

3 Proposed Development

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3 Proposed Development

3.1 Executive Summary

- 3.1.1 The Proposed Development consists of six turbines, up to 149.9 m to tip. A number of ancillary elements are also proposed, including a temporary construction compound, permanent hardstandings adjacent to the wind turbines for maintenance cranes, temporary laydown areas adjacent to the wind turbines which will be re-instated post-construction, external transformers, internal access tracks (both new and upgrading of existing farm access tracks), underground cables between turbines, an on-site substation compound and a permanent meteorological monitoring mast.
- 3.1.2 Construction will take approximately 12 months and environmental impacts will be controlled, mitigated and monitored through the implementation of Construction Environmental Management Plan.
- 3.1.3 Should the Proposed Development be decommissioned it is expected that decommissioning would take approximately six months. The environmental effects of decommissioning are considered to be no greater than construction effects but experienced over a much shorter time period. All turbine components will be carefully removed and foundations removed to 1 m below ground level. Hardstandings will be removed and/or grassed over, however it is likely that the access junction and sections of access track may be left in situ to assist with agricultural access.

3.2 Introduction

- 3.2.1 This chapter provides a description of the site and its geographical context and presents a description of the Proposed Development.
- 3.2.2 The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (Scottish Government, 2017) require that the EIA Report must include " a description of the location of the development; and a description of the physical characteristics of the whole development, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases" Schedule 4, 1 (a) and (b).

3.3 Site Status and Context

- 3.3.1 The Proposed Development site is located on the Mainland of Orkney, approximately 2.7 km north-west from the boundary of Kirkwall Town Centre. The site is located on the peninsula of Quanterness, north of the A965 which abuts the southern boundary of the site.
- 3.3.2 The elevation of the site ranges from 0 m AOD in the north to 20 mAOD in the south. The site covers 172.27 ha and the central grid reference of 341560, 1013640. The site boundary and location are shown in Figure 1.1.
- 3.3.3 The site comprises of agricultural fields, mainly used for cattle grazing, with some crops. There are no natural watercourses within the site boundary, but a number of drainage ditches follow the field boundaries. Although a number of waterbodies are shown within the site on Ordnance Survey mapping, these have been confirmed to be ephemeral, rain-water fed hollows. The Wide Firth is located to the north of the site.
- 3.3.4 No buildings are located within the site boundary, the closest residential properties are 1 and 2 Quanterness Farm Cottages, located 132 m south of the site boundary.
- 3.3.5 The wider area around the site is also agricultural land, with scattered residential properties and settlements.

3.4 Description of the Proposed Development

- 3.4.1 The Proposed Development comprises six wind turbines of up to a maximum 149.9 m height from ground to blade tip when vertical. The likely installed capacity of the Proposed Development will be approximately 28.8 MW. The actual installed capacity may be greater or less dependent on turbine model selection but will not be greater than 50 MW. A number of ancillary elements are also proposed, including a temporary construction compound, permanent hardstandings adjacent to the wind turbines for installation and maintenance cranes, temporary laydown areas adjacent to the wind turbines, external transformers, internal access tracks (both new and upgrading of existing farm access tracks), underground cables between turbines, an on-site substation compound and a permanent meteorological monitoring mast. The Proposed Development site layout is shown in Figures 1.2.
- 3.4.2 Whilst the location of the infrastructure described below has been determined through an iterative environmental based design process, there is the potential for these exact locations to be further optimised through micro-siting allowances prior to construction. In this regard, there will be a micro-siting allowance of up to 50 m in all directions in respect of each turbine and its associated infrastructure in order to address any potential difficulties which may arise in the event that preconstruction surveys identify unsuitable ground conditions or environmental constraints that could be avoided. The exception to this is turbine T5 which will not be micro-sited between 141° and 341° to prevent any impacts on the telecommunication links.
- 3.4.3 The assessments within this EIA report have included the considerations of this 50 m micro-siting and it does not alter the conclusions formed as to worst case effects.

Turbines and Turbine Foundation

- 3.4.4 The Proposed Development will comprise a maximum of six wind turbines with a maximum height from ground to blade tip, when vertical, of 149.9 m (refer to Figure 3.1). The total anticipated generation rating of the Proposed Development will be no greater than 50 MW, depending on turbine models which are available and fit within the physical parameters used for the purposes of this EIA.
- 3.4.5 The proposed locations of the turbines have been defined in order to enable the EIA to describe fully the Proposed Development for which permission is being sought. The British National Grid coordinates denoting where each of the turbines are proposed to be located are listed in Table 3.1 below.

Table 3.1 – Wind Turbine Coordinates (British National Grid)

Turbine	Easting	Northing
T1	340628	1013867
T2	340945	1013407
T3	341401	1013702
T4	341971	1014000
T5	342528	1013923
T6	342177	1013492

- 3.4.6 Each of the turbines comprises the following components:
- blades;

- tower;
 - nacelle;
 - hub; and
 - transformer.
- 3.4.7 Each turbine will be mounted on a tapered tubular steel tower and consist of a nacelle containing the gearbox or direct drive, generator and associated equipment, to which are attached a hub and rotor assembly including three blades. At the base, the turbine will be approximately 5 m in diameter.
- 3.4.8 An elevation drawing of a typical turbine is illustrated in Figure 3.1. The turbines will be of a typical modern, three-blade, horizontal axis design in semi-matt white or light grey with no external advertising or lettering except for statutory notices. The specific turbine manufacturer and model has not yet been selected as this is subject to an on-going tendering exercise and will be confirmed post consent. Therefore, for the purposes of the EIA likely turbine dimensions and operational attributes have been established as a maximum development scenario.
- 3.4.9 A transformer will be sited either within the base of each tower or externally sited a few metres from the turbine tower. For the purpose of the EIA it has been assumed that the transformers would be external and have the approximate dimensions of 6 m long by 3 m wide by 2.5 m high.
- 3.4.10 The turbine foundations are anticipated to be an inverted “T” in section consisting of a reinforced central concrete pedestal approximately with a reinforced concrete slab. The tower is proposed to be attached to the foundations via an anchor cage which is then tension anchored to the tower. Until detailed ground investigations have been undertaken the exact size and depth of foundations required cannot be determined. Therefore, for the purposes of this EIA Report, the following approximate dimensions have been used:
- reinforced concrete slab approximately 12 m in diameter; and
 - depth of the foundations approximately 3 m.
- 3.4.11 An illustration of a typical turbine foundation is provided in Figure 3.2. The actual foundation design will be specific to the site conditions as verified during detailed site investigations undertaken before construction commences. In the unlikely event that ground conditions are unsuitable for the standard foundation design described above, a piled foundation design may be required, involving the installation of a series of concrete piles per turbine, with each pile being bored or driven until the underlying bedrock is reached.

Crane Hardstandings

- 3.4.12 To enable the construction of the turbines, a crane hardstanding area and turning circle at each turbine location will be required to accommodate assembly cranes and construction vehicles. This will comprise a crushed stone hardstanding area measuring, approximately 3,682 m², with a typical thickness of approximately 600 mm, but subject to the specifications required by the selected crane operator and following detailed ground investigations prior to construction. The crane hardstandings will remain in place during the lifetime of the Proposed Development to facilitate maintenance works.
- 3.4.13 In addition to the permanent crane hardstanding, a temporary turbine laydown area and a turning circle will be constructed adjacent to each turbine. This will consist of crushed stone hardstanding approximately 300 mm in depth covering an area of 1,319 m² per turbine. This will be removed and completely reinstated following construction.
- 3.4.14 The crane hardstandings are illustrated as part of the site layout on Figure 1.2.

Access to the Proposed Development Site

- 3.4.15 Access to the site would be taken directly from the A965 via a new priority junction. The junction would be surfaced and constructed so that the junction bellmouth would be to adoptable standards (within the current limits of adoption). The remaining tracks within the site would be private.
- 3.4.16 The access junction would have the first 2 metres surfaced in a bituminous macadam and appropriate junction markings and reflective junction markers would be provided at the access bellmouth. The throat of the junction would be widened to a minimum of 5.5 m to ensure that opposing vehicles can pass in safety.
- 3.4.17 Visibility splays of 160 m in both directions with a set-back distance of 4.5 m from the centre of the junction would be provided.
- 3.4.18 A Transport Assessment (refer to Chapter 11 and Appendix 11.1) has been prepared in support of the application for the Proposed Development and this provides greater detail on access routes to the site for construction vehicles. Chapter 11 (Traffic and Transport) includes a review of the proposed route, construction traffic impacts, and an abnormal load route review.
- 3.4.19 Prior to construction, appropriate highway safety measures will be agreed with Orkney Island Council (OIC), with necessary signage or traffic control measures implemented throughout the construction phase on the agreed basis.

On-Site Access Tracks

- 3.4.20 The access tracks within the site boundary will be approximately 4.5 m. It is anticipated that approximately 851 m of existing farm access tracks would be upgraded and approximately 3,793 m of new access tracks constructed (refer to Figure 1.2).
- 3.4.21 Construction of the access tracks will require stripping existing unsuitable material to a suitable bearing or the designed formation, and placing a filter membrane and or geotextile reinforcement membrane (depending on site conditions) on the ground. Aggregate will then be layered, with the access track capped with a layers of Type 1 or similar material.
- 3.4.22 The proposed layout of access tracks within the site is shown on Figure 1.2 and illustration of a typical access track is provided in Figure 3.3.

Drainage

- 3.4.23 An outline drainage strategy is presented in Appendix 3.1. This provides details on the management of surface waters and of foul water across the site, with detailed information for drainage related to tracks and crane hardstandings.
- 3.4.24 A detailed drainage design will be undertaken and provided to SEPA and OIC prior to construction. Illustration of typical drainage design is provided in Figure 3.4.

Watercourse Crossings

- 3.4.25 There are no natural watercourses on site, however a number of farm drainage ditches will need to be crossed. These will be pre-cast concrete pipe culverts with cast in-situ headwalls (if required) and will be designed in accordance with SEPA Good Practice Guidance (2010). An illustration of a typical watercourse crossing is provided in Figure 3.5.

Electrical Connection

- 3.4.26 The electrical power produced by the individual turbines will be fed to an onsite substation within the site via underground cables. The proposed location for the onsite substation is shown in Figure 1.2, which is located in the centre of the site. Connection of the Proposed Development to the grid or to a private wire will be subject to a separate planning application.
- 3.4.27 Onsite cables installed by the Applicant within the site will be laid in trenches, typically up to a maximum of 0.5 m deep and 1 m wide. The trenches will also carry earthing and communication

cables for the operation of the Proposed Development. Cabling will be located mainly adjacent to the access tracks. The cables will be laid on a sand bed and the trenches backfilled using suitably graded material.

- 3.4.28 The onsite substation compound will measure approximately 30 m by 60 m and will accommodate all the equipment necessary for automatic remote control and monitoring of the Proposed Development, in addition to the electrical switchgear, fault protection and metering equipment required to connect the Proposed Development to the electricity transmission network, and a hardstanding area for vehicle parking constructed from crushed stone to a depth of approximately 600 mm. The substation building will measure no larger than 25 m by 15 m with an approximate height of 5.3 m. This may reduce in scale subject to the final detailed design of the substation. Indicative elevation drawings of the onsite substation are provided in Figure 3.6. It will be constructed and finished in accordance with details to be approved by OIC through an appropriately worded condition.

Meteorological Monitoring Mast

- 3.4.29 A permanent onsite meteorological monitoring mast will be required to monitor wind speeds for the operational life of the Proposed Development. It is expected that the mast will be of a height no greater than 90 m and will be situated on a reinforced concrete foundation of approximately 5 m by 5 m with guidewires extending to a distance of no greater than 50 from the base for stability (refer to Figure 3.7).
- 3.4.30 The final location and height of the meteorological mast will be determined in consultation with the confirmed wind turbine manufacturer prior to construction of the Proposed Development. It is proposed that these details and any requirements for aviation lighting will be addressed through an appropriately worded condition.

Temporary Construction Compound

- 3.4.31 A secure, temporary construction and material storage compound will be required during the construction period. The location of the compound is shown in Figure 1.2 and measures 100 m by 100 m.
- 3.4.32 The compound will house temporary portable cabin structures to be used as the main site office and welfare facilities, including toilets, clothes drying and kitchen, and provision for sealed waste storage and removal. This area will also be used for the storage and assembly of turbine components, parking for vehicles, containerised storage for tools and small parts, and oil and fuel storage.
- 3.4.33 The compound will be constructed using the same methodologies as for the site access tracks and will be removed and the land will be restored following completion of the construction phase.
- 3.4.34 The detailed location, size and engineering properties of the construction compounds will be confirmed prior to the start of construction, after the turbine supplier and model have been confirmed.

Borrow Pits

- 3.4.35 There will be no borrow pits on site, all aggregate will be brought to the site from existing quarries.

3.5 Construction

- 3.5.1 The estimated onsite construction period for the Proposed Development is expected to take approximately 12 months and includes a programme to reinstate all temporary working areas. Normal construction hours will be between 07:30 to 18:00 weekdays and 08:00 to 13:00 Saturdays. There will be no working on Sundays or bank holidays. These times have been chosen to minimise disturbance to local residents and if required to be controlled this will be agreed with OIC via an appropriately worded condition. Details of the construction programme will be provided to OIC in the CEMP prior to the commencement of construction and secured via an appropriately worded condition.

3.5.2 Any construction out with these hours, due to construction time constraints (e.g. specific works are required to be undertaken within one session), weather windows and/or health and safety requirements, will be in line with the noise limits as assessed in Chapter 9 (Noise) and advance warning of any works out with the normal working hours will be provided to OIC Environmental Health Officer and local residents.

3.5.3 The construction programme will consist of the following principal operations, listed sequentially wherever possible. The Proposed Development will likely be phased so that certain activities will take place concurrently:

- construction of the construction compound and establishment of a storage area for wind farm components and temporary site facilities;
- construction of access tracks, including construction of drainage, and excavation of cable trenches;
- construction of wind turbine foundations, crane pad hardstanding areas, met mast and substation;
- cable laying;
- erection of wind turbines;
- connection of on-site electrical power and signal cables;
- commissioning of the site equipment; and
- site reinstatement and restoration of temporary works areas.

3.5.4 An indicative programme is shown below:

Table 3.2 – Indicative Construction Programme

Activity	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Site establishment	■	■										
Access tracks and turbine hardstanding construction		■	■	■	■	■						
Turbine foundations construction				■	■	■	■					
Cable laying						■	■	■	■			
Turbine erection								■	■			
Substation construction								■	■	■		
Site reinstatement & commissioning										■	■	■

3.5.5 The main materials likely to be required in part or total for the construction of the track, turbine and control building foundations, hardstanding areas and cable trenches are described below:

- crushed stone;
- precast concrete pipes or uPVC twin wall pipes for culverts

- geotextile;
 - ready mixed concrete;
 - sand;
 - steel reinforcement; and
 - electrical cable.
- 3.5.6 It is proposed that all the concrete will be batched offsite and transported to the Proposed Development site.
- 3.5.7 Should surface water run-off or groundwater enter the excavation during construction, appropriate pumping measures to divert the run-off will be taken to ensure the works are safely carried out and the excavation is sufficiently dry to allow concrete placement. Once the concrete is cast, the excavated material will be used for backfill and compacted to the required design density. Once this backfill is completed, the hardstanding areas will be constructed.
- 3.5.8 The proposed method for constructing the wind turbines is as follows. The turbines will be erected using a large mobile crane or crawler crane, positioned on the hardstanding adjacent to the turbine base. A smaller tail crane will be positioned adjacent to the delivery position of the turbine components. The two cranes will lift the tower sections and blades into their assembly positions, and the main crane will lift the tower sections, nacelle and blades into their operational positions.
- 3.5.9 As soon as practical, once installation is complete, the immediate construction area will be restored to its original profile, although the crane hardstanding's will be retained for future maintenance. The topsoil will be replaced and reseeded where appropriate and as advised by an onsite Environmental Clerk of Works (ECoW). The ECoW will be responsible for pre-construction surveys and will be onsite through construction and post-construction as required. Further details of their role will be provided in the CEMP.

Traffic and Transportation

- 3.5.10 A detailed Transport Assessment is provided within Chapter 12 (Traffic and Transport) of this EIA Report.
- 3.5.11 Construction traffic associated with the construction and maintenance of the Proposed Development falls into two categories, namely Abnormal Indivisible Loads (AIL) and Construction/Maintenance Loads. Details of both types of vehicles are as follows:
- AILs:
 - wind turbine blade transporter;
 - nacelle/tower section transporter;
 - assembly crane; and
 - transformer transporter.
 - Construction/Maintenance Loads:
 - 4-axle large tipper Heavy Goods Vehicle (HGV);
 - standard low loader; and
 - land rover/transit vans, general personnel transport.
- 3.5.12 Preferred access routes are detailed in Chapter 12 (Traffic and Transport).
- 3.5.13 The abnormal loads are those that will require an escort, either by private contractor or by police escort. Construction/maintenance loads are those that do not require any special escort or permissions and are only influenced by normal traffic regulations.

3.5.14 The Applicant will ensure that the vehicles will be routed as agreed with OIC, to minimise disruption and disturbance to local residents. Further details regarding transport and access can be found in Chapter 12 (Traffic and Transport) of this EIA Report and controlled by the Construction Traffic Management Plan.

Pollution Prevention and Health & Safety

3.5.15 Prior to commencement of construction activities, a pollution prevention strategy, contained within a CEMP, will be agreed with SEPA to ensure that appropriate measures are put in place to protect watercourses and the surrounding environment. Further details regarding the contents of the CEMP are provided later in this chapter.

3.5.16 As with any development, during the construction stage there is the potential for threats to the quality of the water environment in the sea and local ditches. These mostly arise from poor site practice so careful attention will be paid to the appropriate guidance and policies to reduce the potential for these to occur (refer to Chapter 11 (Geology, Hydrology & Hydrogeology)) for further details).

3.5.17 Any fuel or oil held on site will only be of an amount sufficient for the plant required. This will be stored in a bunded area to prevent pollution in the event of a spillage. There will be no long term storage of lubricants or petrochemical products on-site at the Proposed Development.

3.5.18 High standards of health and safety will be established and maintained. At all times, all activities will be undertaken in a manner compliant with applicable health and safety legislation and with relevant good practice as defined under applicable statutory approved codes of practice and guidance.

3.5.19 Further details of site specific storage and management of fuel and oil and protection of watercourses during construction is presented in Chapter 11 (Geology, Hydrology & Hydrogeology).

Construction Environmental Management Plan (CEMP)

3.5.20 As part of the construction contract, the Applicant will produce, and adhere to, a CEMP. The CEMP shall be developed in accordance with the joint Scottish Renewables, SNH, SEPA, Forestry Commission Scotland and Historic Environment Scotland guidance on Good Practice During Windfarm Construction (2019).

3.5.21 The CEMP shall describe how the Applicant will ensure suitable management of, but not limited to, the following environmental issues during construction of the Proposed Development:

- noise and vibration;
- dust and air pollution;
- surface and ground water;
- ecology (including protection of habitats and species);
- agriculture (including protection of livestock and land);
- cultural heritage;
- waste (construction and domestic);
- pollution incidence response (for both land and water); and
- site operations (including maintenance of the construction compound, working hours and safety of the public).

3.5.22 The Applicant shall provide the following for integration within the CEMP:

- details of the all the environmental mitigation which is described within this EIA Report (refer to Chapter 17 (Schedule of Environmental Commitments)) that is required during construction

of the Proposed Development, and of how the Applicant will implement this mitigation and monitor its implementation and effectiveness;

- details of how the Applicant will abide by the local and national legislative requirements e.g. The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (amended 2013);
- details of how the Applicant will implement and monitor construction best practice techniques e.g. the control of noise and dust;
- details of a Waste Management Plan which will include opportunities to reduce and re-use waste on site, recycling of waste which cannot be reused and disposal of waste to landfill; and
- details on how the Applicant will liaise with the public and local landowners and how they will respond to any queries and/or complaints.

3.5.23 The Applicant shall consult with SNH, SEPA, Historic Environment Scotland and OIC on the relevant aspects of the CEMP. The Applicant shall amend and update the CEMP as required throughout the construction and decommissioning period.

3.5.24 The CEMP shall, where applicable, cross-reference and correspond with the Construction Traffic Management Plan (CTMP). The CTMP will detail the management of traffic to and from site, including abnormal loads and daily workers commute. It shall also include mitigation for impacts to public transport, local private access and public foot paths. The Applicant shall amend and update the CTMP as required throughout the construction and decommissioning period.

3.5.25 Specific requirements of the CEMP for each of the environmental topics assessed in the EIA are provided in the relevant EIA Report chapters and an outline CEMP is provided in Appendix 3.2.

3.6 Operation and Maintenance

3.6.1 During operation, only site maintenance vehicles and local utility company vehicles will normally be required on the site. Up to two visits per week to the control building by maintenance personnel in four-wheel drive or conventional passenger vehicles will occur following the commissioning phase.

3.6.2 Any diesel or oil stored on-site will be held within an appropriately bunded location within the onsite substation building.

3.6.3 Health and safety will also be controlled as in the construction phase, as set out above in 3.5.17.

3.6.4 In the event that a major turbine component requires replacement, vehicles delivering the components will use the new access tracks and crane pads, utilising the same route as delivery of components during construction.

Operation Environmental Management Plan

3.6.5 The Applicant will implement an Operation Environmental Management Plan (OEMP). Similar to CEMP the OEMP will set out how the Applicant will manage and monitor environmental effects throughout operation. The OEMP will be developed in consultation with SNH, SEPA and OIC and will include but not be limited to:

- details on the track, water crossings and turbine maintenance;
- the control and monitoring of noise;
- the control and monitoring of surface and groundwater;
- a pollution prevention plan and a pollution incidence response plan;
- details of how the Applicant will abide by the local and national legislative requirements e.g. The Water Environment (Controlled Activities) (Scotland) Regulations 2011; and
- a Grazing Management Plan and relevant protected species management plans (if required).

3.7 Decommissioning

- 3.7.1 Should the Proposed Development be decommissioned it is expected that decommissioning would take approximately six months. The environmental effects of decommissioning are considered to be no greater than construction effects but experienced over a much shorter time period.
- 3.7.2 In the event of decommissioning, vehicles would access the site by the same routes used for delivery and construction.
- 3.7.3 Either the restored temporary construction compound would be re-established or a new construction compound would be developed as agreed with OIC at the appropriate time, to temporarily store decommissioned plant and equipment. The nacelles and blades would be removed using cranes situated on the crane pads as previously constructed. The towers would then be dismantled.
- 3.7.4 All components would be removed from the site for disposal and/or recycling as appropriate and in accordance with regulations in place at that time.
- 3.7.5 It is likely that exposed parts of the concrete foundations would be ground down to below 1 m below the surface and the remaining volume of the foundations would remain in situ. It is considered that leaving in situ will cause less environmental impact than that of complete removal.
- 3.7.6 Hardstandings will be removed and/or grassed over, however it is likely that the access junction and sections of access track may be left in situ to assist with agricultural access. The CEMP will be updated prior to decommissioning by the Principal Contractor to reflect current legislation and policy and will be agreed with OIC, SNH, SEPA and Historic Environment Scotland

3.8 References

Specification for Highway Works (2016). Volume 1, Series 0800: Road Pavements – Unbound, Cement and other Hydraulically Bound Mixtures. Available at:

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