverse residual operational impacts on hydrology, hydrogeology and flood risk. The strategy will detail the site drainage design to ensure that runoff from hard surfaces within the substation / switchgear will be controlled and managed. The Drainage Strategy will also detail how groundwater flows will be maintained around sub-surface structures such as substation foundations and cable ducts.

- 1.159 The effects of decommissioning on geology, hydrology and hydrogeology are anticipated to be similar to or less than those reported for construction and no significant impacts are predicted.
- 1.160 No significant cumulative geological, hydrological or hydrogeological impacts with other proposed onshore projects in the vicinity of Dounreay are predicted provided that any potential for concurrent construction phases of these projects with the Project was avoided.

20. Land Use, Agriculture and Soils

- 1.161 The assessment of impacts on land use, agriculture and soils has considered the potential for the construction and development of a cable landfall, onshore cable route, new electrical substation and associated infrastructure (potentially including an HDD compound) to affect land use activities. The scope of the assessment includes consideration of effects on agricultural land and soils, agricultural activities, changes in temporary and permanent land use including any effects on properties, walking and cycling routes and vehicle access.
- 1.162 The Study Area for the land use assessment is bounded to the north by the Caithness coast, to the east by the Dounreay Nuclear Facility and to the south and west by land used for agriculture. Inland from the coast, agricultural land uses predominate in the Study Area. The land is divided by fences and some stone walls into a number of fields used for a mix of grazing land and arable production within a farm unit operated from a farm at Isauld House which is located some 500m south west of the Study Area. Soils are typically wet gley soils with a small area of acidic podzols in the west of the Study Area, all of which are capable of supporting moderately productive agriculture.
- 1.163 The nearest public road is the A836 Thurso to Bettyhill road which is located approximately 600 m south of the Study Area. This road would provide the main access to the project site and it passes through the nearest settlement to the Study Area, the village of Reay, which is located approximately 1 km to the south. There are no public roads in the Study Area and no formally designated rights of way or cycleways. A vehicle track follows the southern edge of the Study Area between the farm at Isauld House and the Dounreay Nuclear Facility and joins with a track providing access from the A836 to a new substation at the Nuclear Facility.
- 1.164 The eastern part of the Study Area is crossed by the line of two overhead electrical cables supported by lines of steel towers which converge on a point in the southern part of the Dounreay Nuclear Facility. There are a number of small field drains in the Study Area however there are no significant surface watercourses present on the site.
- 1.165 Mitigation measures will be implemented in particular to manage construction works so that agricultural operations are maintained with minimal disruption and to manage soils in accordance with good practice and a Soil Resource Plan during construction to reduce the effects of the proposals on soil quality and productivity. Mitigation also focuses on ensuring that users of tracks and recreational users of the foreshore area around the proposed cable landfall can continue to make journeys during construction works. The presence of any utilities, field drains and other services will be checked in advance of construction to ensure supplies are not adversely disrupted and all agricultural land, tracks, field boundaries and drains will be fully restored following installation of the landfall, cable route and substation.
- 1.166 There are no residential or commercial properties within the Study Area and no properties would be significantly affected by construction of the onshore Project, changes in land use or from its operation.

- 1.167 Construction of the onshore cable, substation and (for Option 1) HDD compound is predicted to temporarily occupy an area of land up to approximately 5 hectares (ha). Some short-term significant effects on recreational users of the coast are predicted during construction of the landfall cable work although these are expected to be limited to short periods of no more than a few days and provision would be made wherever possible to safe maintain public access to these areas.
- 1.168 No significant effects on land use, agriculture and soils are predicted from construction activities or from temporary occupation of the land needed to construct the HDD compound, cable route and substation provided that mitigation is implemented to ensure continued agricultural operations and to protect soils.
- 1.169 No significant changes in access to the Study Area would be predicted during construction or in the longer term for operation and maintenance of the substation and onshore cable route as use would be made of existing farm and utilities access tracks between the A836 road and the proposed onshore works.
- 1.170 Following construction it is estimated that no more than approximately 0.4 ha of land would be permanently required for the onshore works (primarily for the new substation and a small access track extension from the current track to the new substation) and no significant permanent impacts on land use, agriculture and soils (including utilities) are predicted from this change in land use or from the longer term effects of construction activities on agricultural soils. No permanent impacts are predicted on the existing access tracks in the Study Area or to any designated active travel route. Vehicle movements required for operation and maintenance of the substation (and cable) are not predicted to have significant impacts on other users of the tracks including farm operations or occasional walkers and cyclists.
- 1.171 The effects of decommissioning on land use, agriculture and soils are anticipated to be similar to or less than those reported for construction and no significant impacts are predicted.
- 1.172 No significant cumulative land use impacts with other proposed onshore projects in the vicinity of Dounreay are predicted provided that any potential for concurrent construction phases of these projects with the Project was avoided.

21. Terrestrial Ornithology

- 1.173 The key findings of the terrestrial ornithology assessment are as follows.
- 1.174 Two species that are designated features of the Caithness Lochs SPA and RAMSAR were recorded foraging in relatively low numbers within the survey area: whooper swan and greylag goose. Potential effects on these species are assessed as being of a low to negligible level. No significant impacts on these species are predicted and no mitigation is required.
- 1.175 Four seabird species that are designated features of the North Caithness Cliffs SPA were breeding within the western buffer of the survey area: fulmar, razorbill, guillemot and kittiwake. Potential effects on these species are assessed as being of a negligible level and no significant impacts on these species are predicted. However, good practice measures to protect all breeding birds are outlined to ensure compliance with the relevant legislation.
- 1.176 One barn owl nest site was identified within the survey area, although this is located more than 100 m from the current onshore project area. Barn owl is afforded special protection during the breeding season. Potential effects on nesting barn owls are assessed as being of a negligible level and no significant impacts are predicted. However, good practice measures to protect all breeding birds are outlined to ensure compliance with the relevant legislation.

- 1.177 A single peregrine falcon was recorded within the survey area. Peregrine falcon is a protected species and is a designated feature of the Caithness Cliffs SPA. Although there was no evidence that the species was breeding within 2 km of the current onshore project area, suitable breeding habitat was present and it is possible that the species could breed there in future. Potential effects on peregrine falcon are assessed as being of a negligible level and no significant impacts are predicted. However, good practice measures to protect all breeding birds are outlined to ensure compliance with the relevant legislation.
- 1.178 Puffin, common tern and Arctic tern were recorded within the survey area during the breeding season. Breeding puffin is a designated feature of the Caithness Cliffs SPA, while common tern and Arctic tern are afforded special protection. Although none of these species were found to be breeding, potentially suitable habitat was identified and it is possible that small numbers could breed there in future. Potential effects on puffins and terns are likely to be of a negligible level and no significant impacts are predicted. However, good practice measures to protect all breeding birds are outlined to ensure compliance with the relevant legislation.
- 1.179 Four other seabird species of moderate to high conservation concern were breeding within the survey area: shag, black guillemot, herring gull and great black-backed gull. Potential effects on these species are assessed as being of a negligible level and no significant impacts on these species are predicted. However, good practice measures to protect all breeding birds are outlined to ensure compliance with the relevant legislation.
- 1.180 Four wader species that are of moderate to high conservation concern were breeding within the survey area: lapwing, curlew, oystercatcher and redshank. Potential effects on these species are assessed as being of a medium to low level. No significant impacts on these species are predicted, and no cumulative impacts are predicted. However, good practice measures to protect all breeding birds are outlined to ensure compliance with the relevant legislation.
- 1.181 Forty-two species of low conservation concern were recorded within the terrestrial ornithology survey areas, including several wildfowl, seabird and wader species, red grouse, kestrel and 16 passerine species. With the exception of two passerine species (skylark and willow warbler), none were breeding within 500 m of the current onshore project area. Potential effects on these species are assessed as being of a low to negligible level and no significant impacts on these species are predicted. However, good practice measures to protect all breeding birds are outlined to ensure compliance with the relevant legislation.
- 1.182 No significant cumulative impacts on terrestrial ornithology, and no likely significant effects on SPAs or the ornithological interests of other statutory sites, are predicted during any phase of the Project.
- 1.183 Following implementation of specific good practice mitigation to protect nesting birds, effects are likely to be reduced to a low to negligible level and no significant residual impacts are predicted during any phase of the Project.

22. Terrestrial Ecology

- 1.184 This technical chapter describes the non-avian ecology baseline conditions and impact assessment for the current onshore project area.
- 1.185 Fixed and semi-fixed sand dune habitats (SD7 and SD8) which correspond to habitats protected under Annex I of the Habitats Directive, and are part of the notified features of Sandside Bay SSSI, are present within the terrestrial ecology search area, but not within the current onshore project area itself. No direct or indirect effects on these vegetation types are considered likely. Therefore, no significant impacts are predicted and specific mitigation is not

- required. However, good practice measures will be implemented to ensure that sensitive coastal habitats are protected from potential indirect effects resulting from onshore works.
- 1.186 Small areas of embryonic and mobile dune communities (SD2, SD4 and SD6) which correspond to habitats protected under Annex I of the Habitats Directive are present within the terrestrial ecology search area, but outside the current onshore project area. No direct or indirect effects on these vegetation types are considered likely. Therefore, no significant impacts are predicted and specific mitigation is not required. However, good practice measures will be implemented to ensure that sensitive coastal habitats are protected from potential indirect effects resulting from onshore works.
 - 1.187 A small area of M10 mire community which corresponds to habitat protected under Annex I of the Habitats Directive, and is assessed as being highly groundwater-dependent, is present within the terrestrial ecology search area, but outside the current onshore project area. No direct or indirect effects on these vegetation types are considered likely. Therefore, no significant impacts are predicted and specific mitigation is not required. However, good practice measures will be implemented to ensure that sensitive wetland habitats are protected from potential indirect effects resulting from onshore works.
 - 1.188 Small areas of heath communities (M15 and H7) which correspond to habitats protected under Annex I of the Habitats Directive are present within the terrestrial ecology search area, with small areas of H7 (but not M15) present within the current onshore project area. M15 is also assessed as being moderately groundwater-dependent. Potential effects on these vegetation types are assessed as being of a low to negligible level and no significant impacts are predicted. However, good practice measures will be implemented to ensure that sensitive wetland habitats such as M15 are protected from potential indirect effects resulting from onshore works.
 - 1.189 Small areas of W7 woodland, which is likely to have some benefits for local biodiversity, are present outside the current onshore project area. No direct or indirect effects on this habitat are considered likely. Therefore, no significant impacts are predicted and no mitigation is required.
 - 1.190 Three burns were recorded within the terrestrial ecology search area (but outside the current onshore project area), two of which are associated with the Caithness and Sutherland Peatlands SAC. No potential effects on watercourses are expected to occur and no significant impacts are predicted. Specific mitigation is not required, but good practice measures will be implemented to ensure that watercourses are protected from potential indirect effects resulting from onshore works.
 - 1.191 Small areas of MG10 rush pasture community, which is assessed as being moderately groundwater-dependent, are present within the current onshore project area. Potential effects on this vegetation type are assessed as being of a medium to low level and no significant impacts were predicted. However, specific mitigation is recommended to ensure that GWDTEs are protected, and good practice measures will be implemented to ensure that sensitive wetland habitats are protected from potential indirect effects resulting from onshore works.
 - 1.192 A single small pond is present within the terrestrial ecology search area. No significant impacts are predicted and specific mitigation is not required. However, good practice measures will be implemented to ensure that sensitive wetland habitats are protected from potential indirect effects resulting from onshore works.
 - 1.193 A single Scottish primrose plant, which is a designated feature of the nearby Red Point SSSI and a Caithness LBAP and SBL priority species, was recorded outside the current onshore

project area on Reay Golf Course. Potential effects on this species are assessed as being of a negligible level and no significant impacts are predicted. However, specific mitigation is recommended to ensure that all plants are protected.

- 1.194 No signs of any protected faunal species were recorded within the terrestrial ecology survey area, although several protected mammals and reptiles are known to be present in the wider area and limited suitable habitat for these species is present within the current onshore project area. Thus it is expected that some protected species may make occasional use of the current onshore project area. Potential effects on protected faunal species are assessed as being of a negligible level and no significant impacts are predicted. However, specific mitigation is recommended to avoid the potential for accidental disturbance or injury to protected species.
- 1.195 Although no significant impacts on any ecological features recorded within the terrestrial ecology search area are predicted, reinstatement of the onshore cable corridor route (as well as the HDD compound, should this landfall option be selected) is proposed, in order to minimise effects on habitats and the species they support.
- 1.196 Following implementation of mitigation, residual effects on all ecological features are likely to be reduced to a low to negligible level and no significant residual impacts are predicted during any phase of the Project.

23. Onshore Archaeology and Cultural Heritage

- 1.197 The cultural heritage assessment addresses below-ground archaeological remains, standing buildings and the historic landscape, referred to collectively as cultural heritage assets. The assessment considers both direct physical impacts, such as the disturbance of archaeological sites during groundworks, and indirect, non-physical impacts, such as the visual impact on the setting of cultural heritage assets.
- 1.198 There are no Scheduled Monuments or Listed Buildings within the onshore site boundary, nor is it located within an area designated as a Conservation Area, or Garden and Designed Landscape, and there are no known battlegrounds on the site.
- 1.199 There is a concentration of sites along the coastal margin of the onshore site boundary. One known non-designated site is located within the area of proposed Cable Corridor 1. No known cultural heritage assets were identified in Cable Corridor 2 or potential HDD compound or substation locations.
- 1.200 The site potentially affected by Cable Corridor 1 is an earthwork bank (ORCA No. 5) of negligible heritage value. It may be recommended that an archaeological watching brief be required during the excavation of the cable corridor. This would enable the earthwork to be recorded. The final decision as to the requirement and scope for any archaeological mitigation works rests with The Highland Council.
- 1.201 The possibility of previously unknown buried archaeological remains being encountered during the construction phase of the development cannot be discounted. A reporting protocol for the accidental discovery of cultural heritage assets should be instated by the developer and agreed with by The Highland Council Archaeology Unit. The discovery of any unknown buried cultural heritage assets may require further evaluation or mitigation works as agreed with by The Highland Council Archaeology Unit.
- 1.202 Implementation of the suggested management and mitigation strategies will eliminate, reduce or manage any significant impacts to an acceptable level, resulting in no significant residual impacts.

- 1.203 Indirect impacts include visual impacts upon the setting of designated assets such as Scheduled Monuments and Listed Buildings. The proposed offshore wind turbines will be theoretically visible from a number of designated cultural heritage assets. The assessment found that there may be a major impact on the setting of two Scheduled Monuments (Cnoc Freiceadain long cairns and Green Tullochs broch and cairn) and three Listed Buildings (Reay Parish Church and Enclosure Wall, Sandside House Kiln Barn and single storey range of former byres, cottage, dairy and implement shed, and Sandside Harbour 1 and 2; all of which are Category A-Listed Buildings). A further Moderate impact on the setting may affect three Scheduled Monuments (Cnoc Stanger Cairn; Reay burial ground, old church and cross slab; and Balligill limekilns as well as two Listed Buildings (Sandside House and the associated garden walls, walled garden, dovecote and privy all of which are Category B-Listed Buildings). However, it is considered that these impacts will not fundamentally remove the understanding, appreciation or experience of the heritage asset to which the affected setting relates. It was also determined that the erection of the substation building, adjacent to the Dounreay Nuclear facility, will have no impact on the setting of onshore cultural heritage assets.
- 1.204 It is important to note that the impacts upon the setting will be limited to the 25-year Operational period of development, after which time the landscape would be returned to its current state. Other than mitigation by design, as part of the design process, there is no direct mitigation that can be offered to lessen the impacts upon the setting of cultural heritage assets.

24. Air Quality

- 1.205 The onshore construction works, including: earthworks associated with cable laying and the foundations of the sub-station/switchgear building, the access road; the construction of the sub-station/switchgear building and deliveries of material all have the potential to give rise to dust. Dust effects are very localised, only affecting receptors within 100 m of the onshore development area. In this instance the receptors are industrial buildings, the North Caithness Special Protection Area and Red Listed bird species (Lapwing and Skylark). An assessment of effects on each of the receptors was carried out in accordance with the Institute of Air Quality Management guidance and identified effects to be minor to moderate without mitigation. Dust impacts can be easily mitigated by applying good practices construction techniques such as dampening stored material during periods of dry weather and good housekeeping such as road sweeping. Appropriate mitigation has been identified for each of the construction activities. With mitigation applied dust effects are reduced to negligible to minor and as such are not significant.
- 1.206 The production of energy utilising the renewable wind power gives rise to Carbon dioxide equivalent saving to other energy sources. Over a 25 year lifetime the project has the potential to produce between 1.63– 2.45 TWh of electricity. If it is assumed that the wind turbines replace electricity produced by natural gas then they will save between 5,949.5 and 8,942.5 Tonnes of Carbon Dioxide. The construction of the project will have an associated carbon cost of 10,689.2 Tonnes of Carbon Dioxide primarily due to the materials utilised to construct the Project primarily steel. However many of the materials can be recycled at the end of the projects lifetime, recycling steel provides a large carbon saving when compared to virgin steel production. Hence at decommissioning 6468.1 Tonnes of Carbon Dioxide will be saved by recycling the steel. Overall the project will save between 781.9 and 3774.9 tonnes of Carbon Dioxide when compared to natural gas power generation.

25. Landscape and Visual Amenity

- 1.207 Baseline surveys of the 10 km radius study area identify a total of 12 Landscape Character Types (LCTs), 1 Special Landscape Area (SLA), and 6 static visual receptors as well as 3 sequential routes and 15 core paths used by people travelling through the area. Five LCTs, 2 viewpoints and one sequential route were scoped out of the assessment due to the fact that there would be no visibility of the proposed development.
- 1.208 The most sensitive receptors include LCTS within the study area, areas designated for their landscape value, areas valued for their wild land qualities, valued views and recreational routes.
- 1.209 The Project will result in physical changes to the Long Beaches, Dunes and Links and the Mixed Agriculture and Settlement LCTs and the consequent effects will be both direct and indirect.
- 1.210 Potential effects on other landscape receptors relate to the visibility of the Project and will be indirect.
- 1.211 The primary determinant of the assessments relates to the magnitude of the predicted effects, which due their relatively small scale, limited geographical extent or size, or a combination of these factors, was considered to be minor/negligible for most receptors.
- 1.212 During the construction phase, the Project would result in a very limited number of significant effects: moderate direct and indirect effects during the construction phase on LCT 16 Long Beaches Dunes and Links; and moderate indirect effects on Core Paths CA 11.07 and CA 11.08.
- 1.213 The Project would also result in moderate direct and indirect significant effects during the operational phase on one LCT 22 Open Intensive Farmland. During decommissioning, the Project would result in moderate direct and indirect significant effects during the construction phase on LCT 16: Long Beaches Dunes and Links.
- 1.214 Cumulative, or in-combination, effects due to the addition of the Project to other approved onshore wind turbine approved projects at Berriedale and Lybster Road, other proposed on shore wind turbine projects at Strathy Forest and Strathy South, and other developments in planning (Dounreay Substation Extension, Dounreay to Mybster 275kV overhead line) and Dounreay Tri Offshore turbines are predicted, but these are assessed as not significant.