

## 4. Project Description

### 4.1 Introduction

4.1.1 This chapter of the EIAR provides a description of the Proposed Development for the purposes of identifying and assessing the likely significant effects. Information is provided on:

- The location of the Proposed Development;
- The physical characteristics of the Proposed Development, including the land-use requirements during the construction and operational phases;
- The main characteristics of the construction and operational phase of the Proposed Development having regard to the type and quantity of expected residues and emissions; and
- Typical activities associated with the decommissioning of the Proposed Development.

4.1.2 This chapter is supported by the following Figures and Appendices listed in **Table 4.1** Supporting Figures and Technical Appendices

**Table 4.1 Supporting Figures and Technical Appendices**

| Document title                                      | Document Description                                                     |
|-----------------------------------------------------|--------------------------------------------------------------------------|
| <b>Figures</b>                                      |                                                                          |
| Figure 1.1 – Location Plan                          | Site location plan                                                       |
| Figure 1.2 – Site Plan                              | Site layout plan                                                         |
| Figure 4.1a – Turbine Parameters – 200m Tip Height  | Illustrates the indicative turbine model up to 200m tip height.          |
| Figure 4.1b – Turbine Parameters – 180m Tip Height  | Illustrates the indicative turbine model up to 180m tip height.          |
| Figure 4.2a – Typical Foundation Detail – Gravity   | Illustrates indicative gravity turbine foundation.                       |
| Figure 4.2b – Typical Foundation Detail - Piled     | Illustrates indicative piled turbine foundation.                         |
| Figure 4.3 – Permanent Met Mast Detail              | Illustrates indicative met mast dimensions.                              |
| Figure 4.4 – Typical Crane Pad Detail               | Illustrates indicative crane pad layout and dimensions                   |
| Figure 4.5 – Substation and Control Building Layout | Illustrates indicative substation and control building layout.           |
| Figure 4.6 – Typical Construction Compound Layout   | Illustrates indicative construction compound and battery storage layout. |
| Figure 4.7 – Typical Track Section                  | Illustrates indicative Battery Storage Layout                            |
| Figure 4.8 – Typical Floating Access Track Section  | Illustrates indicative road detail.                                      |

| Document title                                                                          | Document Description                                                                                                                                                                              |
|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Figure 4.9 – Typical Underground Cable Trench                                           | Illustrates indicative floating road detail.                                                                                                                                                      |
| Figure 4.10 – Battery Storage Facility Layout                                           | Illustrates indicative underground cable trench.                                                                                                                                                  |
| Figure 4.11 – Residential Receptors                                                     | Illustrates residential receptors proximity to the Development Site and MDA.                                                                                                                      |
| Figure 6.3a – Landscape Designations and Blade Tip Zone of Theoretical Visibility (ZTV) | This figure shows the designated landscapes relative to the blade tip ZTV for the Proposed Development.                                                                                           |
| Figure 7.3 - Designated Assets within 10 km                                             | This figure shows the location of designated heritage assets within 10 km of the Development Site.                                                                                                |
| Figure 8.1a – Statutory Designated Sites                                                | This figure shows the location of designated ecological sites within 10 km of the Development Site.                                                                                               |
| Figure 9.2 – Ornithological Designated Sites Within 20 km                               | This figure shows the location of designated ornithological sites within 20 km of the Development Site.                                                                                           |
| <b>Appendices</b>                                                                       |                                                                                                                                                                                                   |
| Appendix 4.1: Infrastructure and Telecommunications                                     | This provides detail on existing utility services in existence that the Proposed Development may interact with.                                                                                   |
| Appendix 4.2: Outline Construction Environmental Management Plan (oCEMP)                | This outlines the environmental management and construction methods to be employed during the construction of the Proposed Development.                                                           |
| Appendix 4.3: Forestry Assessment Report                                                | This sets out the forestry baseline, felling calculations and plans, as well as the compensatory replanting requirement in line with The Scottish Government's Control of Woodland Removal Policy |

## 4.2 The Development Site

4.2.1 The Development Site is located approximately 13 kilometres (km) northwest of Alness and 3.5 km north of Loch Morie. It includes three main areas:

- the land within which the turbines and battery storage will be sited, referred to as the Main Development Area (MDA);
- areas of land without infrastructure; and
- the Existing Forestry Access Track area (within which some development is also required), as illustrated in **Figure 1.2**.

- 4.2.2 The Development Site is approximately 2,558 hectares (ha) in size; however, the proposed MDA would occupy approximately 681 ha. The Existing Forestry Access Track is approximately 12 km long and will be upgraded as part of the Proposed Development.
- 4.2.3 The majority of the Development Site is open moorland; it includes areas of peatland site-wide and mountainous areas to the north. Elevations range across the Development Site from approximately 340 m above ordnance datum (AOD) to 838 m AOD at Carn Chuinneag, in the northwest.
- 4.2.4 The Development Site is located outside of national and international statutory designations for landscape and nature conservation. The following statutory designated sites are the closest to the Development Site (as shown in **Figures 6.3a, 8.1a and 9.2**):
- Special Areas of Conservation (SAC); the closest of which is Amat Wood SAC, located 3.27 km south at its closest point from the Development Site;
  - Sites of Special Scientific Interest (SSSI); the closest of which is Amat Wood SSSI, located 3.27 km south away at its closest point from the Development Site;
  - Special Protection Areas (SPA); the closest of which is Ben Wyvis SPA, located 8.45 km south at its closest point from the Development Site;
  - National Nature Reserves (NNR); the closest of which is Ben Wyvis NNR, located 8.45 km south at its closest point from the Development Site;
  - National Scenic Areas (NSA); the closest of which is the Dornoch Firth NSA, located 8.5 km northeast at its closest point from the Development Site; and the
  - Ramsar Sites; the closest of which is Cromarty Firth Ramsar, located 14.5 km southeast at its closest point from the Development Site.
- 4.2.5 A full description of these designations can be found in **Chapter 6: Landscape and Visual Assessment, Chapter 8: Ecology and Chapter 9: Ornithology**.
- 4.2.6 As shown in **Figure 6.3** (within **Chapter 6: Landscape and Visual Assessment**), a portion of the Development Site is located within the fringe of the Rhiddoroch - Beinn Dearg - Ben Wyvis Wild Land Area (WLA).
- 4.2.7 The residential receptors in close proximity to the Development Site are shown on **Figure 4.11**. The closest receptor to the MDA, Sonraichte, Kildermorie Estate, is located approximately 2.5 km from the MDA and 3 km to the southwest of the closest turbine (T11). There are two residential receptors within the southern extents of the Development Site, but outside of the MDA, at Inchlumpie. Scattered properties are located within the Strath Rusdale Valley, Kildermorie Estate and Diebidale River Valley.
- 4.2.8 Areas of category 2b long-established woodland (of plantation origin) (LEPO), as identified within the Ancient Woodland Inventory, are present within the Development Site boundary (along the Existing Forestry Access Track). These areas are predominantly planted with non-native species such as Norway spruce and Sitka spruce.

- 4.2.9 A Category A listed building, Ardross Castle, is located approximately 1.2 km southeast of the site entrance but approximately 10 km from the MDA. Within the Ardross Castle Estate there are several Category A Listed buildings, as well as the castle itself. The estate grounds are designated as a Garden and Designed Landscape as shown on **Figure 7.3** and detailed in **Chapter 7: Cultural Heritage**.
- 4.2.10 As detailed in **Appendix 4.1: Infrastructure and Telecommunications (Figure 4.1.1)**, the following infrastructure assets have been identified within the Development Site crossing the Existing Forestry Access Track:
- Scottish & Southern Electricity Networks (SEN) – Fibreoptic cables, 33kV buried cables and 11kV overhead lines have been identified at the southern end of the track; and
  - BT Open Reach – Communication cables have been identified crossing the access road near to Loch Bad a'Bhathaich, and at the southern end of the track.
- 4.2.11 An assessment of the potential impacts of the Proposed Development on utilities and telecommunications infrastructure is provided in **Appendix 4.1**. The assessment concludes that while utilities infrastructure assets have been identified within the Development Site along the Existing Forestry Access Track, there are no anticipated impacts on these assets from the Proposed Development.

## 4.3 Sustainable Design

- 4.3.1 The Highland Council's Sustainable Design Guide Supplementary Guidance (The Highland Council, 2013) provides advice and guidance on a range of sustainability topics, including design, building materials, and reducing the environmental impacts of development. This document has been considered throughout the design of the Proposed Development and is discussed in detail in the supporting Design and Access Statement.

## 4.4 The Proposed Development

- 4.4.1 The Proposed Development would comprise of up to 13 wind turbines and a battery energy storage system along with associated infrastructure and ancillary development, as illustrated in **Figure 1.2: The Proposed Development** is described in greater detail in the remainder of this chapter.
- 4.4.2 Overall, the Proposed Development would include the following key components:
- Up to 13 wind turbines consisting of 9 turbines with ground to tip heights up to 200m and 4 turbines with ground to tip heights up to 180m;
  - Turbine foundations and associated crane pads and blade laydown areas;
  - On-site access tracks (floating and excavated), passing places and turning heads;
  - Temporary construction compounds;

- A temporary concrete batching plant area, located within a temporary construction compound;
- Control building and electrical substation;
- A Battery Energy Storage System (BESS);
- Underground cabling linking the turbines and BESS with the on-site substation;
- A permanent anemometer mast including associated foundations and hardstanding;
- New and upgraded watercourse crossings (including the potential replacement or bypassing of two existing single-span bridges along the Existing Forestry Access Track)
- Upgrade, widening and localised realignments of the Existing Forestry Access Track;
- Borrow pit(s) search areas;
- Habitat Management Areas (including areas of peatland restoration);
- Aviation lighting; and
- Micrositing allowance for all proposed structures and infrastructure of up to 100 m.

4.4.3 The Proposed Development would have an operational life of 40 years.

4.4.4 Further details of the Proposed Development, including indicative dimensions, are provided in **Table 4.2** Overview of Proposed Development.

**Table 4.2 Overview of Proposed Development**

| Elements                                                                       | Proposed Development* **                                                                                                                                                               |
|--------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No. of Turbines                                                                | 13                                                                                                                                                                                     |
| Turbine Locations                                                              | Refer to <b>Table 4.3</b> Turbine Locations                                                                                                                                            |
| Maximum Tip Height                                                             | 4 x 180 m (T7, T11, T12 & T13)<br>9 x 200 m (T1, T2, T3, T4, T5, T6, T8, T9 & T10)                                                                                                     |
| Operational Lifetime                                                           | 40 years                                                                                                                                                                               |
| New permanent access track (within the MDA) ('MDA Access Track')               | 17.5 km of new access track (of which 7.2 km of floating track in areas of peat)<br>Typical running width 5 m with 2.5 m shoulder either side<br>Passing places 90 m x 6 m             |
| Upgrades to Existing Forestry Access Track                                     | 12 km                                                                                                                                                                                  |
| Turbine Foundations and Hardstandings (including crane pads and laydown areas) | Footprint per Turbine: 24 m diameter (452 m <sup>2</sup> ) to a depth of 3.5 m<br>Total crane pad footprint: 4,072 m <sup>2</sup><br>Blade laydown: 2,024 m <sup>2</sup> (23 m x 88 m) |
| Control Building and Substation                                                | Total Number: 1<br>Location centred on NH 53470 82170<br>Compound dimensions: 120 m x 50 m (6,000 m <sup>2</sup> )<br>Control Building and substation height: up to 10 m               |

| Elements                                                                             | Proposed Development* **                                                                                                                                                                                                                                                                                                               |
|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Met Mast                                                                             | Total Number: 1<br>Location centred on NH 50203 82547<br>Met Mast Height: Up to 125 m<br>Foundation dimensions: 20 m x 25.5 m (510 m <sup>2</sup> )                                                                                                                                                                                    |
| Construction Compounds                                                               | Total Number: 5<br>Refer to <b>Table 4.5</b> Temporary Construction Compounds for locations and indicative dimensions                                                                                                                                                                                                                  |
| BESS compound                                                                        | Capacity: up to 80 megawatts (MW) / 320 MWh<br>Compound dimension: 80 m x 165 m (13200 m <sup>2</sup> )<br>Up to 104 Battery units (3 m x 8 m)<br>Up to 26 Inverter units (3 m x 8 m)                                                                                                                                                  |
| Borrow Pit Search Areas                                                              | Total Number: 8<br>Refer to <b>Table 4.4</b> Borrow Pit Search Areas for locations and indicative dimensions.                                                                                                                                                                                                                          |
| Aviation Lighting                                                                    | Reduced lighting scheme agreed with the aviation stakeholders.<br>This is based on the installation of visible 2000 candela lights (dimnable to 200 candela in good visibility conditions) on the nacelle of five of the wind turbines (T5, T6, T9, T12 & T13) along with infrared lights on all turbines (see <b>Appendix 12.1</b> ). |
| * microsites allowance of up to 100 m for all proposed structures and infrastructure |                                                                                                                                                                                                                                                                                                                                        |
| ** All measures are approximate                                                      |                                                                                                                                                                                                                                                                                                                                        |

## Wind Turbines

- 4.4.5 The Proposed Development will comprise of up to 13 turbines as illustrated in **Figure 1.2**. The indicative easting and northing coordinates for each turbine location are set out in **Table 4.3** Turbine Locations.
- 4.4.6 The turbine will comprise a tapered tubular steel tower and nacelle, containing the generator and associated equipment. These are attached to a hub and rotor assembly including three turbine blades. **Figure 4.1a** and **Figure 4.1b** provide illustrations of the indicative turbine model for a 200 m and 180 m tip height respectively. Turbines will be finished in a semi-matt grey colour.
- 4.4.7 Wind turbine technology is continually evolving with more productive and efficient designs coming on to the marketplace each year. It is expected that the output per turbine will be up to 7 MW. On this basis the current expectation is that the total generating capacity of the Proposed Development will be up to 79.2 MW but may be more.
- 4.4.8 The final turbine model for the Proposed Development has not yet been chosen, however suitable indicative machines which could be accommodated within the maximum tip height of 200 m (and up to 180 m tip for T7, T11, T12 & T13) are currently being considered. Refer to **Figure 4.1a** and **Figure 4.1b** for indicative details.

**Table 4.3 Turbine Locations**

| Turbine No. | Proposed Development |          | Maximum Tip Height (m) |
|-------------|----------------------|----------|------------------------|
|             | Easting              | Northing |                        |
| 1           | 253215               | 881758   | 200                    |
| 2           | 252625               | 881995   | 200                    |
| 3           | 251887               | 882585   | 200                    |
| 4           | 251480               | 882937   | 200                    |
| 5           | 250993               | 883296   | 200                    |
| 6           | 249914               | 883105   | 200                    |
| 7           | 250332               | 882853   | 180                    |
| 8           | 251170               | 882257   | 200                    |
| 9           | 252039               | 882159   | 200                    |
| 10          | 252532               | 881499   | 200                    |
| 11          | 252828               | 881106   | 180                    |
| 12          | 253602               | 881425   | 180                    |
| 13          | 253438               | 880925   | 180                    |

- 4.4.9 The locations of the turbines and other infrastructure would be subject to ‘micrositing.’ This process allows for minor changes in turbine or infrastructure locations to respond to possible variations in ground conditions across the Development Site, which would only be confirmed following detailed ground investigation (GI) work to be conducted prior to construction. This process also provides scope for further mitigation of localised potential environmental effects through avoidance of sensitive features (e.g. deep peat). It is anticipated that the proposed micrositing distance of 100 m for the proposed turbines and all other site infrastructure would form a condition accompanying any consent. Any repositioning would be conducted under the supervision of an Ecological Clerk of Works (ECoW) and an appropriately experienced and qualified engineering geologist/geotechnical engineer.

## Turbine Foundations

- 4.4.10 The turbines will be constructed on reinforced concrete foundations, established on suitable competent soil or bedrock (following excavation). Depending on localised ground conditions, piling may be required. The exact specification of the turbine foundations will be subject to detailed design and the results of intrusive GI which would be undertaken following the award of consent for the Proposed Development, if granted.
- 4.4.11 In terms of land-take, gravity foundations are considered to have the larger impact when compared to the piled solution (hence these have been assumed for the purpose of the EIA assessment). For the gravity foundations, each foundation will require approximately 1,487.5 cubic metres (m<sup>3</sup>) of concrete and will have a surface footprint of up to 452 m<sup>3</sup> (24 m diameter).

**Figure 4.2a** provides an illustration of a typical gravity foundation design, meanwhile **Figure 4.2b** provides an illustration of a typical pile turbine foundation design.

## Turbine Transformers

- 4.4.12 At each turbine, a transformer will be required. It is expected that the transformer could be located either within or outwith the turbine tower, subject to final candidate turbine. Refer to **Figure 4.1a** and **Figure 4.1b** for indicative details.

## Turbine Laydown Areas

- 4.4.13 Each turbine location requires that a hardstanding (crane pad) of approximate total area 4,075 m<sup>2</sup> be installed adjacent to the turbine. The hardstanding is required to accommodate a suitable crane for the erection of the turbine, alongside a storage area for the turbine blades. These crane pads provide a stable base on which to locate the turbine components and installation equipment. The crane pad will be made up of a layer of geo-textile or geo-synthetic material overlain with compacted aggregate material. The exact dimensions, number of pads and specification of the crane pads will be subject to detailed design following granting of consent for the Proposed Development. A typical crane pad detail, for the indicative turbine, is provided in **Figure 4.4**.
- 4.4.14 The crane pads will be left in-situ following construction. This will allow for their use should major components need to be replaced during the operational life of the Proposed Development as well as for use during decommissioning at the end of the operational life.

## Development Site Access Formation

### Existing Forestry Access Track Upgrades

- 4.4.15 There is an Existing Forestry Access Track owned by Forestry Land Scotland which would be used to provide access to the Development Site. The Existing Forest Access Track is approximately 12 km long and connects to the U1907 (Strathrusdale Road).
- 4.4.16 The layout has been designed to use the Existing Forestry Access Track owned by Forestry Land Scotland as far as practicable thus reducing the need to form new tracks and reducing the overall permanent footprint of the Proposed Development.
- 4.4.17 Widening and upgrades works will be required along the Existing Forestry Access Track to accommodate Heavy Good Vehicles (HGV) loads and the movement and parking of abnormal indivisible loads (AILs) during the construction phase. The extent of the Existing Forestry Access Track can be seen in **Figure 1.2**.
- 4.4.18 Road design specification will be identified following the completion of a GI exercise at a later stage of the project.

## MDA Access Tracks

- 4.4.19 The Existing Forestry Access Track terminates at the boundary of the MDA. From this boundary new access track will be provided to allow access on site access within the MDA.
- 4.4.20 The MDA Access track is illustrated in **Figure 1.2**. The layout has been largely influenced by ground conditions (e.g. peat depths) and topography with floating tracks provided to minimise impacts on peat.
- 4.4.21 It is proposed to construct approximately 17.5 km (including 7.2 km of floating track and 10.3 km of excavated track) of MDA Access Tracks to provide permanent access to turbine locations and other associated infrastructure across the Development Site. In addition to the MDA Access Tracks, approximately 12 km of Existing Forestry Access Track will be upgraded. The access tracks will be finished with crushed stone (Type 1 material or similar) and have a running width of approximately 5 m on straight sections and up to 10 m through bends. Passing places measuring approximately 90 m x 6 m are proposed at regular intervals across the Development Site.
- 4.4.22 The MDA Access Tracks have been designed to avoid areas of deeper peat as well as reduce the impacts on watercourses by reducing the number of crossings required. A 100 m micro-siting tolerance is proposed for these tracks, to accommodate unforeseen ground conditions and ensure flexibility in the detailed design phase post-consent.
- 4.4.23 MDA Access Tracks will be either traditional 'cut' access tracks (refer to **Figure 4.7**) or floating tracks (refer to **Figure 4.8**) construction, depending on the local ground conditions. Cut tracks would involve a surface vegetation 'strip,' removal of topsoil and excavation to a suitable base upon which the access track will be constructed. Floating access tracks would be constructed in accordance with best practice whereby surface vegetation will be stripped and peat will be left in-situ. Layers of geogrid will be installed directly on the peat surface followed by crushed and compacted rock. Depending on the in-situ ground conditions, multiple layers of geogrid may be required to establish the finished floating road.
- 4.4.24 Construction of the MDA Access Tracks (5 m running width with a 2.5 m shoulder either side) and associated underground cabling works will occur within an approximate 25 m wide corridor. Following completion of construction, disturbed land adjacent to the access tracks will be reinstated.
- 4.4.25 Road design specification will be identified following the completion of a GI exercise at a later stage of the project.

## Watercourse Crossings

- 4.4.26 The layout of the access tracks has been developed to reduce the number of new watercourses crossing required. A total of 32 crossings would be utilised, of which 15 would be new crossings and 17 existing. All watercourse crossings will consider the guidance contained within 'Engineering in the Water Environment Good Practice Guide - River

Crossings: Second Edition' (Scottish Environment Protection Agency: SEPA, 2010), 'River Crossings and Migratory Fish: Design Guidance' (Scottish Executive, 2012) and the 'The UK Forestry Standard, The government's approach to sustainable forestry (Forestry Commission, 2017).

- 4.4.27 As set out in the CAR Regulations, where existing crossings are not suitable for use, any upgrades will be undertaken to provide betterment to the water environment.
- 4.4.28 All crossings will be designed to accommodate 1 in 200-year peak flows (including climate change allowance) in order to reduce the risk of flooding. The exact specifications of the watercourse crossings will be subject to detailed design following granting of consent. The final watercourse crossing designs will be compliant with the SEPA Guidelines and agreed with FLS.
- 4.4.29 The location of the proposed water crossings is illustrated in **Figure 1.2**. Further details of the watercourse crossings are included in **Chapter 13: Geology, Hydrology, Hydrogeology and Peat** and **Appendix 13.1**.

## Drainage and Flooding

- 4.4.30 The detailed drainage design for the Proposed Development will be developed following consent, if granted; however, for the purposes of the EIA, the basic principles with which the Proposed Development must comply have been identified. The drainage system will be based on Sustainable Urban Drainage (SuDS) principles and will be developed in accordance with the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) (known as "CAR").
- 4.4.31 Drainage will comprise a combination of drainage ditches, located either side of access tracks, as well as cross drains at regular intervals. The running surface of the access tracks will be gently cambered or have a cross fall to provide some permeability in order to prevent the build-up of large volumes of water. Drainage ditches will be appropriately sized and vegetated in order to accommodate peak runoff volumes. Cross drains will be located at regular intervals to reduce the flow from each pipe crossing and reduce erosion at the outfall. Further details are provided in **Chapter 13: Geology, Hydrology, Hydrogeology and Peat**.

## Borrow Pits

- 4.4.32 An estimated 165,000 m<sup>3</sup> of stone aggregate material will be required for the construction of the Proposed Development.
- 4.4.33 It is anticipated that up to eight temporary borrow pits (BP) can be developed within the Development Site to source the aggregate material. The proposed locations of the 8 borrow pit search areas are shown in **Figure 1.2** and details of each of the BP search areas are provided in **Table 4.4**.

- 4.4.34 The BP search areas will be subject to detailed GI and the exact design of the BPs determined following award of consent for the Proposed Development. A 100 m micro-siting tolerance has been proposed, to allow for unforeseen ground conditions.
- 4.4.35 Following the completion of construction activities, the BPs will be reinstated using excess spoil generated during the works and with peat, as set out in **Appendix 13.4: Outline Peat Management Plan**.

**Table 4.4 Borrow Pit Search Areas**

| BP No. | Coordinates |          | Length (m) | Width (m) | Depth (m) |
|--------|-------------|----------|------------|-----------|-----------|
|        | Easting     | Northing |            |           |           |
| 1      | 254475.3    | 878322.7 | 270        | 210       | 3         |
| 2      | 252904      | 882706.8 | 200        | 200       | 3         |
| 3      | 252148.2    | 882444.9 | 100        | 100       | 3         |
| 4      | 251198.2    | 883160.9 | 50         | 50        | 3         |
| 5      | 250206.1    | 883448.5 | 100        | 100       | 3         |
| 6      | 249887.7    | 883057.1 | 50         | 50        | 3         |
| 7      | 252714.7    | 881010.5 | 100        | 100       | 3         |
| 8      | 253363      | 881015.1 | 100        | 100       | 3         |

## Control Building and Substation Compound

- 4.4.36 A control building and substation compound will be constructed within the Development Site. The compound will accommodate plant and equipment (including external high-voltage switchgear), as well as Supervisory Control and Data Acquisition (SCADA) plant and equipment that will allow local control of the Proposed Development. The compound will also accommodate welfare / office facilities and parking for operational use. The footprint of the compound containing the building and substation will be approximately 120 m x 50 m (6,000 m<sup>2</sup>). The height of the control building / substation structure would be up to 10 m. **Figure 4.5** provides an indicative layout for the control building and substation compound.
- 4.4.37 The control building and substation will be subject to detailed design, following award of consent. Buildings will be developed to integrate with their surroundings and constructed in the local vernacular. It should be noted that, subject to detailed electrical design, certain equipment such as high voltage equipment may be located externally but within a secure compound.

## Battery Energy Storage System (BESS)

- 4.4.38 The BESS facility will utilise the area of a borrow pit (BP2) so as to reduce the land take of the Proposed Development. The footprint of the facility is approximately 165 m x 80 m (13,200 m<sup>2</sup>), which it is anticipated to accommodate a facility with a storage capacity of up to 80MW /

320MWh and would include approximately 92 BESS container units and 23 inverter skids. **Figure 4.10** shows an indicative design for the facility.

- 4.4.39 Each battery container is equipped with an independent fire detection and suppression system designed in accordance with IEC 62933 standards<sup>1</sup>. The suppression system typically utilises agents such as Novec gas or aerosol-based compounds, selected to ensure effective mitigation of thermal events. The container design and are fully compliant with NFPA 855<sup>2</sup> requirements (certificated) and have successfully passed large-scale fire testing in accordance with the UL 9540 <sup>3</sup>standard.

## On-Site Cabling

- 4.4.40 Underground electrical cables will connect the turbines to the on-site substation, which in turn will be connected to the electricity transmission / distribution network. The underground cables will be laid in trenches approximately 1 m in width and 1.2 m in depth, following the MDA Access Tracks. The cable trenches will be backfilled with excavated material and the ground surface reinstated. **Figure 4.9** shows an indicative cable trench for the Proposed Development. Exact dimensions are to be confirmed following detailed design. At this stage one cable is advised per trench at 1 m wide. The final width of the trench with multiple cable will depend on a number of factors such as the thermal rating of the cable and the ground conditions.
- 4.4.41 The position of underground cables will be marked with permanent posts, to ensure safety of future forestry operations and permanent crossing points for forestry machinery will be provided over the underground cables at appropriate access points, as required.
- 4.4.42 The onsite cabling between the turbines and the site substation would have no interaction with existing utilities which are located south of the MDA.

## Meteorological Mast

- 4.4.43 A permanent met mast will be installed with a 100 m micro-siting tolerance. The mast will be erected to assist with the performance monitoring of the wind turbines and to collect meteorological data. The mast will be up to 125 m high, comprising of a steel lattice structure fixed by guywires, with monitoring and recording equipment attached. The mast will be constructed on a reinforced concrete foundation, the dimensions of which would be approximately 20 m x 25.5 m x 3 m (L x W x D), in order to ensure that the mast withstands severe weather conditions. The location of the met mast is shown in **Figure 1.2** and a typical detail is shown in **Figure 4.3**.

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<sup>1</sup> IEC62933-5-2:2020-Safety requirements for grid-integrated ESS systems-Electrochemical-based systems & IEC62933-5-3:2023-Safety requirements for grid integrated EES systems – Test methods for fire propagation.

<sup>2</sup> NFPA 855:2023-Standard for the Installation of Stationary Energy Storage Systems,

<sup>3</sup> UL 9540:2023-Standard for Energy Storage Systems and Equipment

## Temporary Construction Compounds

4.4.44 During the construction period, there will be a requirement for a number of temporary construction facilities, including:

- Site offices;
- Staff welfare;
- Concrete batching;
- Security Office;
- Storage and laydown areas for construction plant, and excavated material; and,
- Appropriately bunded areas for the storage of oils and fuels.

4.4.45 Five temporary construction compounds are proposed for the Proposed Development, two of which are located along the Existing Forestry Access Track, and three of which are located within the MDA, as set out in **Table 4.5** Temporary Construction Compounds, along with indicative dimensions, and shown in **Figure 1.2**. The compounds will accommodate the facilities described above, as well as providing sufficient parking for the contractor's workforce, deliveries, and visitors. The temporary compounds will be made up of compacted aggregate material atop geotextiles or geosynthetic materials, depending on in-situ ground conditions.

**Table 4.5 Temporary Construction Compounds**

| Temporary<br>Construction<br>Compound No. | Coordinates |          | Indicative<br>Length (m) | Indicative<br>Width (m) | Surface Area<br>(m <sup>2</sup> ) |
|-------------------------------------------|-------------|----------|--------------------------|-------------------------|-----------------------------------|
|                                           | Easting     | Northing |                          |                         |                                   |
| 1                                         | 260007.8    | 874723.9 | 50                       | 25                      | 1,250                             |
| 2                                         | 257072.7    | 876326.3 | 120                      | 50                      | 6,000                             |
| 3                                         | 252279.5    | 882429.9 | 150                      | 50                      | 7,500                             |
| 4                                         | 250441.0    | 883386.6 | 60                       | 50                      | 3,000                             |
| 5                                         | 252118.4    | 882058.7 | 70                       | 50                      | 3,500                             |

4.4.46 Areas of the compound which are considered to present an increased pollution risk, such as fuelling or oil storage areas, shall be bunded and site drainage directed towards an isolated holding tank for treatment and disposal. Drainage from low pollution risk areas, such as site offices, will be directed towards a settlement pond. Foul effluent generated from temporary toilet facilities would be treated either by septic tank with soakaway or by the use of self-contained chemical facilities which would be periodically removed for off-site disposal.

4.4.47 The exact make up, layout and dimensions of the temporary compounds will be finalised following award of consent, if granted, and appointment of a contractor. Due to the remote nature of the Proposed Development, a small diesel generator will be used as the power source at the temporary construction compounds.

- 4.4.48 The temporary construction compounds will be contained within a secure fenced area. Temporary palisade fencing or similar will be located around each compound to provide security. At night and during periods of darkness, security lighting will be used, where necessary and as agreed with the Ecological Clerk of Works (ECoW). Security lighting would be directional to avoid visual impacts and disruption to wildlife.
- 4.4.49 The construction compounds will be removed and the land reinstated at the end of the construction period.
- 4.4.50 The location of construction compounds are shown in **Figure 1.2** and a typical detail is shown in **Figure 4.6**.

## Water Requirements

- 4.4.51 During construction, potable water will be delivered to the Site for drinking and sanitation needs or extracted on-site via borehole (subject to appropriate permissions).
- 4.4.52 During operations, rainwater harvesting systems will supply water for waste management and sanitary facilities, reducing reliance on external water sources.

## Permanent and Temporary Land Take

- 4.4.53 The Proposed Development would require permanent use of 1% of the total Development Site area (25.26 ha out of a total of 2,567 ha). In addition to the permanent land take, approximately 18.9 ha (0.7%) of land would be required temporarily for the construction of the Proposed Development and would be reinstated upon completion of the construction phase.
- 4.4.54 **Table 4.6** sets out the approximate temporary land take during construction and the permanent land use associated with each element of the Proposed Development.

**Table 4.6 Approximate Land Take**

| Wind Farm Element                                                                                                                               | Temporary Land Take<br>(m <sup>2</sup> ) | Permanent Land Take<br>(m <sup>2</sup> ) |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|------------------------------------------|
| Turbine Foundations                                                                                                                             | 3,840                                    | 3,840                                    |
| Hardstandings including permanent main crane pads, temporary auxiliary crane pads, temporary crane boom pads and temporary blade laydown areas. | 89,350                                   | 48,290                                   |
| MDA Access tracks – new (floating and excavated)                                                                                                | 112,040                                  | 112,040                                  |
| Existing Forestry Access Tracks – upgrade                                                                                                       | 55,460                                   | 55,460                                   |
| Met Mast                                                                                                                                        | 630                                      | 630                                      |
| Control & Substation Building                                                                                                                   | 6,000                                    | 6,000                                    |

| Wind Farm Element                                                                                                                                                                                                                                                                                                                                                                                           | Temporary Land Take (m <sup>2</sup> ) | Permanent Land Take (m <sup>2</sup> ) |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|---------------------------------------|
| Temporary Construction Compounds                                                                                                                                                                                                                                                                                                                                                                            | 20,240                                | -                                     |
| Cabling                                                                                                                                                                                                                                                                                                                                                                                                     | 13,130                                | 13,130                                |
| Borrow Pits                                                                                                                                                                                                                                                                                                                                                                                                 | 119,630                               | -                                     |
| BESS                                                                                                                                                                                                                                                                                                                                                                                                        | 13,200                                | 13,200                                |
| Total Land Take                                                                                                                                                                                                                                                                                                                                                                                             | 433,520                               | 252,590                               |
| Total area of main site boundary                                                                                                                                                                                                                                                                                                                                                                            | 25,678,320                            |                                       |
| % of Permanent Development Site Area                                                                                                                                                                                                                                                                                                                                                                        |                                       | 0.99%                                 |
| Notes                                                                                                                                                                                                                                                                                                                                                                                                       |                                       |                                       |
| <ul style="list-style-type: none"> <li>• Values rounded to the nearest 10 m<sup>2</sup></li> <li>• The Permanent Land Take consists of the permanent infrastructure that will be in place following the completion of construction.</li> <li>• The Temporary Land Take consists of the permanent infrastructure and all temporary infrastructure required to construct the Proposed Development.</li> </ul> |                                       |                                       |

## Connection to the Electricity Grid

- 4.4.55 A connection to the electricity distribution system will be required which will connect into Fyrish Substation. This does not form part of the Proposed Development and is not the subject of the current application to which this EIAR relates. This will be developed by Scottish and Southern Electricity Network (SSEN) who are the regional Transmission Network Operator. It is anticipated that the grid connection would be a separate application made by SSEN.

## 4.5 Construction Programme

- 4.5.1 The construction of the Proposed Development is expected to be undertaken over a period of 24 months, subject to the consent and subsequent award of construction contract.
- 4.5.2 Construction will include the typical activities shown in the list below and contained in **Table 4.7** Indicative Construction Programme. It should be noted that a number of activities will be undertaken simultaneously. The sequence of activities include:
- **Formation of temporary construction compounds:** Establishment of temporary facilities including the site offices, welfare facilities, lay down and storage areas, concrete batching plants, development of electricity and water supplies and erection of site signage, security fencing or hoarding, as required;
  - **Creation of temporary quarries:** Opening of temporary borrow pits for the extraction and processing of aggregate for the construction of the Proposed Development.
  - **Upgrade of Existing Forestry Access Track:** Upgrading of the existing forestry track, including localised realignments and junction with the Ardross Road;

- **Formation of new MDA Access Tracks:** creation of tracks connecting the infrastructure within the MDA;
- **Forestry Removal:** Removal and/or clear felling of forestry to allow widening of Existing Forestry Access Tracks and create areas for other associated infrastructure;
- **Excavations for turbine foundations:** Excavations for turbine foundations by mechanical plant;
- **Construction of turbine foundations:** Construction of turbine foundations will involve a combination of concrete and steel;
- **Construction of hardstanding / crane pads:** Formation of crane pads and laydown areas adjacent to each turbine location;
- **Construction of control building and substation:** Construction of buildings to house specialist electrical and control equipment, including delivery and installation of HV equipment;
- **Construction of BESS (including foundations):** Delivery and installation of BESS units along with construction of BESS unit foundations;
- **Underground cable laying:** Installation of underground cabling between turbine locations and the substation compound and control building;
- **Turbine delivery and erection:** Delivery of all turbine components to the Development Site and erection of turbines. Typically, turbine erection will take 3-5 days per turbine; and
- **Commissioning and site reinstatement:** Testing and commissioning of turbines, substation and control building, BESS and electrical equipment (e.g. cables etc.), as well as reinstatement including removal of temporary infrastructure and facilities, landscaping and habitat restoration, where applicable.

4.5.3 Ahead of construction pre-construction surveys required to be undertaken in advance of construction and to inform detailed design, these will include for example GI (trial pits and bore holes), topographic surveys, etc.

Table 4.7 Indicative Construction Programme

| Activity                                           | Month |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|----------------------------------------------------|-------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
|                                                    | 1     | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| Civil Construction                                 |       |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Formation of temporary construction compounds      |       |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Creation of small temporary quarries               |       |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Upgrade of Existing Forestry Access Track          |       |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Upgrade and formation of the new MDA Access Tracks |       |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Forestry removal                                   |       |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Excavations for turbine foundations                |       |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Construction of turbine foundations                |       |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Construction of hardstandings / crane pads         |       |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Construction of substation and control building    |       |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Electrical Construction                            |       |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Underground cable laying                           |       |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Installation of switchgear and transformers        |       |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Turbine Erection                                   |       |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Turbine delivery and erection                      |       |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Battery Storage                                    |       |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Enabling works                                     |       |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Battery Installation                               |       |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Battery Commissioning                              |       |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Commissioning and site reinstatement               |       |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Commissioning and site reinstatement               |       |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |

## 4.6 Construction Activities

### Construction Access

#### Construction Access Routes

- 4.6.1 During the construction period, a range of vehicles will be accessing the Development Site, including flat-bed trucks, HGVs and Abnormal Indivisible Loads (AILs) delivering aggregates and plant (such as excavators, bulldozers, and cranes etc.), as well as smaller cars and vans associated with construction staff movement.
- 4.6.2 Access to the Development Site throughout the construction period would be via the Existing Forestry Access Track. The existing access junction will be upgraded to allow for construction vehicles to access the Development Site.
- 4.6.3 As shown in **Figure 11.5**, loads relating to the turbine components would be delivered from the Port of Nigg, utilising sections of proven AIL routes used during the construction of other wind farms in the area. There will be a requirement for different turbine components to utilise different routes when exiting the A9 and travelling through to the Development Site, which are detailed below:
- Blade Route

Loads would depart the Port of Nigg, join the A9 heading south-west, then cross Alness at the Millennium garden and join the Ardross Road / B9176 Junction, before continuing westbound on the U1907 toward the Development Site access junction.
  - Tower Loads and other components Route

Loads would depart the Port of Nigg, join the A9 heading south-west and exit at the B9176 Junction heading north-east. Loads would continue westbound on the U1907 toward the Development Site access junction.
- 4.6.4 Throughout the construction phase, deliveries will be made to the Development Site by HGV.

#### Construction Traffic Management Plan

- 4.6.5 A Construction Traffic Management Plan (CTMP) will be prepared and developed in consultation with The Highland Council (THC) following award of consent. This will set out all traffic management procedures, including programme, vehicle movements on and offsite, stacking areas and diversions. The CTMP will be developed in consultation with FLS to ensure that it takes account of the cumulative impact of planned felling, harvesting, or re-planting within their forestry land and any vehicle movements associated with these activities.

#### Construction Traffic Programme

- 4.6.6 During the 24-month construction phase, the following traffic will require access to the Development Site:
- Staff transport, in either cars or staff minibuses;

- Construction equipment and materials, deliveries of machinery and supplies such as concrete materials and aggregates;
- Components relating to the substation, BESS and associated infrastructure;
- AILs consisting of the wind turbine sections and heavy lift cranes; and
- Escort vehicles for AIL deliveries.

4.6.7 The peak of construction occurs in month 11 and month 12 when there will be a total of 3,952 vehicle movements per month, which equates to approximately 182 vehicle movements per day, comprising 138 two-way HGV movements and 44 car / LGV movements.

4.6.8 This would equate to approximately 15 two-way total movements or approximately 12 two-way HGV movements per hour, across a typical 12-hour day, assuming a flat traffic profile, where traffic arrived and departed the site equally throughout the working day.

### Off Site Work - Blade Transfer Area

4.6.9 Two off-site areas for the transfer of blades may be required to transfer the blades from a long trailer to a specialized blade transporter (and vice versa) to ensure delivery of blades to the Development Site.

4.6.10 The area of land required will need to be circa 200 m x 60 m and will need to include two access junctions and two crane pads. Storage for up to six blades should also be available with all infrastructure designed in accordance with turbine supplier standards.

4.6.11 The location of the blade transfer areas is not yet known and would be subject to a separate planning consent.

### Other Off-Site Works

4.6.12 Other minor offsite works would be required for the AIL delivery, this include installation of load bearing surfaces, removal of street furniture, etc.

### Hours of Work

4.6.13 The normal working hours would be as follows:

- Monday – Friday 0700 – 1900; and
- Saturday 0700 – 1600.

4.6.14 No construction working will be undertaken on Sundays or public holidays without prior written approval from the Planning Authority. Out of hour deliveries may be required during the main construction period.

4.6.15 Maintenance works, emergency works and construction works outwith these specified hours will be limited to concrete pours, wind turbine erection, dust suppression, and the testing and commissioning of plant and equipment, unless otherwise approved in advance in writing by the Planning Authority.

4.6.16 Heavy Goods Vehicles (HGVs) are permitted as follows:

- Monday – Friday 0700 – 1900; and
- Saturday 0700 – 1600.

4.6.17 Outwith these hours, HGV movements are to be limited to wind turbine delivery, unless otherwise approved in advance in writing by the Planning Authority.

4.6.18 Any other out-of-hours deliveries would be subject to prior agreement with THC. The requirement for out-of-hours work could arise, for example, from delivery and unloading of abnormal loads or health and safety requirements, or to ensure optimal use is made of fair weather windows for the erection of turbine blades and the erection and dismantling of cranes.

## Site Construction Environmental Management

4.6.19 During construction, all site contractors will be required to operate under a detailed site-specific Construction Environmental Management Plan (CEMP). The CEMP will be prepared and agreed with THC prior to commencement of construction. Refer to the Outline Construction Environmental Management Plan (oCEMP) provided in **Appendix 4.2**.

4.6.20 The CEMP will implement all of the committed mitigation measures identified for the construction period within this EIAR as well as any additional construction mitigation required by planning conditions. The CEMP will set out a variety of control measures for managing the potential environmental effects of construction works including control and management of noise, dust, water runoff, access, emergency response, material management and construction traffic. It will draw upon wind farm and general construction good practice, taking into account the guidance contained within, but not limited to, the following good practice guidance documents:

- CAR a Practical Guide SEPA, 2025) and the requirement for a Construction Site Licence (SEPA, 2021) (and Pollution Prevention Plan);
- Forestry Commission (2017). 'The UK Forestry Standard: The governments' approach to sustainable forestry, 4th Edition. Forestry Commission' (Service.gov, 2025);
- NatureScot (2019) 'Good Practice During Wind Farm Construction', a joint publication by Scottish Renewables, NatureScot, SEPA, Forestry Commission Scotland and Historic Environment Scotland, Marine Scotland Science, 4th Edition (NatureScot, 2024);
- SEPA, Pollution Prevention Guidelines (PPG) and Guidance for Pollution Prevention (GPP) (NatRegs, 2025);
- CIRIA Publications including CIRIA C768 (Guidance on the construction of SuDS), CIRIA C753 (The SuDS Manual) (Susdrain, 2025), CIRIA 786 (Culverts, screen, and outfall manual); and
- NatureScot (2015) 'Constructed Tracks in the Scottish Uplands', 2nd Edition (NatureScot, 2025).

- 4.6.21 Should water abstraction be required during construction, activities will be undertaken under a Controlled Water Regulation (CAR) licence, obtained from SEPA.

## Peat Management

- 4.6.22 **Appendix 13.4: Outline Peat Management Plan** outlines the proposed working methodology where the excavation of peat would be required and provides further details on potential volumes of excavated peat and the likely requirements for reinstatement.
- 4.6.23 **Appendix 13.2: Peat Landslide Hazard and Risk Assessment (PLHRA)** provides further technical information on the likely risk and hazards associated with peat instability and has been used to inform the design of the Proposed Development (by avoiding areas of moderate risk as far as practicable) and to identify the required additional mitigation and working methods that would be implemented during construction to seek to reduce adverse effects associated with peat instability.

## Tree Felling

- 4.6.24 The Proposed Development requires the widening of the existing road corridor to an overall planned width of 20 m from its current variable width of approximately 5–7 m. As a result of these upgrade works, approximately 16.38 ha of woodland, predominantly conifer woodland, will require felling. This figure includes both permanent and temporary land take, as well as any oversail or overrun areas required for the movement and installation of turbine components.
- 4.6.25 In accordance with the Scottish Government Policy, compensatory planting will be delivered off-site, with an additional forestry restocked on-site following construction where possible.
- 4.6.26 An assessment of the impacts of the Proposed Development on forestry is provided in **Appendix 4.3**.

## Construction Waste Management

- 4.6.27 All excavated materials will be re-used on the Development Site wherever possible, provided the material is suitable (from an engineering as well as environmental perspective), for a required and predetermined end use as part of the construction and reinstatement on the Development Site.
- 4.6.28 Where waste materials are not suitable for on-site reuse, they will be removed from the Development Site via a licensed contractor and sent to an off-site licensed treatment /disposal facility. Waste will be managed in accordance with Environmental Protection (Duty of Care) (Scotland) Regulations 2014 (as amended) and other relevant waste management legislation (e.g. the Waste Management Licensing (Scotland) Regulations 2011, the Environmental Protection Act 1990 (as amended), and the Landfill (Scotland) Regulations 2003).
- 4.6.29 A Site Waste Management Plan (SWMP) will be prepared by the construction contractor prior to the commencement of the works and agreed with THC.

## Health and Safety

- 4.6.30 Health and safety during construction will fall under the Construction (Design and Management) (CDM) Regulations 2015. A Construction Phase Health and Safety Plan will be prepared following award of consent.
- 4.6.31 Suitable signage will be erected at the entrance to the Development Site in order to highlight that construction activities are being undertaken and provide directions and health and safety information. During the construction phase public access onto the Development Site would be restricted for health and safety purposes. There are no Public Rights of Way through the Development Site.

## Site Reinstatement and Commissioning

- 4.6.32 At the end of the construction period, all temporary infrastructure and facilities will be removed. The disturbed parts of the Development Site will be reinstated and the excavated / disturbed material that does not have a genuine and suitable identified reuse will be classified as waste material. This waste material will be managed and disposed from the Development Site in accordance with the management measures detailed in the SWMP.
- 4.6.33 Access tracks and main crane pads will be left in-situ for use during the operational phase of the Proposed Development and to facilitate decommissioning.
- 4.6.34 A period of commissioning and testing will be undertaken prior to full operational start up. This comprises a full systems check and unlocking the turbine blades during suitable wind conditions to monitor the blade movement and electricity generation, to verify the Proposed Development is operating adequately.

## Habitat Management Plan

- 4.6.35 A Habitat Management Plan (HMP) will detail how new habitat will be created to compensate for the residual losses to provide a net gain and where any enhancements have been made. An Outline HMP (oHMP) is presented in **Appendix 8.6**, which provides a summary of the broad aims and objectives of the HMP.

# 4.7 Operation and Management

## Life of the Project

- 4.7.1 It is proposed that, if consented, the Proposed Development will have an operational lifetime of up to 40 years, after which time it is assumed for the purposes of this EIA that it would be decommissioned. During operation, the majority of activities on-site will be limited to repairs, inspections, and servicing of the wind turbines and other associated infrastructure as required.
- 4.7.2 A SCADA system will be installed to gather information from each of the turbines about their performance. The SCADA system also enables the turbines to be controlled remotely.

## 4.8 Decommissioning

- 4.8.1 Nearer the end of the Proposed Development's operational life, a decision would be made as to whether extend the life, repower, or decommission the Site.
- 4.8.2 If it is considered that the development area may be suitable for re-powering or if the existing wind farm infrastructure is suitable for a lifetime extension, the Applicant would submit a new application for consent. If a decision were to be taken to decommission the Proposed Development, a Decommissioning and Restoration Strategy would be prepared ahead of the decommissioning phase. This strategy would set out the decommissioning operations, environmental protection measures and restoration principles which would be implemented. This strategy would be agreed with the planning authority and currently these plans do not form part of this proposal. It is anticipated this would be secured by an appropriately worded planning condition.
- 4.8.3 For the purposes of this EIAR it has been assumed that at the end of its operational life the Proposed Development will be decommissioned.
- 4.8.4 Decommissioning will be undertaken in accordance with good practice available at the time. Based on the typical methodology implemented for projects of comparable size, it is anticipated the decommissioning operations would involve the following operations:
- Turbines will be dismantled and removed from site;
  - Turbine foundations will be removed to a depth of 1 m;
  - The cranepads/ hardstands will be scarified and reinstated;
  - Any above ground electrical infrastructure will be removed;
  - The control building and substation and BESS, including foundations (up to 1 m), will be dismantled, removed and reinstated;
  - Underground cables will be left in situ; and
  - Infrastructure tracks left in situ after completion, for handover to the landowners.
- 4.8.5 Decommissioning of the Proposed Development will require a temporary compound; its location will be confirmed at the time following consultation with planning authority.
- 4.8.6 On completion of the decommissioning works, all temporary facilities will be removed, and areas of excavation/ disturbed ground will be reinstated.
- 4.8.7 Consideration has been given to the decommissioning phase as part of this EIAR, in each technical chapter, where relevant. However, a detailed assessment has not been undertaken for the following reasons:
1. the future baseline conditions (environmental and other developments) cannot be predicted accurately at this stage, and

2. the proposals for refurbishment/ decommissioning are not known at this stage.
- 4.8.8 It is anticipated that the significance of effects of decommissioning will be no greater, or less than the impacts of construction.

## 4.9 Socio-economic Impact

- 4.9.1 The Proposed Development will include 13 turbines with an estimated total generating capacity of up to 91 MW (based on each turbine being rated up to 7 MW) and a BESS having the potential to accommodate a facility of up to 80 MW of storing capacity.
- 4.9.2 The average expenditure on development and construction can be estimated based on the average spend per MW of generating capacity. On this basis, the total development and construction cost is estimated to be £133.7m based on a total generating capacity of 91MW. It is estimated that the development and construction of the Proposed Development could generate £23.8m for the Highland region, and £73.9m for Scotland.
- 4.9.3 Similarly, the contract values potentially awarded in each area would support employment; 203 direct years of employment in the Highlands and 629 direct years of employment in Scotland.
- 4.9.4 The operation and maintenance impact of the Proposed Development would persist throughout its lifespan with an estimated annual cost of operations and maintenance of around £5.6m. Overall, it is estimated that this would result in a direct economic impact of £1.3m and a total of 18 jobs for the Highland region, and £2.5m and a total of 52 jobs across Scotland, annually. There would also be indirect economic impacts of an additional £1.7m in the Highland region and £4.8m across Scotland over the project lifetime.
- 4.9.5 It is estimated that the Proposed Development could generate a minimum of £1.2m in non-domestic rates each year of operation, equivalent to a minimum of £41.8m over its operational lifetime (40 years).
- 4.9.6 The details of the socio-economic assessment of the Proposed Development are provided in the standalone **Socio-economics, Recreation and Tourism Assessment**.

## 4.10 Use of Natural Resources

- 4.10.1 The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 ('the EIA Regulations') require the consideration of the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources. The Proposed Development would permanently use approximately 25.2 ha of land, with an additional 18.9 ha used temporarily during construction. Other than the change of land use, given the nature of the Proposed Development (i.e. there are no production processes), there would be a negligible or no demand for natural resources during the operational life of the wind farm.

## 4.11 Residues and Emissions

- 4.11.1 The EIA Regulations require that the EIAR provides an estimate, by type and quantity, of expected residues and emissions (such as water, air and soil and subsoil pollution, noise, vibration, light, heat, radiation and quantities and types of waste produced) resulting from the construction and operation of the Proposed Development.
- 4.11.2 **Table 4.8** provides a summary of the anticipated residues and emissions, which have been used to inform the scope of this EIA.

**Table 4.8 Residues and Emissions**

| Topic | Potential Residue / Emission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Relevant EIA Chapters                                        |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| Water | <p>Water emissions from construction will be limited to surface water, runoff and contaminated water will be captured in compounds, and water quality monitoring from pre-construction through to the operational phase will capture any potential pollution. Suitable SuDS will be implemented as construction progresses.</p> <p>Water emissions resulting from the operational development are anticipated to be limited to surface water, and very small quantities of wastewater (likely disposed of offsite) from the site welfare facilities. Water quality monitoring during the operational phase would allow early detection of potential pollution incidents and assurance as to the on-going performance of the SuDS.</p> <p>The layout of the Proposed Development would be further developed prior to construction to ensure that surface water runoff does not exceed the pre-development volume or rate of run-off. Access tracks would be designed to be semi-permeable and to act in a similar manner to a SuDS, allowing some infiltration of surface water through the track surface. In addition, there would be a trackside drainage system installed during construction incorporating measures to attenuate the flow and provide for physical filtration and infiltration of surface water. Runoff from areas of impermeable hardstanding such as crane pads and foundations is expected to infiltrate locally on unsurfaced areas.</p> <p>Following decommissioning there will be no impact on water.</p> | <b>Chapter 13: Geology, Hydrology, Hydrogeology and Peat</b> |
| Air   | <p>Due to the nature of the development, no significant point source air emissions would be produced during the operation of the Proposed Development. During construction there will be an increase in carbon dioxide emissions, due to construction vehicles and generators. The Proposed Development would generate renewable electricity and would therefore displace carbon dioxide</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>Appendix 13.3: Carbon Balance Assessment</b>              |

| Topic | Potential Residue / Emission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Relevant EIA Chapters                                        |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
|       | emissions associated with electricity generation, which would otherwise be supplied via other forms of power generation requiring the combustion of fossil fuels.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                              |
|       | Dust would be associated with construction activities and construction traffic movements at the Development Site. Dust mitigation measures and good practice will be considered prior to the start of construction. Further details on the dust mitigation plan can be found in <b>Appendix 4.2: oCEMP</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>Appendix 4.2: oCEMP</b>                                   |
| Soil  | Soil and subsoil excavation, handling and storage would be required during construction. All soil would be stored temporarily for use in reinstatement, such that there would be no residue (surplus) remaining following the construction work. Further details on peat management are provided in <b>Chapter 13</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>Chapter 13: Geology, Hydrology, Hydrogeology and Peat</b> |
| Waste | <p>The construction phase would generate construction waste from packaging of construction materials; all construction waste will be collected in skips and disposed of in accordance with local guidance and a Site Waste Management Plan (SWMP). There is no reason to believe the waste generated would exceed that of a typical wind farm project of a similar size.</p> <p>The power generation aspect of the Proposed Development would not produce any significant waste emissions or pollutants. The general operation and maintenance of the development has the potential to produce a small amount of waste. This is likely to be restricted to waste associated with the welfare building from employees and visiting contractors, and the use of small quantities of materials including oils and lubricants in maintenance activities. Oil filters will be replaced at regular intervals. Waste lubricating and cooling oils will be recorded, drained into designated storage containers. All waste would be delivered to a suitable licenced facility for treatment / re-use / disposal in accordance with applicable legislation. As set out in <b>Appendix 13.4: oPMP</b>, no surplus soil or peat waste is anticipated as a result of the Proposed Development.</p> <p>Decommissioning would generate some waste from non-recyclable materials, however the bulk of the turbine components and the tower are able to be recycled, and access tracks would be able to be recovered as aggregate and reused. The largest area of waste would come from the blades which depending on the blade material may not be able to be recycled, instead being cut up and disposed of in accordance with the relevant guidance.</p> | <b>Appendix 13.4: oPMP</b>                                   |

| Topic               | Potential Residue / Emission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Relevant EIA Chapters                                                                       |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| Noise and Vibration | <p>During construction there would be noise generation from site traffic and construction. Construction noise would be managed through a CEMP which will include adherence construction noise best practice (<b>Appendix 4.2: oCEMP</b>). No significant construction noise and vibration effects were identified</p> <p>Operational noise has been mitigated by design, with turbines and BESS sited well away from the sensitive noise receptors, hence operational noise effects are not considered to be significant in EIA terms. Further details are provided in <b>Chapter 10: Noise and Vibration</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                   | <p><b>Chapter 10: Noise and Vibration</b></p> <p><b>Appendix 4.2: oCEMP</b></p>             |
| Lighting            | <p>As the Proposed Development turbine tip height exceeds the 150m ground to tip height, a scheme of aviation lighting will be required. The implementation of the reduced lighting scheme has been agreed with the aviation stakeholders. This is based on the installation of visible 2000 candela lights (dimable to 200 candela in good visibility conditions) on the nacelle of five of the turbines (T5, T6, T9, T12 &amp; T13) along with infrared lights on all turbines (see <b>Appendix 12.1</b>).</p> <p>The visual impact of proposed aviation lighting is considered within <b>Chapter 6: Landscape and Visual</b> and <b>Appendix 6.2: Aviation Lighting</b>.</p> <p>Impacts have been mitigated through a considered approach to the aviation lighting strategy, minimising the number of turbines requiring visible lights to five and reaching agreement to omit mid tower lights, use of low intensity settings in periods of good visibility, and use of directional units to limit apparent intensity from lower elevations.</p> | <p><b>Chapter 6: Landscape and Visual</b></p> <p><b>Appendix 6.2: Aviation Lighting</b></p> |
| Chemicals           | <p>Pollution-prevention practices will be implemented to reduce environmental impact, ensuring that waste, emissions, and chemical releases are minimized at the source. This will be ensured through adherence to the CEMP.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <p><b>Appendix 4.2: oCEMP</b></p>                                                           |

## 4.12 Disaster and Accident Resilience

- 4.12.1 The Proposed Development is not located in an area with a history of natural disasters and its construction and operation will be carried out to align with the requirements of standard health and safety related regulations, including the Construction (Design and Management) Regulations 2015 and the Health and Safety Work, etc. Act 1974.

- 4.12.2 Separately from health and safety regulations, the EIA Regulations require the consideration of the expected effects derived from the vulnerability of the Proposed Development to major accidents and disasters. This requirement is interpreted as requiring the consideration of low likelihood but high consequence events which would result in serious harm or damage to environmental receptors. Given the nature of the Proposed Development, the potential for risks related to the vulnerability to major accidents and disasters are likely to be limited to those associated with extreme weather.
- 4.12.3 Wind turbines are specifically engineered to withstand extreme conditions. Their robust design features include:
- **Advanced Weather Monitoring:** Wind turbines have integrated weather monitoring systems that enable them to adapt their operation based on prevailing wind conditions, ensuring optimal performance and resilience during storms.
  - **Rugged Construction:** These structures are built to withstand high wind speeds. Advanced engineering techniques and materials, such as carbon fibre and steel, contribute to their ability to endure turbulent weather.
  - **Lightning Conduction:** In the event that a wind turbine is struck by lightning, the turbine will safely conduct the electricity into the earth
  - **Flexible Blades and Pitch Control:** Modern wind turbines employ flexible blades and pitch control systems allowing them to adjust their orientation to optimize energy production and with pitch control methods also allowing the blade to feather into the wind to prevent damage from excessive wind forces. Feathering the turbine blades also reduces stress on the breaks when applied, increasing turbine safety.
- 4.12.4 **Chapter 12: Aviation Safeguarding** considers the potential impact of the Proposed Development and outlines the mitigation measures provided to ensure alignment with the requirements of the Civil Aviation Authority (CAA) and the Ministry of Defence (MoD). Alignment with these requirements.
- 4.12.5 The BESS proposed is expected to make use of modern liquid cooled battery systems to mitigate fire risks. In addition, the modular design nature of most battery energy storage facilities further reduces the risk of fire spreading between battery housings by incorporating adequate internal spacing.
- 4.12.6 An assessment of the potential impacts of flooding on the Proposed Development is provided in **Chapter 13: Geology, Hydrology, Hydrogeology and Peat**.
- 4.12.7 With regard to ground conditions, **Appendix 13.2: Peat Landslide Hazard Risk Assessment (PLHRA)** has been prepared which provides further technical information on the likely risk and hazards associated with peat instability and has been used to inform the design of the Proposed Development (by avoiding areas of moderate risk as far as practicable) and to identify the required additional mitigation and working methods that would be implemented during construction to seek to reduce adverse effects associated with peat instability.

- 4.12.8 An Emergency Action Plan would be prepared prior to construction to establish the safety precautions to be taken in the event of a major emergency.
- 4.12.9 **Chapter 11: Traffic and Transport** considered the potential for the Proposed Development to have an impact on Personal Injury Accidents. Based on the information available, it has been established that there are no specific road safety issues within the immediate vicinity of the Proposed Development that currently require to be addressed or will be exacerbated by construction activities associated with the Proposed Development.

## 4.13 References

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