Beaw Field Wind Farm

Design & Access Statement March 2016

Contents

- **1. Introduction**
- 2. Development Context
- 3. Development Approach, Process and Strategy
- 4. Design Development
- 5. Access Design Development
- 6. Design Solution Figures





1 Introduction

- 1.1.1 This Design and Access Statement ('DAS') has been prepared by WYG in support of an application to Scottish Ministers by Peel Wind Farms (Yell) Ltd (the 'applicant') for Section 36 (of the Electricity Act 1989) consent and deemed planning permission to construct, operate and decommission the Beaw Field Wind Farm (the 'Proposed Development').
- 1.1.2 The purpose of the DAS is to provide information on the principles and approach which have guided the design process of the Proposed Development and to demonstrate the fulfilment of equal opportunity requirements for access. The DAS demonstrates how the Site and its surroundings have been fully appraised to ensure that the final design solution is most suitable. The design iterations for the development are discussed, outlining how the design changed in response to environmental and technical constraints, community input and findings identified through the Environmental Impact Assessment (EIA) process. Details of the access arrangements to the Site are also outlined.

1.2 The Applicant

- 1.2.1 Peel Wind Farms (Yell) Ltd is part of Peel Energy. Peel Energy is at the forefront of delivering low carbon energy for the UK and has a balanced portfolio in generation and development of renewable energy including onshore wind, tidal, hydro-electric, solar and biomass. Peel Energy owns several renewable energy projects that are currently in operation, being constructed or have received planning consent. Peel Energy's consented wind farms include Scout Moor in Rochdale which was constructed and commissioned in 2008 and has an installed capacity of 65MW, and Frodsham in Cheshire (50.35MW installed capacity) which is currently under construction and will be commissioned by the end of 2016.
- 1.2.2 Peel Energy is itself part of the Peel Group, one of the UK's leading real estate, property, infrastructure and investment companies. In addition to the Peel Group's own land interests, Peel Energy has strategic partnership agreements with a number of other major companies to examine their land holdings for onshore wind energy potential.

Design Team

1.2.3 The Proposed Development design process has been managed by Wardell Armstrong LLP, a multidisciplinary environmental and engineering consultancy which specialises in EIA including onshore wind development. Wardell Armstrong LLP is the author of the Environmental Statement ('ES'), however specialist consultants were also appointed to provide additional technical assessments required for the ES. Together they have informed the design process from inception, through scoping, public consultation, design iterations up to and assessing the final Proposed Development design. Details of the additional consultants who have informed the design process are found in Table 1: Design Team.



Table 1: Design Team

Component	Organisation
Landscape and Visual Impact and Residential Amenity Assessment	Axis
Ecology, Ornithology and Habitat Regulation Assessment	Alba Ecology
Cultural Heritage and Archaeology	AOC Archaeology
Geology, Hydrology and Hydrogeology	Wardell Armstrong
Soils and Peat	Blairberg Associates & Wardell Armstrong
Noise	TNEI Consultants
Telecommunications	Wardell Armstrong
Highways and Transport	WYG
Aviation	Cyrrus & Wardell Armstrong
Planning and Policy	Savills
Scocio-Economic, Tourism and Recreational Assessment	Keddie Associates

1.3 Beaw Field Wind Farm

- 1.3.1 Three figures are provided in Appendix 1, these are:
 - Figure 1.1, as per the ES: The Site Location Plan;
 - Figure 2.1, as per the ES: Sensitive receptors within the context of Yell; and
 - Figure 2.2, as per the ES: Sensitive receptors within 1.5km of the Site.
- 1.3.2 The location of the Site is illustrated in Figure 1.1. The Site is located on the southern half of Yell, an island located in the north of the Shetland Islands and within the Shetland Islands Council (the 'Council') administrative area. The area within the Site extends to approximately 1,135ha and is centred on the Burn of Hamnavoe at grid reference HU 50461 82092. The closest settlements are Ulsta located approximately 4km to the southwest, Burravoe located 1km to the southest and Gossabrough located 1km to the north.
- 1.3.3 The wind farm array will comprise 17 Turbines with a maximum height to blade tip of 145m with an installed capacity of over 50MW (this relates to a candidate Servion turbine representative of what is likely to be installed at the Site to allowassessment, dimensions of which are indicatively 93m to hub height with a diameter of 104m rotor). Turbines will be of a conventional horizontal axis design: tower; nacelle and three blades with a typical rotational speed of 10-22rpm. A micro-siting allowance of 50m is sought, excluding any buffer zones to sensitive receptors or into land outwith the control of the Applicant.



- 1.3.4 Other key components of the development include:
 - Approximately 11.1km of access tracks of minimum width 4.5m and verges plus drainage (as shown in ES Volume 2, figures 3.1 and 3.10);
 - Five major and one minor mapped watercourse crossings (as shown in ES Volume 2, figure 3.14);
 - Hardstanding areas for construction and maintenance of turbines (as shown in ES Volume 2, figure 3.5);
 - Electrical substation and control building (as shown in ES Volume 2, figure 3.6);
 - Underground cabling connecting turbines to the substation and control building;
 - One anemometry mast up to 90m in height (as shown in ES Volume 2, figure 3.8);
 - Four borrow pits to provide aggregates for the construction of the wind farm (as shown in ES Volume 2, figures 3.16, 3.17, 3.18 and 3.19); and
 - A radio communications tower of up to 20m tall (as shown in ES Volume 2, figure 3.9).
- 1.3.5 The following temporary elements would also be required during the construction phase of the Proposed Development:
 - Temporary Site compound for construction and storage;
 - Site office;
 - Temporary removal of road signage along the A968 and B9081
- 1.3.6 The Proposed Development layout is contained within Volume 2, Figure 3.1 of the ES.
- 1.3.7 The Proposed Development would have a total installed capacity potential 239GWh per year. This is the equivalent to the amount used annually by approximately 60,000 average households and could avoid 108,350 tonnes of CO₂ equivalent emissions per year. This would contribute towards reaching EU, UK and Scottish renewable energy targets.

1.4 Legislative Context

- 1.4.1 The Applicant is applying to the Scottish Ministers for consent under Section 36 of the Electricity Act 1989 for the construction, operation and thus generation of electricity from the Proposed Development, 'Beaw Field Wind Farm'. The Applicant is also seeking deemed planning permission for the development in terms of Section 57(2) of the Town and Country Planning (Scotland) Act 1997.
- 1.4.2 Design and Access Statements are required for all 'national' and full planning applications for 'major' applications submitted to a Local Authority under the Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2013. Although there is no statutory requirement for the provision of a DAS under S.36, the Applicant recognises the inclusion of a DAS as good practice.
- 1.4.3 The following sections of this DAS consider the Proposed Development in terms of its: use; scale; form; appearance; siting; layout; construction; access and landscaping. This report should be read in conjunction with the Environmental Statement.



1.5 Design and Access Statement

- 1.5.1 The DAS has been prepared in accordance with the requirements of the Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2013 and Circular 3/2013 Development Management Procedures, and with reference to the guidance set out in Planning Advice Note 68 Design Statements (Scottish Executive, 2003).
- 1.5.2 Regulation 13 states that "a design statement is a written statement about the design principles and concepts that have been applied to the development" and a design and access statement is "a design statement and written statement about how issues relating to access to the development for disabled people have been dealt with."
- 1.5.3 Therefore, the DAS explains the approach adopted regarding design and how policies relating to the design in the local development plan have been taken into account. It describes the steps taken to appraise the context of the development and demonstrates how the design of the Proposed Development took this context into account. It also confirms the consultation which has been undertaken on issues relating to the design principles and how comments made have been taken into account within the final design.
- 1.5.4 Planning Advice Note 68 'Design Statements' outlines a five stage approach for the design process for developments, these are namely:
 - Stage 1 Site and area appraisal
 - Stage 2 Identification of the design principles
 - Stage 3 Analysis
 - Stage 4 Design Concept
 - Stage 5 Design Solution
- 1.5.5 The structure of this DAS broadly follows this approach to set out the design principles of the development, having due relevant planning policies and providing a detailed account of the design process and resulting iterations in conjunction with the findings of the Environmental Impact Assessment (EIA). The structure of the DAS is as follows.
 - Development Context
 - Design Approach, Process and Strategy
 - Design Development
 - Access Design Development
 - Design Solution



2 Development Context

2.1 Introduction

2.1.1 The following chapter describes the Development Context of the Site. This includes consideration of the physical and planning context of the Site location, including physical environmental features such as topography, watercourses and vegetation as well as landscape character, land use and environmental designations.

2.2 Site, Surroundings and Landscape Character

- 2.2.1 The Site is located on the island of Yell, the largest island of the archipelago forming the Shetland Islands, to the north east of Scotland. The Site is centred on the Burn of Hamnavoe at grid reference HU 50461 82092 and is located approximately 4km north east of Ulsta, 1 km northwest of Burravoe and 1km south of Gossabrough settlements.
- 2.2.2 The Site is situated to the north of Upper Neepaback hill and to the south of Gossabrough. Upper Neepaback hill area forms a part of the larger community of Burravoe located on the north shore of Burra Voe. To the west of Burravoe, the smaller settlements of Houlland and Hamnavoe form a ribbon of residential properties along the B9081, which connects to the A968 and onwards to the ferry port at Ulsta. To the north east, the community of Gossabrough is located, which overlooks the beach at the Wick of Gossabrough. The character of these settlements is defined by widely dispersed, small clusters of detached dwellings with associated land and outbuildings surrounding them. Community buildings and resources are situated throughout the settlement areas. No settlements or dwellings are located within the Application Boundary.
- 2.2.3 The majority of the Site is characterised by heathery moorland interspersed with vast areas of bare peat. Habitats within the Site are characterised by blanket bog, degraded blanket bog and moorland pasture with more extensive areas of deep peat on higher ground to the west. The landscape is undulating, grassland with heathery outcrops on higher ground.
- 2.2.4 Crofting typifies the use of land surrounding the settlements areas and has been the use of the Site for much of its history. Crofters living within the surrounding settlements manage the Site for moorland sheep grazing, with lower lying land surrounding dwellings in more direct agricultural use. Peat cutting continues to be active in the area and takes place within the Site, with brick pyramids a typical feature of the landscape in the early summer. Walking and bird watching are recreational activities which take place within the Site.
- 2.2.5 The Site is characterised by lowland, undulating ground rising to more hilly terrain towards the north west of the Site. The topography ranges from approximately 200m Above Ordnance Datum (AOD) at the Hill of Arisdale in the north, to less than 10m AOD in the south. The majority of the Site lies between 80 to 150m AOD; the summit is known as Beaw Field, at 120m AOD.
- 2.2.6 The Proposed Development would be located entirely within Landscape Character Area ('LCA') B1: Yell Peatland. The Yell Peatland is an extensive LCA and covers the majority of the island, with the exception of coastal areas. The landscape character of the coastal areas is more varied and sensitive to wind farm development. The Site would also be located close to the boundaries with LCA F5: Scattered Settlement/ Crofting and Grazing Land, and LCA G: Coastal Edge, both of which are identified as having a 'higher' sensitivity. LCAs located within approximately 10km of the Proposed Development are illustrated on Figure



7.2a and the sensitivity levels for each LCA are illustrated on Figure 7.2b of the ES. The Proposed Development would be located in Visual Compartment D: Colgrave Sound, close to the boundary with Visual Compartment E: Yell Sound and South Yell.

2.3 Drainage

- 2.3.1 The Site includes a number of watercourses, waterbodies and associated catchments, as discussed in greater detail within Chapter 15 of the ES: Hydrology and Hydrogeology. The majority of the Site is drained by the Burn of Hamnavoe and its tributaries, which discharge into Hamna Voe. The Evra Water (loch) drains into the Burn of Evrawater, which converges with the Burn of Hamnavoe. The north eastern part of the Site drains into the Bay of Whinnifirt and the Wick of Gossabrough. The western part of the Site drains into the Burn of Arisdale and its tributaries, which also discharge into Hamna Voe. The southern part of the Site drains into the Loch of Kettlester and the Loch of Neepaback, which are adjacent to the southern boundary of the Site, both lochs discharge into Burra Voe, to the west of Burravoe.
- 2.3.2 The underlying bedrock at the Site is composed of a group of metamorphic rocks known as the Yell Sound Division. The bedrock is covered by a thin horizon of glacial drift (small stones and soil) and thought to be the residue of a thin and persistent layer of true glacial till.

Water Resource

2.3.3 The Site lies within a Drinking Water Protection Area (Groundwater), as designated by the Water Framework Directive. The Loch of Kettlester, which lies adjacent to the southern boundary of the Site, is also classified as a Drinking Water Protection Zone.

Designated sites and sensitive features

- 2.3.4 There are no designated areas within the Site. Figures 2.1 and 2.2 of the ES, attached within Appendix 1 of this DAS provide details of the sensitive receptors in the surrounding area, including on Yell and Mainland generally and within 1.5km of the Site. These show the Otterswick and Graveland Special Protection Area ('SPA'), and Site of Special Scientific Interest ('SSSI') which are adjacent and close to the northern and north-west boundaries of the Site. The SPA and SSSI extend across 1,388ha of coastal and uplands area that supports maritime grassland, blanket bog and dry heather moorland and the qualifying species of the SPA, the red-throated diver (Gavia stellata).
- 2.3.5 Yell Sound Coast SAC and SSSI and the East Mires and Lumbister SAC and SSSI are also within 10km of the Application Boundary, also as shown on Figure 2.2.
- 2.3.6 Figure 2.2 identifies the following landscape designations. Two National Scenic Areas located within 30km of the Site (Fethaland, Esha Ness and Muckle Roe), all are outwith the island of Yell, on Mainland. In scoping the study area, only Fethaland is materially within the Zone of Theoretical Visibility (ZTV) for the Proposed Development. Three non-statutory local landscape areas ('LLA') (Ronas Hill, Nibon and Mangaster, and Luna Ness and Lunning) are also situated on Mainland and within 25km of the Proposed Development, of these only Ronas Hill, and Luna Ness and Lunning are materially within the ZTV and required assessment. The nearest designated wild land is Ronas Hill and North Roe, which is 15.8km west of the Site, located on Mainland. The majority of the Wild Land Area ('WLA') would be outside of the ZTV for the Proposed Development and would experience no change to its visual context. Whilst views towards the Site would be available from the east facing slopes of Ronas Hill, the visual context of these views is already influenced by large-scale telecommunications masts at the edge of the WLA, views to the more distant Sullom Voe Oil Terminal and the more settled coastal landscapes to the east.



- 2.3.7 There is a Scheduled Ancient Monument ('SAM') and a number of listed buildings within 1.5km of the site as shown in Figure 2.1. The SAM broch and settlement at Gossabrough survives as a mound set on a small hill with turf-covered foundations of rectangular structures, east and south, which are likely to be the remains of a settlement either of the post-broch Iron Age or, more likely, of the Norse-medieval period.
- 2.3.8 St Magnus Kirk is a category B listed building that overlooks the community of Hamnavoe, and includes the graveyard walls and post box as part of its listing. Five further listed buildings are located in Burravoe, with the Burravoe shop and former booth (C), Burravoe telephone kiosk (B), Burravoe Old Haa of Brough (B), Burravoe St Colman's Episcopal Chuch (B) and Burravoe Manor House (C).
- 2.3.9 Further listed buildings can be found to the west, on Yell, at Ulsta, Mid Yell and West Sandwick, as shown on Figure 2.2 and which also illustrates the number of listed buildings within the wider area, on adjacent islands, up to 30km from the Site.

Peat

- 2.3.10 As stated above, the Site can be described as a moorland environment with peat of variable depth supporting a variety of blanket bog habitats (see Chapter 12 of the ES for more detail). The habitats have degraded over large areas due to agricultural uses, over grazing, peat cutting and water and wind erosion.
- 2.3.11 A preliminary peat survey was completed across the majority of the Site in January 2015. It provided a record of peat depths on a regular grid, along with information on the nature and condition of the peat land habitat to inform the design and layout of the Proposed Development.

Ecology

- 2.3.12 Chapter 11 of the ES (Ecology) establishes the baseline conditions of the Site using a desk-study and target ecological surveys including:
 - Phase 1 habitat survey;
 - National Vegetation Classification (NVC) survey;
 - GWDTE survey;
 - Otter survey;
 - Freshwater pearl mussel survey;
 - Fish survey; and
 - Macro-invertebrate survey.
- 2.3.13 A number of necessary mitigation measures were identified as part of the ecological assessments for the Proposed Development's final turbine layout. The conclusions of the chapter identify that ecological receptors that influenced the design of the Proposed Development and required mitigation are otter, fish and habitats.

Aviation

2.3.14 Scatsta Airport is located 8 natuical miles ('NM') south west from the Site, which has an obstacle limitation surface, a safeguarded area. There are also three radars operating within 40NM of the Site where the Proposed Development has the potential to cause interference, these include:



- Sumburgh Primary Surveillance Radar, located 40NM to the south of the Site;
- Fitful Head Monopulse Secondary Surveillance Radar 38NM to the south of the Site; and
- Scatsta Primary Surveillance Radar, based at the aerodrome and 8NM to the south west of the Site.

2.4 Planning Policy

2.4.1 The design of the Proposed Development has taken account of guidance and policy that are relevant to the design of wind farms. Full details of all planning policies relevant to the development are available in Chapter 4: Planning Policy and Background of the ES. The Planning Statement which accompanies the application also provides a detailed assessment of the final design of the Proposed Development against statutory planning policy and other material considerations.

National Planning Policy

- 2.4.2 National Planning Policy and guidance provides significant advice in relation to the development of wind farms. As outlined above, the assessment of the Proposed Development against this policy and guidance is discussed in further detail in the submitted Planning Statement. With regard to the design of the Proposed Development, the following national policy, guidance and advice notes have been taken into account:
 - National Planning Framework 3 (June 2014);
 - Scottish Planning Policy (June 2014);
 - Scottish Historic Environment Policy (SHEP)(2011);
 - Historic Scotland's Guidance Note Managing Change in the Historic Environment Setting (2010);
 - Scottish Natural Heritage, Spatial Planning for Onshore Wind Turbines natural heritage considerations Guidance, June 2015;
 - PAN 60: Planning for Natural Heritage (2000);
 - PAN 61: Planning and Sustainable Urban Drainage Systems (2001);
 - PAN 68: Design Statements (2003);
 - PAN 69: Planning and Building Standards Advice on Flooding (2004);
 - PAN 75: Planning for Transport (2005);
 - PAN 79: Water and Drainage (2006);
 - PAN 3/2010: Community Engagement (2010);
 - PAN 1/2011: Planning and Noise (2011);
 - PAN 2/2011: Planning and Archaeology (2011);
 - Advice Sheet: Onshore Wind Turbines (2014); and
 - Advice Sheet: Wind Farm Developments on Peat Land (2013).

National Planning Framework 3 (2014)

2.4.3 NPF3 establishes that the Scottish Government's central purpose is to create a more successful country, through increasing sustainable economic growth.



2.4.4 NPF 3 does not provide detailed guidance on managing development; it notes that SPP sets out the required approach to spatial frameworks which will guide new wind energy development to appropriate locations. However, the document's vision for natural and cultural assets, progress towards low carbon energy generation and economy are continued within specified policy outlined within SPP, guidance notes and local planning policy, which ultimately influenced the design, access and layout of the Proposed Development.

Scottish Planning Policy

- 2.4.5 Scottish Planning Policy ('SPP') reiterates the importance of the planning system in achieving sustainable development and observes the Climate Change (Scotland) Act 2009 targets for reducing greenhouse gas emissions by 2020 and 2050 (paragraph 18).
- 2.4.6 SPP provides guidance in relation to wind farm siting and design in Paragraph 161, Onshore Wind, identifying that Local Authorities should identify areas which are likely to be most appropriate for onshore wind farms as a guide for developers and communities following the approach set out in Table 1: Spatial Frameworks (SPP, 2014). The table identifies three groups: Group 1, Areas where windfarms will not be acceptable; Group 2, Areas of Significant Protection; and Group 3, Areas with potential for wind farm development.
- 2.4.7 The Site is considered to be located within Group 2 Areas of Significant Protection, on the basis of the presence of peat over 50cm. However, wind farm sitings within Group 2 may be considered appropriate where it is demonstrated that significant effects on the qualities of the areas of significant protection can be overcome by siting, design or other mitigation.
- 2.4.8 Paragraph 169 identifies a range of considerations relevant to the determination of energy projects (including onshore wind developments), which are relevant to the design process:
 - 'Cumulative impacts planning authorities should be clear about likely cumulative impacts arising from all of the considerations below, recognising that in some areas the cumulative impact of existing and consented energy development may limit the capacity for further development;
 - Impacts on communities and individual dwellings, including visual impact, residential amenity, noise and shadow flicker;
 - Landscape and visual impacts, including effects on wild land;
 - Effects on the natural heritage, including birds;
 - Impacts on carbon rich soils, using the carbon calculator;
 - Public access, including impact on long distance walking and cycling routes and scenic routes identified in the NPF3;
 - Impacts on the historic environment, including scheduled monuments, listed buildings and their settings;
 - Impacts on tourism and recreation;
 - Impacts on aviation and defence interests and seismological recording;
 - Impacts on telecommunications and broadcasting installations, particularly ensuring that transmission links are not compromised;
 - Impacts on road traffic;



- Impacts on adjacent trunk roads;
- Effects on hydrology, the water environment and flood risk;
- The need for conditions relating to the decommissioning of developments, including ancillary infrastructure, and Site restoration;
- Opportunities for energy storage; and
- The need for a robust planning obligation to ensure that operators achieve Site restoration.'
- 2.4.9 These considerations alongside other policies and guidance relating specifically to landscape and natural heritage, historic environment, transport, drainage and flooding have shaped the Proposed Development layout, with local planning policy providing specific guidance, knowledge and key considerations to design within the Site and Proposed Development, as undernoted.

Local Planning Policy

2.4.10 Shetland Local Development Plan 2014 (adopted September 2014) ('LDP') sets out the vision and spatial strategy for development in the islands over the next 10-20 years.

Shetland Local Development Plan 2014 (LPD)

- 2.4.11 The LDP states that Shetland is well placed to make a positive contribution to the national renewable energy production targets, through the development of the outstanding renewable resources available such as wind, wave and tidal. The Council is committed to harnessing the benefits from renewable energy, for the good of the community at large, and the LDP contains a Renewable Energy policy calling for renewable energy proposals to be supported (subject to meeting certain criteria).
- 2.4.12 Policy RE 1 Renewable Energy states that,

"Proposals for renewable energy developments will be supported where it can be demonstrated that there are no unacceptable impacts on people, the natural and water environment, landscape, historic environment and cultural heritage of Shetland.

All proposals for renewable energy developments will be assessed with consideration of their cumulative impacts."

- 2.4.13 Draft supplementary guidance, titled *Onshore Wind Energy* (Shetland Islands Council, July 2015), has also been prepared by the Council and includes a spatial framework for wind farms in the islands, to guide the location of wind farms. This is a non-statutory document, but is a material consideration for the assessment of the Proposed Development. It also contains further guidance which provide a local context to the SPP paragraph 169 development considerations of onshore wind energy applications.
- 2.4.14 The following list of policies is also relevant to the assessment of the Proposed Development and full details of the content of each policy are contained within Chapter 4 of the ES. Assessment against the policy framework relevant to the Proposed Development is provided in the Planning Statement accompanying the application for consent under section 36 of the Electricity Act 1989 and deemed planning permission under section 57 (2) of the Town and Country Planning (Scotland) Act 1997.
 - DC1 Landscape and Visual Impact;
- DC3 Natural Heritage;

• DC2 Cumulative Impact;

• DC4 Impacts on communities;



- DC5 Water Resources;
- DC6 Decommissioning;
- DC7 Historic Environment;
- NH1 International and National Designations;
- NH2 Protected Species;
- NH3 Furthering the Conservation of Biodiversity;

;

- NH4 Local Designations
- NH5 Soils;
- NH6 Geo-diversity;
- NH7 Water Environment;

- HE1 Historic Environment;
- HE2 Listed Buildings;
- HE3 Conservation Areas;
- HE4 Archaeology;
- HE5 Gardens and Designed Landscapes;
- HE6 Trees and Woodland;
- TRANS3 Access and Parking Standards;
- WD Flooding Avoidance; and
- WD3 SuDs.
- 2.4.15 The design of the Proposed Development has taken account of the design policies and guidance relevant to wind farm developments and to the wider subject policies which influence design decisions, such as heritage, ecological and transportation.



3 Development Approach, Process and Strategy

3.1.1 The following section describes the Development Approach, Process and Strategy of the Beaw Field Wind Farm. This outlines the factors considered as part of Site selection, and the design approach undertaken in relation to the proposed development.

Overview

3.1.2 An integrated approach is required for wind farm design in order to allow for consideration of a range of technical, environmental, planning and commercial factors at every stage of the design process. This section describes the design process applied to the Proposed Development, including how design constraints were identified.

Site Selection

- 3.1.3 The Applicant and team of consultants used the following factors as the first steps in identifying a suitable site for a wind farm:
 - Suitable wind speeds;
 - Separation from settlements;
 - Identification of environmental designations;
 - Acceptability of site in context of Scottish Planning Policy;
 - Adequate access;
 - Availability of a grid connection; and
 - Land ownership.
- 3.1.4 Following an initial assessment based on the factors identified above, the Applicant obtained the rights to the proposal from Enertrag (a European based renewable energy company) and an initial and iterative design process for the Proposed Development turbine layout was developed, as detailed below.

Design Approach

3.1.5 Following identification of the Site, an iterative design process was initiated in parallel with the Environmental Impact Assessment (EIA), technical and engineering studies, and communication with the community, stakeholders and landowners. The design process allowed for the constraints driven analysis of site-specific issues. It sought to establish environmental constraints and mitigation options which could then be considered with key stakeholders, including the community, the local authority and statutory consultees. This allowed a development layout to be established which was both technically feasible and which sought to take account of environmental constraints and potential effects of the wind farm.

Potential high-level environmental constraints

- Landscape character and visual impact;
- Residential Amenity;
- Existing land uses;
- Sites of designated ecological importance and protected species;



- Sites, features and buildings of designated archaeological and/or historic interest; and
- Surface and groundwater resources.

Potential technical constraints

- Siting wind turbines to avoid wake effects and turbulence to ensure optimised performance;
- Suitable ground contours and conditions for wind turbines foundations, access tracks and control building;
- Availability and accessibility of connection to the electricity transmission grid;
- Aviation interests; and
- Interference with telecommunications links.
- 3.1.6 As part of the EIA process, specialist surveys were undertaken in order to establish a baseline of existing conditions to inform the design process. The key activities undertaken to inform these documents are outlined below.

Environmental Impacts and Planning

- Landscape character analysis, visibility mapping through ZTV's, wireframes and view point analysis from a number of locations (representative of key views as established through scoping);
- Identification and mapping of residential properties including background noise monitoring and shadow flicker analysis;
- Ecological surveys including habitat and vegetation, protected species surveys including otters;
- Ornithological surveys including flight activity, breeding activity, non breeding bird walk over surveys and targeted red-throated diver nest watches;
- Hydrological and hydro-geological surveys including the identification of watercourses, catchments and groundwater dependant terrestrial ecosystems;
- Ground conditions surveys, peat depth mapping and review of British Geographical Survey (BGS)
- Identification and mapping of known archaeological and heritage features within the Site and wider study areas;
- Identification of tourism and recreational resources including walking, bird watching and other local activities; and
- Review of the Shetland Local Development Plan (2014) and associated adopted and draft supplementary guidance.

Technical and Engineering

- 3.1.7 A number of technical and engineering studies and assessment were undertaken, some of which overlap or form part of the EIA.
 - Meteorological monitoring including wind speed, direction and rainfall. This informed wind yield analysis and noise assessments;
 - Ground conditions review including topographical mapping (elevation and slope) and peat depth mapping (to identify engineering and environment constraints);
 - Transport engineering review of turbine delivery routes;



- Identification of other infrastructure including communications links, utilities and grid connections; and
- Aviation analysis including consideration of air traffic and radar operations and buffers.

Consultation

- 3.1.8 The Environmental Statement provides details on the scoping and consultation activities undertaken as part of the EIA. Additional issue specific consultations were undertaken with the Shetland Islands Council and consultees are outlined within the relevant chapters of the Environmental Statement to discuss issues including, Core Paths, aviation and communications.
- 3.1.9 The application submission also contains a Pre-Application Consultation report ('PAC' report) which details the consultation undertaken with the local communities and the outcomes of these activities and should be read separately to understand the specific work undertaken to inform and seek comments from the community to influence the design of the Proposed Development.
- 3.1.10 In summary, the process ranges from the inception of a website to inform the public in March 2015 through to the submission of the application to Scottish Ministers in March 2016. As well as on-going updates and a live website, four public consultation events were undertaken, two in April 2015 and two in October 2015. The first series of events in April 2015 sought views on alternative schemes, a 28 Turbine development with turbines to a tip height of 125m or an alternative scheme of 17 Turbines with a maximum tip height of 145m. The findings, as outlined in the PAC were that a small majority of respondents preferred the smaller number of larger sized turbines, i.e. the scheme of 17 Turbines at 145m to tip height. This helped to inform the iterative design process. A second series of consultation events in October 2015 sought to consult only on the 17 turbine scheme whilst also incorporating other design changes following previous feedback, including: moving the development further from Scatsta airport; moving turbines further from residents at Burravoe to minimise visual impact, and moving turbines from the flight paths of breeding red-throated divers. The second consultation found that an overwhelming majority of 92% considered the changes to the design as an improvement from the previous scheme consulted upon in April 2015. Moreover, all the respondents either strongly (88%) or reasonably (12%) supported the Proposed Development.

Design Strategy

- 3.1.11 Following the analysis of the outcomes of the EIA and associated and engineering and technical studies, a range of constraints on design were identified, as shown in ES Volume 2, Figure 3.11. The constraints had varying effects on the evolution of the wind farm design, and this is discussed further in the next section in the context of the design iterations of the wind farm layout.
- 3.1.12 Therefore, following the completion of studies and surveys and consultation exercises, the key design considerations that influenced the design strategy are as follows:
 - Provision of a turbine layout and model which is appropriate in scale and visual impact, and relates to the landscape character of the Site and its surroundings;
 - Provision of a turbine layout which is appropriate in relation to the technical and environmental constraints of being located on an exposed coastal environmental, with sensitive receptors nearby;
 - To develop a development layout which avoids, or mitigates, potential effects on cultural heritage features including their settings;
 - To avoid as far as possible areas of sensitive ornithological and ecological habitat and potential Groundwater Dependant Terrestrial Ecosystems;



- To develop a drainage design which reduces effects on hydrology and hydro-geology and which will support areas of water dependant habitats;
- To avoid walking routes within and on the margins of the Development and where possible improve and promote access to the Site; and
- To take account of relevant national and local planning policy and guidance through design.



4 Design Development

4.1 Design Iteration Stage 1: Preliminary Site Feasibility Layout

- 4.1.1 The Applicant acquired the Beaw Field Wind Farm project from Enertrag Limited in October 2014. The Enertrag proposal had previously been the subject of a scoping request, with their scheme proposing seventeen, 6MW turbines with a maximum tip height of 165m.
- 4.1.2 When the Applicant obtained the Site, there was a reconsideration of the proposed layout and a reduction of the tip height of the turbines to 145m. This decision, to reduce the height of the proposed turbines was made as a result of a design review with the landscape architect in order to minimise potential visual and landscape impacts, and to bring the development in line with the scale of turbines on the consented Viking Energy Wind Farm proposal on Shetland Mainland. This decision allowed for 65 turbines to be accommodated on the Site based purely on technical considerations, as per ES Volume 2, Figure 5.1: Stage 1 Layout A, shown in Appendix 2 of this DAS.
- 4.1.3 At this stage a number of initial environmental assessments were commenced in order to begin to establish environmental constraints which would influence the development layout.

Design Iteration Stage 2: Arriving at the Scoping Layout

- 4.1.4 Design Iteration 1 was developed to take account of known ecological designations and the results of the baseline surveys undertaken so far at this stage. Whilst they had not been completed, the findings at that time indicated that turbines should be excluded from the north west of the Site in order to protect the Otterswick and Graveland SPA and SSSI. This reduced the number of turbines within the Site to 52, as per ES Volume 2, Figure 5.2: Stage 2 Layout A.
- 4.1.5 As the environmental assessments continued, a further finding demonstrated that the number of turbines would have to be reduced further in order to avoid the flight lines of red throated divers. This reduced the figure to 47, as per ES Volume 2 Figure 5.3, Stage 2 Layout B.Further baseline data relating to specific environmental issues such as peat depth, hydrology and ground water dependant ecosystems was obtained and identified areas of unmodified peat bog and potentially ground water dependant ecosystems. Whilst these areas were already excluded in the main due to ornithological reasons, the turbine layout required further modification and reduction in turbines numbers to 43 to avoid areas of habitat, see ES Volume 2, Figure 5.4: Stage 2 Layout C.Following detailed assessments and direct consultation on the potential effects of the Proposed Development on operations at Scatsta Airport, a large portion of the available land area within the Site was within the Obstacle Limitation Surface ('OLS'). The OLS places restrictions on the construction of tall structures that have the potential to adversely impact on airport operations. This led to a significant re-design of the turbine layout, with multiple iterations ranging from 28 to 20 Turbines. An example of one of the design iterations is as shown in detail in ES Volume 2, Figure 5.5: Stage 2 Layout D, which illustrates the 24 Turbine layout, and shown indicatively in Appendix 2.

Design Iteration Stage 3: Scoping Layout

4.1.6 The design iteration process at Stage 2 provided a range of alternative options. This included a range of proposals from a scheme of 28 turbines at a maximum tip height of 125m to a 17 turbine scheme at 145m to tip height. The two extremes of the options were used for community consultation purposes. At approximately the same time, there was a need to submit a scheme for scoping to inform the next stages of the EIS process. In order to scope the worst-case scenario, it was considered that a 20 Turbine scheme



of the larger profile turbines measuring 145m to tip would provide the most reliable Scoping Opinion and less subject to change than a larger number of the smaller profile 125m turbines. The 20 turbine layout used for the purposes of a requesting scoping opinion (Planning Application ref. 2015/133/SCOP) is shown in ES Volume 2, Figure 5.6: Stage 3 Layout A.The scoping opinion was submitted on the 14 April 2015. At this stage it remained technically possible to fit up to 28 turbines within the Site though they would have been less than 145m to tip.

- 4.1.7 The Council's scoping opinion provided advice to the consultant team and informed further detailed and focused environmental studies which were then undertaken to establish the baseline as part of the EIA.
- 4.1.8 Design iteration 3 was developed to take account of the findings of the more detailed environmental studies, the comments of stakeholders and the results of the community consultation exercise undertaken.
- 4.1.9 As a result a further revision of the layout was prepared, required as consequence of the archaeology baseline studies to include a 1,500m buffer between the Broch of Gossaburgh, a scheduled ancient monument. This buffer ensures that the Proposed Development does not have an unacceptable impact on the setting of the Broch. Further buffers zones were also applied to the layout from residential dwellings as a result of the feedback from the public consultation exercise.
- 4.1.10 Design Iteration 3 benfitted from input by the landscape architect taking account of all findings to date to prepare what was considered to be the most acceptable development, to ensure that the turbines were visually as cohesive, spaced and legible within the receiving landscape as possible. This layout is shown in detail in ES Volume 2, Figure 5.7: Stage 3, Layout B and indicatively in Appendix 2.

Final Design

- 4.1.11 Not long after the development of Stage 3 Layout B, a further ecological survey in summer of 2015 confirmed that a successful nesting site of red throated divers had been established on Litla Water, as previously identified in 2011. This created an exclusion zone, which further reduced the turbine layout to 17 turbines, shown in detail in ES Volume 2, Figure 5.8: Stage 4, Layout A and indicatively in Appendix 2 of this DAS.
- 4.1.12 Consultation with OFCOM and various network operators, identified several communication links crossing the Site. A link for Vodafone and Shetland Island council runs through the centre of the Site from the south to the north. The operator confirmed that rerouting the link was not feasible, therefore to ensure that the turbine development has no detrimental effect on the transmission, it was requested that a buffer of 25m, (alongside the second Fresnel zone) was provided around the link centreline.
- 4.1.13 To accommodate this, turbine T13 had to be relocated 74m to the north. A third link was then identified, running north to south through the Site. Turbines T3 and T8 were situated at the centre of this link however due to existing constraints on site, there was no possibility to revise the layout. Therefore, a radio communications tower is now proposed in the south-eastern corner of the Site. This will redirect the communications link around the array, ensuring that there is no signal degradation and allows T3 and T8 to remain in their proposed locations.
- 4.1.14 Figure 5.8 represents the final iteration before the final design (shown in ES Volume 2, Figure 3.1) was selected. It was used for the purposes of community consultation in October 2015 and, as noted previously in this statement, was endorsed by 92% of respondents considering the changes to the design as an improvement from the previous scheme consulted upon in April 2015. Moreover, all the respondents either strongly (88%) or reasonably (12%) supported the Proposed Development. It was considered that taking



account the findings of all the EIA and consultation work undertaken by the design team, that a final design had been prepared.

- 4.1.15 Each turbine location has been reviewed to ensure the locations are appropriate for access and amenable for suitable foundation design. The precise position of the turbine and hardstanding would be directed by the results of a final Ground Investigation ('GI') undertaken prior to construction and further design optimisation. The GI will provide the data for foundation design for each turbine and it would be on this basis that micro-siting requirements would be determined.
- 4.1.16 A micro-siting allowance of 50m has been allowed, except where micro-siting would overlap sensitive receptor buffers or located in land not within the control of the Applicant.
- 4.1.17 The layout of the turbines and associated infrastructure has evolved throughout the EIA and project development process. It has been influenced by environmental, technical and social factors and considerations.
- 4.1.18 Whilst the key design iteration stages have been discussed above, the iterative design progression is an integral part of the EIA process, accordingly, the key issues addressed through the process are also summarised in Table 2: Summary of Mitigation by Design.

Environmental Aspect	Potential Impact	Mitigation by Design
Ornithology	Potential Impact on Otterswick and Gravesland SPA conservation and management objectives	Ornithological surveys between 2011 and 2015 have defined a protection zone extending to the south and east of the SPA boundary. Flight lines identified for red-throated diver have influenced location of turbines.
Omithology	Impact on qualifying species of the SPA – barrier effect of wind turbines and collision risk	Analysis of vantage point surveys from 2015 identified further ornithological interest for non- SPA red-throated divers on Litla Water to east of Site. Separate constraint boundary was defined.
Landscape	Minimise potential impact of the turbines upon sensitive receptors and minimise conflicts with cultural heritage features.	Layout revised to reduce the number of turbines, with the final design achieving a near even spacing, thus reducing the footprint of the wind farm. The most easterly turbines have been removed thereby increasing the distance of from the nearest turbine to the coast line. No turbines are located on the higher ground to the west of the Site.
Aviation	Proximity of the Site to Scatsta Airport meant potential interference with navigational instruments and conformance with flight procedures.	Aviation Obstacle Limitation Surface excluded 540ha of the total Site area from turbine allocation.

Table 2: Summary of Mitigation by Design



Environmental Aspect	Potential Impact	Mitigation by Design	
	Potential to impact water quality, drainage pattern and flood plain.	The location of turbines has taken account of minimum offset distance 50m from water courses and bodies. Access track has made use of existing routes	
Hydrology		where practical and watercrossings have been limited to five crossings of major watercourses and one minor watercourse.	
		The design of the watercourse crossings would maintain passage of fish and otters and have been designed to have capacity for 1 in 200 year flood event without causing constriction of flow or increasing potential flood risk further downstream.	
Cultural Heritage	Potential to impact archaeological features.	Baseline survey based on 20m transects identified cultural heritage remains would be affect by one of the access tracks. Access track alignment avoids potential impact on these finds. Location of borrow pits does not conflict with the findings of the baseline survey.	
Peat and carbon balance	Much of application area is covered by deep peat >0.5m which would be disturbed within the construction footprint of the wind farm.	Peat depth survey was conducted across the Site where continuous deposits of deep peat were present. These were excluded from the development, as the deep peat coincided with the ornithological constraint buffer to the west of the Site.	
		A second peat depth survey has provided data at a 50m grid around turbine locations and on access routes and has been used to inform the design of infrastructure required for construction of the wind farm.	
Residential amenity, noise and shadow flicker	Baseline data confirmed settlements of Burravoe, Gossabrough and Hamnavoe are quiet with a few sources of noise.	During the design evolution, turbines were relocated to increase the separation distance between the nearest properties and the outer edge of the wind farm, in particular a turbine to the south east of the array has been removed in the design freeze layout.	
	The properties generally face out to the sea and therefore facing away from the turbines within the wind farm.		

Table 2: Summary of Mitigation by Design



Environmental Aspect	Potential Impact	Mitigation by Design
Telecommunications	Electromagnetic interference on those telecommunications networks with transmissions over or near the Site.	Turbine layout has been modified to ensure that required separation is maintained from link centreline. Emergency services link operated by Airwave Solutions Ltd is directly impacted by two of the turbines and there is insufficient space to avoid them. Mitigation entails rerouting the link to avoid the area of the Site where turbines are being deployed.

Table 2: Summary of Mitigation by Design

Component Design

4.1.19 The locations of the turbines are just one element of the overall Proposed Development. The following sections discuss turbine selection, including components, and associated development as part of the requirements for the development.

Turbine Size, Scale and Colour

- 4.1.20 The proposed turbines would be of the conventional three bladed; horizontal axis design with a maximum blade tip height of 145m. Several varieties of turbine model are being reviewed, with small differences in the hub height and rotor diameter. This will not impact on the maximum height of the turbines. The exact model of the turbine shall be selected should consent and deemed planning permission be granted for the development. For the purposes of the EIA and Landscape and Visual Impact Assessment, the candidate turbine used was the Senvion 3.4M with a 104m rotor diameter and 93m to hub height. It is a typical type of turbine that may be installed in terms of the visibility and noise characteristics. Drawings of the proposed candidate turbine are contained in ES Volume 2, Figure 3.3.
- 4.1.21 The final external colour finish of the turbines would be determined in consultation with the Shetland Islands Council should s.36 consent be granted however, for the purpose of the EIA, the assumed colour of the turbines is semi matt grey, or off white grey. This is similar to the majority of onshore wind turbines deployed in the UK.

Lighting for Aviation

4.1.22 Discussions with aviation stakeholders have indicated that 'obstacle avoidance lighting' should be installed on specific turbines. The exact specification of the lighting will be agreed with the relevant stakeholders but will most likely comprise omnidirectional avoidance lighting (red) being installed on the top of the turbine nacelles. The installation of this lighting will be secured through appropriate conditions to the S.36 consent and deemed planning permission.

Rotor Speed

4.1.23 The proposed turbine would be variable speed to minimise voltage frequency fluctuations and reduce strain on the structure and mechanics of the turbines and reduce noise at lower wind speeds. It is anticipated that the rotational speeds would range from around 10 revolutions per minute (rpm) to 22rpm depending on the wind speed and final turbine selected.



Turbine Foundations

4.1.24 The turbine foundations would be dependent upon site-specific ground conditions and the turbine selection. However, it is anticipated that standard construction techniques would be suitable at all locations. Each turbine foundation would comprise a reinforced concrete base of approximately 18-22m in diameter and approximately 2.0-2.5m deep (depending on ground conditions) with a reinforced concrete central column up to 1m in length extending from the foundation base to the ground surface. The turbine tower would attach to the top of this central column.

Hardstanding Areas

4.1.25 The hardstanding areas will be constructed for cranes (crane pads) and the assembling of the turbine's rotor. These would be up to 1,600m² in area and would be adjacent to each turbine location. The precise locations and dimensions of the hardstanding areas may vary due to topography, ground conditions and potential micro-siting of the turbines. However, all hardstanding areas would remain within the Application Boundary and away from any sensitive areas or land outwith the ownership of the applicant. Changes in either the location or dimensions would have an insignificant impact on the volumes of material requiring to be imported to the Site.

Transformers

4.1.26 A transporter would be required for each turbine to increase the voltage of the electricity generated from 690V to 33,000V prior to transmission to the wind farm substation. The transformers would be located within the turbine towers at ground level or within an enclosed cabin of approximately 10m² and maximum height of 3m high, adjacent to the turbine. This is subject to the selected turbine manufacturer. Indicative drawings are included in ES Volume 2, Figure 3.3.

Temporary Site Compound

- 4.1.27 The construction period for development of the wind farm would be approximately 24 months, as provided in ES Volume 2, paragraph 3.19.
- 4.1.28 The Site compound will contain welfare arrangements for construction staff such as toilets and a canteen, as well as necessary equipment and storage facilities. Refuelling would also take place within a designated area of the compound, with fuel storage facilities contained to a bounded area.

Substation and control building

- 4.1.29 The substation and control building would house the equipment necessary for the standard operation of a wind farm. It would also house the Supervisory Control and Data Acquisition (SCADA) equipment required to allow remote monitoring of the wind farm. The proposed location of the substation and control building is identified in ES Volume 2, Figure 3.1.
- 4.1.30 The substation and control building would also house associated electrical infrastructure and external parking. The compound will be surrounded by a boundary fence. The foot print of the control building would measure 15m by 6m and would be approximately 5.5m in height.



Cable Layout

4.1.31 Cables would be required to transmit electricity from the turbines to the onsite substation. Additional cables would be required for earthing and for communication between the turbine, substation, control building and anemometer mast. The cables would be laid in underground trenches, typically around 1m deep and up to 2m wide located within the verge, directly adjacent to access tracks to connect the turbines to the substation.

Grid Connection

4.1.32 The wind farm would be connected to the Scottish Mainland via the Transmission network operated by National Grid (NGET in the form of an underground cable which would leave the substation compound alongside the access track to the Site boundary where it would follow the B9081 via overhead cables to the Bay of Ulsta. Here a 4km subsea cable would be installed between the Bay of Ulsta and Mossbank on Mainland Shetland with the line then continuing overland to the proposed HVDC substation at Kergord. A subsea HVDC interconnector is proposed from Kergord to Caithness on the Scottish Mainland. The offsite grid connection will be subject to a separate application.

Anemometry Mast

4.1.33 A permanent anemometry mast would be installed at the Site to provide ongoing monitoring of wind conditions during the operation of the Proposed Development. The anemometry mast must be sited to avoid wake effects from turbines, as demonstrated on Figure 3.1 of the ES, with the design included as Figure 3.10 of the ES.

Radio Communications Tower

4.1.34 To mitigate against any possible effects on the emergency service radio communications network, a radio communications tower will be installed in the south east of the Site (ES Volume 2, Figure 3.1,). The tower will be a maximum of 20m tall and will include a small building next to the mast containing a back-up generator. The exact specification of the mast is the subject of ongoing consultation with Airwaves (the operator).

Borrow Pits

- 4.1.35 Ten potential locations for borrow pits within the Application Boundary were considered and evaluated based on the possible constraints such as access, archaeological impact and landscape and visual impact. Based on the evaluation, up to four borrow pits have been identified for the Proposed Development. The details of the borrow pits including working and restoration plans are provided in ES Volume 2, Figures 3.16 3.19.
- 4.1.36 The resource estimation for the identified borrow pits indicates that there are sufficient quantities of aggregate available for construction of access tracks, turbine foundations and hardstanding areas. Other raw materials such as sand, gravel and cement will be imported to the Site and stockpiled at the temporary construction compound.



5 Access Design Development

5.1 Access

- 5.1.1 The Shetland Local Development Plan (adopted 2014), Policy Trans3 'Access and Parking', requires a safe and adequate access for all developments. The wind farm is an energy generating station and, as such, access requirements must prioritise the easy movement of construction and maintenance vehicles first and foremost. There is also a responsibility to ensure that throughout the construction process appropriate safeguards are put in place to ensure than anyone accessing the Site is not put at risk from construction activities.
- 5.1.2 A key issue to be addressed in the DAS is to consider how the design of the development seeks to promote access for members of the public with limited mobility. However, due to the Site's location, it is not a priority destination for people with mobility issues. The nature of this operation in a rural location does not specifically seek to promote public access whether or not they are able bodied or have mobility issues. This means that specific design measures to allow access for those with limited mobility have not been included, particularly given that there are no visitor facilities associated with the development. However, details of improved access during the operational phase are discussed later within this section.

Access Track

- 5.1.3 ES Volume 2, Figure 5.9: Access Track Evolution, provides details of the evolution of the Access Track design. The final design of for 11.1km of access tracks which will be constructed to transport and serve the Proposed Development. The track will be an average width of 4.5m, with 1m wide cable trenches cut into the verge of the track. The location of the access tracks has developed alongside the wind turbine layout, and has been subject to similar constraints and design criteria.
- 5.1.4 The first access track design was based on using the B9081 to gain access into the Site to the north of Burravoe following advice from local landowners and the Highways department and developed as it was considered to secure reduced visual and environment effects. However, this option was dismissed due to volume of large construction vehicles moving through the small settlements of Hamnavoe, Houlland and Burravoe.
- 5.1.5 The second option for the access track was the shortest route from the B09081 junction to the location of turbine 8 (Figure 5.9) on an alignment to the west of Beaw Field. However, peat depth surveys demonstrated that the access track would have to be constructed on areas of deep peat and floating road option would not be practical due to the steep topography and gradients on Site.
- 5.1.6 A third option was explored which followed the route of an existing track from a point south of Beaw Field at B0981 to the north of Burravoe. However, the alignment of the access track followed an existing Scottish Water supply pipeline and was within the 10m buffer restrictions.
- 5.1.7 The final access track route for which consent is being sought, meets the technical requirements relating to the Site constraints, including water crossing points and bend radii and also results in reduced environmental effects. The route provides construction access to the Site compound and the long-term operational access to the substation. The access track follows where possible area of low to moderate peat depth. In areas where this is not possible, floating roads may be used, as appropriate.



Vehicle Access and Transport

5.1.8 The wind turbine components will be shipped to the construction jetty at Sullom Voe on the Shetland Mainland, and will then be transported on the B9076 and A968 roads to the Tofts Voe Pier. The components will then be transported by ferry from Mainland to Ulsta Ferry Terminal in Yell. From this point the components will then be transported via the A968 and B9081 road to the beginning of the access track to the Site as per ES Volume 2, Figure 3.12.

Paths

- 5.1.9 The Shetland Islands Council (SIC) Core Path Plan does not indicate any Core Paths in the vicinity of the proposed Site. However, a circular walking route, the 'Ward of Otterswick Walk' has been indicated by the Council. It follows the B9081 from Hamnavoe, passes the Site entrance to the Arisdale Farm, heads north to Ward of Otterswick, and then back south to Hamnavoe. The section of the route which follows B9081 between the Site access junction and the Arisdale Farm entrance would be used by construction or operation traffic serving the Proposed Development in addition to the traffic that is currently using the road.
- 5.1.10 North of Hamnavoe and within the Site, the route would be crossed and followed for a short length by the main Site access road. This route will therefore also be affected by construction traffic.

Public Access

- 5.1.11 During the construction and decommissioning stages, public access to the Site and paths identified above will be limited through restrictions put in place by the principle contractor, on the basis of public health and safety. Construction will accord with the (Design and Management) Regulations (CDM, 2015).
- 5.1.12 Appropriate signage to limit and direct the public via alternative routes will be provided in appropriate locations across the Site and surrounding area and controls will be put in place to monitor access to the construction Site during construction and decommissioning stages. Outwith operational hours the construction Site will be secured to prevent unauthorised access. Once construction is completed and the operational phase commences, the routes will be re-instated as previous and overall access to the Site will be improved for pedestrians and cyclists. Access tracks will become available for non-vehicular traffic. Furthermore, a heritage access and interpretation trail will be incorporated, as outlined within ES Volume 2, Figure 3.20.



6 Design Solution

- 6.1.1 The final layout, as shown in ES Volume 2, Figure 3.1 is based on the design strategy outlined earlier. The strategy has achieved a design that has avoided or where avoidance has not been possible, limited potential environmental effects.
- 6.1.2 The number of turbines has been reduced from 65 to 17 following the identification of environmental and technical constraints, to minimise landscape and visual effects and to take account of comments from the Council, statutory and non-statutory consultees and the public consultation process. The access track has been modified to reduce the disturbance to areas of deep peat. Associated infrastructure has also been located in areas that have been identified to be of the lowest sensitivity.
- 6.1.3 As outlined above, the precise locations of the turbines will be micro-sited to within a 50m radius of the locations provided in the Environmental Statement. This allowance for micro-siting will allow for movement dictated by ground conditions that will be subject to further engineering investigation before construction of the wind farm.
- 6.1.4 On the completion of the construction phase of the development, a programme of Site restoration will be initiated in order to improve the appearance of the development and to restore areas of peat that have been disturbed. Reinstatement will include the use of peat for road edgings, verge profiling, restoring the borrow pits and infill around turbine bases. The design of the Site minimised peat extraction and the final layout proposed is expected to result in no significant net loss of peat and that restoration will contribute to reducing the Carbon payback of the development.
- 6.1.5 The nature of the landscape in which the Proposed Development is located means there is limited opportunity for schemes to mitigate views of turbines and associated infrastructure through tree planting. However the landscape topography should ensure that the infrastructure such as borrow pits and access tracks, should be screened from multiple viewpoints and would not dominate the landscape. Mitigation through the design of the turbines has been employed instead, as described within this DAS and as assessed in the ES.



Appendix 1: Site Location and Designations











Key			
	Application Bo	oundary	
X X	Special Protect	ction Areas	
111	Special Areas	of Conservation	
	Sites of Speci	al Scientific Interest	
	SPA - Red-thr (breeding) Ave	oated diver bidance Area	
	Non SPA - Re (breeding) Avo Obstacle Limit Scatsta Airpor	d-throated diver pidance Area tation Surface t	
	Scheduled Mo	onument	
٠	Listed Building	g	
	On Road Loca	al Cycle Network Rou	ites
	Core Path		
	Buildings	waaa and	
	Waterbodies E	Buffer	
Scottish Na © Crown c Historic En All rights re Sustrans © Ornitholog Aviation fe Contains © © Crown C	atural Heritage Co opyright and datab wironment Scotlan eserved 2015 Crown Copyright y features provided atures provided by Ordnance Survey d Copyright and datal Beaw Field	ntains Ordnance Survey d base right (2015) d © Crown Copyright. . All rights reserved 2015 d by Alba Ecology 2015 d Cyrrus 2015 ata. base right 2015	ata
N			-
\uparrow		PE	L
TITLE:			
Sensitiv	e Receptors Figu	within 1.5km of the ure 2.2	Site
Scale: 1:2	5,000 @ A3	Date: 27/0	1/2016
Develop	Ordnance Survey® per Partner	This material has been reproduced Ordnance Survey digital map data w the permission of the Controller of Her Majecty's Stationary Office © Crown Copyright Licence Number 100018033	irom vith
Ref:			



Appendix 2: Design Iteration Stage 1-4





a	Кеу
	Study Area
	Turbine locations T1 to T24
	Otterswick and Graveland SPA and SSSI
	(breeding) Avoidance Area
	Obstacle Limitation Surface Scatsta Airport
	B9081 safety buffer
*	
	Aviation features provided by Cyrrus 2015.
	Ornithology features provided by Alba Ecology 2015.
	Scottish Natural Heritage Contains Ordnance Survey data. © Crown Copyright and database right 2015
	Beaw Field Wind Farm
	N ↑ PEEL
	TITLE:
	24 Turbine Lavout
	Figure 5.5
	Scale: 1:25,000 @ A3 Date: 27/01/2016
	This material has been reproduced from Ordnance Survey digital map data with the permission of the Controller of Her Maiert's Stationary Office
	Developer Partner © Crow Logvight Licence Number 100018033
	Ref:



ja	Кеу
	Application Boundary
	Turbine locations T1 to T18
	Otterswick and Graveland SPA and SSSI
	SPA - Red-throated diver (breeding) Buffer Area
	Obstacle Limitation Surface Scatsta Airport
`.	Seven rotor diameter dwelling buffer (728m)
	— — 1500m Buffer Ness of Gossabrough ☐ J broch (SAM)
	Aviation features provided by Cyrrus 2015
	Ornithology features provided by Alba Ecology 2015
	Heritage features provided by AOC Archaeology 2015
	Scottish Natural Heritage Contains Ordnance Survey data. © Crown Copyright and database right 2015
	Beaw Field Wind Farm
	₩ PEEL PEEL
	TITLE:
	18 Turbine Layout
	Figure 5.7
	Scale: 1:25,000 @ A3 Date: 12/02/2016
	Ordnance This material has been reproduced from Ordnance Survey digital map data with the permission of the Controller of Her Majerty's Stationary Office Developer Partner Ordnance Survey digital map data with the permission of the Controller of Her Majerty's Stationary Office
	Ref:
_	



ga	Кеу
	Application Boundary
	Location of Turbines T1 to T17
	Otterswick and Graveland
	SPA and SSS SPA - Breeding Red-throated diver (breeding) Avoidance Area
	Non SPA - Breeding Red-throated diver (breeding) Avoidance Area Obstacle Limitation Surface Scatsta Airport
	Aviation features provided by Cyrrus 2015.
	Ornithology features provided by Alba Ecology 2015.
	Heritage features provided by AOC Archaeology 2015.
	Scottish Natural Heritage Contains Ordnance Survey data. © Crown Copyright and database right 2015.
	Beaw Field Wind Farm
	TITLE:
	Design Freeze - 17 Turbines
	Figure 5.8
	Scale: 1:25,000 @ A3 Date: 27/01/2016
	This material has been reproduced from Ordnance Survey digital map data with the permission of the Controller of Her Majecty's Stationary Office
	Developer Partner
	rei.