

Environmental Impact Assessment Report

Beinneun 2 Wind Farm

Volume 1

Chapter 4: Development Description

Document prepared by Envams Ltd for Beinneun 2 Ltd

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4 DEVELOPMENT DESCRIPTION

4.1 INTRODUCTION

This Chapter of the Environmental Impact Assessment Report (EIA Report) provides a description of the proposed Beinneun 2 Wind Farm (the Development) and forms the basis of the assessments presented within Chapters 5 to 14. It provides details of the construction phase, the 40-year operation phase and decommissioning phase of the Development.

The Development is situated approximately 5.4 kilometres (km) northwest of Invergarry, and approximately 11.3 km southwest of Fort Augustus (the Site).

This Chapter includes an overview of the Development followed by a detailed description of the main components and their method of construction. Measures that have been built into the design of the Development to reduce effects, also known as 'embedded' mitigation measures, are set out in the previous chapter (Chapter 3: Site Selection and Design Evolution), and in this Chapter. In addition to these embedded mitigation measures, Chapters 5 to 14 present mitigation and enhancement measures where specifically relevant to their assessment topic. Chapter 15 presents the summary of mitigation measures proposed for the Development.

This Chapter of the EIA Report is supported by the following figures provided in Volume 2a: Figures excluding LVIA:

- Figure 4.1: Site Layout;
- Figure 4.2: Indicative Turbine Elevation (200 m Tip Height);
- Figure 4.3: Typical Turbine Foundations;
- Figure 4.4: Typical Crane Pad Hardstanding;
- Figure 4.5: Typical Cable Trench Detail;
- Figure 4.6: Typical Substation Layout and Elevation;
- Figure 4.7: Typical BESS Layout;
- Figure 4.8: Typical Control Building and BESS Elevations;
- Figure 4.9: Typical Construction Compound;
- Figure 4.10: Typical Track Details;
- Figure 4.11: Typical Watercourse Crossings;
- Figure 4.12: Proposed Site Entrance; and
- Figure 4.13: Typical Meteorological Mast.

This Chapter of the EIA Report is supported by the following Technical Appendices (TAs) provided in Volume 3:

- TA A4.1: Outline Construction Environmental Management Plan (OCEMP).

Given the current stage of the Development, in which the detailed geotechnical site investigations are yet to be undertaken, wind turbine models have yet to be selected, and detailed layout has yet to be designed, the dimensions and specifications submitted in the present report shall be deemed as indicative, though noting that the turbine tip-heights stated in this report will not be exceeded.

4.2 DEVELOPMENT DESCRIPTION

4.2.1 Development Overview

The Development comprises a wind powered electricity generating station, including battery energy storage, known as Beinneun 2 Wind Farm. The total export capacity of the Development (wind turbines and BESS) is will exceed 100 MegaWatts (MW) but not exceed 300 MW. It will involve the construction, operation and decommissioning of a wind farm and associated infrastructure, as described in Table 4.1 below.

The Development will comprise:

- Up to 19 wind turbines, with a maximum tip height of up to 200 m;
- Associated foundations and crane hardstandings at each wind turbine location;
- Access tracks linking the turbine locations comprising of 17.5 km of new tracks;
- Battery Energy Storage System (BESS) compound containing approximately 27 no. 40-ft (or equivalent) battery containers;
- One meteorological mast;
- Network of underground cabling;
- New substation compound; and
- Two construction and storage compounds, one of which will be at the BESS/substation compounds.

Access to the Site will be taken from the west of the Site from the A87 at National Grid Reference (NGR) 219586, 806801, as shown in Figure 4.1.

Borrow pits are proposed for the Development to facilitate construction, as described in Section 4.2.10.

The arrangement of the components within the layout and the details of the components will be finalised following consent and before construction starts. Changes to locations of components will be within the specified extent of micro-siting, as set out in section 4.2.9. This flexibility is required to allow the Applicant to select manufacturers and models of components post-consent, and to allow for localised ground conditions that will be established through site investigation pre-construction. These details would be submitted to The Highland Council for approval, and this is anticipated to be secured through a planning condition as is normal for wind farm consents.

The components of the Development are summarised in Table 4.1 and shown on Figure 4.1. Full details are provided in Sections 4.2.2 through 4.2.11.

Table 4.1: Key Parameters of the Development

Element	Details
Turbines	Up to 19 turbines, with a maximum tip height of up to 200 m. Each turbine will require a small transformer located either inside the tower or adjacent to the turbine.
Foundations and Crane Hardstandings	Each foundation would be designed according to the geotechnical site investigations undertaken during pre-construction works to establish the nature of the subsoil condition at each turbine location. Typically, foundations are expected to have an approximate diameter of 25 m. The main working area at each hardstanding area composed of crushed stone will be approximately 115 m by 70 m (depending on the turbine manufacturer's specifications), the footprint of the main hardstanding will be up to approximately 3,600 m ² , as shown on Figure 4.4. In addition to the main hardstanding area, there will be smaller hardstanding areas for the crane assist and blade finger areas. Additional flattened areas will be used for crane assembly and turbine blade storage; however, these will be temporary and not constitute hardstanding.
Access Tracks	The Site access will be afforded via an existing entrance point off the A87, at approximately NGR 219586, 806801 (Figures 4.1 and 4.12). Taking access via the west of the Site, the length of onsite access tracks will comprise of 17.5 km of new tracks. These new tracks will be constructed of a graded stone as appropriate for the ground conditions. The access tracks will require 23 new watercourse crossings. The type and design of each watercourse crossing will be dependent on the stream morphology, peak flows, local topography and ecological requirements, and will be chosen so as to avoid or minimise potential environmental effects.
BESS Compound	The BESS compound will be constructed at approximately NGR 223507, 804875. This will be made up of approximately 27 no. 40-ft (or equivalent) BESS containers and will measure approximately 100 m by 100 m. It will have an instantaneous power output of up to approximately 160 MW. The battery units

Element	Details
	will be supported by Power Control System (PCS) units, comprising inverters and transformers, required to connect the batteries to the substation.
Meteorological Mast	One meteorological mast, of height up to 149.9 m, will be installed at NGR 220250, 805734. It will be free-standing or secured with guy wires.
Electrical Cabling	Onsite cabling will be laid underground alongside or within the access tracks where possible, linking the turbine transformers to the wind farm control building, substation and the BESS. Cables will be laid at a depth of approximately 1 m below ground level.
Substation Compound	A substation compound with a control building will be located in the southeast of the Site at approximately NGR 223411, 804848, measuring approximately 100 m by 100 m with external transformer and connection equipment. The compound will also include space for any Distribution Network Operator equipment to facilitate the grid connection.
Construction Compound	<p>Two construction compounds will be required during the construction of the Development, forming an area of hardstanding providing space for temporary construction cabins, parking and lay down areas.</p> <p>The first will measure approximately 130 m by 60 m and be located within the west of the Site, at approximately NGR 220551, 805946.</p> <p>Due to the size of the Site, a second construction compound will be required which will be located at the site of the substation and BESS compounds. The substation and BESS components will be constructed on the site of this temporary construction compound near the completion of the construction of the Development.</p>

4.2.2 Wind Turbines and Associated Infrastructure

4.2.2.1 Wind Turbines

The Development comprises 19 three-bladed horizontal axis wind turbines, with a maximum tip height of up to 200 m. Indicative turbine dimensions are shown on Figure 4.2. Table 4.2 details the locations of each turbine.

Table 4.2: Wind Turbine Co-ordinates and Elevations

Turbine No.	Easting	Northing	Maximum Turbine Tip Height (m)	Base Elevation (m) AOD
T1	220661	806534	200	399
T2	220767	805955	200	450
T3	220182	805374	200	479
T4	220196	804821	200	492
T5	220633	804335	200	448
T6	221378	804594	200	412
T7	222090	804595	200	409
T8	222736	804789	200	414
T9	222945	804299	200	352
T10	223449	805199	200	438
T11	224176	805530	200	458
T12	224483	805104	200	407
T13	224850	805801	200	478
T14	225412	805717	200	457
T15	225764	805397	200	389
T16	225607	806484	200	512

Turbine No.	Easting	Northing	Maximum Turbine Tip Height (m)	Base Elevation (m) AOD
T17	226228	806492	200	490
T18	226530	806045	200	461
T19	226436	805411	200	399

The blades are likely to be made of fiberglass reinforced epoxy and mounted on a tapered tubular tower. The turbines will be light grey in colour.

The specific turbine model that will be built depends on the turbine models available at the time of procurement and will be chosen with the aim of optimising renewable energy generation at the Site.

Turbines are typically of a variable speed type, so that turbine rotor speed will vary according to the energy available in the wind.

The turbines are computer controlled to ensure that at all times whilst turning, the turbine faces directly into the wind to ensure optimum efficiency. The rotors of all 19 turbines will rotate in the same direction relative to the wind direction.

When operating, the rotational movement of the blades is transferred through the gearbox, to drive the generator. This produces a three-phase power output typically at 690 Volts (V), which is transferred from the generator to the turbine transformer. The turbines will be controlled and monitored from within the proposed control building and will also be remotely monitored where performance details and statistical information for each turbine will be recorded.

The method for erecting each turbine would depend on the turbine supplier and site conditions. Turbine components would either be lifted directly off transportation units for erection or stored adjacent to the crane hardstanding area. The tower sections are initially erected, followed by the nacelle and then the hub depending on the blade installation. The turbine blades would then be lifted individually and attached to the hub or if sufficient space is available would be attached to the hub at ground level, then raised together and attached to the nacelle.

The turbines and all other infrastructure will be subject to a micro-siting allowance (detailed in Section 4.2.9) to allow flexibility for encountering unknown ground constraints during pre-construction and construction.

4.222 Turbine Foundations

The foundation for the turbines would comprise a standard concrete gravity foundation constructed of poured concrete with steel reinforcement. Designs vary depending on ground conditions but typically, turbine foundations typically consist of an octagonal or circular base approximately 25 m in diameter, which sits on the underlying rock or suitable substratum. Concrete volumes for turbines of this size are typically 1,200 m³ and would include typically 90 tonnes of steel reinforcement. The area of excavation is likely to be a maximum of 30 m by 30 m to allow for an excavated working area around the concrete turbine foundation.

A typical turbine foundation is shown in Figure 4.3.

The detailed design specification for the foundation would depend on the geotechnical site investigations undertaken during pre-construction works to establish the nature of the subsoil condition at each turbine location. Each foundation would be designed separately according to the chosen turbine type and manufacturer specification, in response to local ground conditions.

The ground excavation methods would vary depending on the local ground conditions and the nature of the surface vegetation. The general process would be as follows:

- Topsoil/turf will be stripped and stored in order to be reused in restoration of the turbine construction area;
- Subsoil (if present) will be stripped and stored, keeping this material separate from the topsoil/turf. Any peat would be handled in accordance with the Peat Management Plan (an outline of which is provided in section 4.2 of Technical Appendix A12.2, Peat Landslide Hazard and Risk Assessment);

- Excavation of turbine foundations will then take place followed by the installation of the steel reinforcement bars and casting of concrete; and
- After the foundation has been poured the area would be backfilled as soon as practicable with spoil, pending turbine installation.

4.2.23 Crane Hardstandings

Each turbine requires an area of hardstanding adjacent to the turbine foundation to provide a stable base on which to site the turbine components and cranes for the erection of the turbine. The size and shape of the hardstanding depends on the requirements of the turbine manufacturer, so would be finalised pre-construction once the turbine supplier is known.

The main working area at each hardstanding area composed of crushed stone will be approximately 115 m x 70 m, and the footprint of the main hardstanding will be approximately 3,600 m². There will be smaller temporary auxiliary crane areas which are required for the assembly of the main crane jib and 'blade fingers' which are required for the storage of the turbine blades.

A typical arrangement is shown in Figure 4.4; however, the final arrangement of the hardstanding will depend on the method of erection and exact specification of the cranes chosen by the turbine erection contractor. The hardstandings will be sufficiently level and with a suitable load-bearing capacity for storage of turbine components and operation of the cranes.

Surface water and groundwater levels will be managed to ensure that natural drainage patterns are maintained and that water levels within excavations do not rise beyond appropriate and safe limits. Various cable ducts and other ancillaries will be installed within the foundations and under the access track crossing points.

Construction of the crane hardstanding would be similar to the construction of the access tracks as described in Section 4.2.3. Surplus excavated material would be reused elsewhere within the Site such as for track maintenance during construction. Similarly, any surplus topsoil would be used to restore track edges after construction. Any peat would be handled in accordance with the Peat Management Plan (an outline of which is provided in Technical Appendix A6.6).

The crane hardstanding would be left in place following construction in order to allow for the use of similar machinery should major components need replacing during the operation of the Development. These would also be utilised during decommissioning at the end of the Development's life, at which point the crane hardstanding areas would be restored.

4.2.24 Turbine Transformers

Depending on the final choice of turbine, transformers will either be located within the turbine or externally, close to the base of the tower. For the purposes of this assessment, it has been assumed that the transformers will be located adjacent to each turbine. An external transformer would typically be placed within a glass reinforced plastic (GRP) housing, the size of housing will depend on the type of transformer selected but in general it would be approximately 3 m by 2.5 m in plan and 2.5 m in height above surrounding ground level, located adjacent to the turbine within the hardstanding area (Figures 4.2 and 4.4).

The transformers will be either oil-filled with a bunded footing to remove any risk of spillage or a solid cast resin type which is effectively non-polluting. The transformers will increase the electrical voltage from typically 690 V to 33 kiloVolts (kV), suitable for connection to the substation.

4.2.25 Aviation Lighting

Civil Aviation Authority (CAA) guidance requires that 'en-route obstacles' at or above 150 m above ground level are lit with visible lighting to assist their detection by aircraft. As such, there is potential that parts of the Development may be visible at night.

To ensure compliance with the Air Navigation Order 2016, the turbines at the Development will be fitted with lighting to be agreed with the CAA. To minimise night-time amenity effects, the lighting will be kept to the minimum required by the CAA.

A proposal for minimising lighting has been presented to the CAA and, at the time of writing this EIA Report (July 2025), a response from the CAA is awaited. The proposal involves visible lighting on only 9 of the wind turbines, only at hub height and with much reduced light

intensity in good visibility conditions. Such a reduction has typically been accepted by the CAA for recent wind farm applications. However, in the absence of an agreement of a specific lighting proposal from the CAA, this EIA has been based on a worst-case scenario, which follows the specification of visible lighting set out in the CAA Onshore Wind Aviation Lighting Policy Statement:

- All obstacles at or above 150 m above ground level will be fitted with medium intensity (2000 candela) omni directional visible aviation lighting which, in the case of wind turbines, will be located on the hub;
- A secondary light (of the same specification) will be fitted for use only when the primary light fails and would not be lit concurrently; and
- Low intensity (32 candela) aviation lights will be provided at an intermediate level of half the hub height. These would need to be fitted around the towers to allow for 360° horizontal visibility.

The technical specifications for the visible aviation lighting specify how they are perceived from different viewing angles. This means that the lights only generate their nominal 2000 candela intensity in a relatively narrow band of elevation angles, from the horizontal to several degrees above the horizontal, and that the intensity of the light reduces significantly at angles of elevation below the horizontal. An assessment of the visual effects of aviation lighting using these specifications is provided in Chapter 5: Landscape and Visual Impact Assessment.

The final lighting specification will be submitted for approval to the Planning Authority and Civil Aviation Authority prior to construction.

4.2.3 Access Tracks

4.2.3.1 Access Point

Access to the Site will be taken from the west via the A87, as shown on Figures 4.1 and 4.12. This access point will involve the creation of a new access junction.

4.2.3.2 On-Site Tracks

New onsite access tracks will be created for the Development with a total length of approximately 17.5 km.

New tracks will be constructed to connect the turbine locations to the access point, to enable the turbine components, construction materials and construction staff to be transported to their locations, and to enable access for subsequent maintenance visits. The proposed track layout is illustrated in Figure 4.1, with a cross-section shown in Figure 4.10.

Access tracks will be approximately 5 m in width, typically, though wider on tighter corners to allow for the long turbine delivery vehicles. The tracks have been designed to have sufficient radii for turning of the construction vehicles, abnormal loads and plant.

Figure 4.10 illustrates typical track designs which are likely to be employed for the Development's onsite tracks. It is anticipated that access tracks would be constructed using a 'cut track' design, given the absence of deep peat at the site. Topsoil is stripped to expose a suitable rock or sub-soil horizon on which to build the track. The track is built up, if required (depending on the sub-surface) on a geotextile layer by laying and compacting crushed rock to a depth dependent on ground conditions and topography. Generally, the surface of the track will be flush with or raised slightly above the surrounding ground level.

Excavated soils would be stored at no greater than 3 m in height, directly adjacent to, or near the tracks on ground appropriate for storage of materials i.e., relatively dry and flat ground, a minimum of 50 m away from any watercourses. Where possible, reinstatement will be carried out as track construction progresses.

Tracks would typically have drainage ditches adjacent to them, and electrical cabling would typically run alongside the tracks (see section 4.2.5).

4.2.3.3 Watercourse Crossings

The track layout design has sought to limit the number of watercourse crossings; however, given the nature of the Site a number of crossing points are necessary. The access tracks will require 23 new watercourse crossings across all sections of the Development. The watercourse crossings are set out in Technical Appendix A12.1: Watercourse Crossings.

The type and design of each watercourse crossing will be dependent on the stream morphology, peak flows, local topography and ecological requirements, and will be chosen so as to minimise potential environmental effects.

Crossings would be designed in accordance with Construction Industry Research and Information Association (CIRIA) Culvert design and operation guide (C689)¹ and incorporating the most recent climate change allowances, to ensure sufficient capacities for spate or flooding events.

Crossings would be subject to the requirements of The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended)² (CAR) and Water Environment (Miscellaneous) (Scotland) Regulations 2017³.

4.2.4 Meteorological Mast

One meteorological mast, of height up to 149.9 m, will be installed. It will be free standing or secured with guy wires. As guy wires tend to be difficult to see for birds, these will have line markers or bird diverters installed. Indicative details of a meteorological mast with guy wires are shown in Figure 4.13.

4.2.5 Electrical Infrastructure

4.2.5.1 Cabling

Turbines will be connected to the substation by 33 kV power cables which will be laid in trenches alongside and across the access tracks, with a depth of approximately 1 m. The excavated trenches will also include Supervisory Control and Data Acquisition (SCADA) cables or fibre optic cables. This will allow interrogation and control of individual turbines as well as remote monitoring. A copper cable will also be located in the trench and will be connected to the substation and each turbine to provide an earthing system to provide protection from lightning strikes and electrical faults. The cables will be laid on a sand bed, then surrounded by further sand and backfilled using suitably graded material. In mineral soils, clay, or equivalent low permeability barriers, will be inserted into the cable trenches at regular intervals to avoid the trenches becoming preferential drainage pathways. Details of typical trenches are shown in Figure 4.5.

4.2.6 BESS Compound

The BESS compound will be constructed at approximately NGR 223507, 804875. This will measure approximately 100 m by 100 m. The indicative layout of the BESS compound is shown in Figure 4.6, and indicative elevations of the components of the BESS are shown in Figure 4.7.

Technological advances in battery storage are occurring rapidly and so the final installed capacity and the battery technology would be confirmed prior to construction. The total export capacity of the Development (wind turbines and BESS) will exceed 100 MW but not exceed 300 MW.

At this stage it is anticipated that the BESS will comprise approximately 27 no. 40-ft (or equivalent) battery containers. The battery units will be supported by Power Control System (PCS) units, comprising inverters and transformers, required to connect the batteries to the substation.

As the storage market continues to evolve rapidly, the BESS units may be installed following the construction of the wind farm and once the turbines have been commissioned.

¹ Construction Industry Research and Information Association (CIRIA) (2010) Culvert design and operation guide (C689). London: CIRIA.

² Scottish Government (2011) The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended). Available at: <https://www.legislation.gov.uk/ssi/2011/209/contents/made> [Accessed 23/05/2025].

³ Scottish Government (2017) Water Environment (Miscellaneous) (Scotland) Regulations 2017. Available at: <https://www.legislation.gov.uk/ssi/2017/389/contents/made> [Accessed 23/05/2025].

4.26.1 Substation Compound

The substation compound would be located on an area of crushed stone hardstanding measuring approximately 100 m by 100 m. The compound is centred at approximately NGR 223411, 804848, as shown on Figure 4.1.

The substation compound will accommodate the control building and associated external electrical switchgear. The final layout will be designed following detailed specification of the grid connection arrangements, however, an indicative layout for the substation compound is presented in Figure 4.6.

Indicative elevations for the substation and control buildings are presented in Figure 4.8.

The substation building will have its own foul drainage system, comprising a rainwater collection tank and either a septic tank (which treats and discharges the waste) or a cesspit (which stores the waste for periodic pumping into a tanker for off-site disposal). Surface water will drain via soakaway or other preferred SuDS method to be agreed with the Highland Council.

The underground cables from the wind turbines would be brought into the substation building in ducts. The ducts would guide the cables to the appropriate switchgear inside the building. Communications cables would enter in a similar manner.

Lighting will be kept to a minimum and will be limited to working areas only and will comply with health and safety requirements. Lighting will be directed downwards and linked to timers and movement sensors so that light pollution is kept to a minimum.

4.26.2 Grid Connection

The grid connection does not form part of the Section 36 consent application for the Development. The consent for the grid connection will be sought by the relevant grid operator, Scottish and Southern Electricity Networks, as required by law.

4.2.7 Construction and Storage Compounds

Two construction compounds will be required during the construction of the Development, forming an area of hardstanding providing space for temporary construction cabins, parking and lay down areas.

The first will measure approximately 130 m by 60 m and be located within the west of the Site, at approximately NGR 220551, 805946 as shown on Figure 4.1.

Due to the size of the Site, a second construction compound will be required which will be located at the site of the substation and BESS compounds. The substation and BESS components will be constructed on the site of this temporary construction compound near the completion of the construction of the Development.

The location of the first compound has been chosen within a relatively level area of the Site, relatively close to the access point, and with suitable separation distance from any environmental constraints identified during the EIA process.

The compounds will include space for:

- Temporary construction cabins for site office and staff welfare facilities with provision for sealed waste storage and removal;
- Areas for storing materials;
- Parking for project related vehicles;
- Concrete batching; and
- Containerised storage for tools and spares.

A typical construction compound arrangement is shown on Figure 4.9. Welfare facilities for site personnel will be required during construction which would be located within the construction compound. Foul water and effluent would be treated either via septic tank with soakaway designed to SEPA guidelines (including GPP4) or by the use of chemical facilities with periodic removal for off-site disposal. Any facilities other than 'Portaloo'-type facilities would be subject to agreement with the Highland Council in consultation with SEPA.

The area to be used for the construction compound would be stripped of topsoil to expose a suitable formation which will be stored for future re-instatement. A geosynthetic material

base or similar will then be laid followed by a layer of suitable material then a further geosynthetic material laid prior to the top surface of blended fines.

Appropriate bunding arrangements will be employed in all areas where fuel and oil storage tanks will be situated, in order to prevent contamination of the surrounding soils, vegetation, surface water and ground water. The fuel storage area will be above ground with secondary containment in accordance with SEPA's GPP2 (Above Ground Oil Storage Tanks)⁴, PPG7 (Refuelling facilities)⁵ and GPP8 (Safe storage and disposal of fuel oils)⁶. Any contaminated run-off within the sealed bund will be removed to a licensed waste management facility.

4.2.8 Site Signage

During construction, the Site will have suitable signage to protect the health and safety of workers, contractors and the general public. There will be a sign giving the operator's name, the name of the Development and an emergency contact telephone number. On the turbines and substation building, there will be further signs giving information about the component, potential hazards, the operator's name, the location grid reference, and the emergency telephone number. The signage will occur largely on footpaths and along tracks; however, the exact final locations and design of the signage will be defined prior to the Development becoming operational.

During operation, the Site will have signage at the access gate and at track junctions to identify the wind farm and to identify individual wind turbines.

4.2.9 Micro-Siting

In addition to the design iterations described in Chapter 3: Site Selection and Design Evolution of this EIA Report, the continual refinement of the scheme will extend into the construction phase. Appropriate efforts have been made to establish ground conditions at the locations of proposed infrastructure prior to applying for consent for the Development, as set out in Chapter 12: Hydrology and Ground Conditions of this EIA Report, however, further investigation around the proposed infrastructure locations will be required during construction to minimise construction risk and further minimise local environmental effects, such as localised ground conditions and their suitability for supporting a wind turbine foundation. It is established practice, therefore, to seek agreement for the micro-siting of the turbines and other Development infrastructure. This is sought within 50 m of the proposed locations. However, the micro-siting is further limited in that there will be no micro-siting into, or further into, known constrained areas, namely within 50 m of watercourses. Micrositing would also not be allowed where it would lead to blade oversail of the Site boundary. This micro-siting potential has been considered in the technical assessments reported in this EIA Report (chapters 5 to 14). In addition, any micrositing will be agreed with the Ecological Clerk of Works (ECoW) (as described in the oCEMP, TA A4.1) to be appointed prior to the micro-sited elements being constructed.

4.2.10 Borrow Pits

The stone won from the original / existing Beinneun Wind Farm was of such quality that it was also used for concrete batching, and it is expected that sufficient stone of good quality will be available for the Development.

At this stage, search areas have been identified and are shown in Figure 4.1. The search areas are in locations identified by engineering geologists as having good quality exposed rock and are sized sufficiently large to ensure all rock could be sourced on site.

Detail of the borrow pits will be developed following pre-construction ground investigations, and this detail will be provided to the Highland Council for approval (assumed to be required

⁴ Netregs (2022) GPP 2: Above Ground Oil Storage Tanks. Available at: <https://www.netregs.org.uk/media/1890/guidance-for-pollution-prevention-2-2022-update.pdf> [Accessed 23/05/2025].

⁵ UK Government (2011) PPG 7: Refuelling Facilities. Available at: <https://www.gov.uk/government/publications/operating-refuelling-sites-ppg7-prevent-pollution> [Accessed 23/05/2025].

⁶ Netregs (2021) GPP 8: Safe Storage and Disposal of Fuel Oils. Available at: <https://www.netregs.org.uk/media/1900/guidance-for-pollution-prevention-8-2022-update.pdf> [Accessed 23/05/2025].

subject to a planning condition). The oCEMP (TA A4.1) includes information to be provided in the final CEMP in relation to borrow pits.

For assessment purposes, a worst-case approach has been taken. Chapter 11, Traffic and Transport, assumes that all stone will be imported to Site from local quarries. Other chapters assume that borrow pits will be implemented at all the identified search areas, and managed in accordance with the oCEMP (which would require consultee approval prior to implementation). Further detail on borrow pits is therefore not required for the EIA.

4.2.11 Restoration

Site restoration will involve the restoration of track and hardstanding verges and any parts of the construction and storage compound that won't be used during the operation phase to provide a natural ground profile with non-geometric surfaces and tie-ins with existing undisturbed ground levels. Restoration will be undertaken at the earliest opportunity to minimise storage of turf and other materials and to allow restoration of disturbed areas as early as possible and in a progressive manner. Measures set out in the Habitat Management Plan (HMP), which will accord with the Outline HMP provided as Technical Appendix A6.6, will generally be implemented at this stage.

4.3 CONSTRUCTION PHASE

The construction phase would comprise the following principal operations:

- Site mobilisation, establishment of the construction compound area and pegging out of new tracks and the borrow pits;
- Excavation of stone from the borrow pits;
- Upgrade of existing access tracks and construction of new access tracks, including watercourse crossing points;
- Construction of the meteorological mast;
- Installation of temporary and permanent drainage;
- Construction of turbine foundations;
- Construction of crane hardstanding areas;
- Remedial works to the public highway to accommodate turbine deliveries;
- Construction of the substation building;
- Excavation of shallow cable trenches approximately 1 m off the edge of the track and cable laying adjacent to the access tracks and crane hardstandings for drainage;
- Delivery, erection and commissioning of wind turbines;
- Connection of onsite electrical distribution cables;
- Construction of the substation compound;
- Construction of the BESS compound;
- Commissioning of the site equipment; and
- Site restoration, including restoring the borrow pits and construction compound and implementing any proposed habitat management measures.

4.3.1 Construction Period

The on-site construction period is estimated at approximately 18 months in duration.

Construction will be timed to complete at the same time as the agreed grid connection date, so that the Development is operating and exporting electricity as early as possible. The grid connection date is subject to the current (July 2025) grid reform process, and as such is currently not known. For the purposes of this EIA Report, it has been assumed that the grid connection date will be 2032, with construction from 2030 to 2032.

The starting date for construction activities will largely be dependent upon the date that consent may be granted and grid availability; subsequently, the programme would be influenced by constraints on the timing and duration of any mitigation measures confirmed in the individual technical chapters or by the consent decision, as well factors such as weather and ground conditions experienced on the Site.

4.3.2 Construction Materials

The key materials which would be required for the construction of the track, turbine foundations, hardstanding areas and cable trenches are:

- Crushed stone;
- Geotextile;
- Cement;
- Sand;
- Concrete quality aggregate: high strength structural grade, which is not prone to substantial leaching of alkalis;
- Steel reinforcement; and
- Electrical cable.

Borrow pits are proposed, as set out in section 4.2.1, and are expected to meet all stone requirements for the Development; however, where it is a worst-case, import of stone to Site has been assumed.

4.3.3 Construction Movements

Various vehicle types are required during the construction stage of the Development, of these; the majority would be standard road vehicles of similar type to those using local roads on a daily basis. However, the delivery of some of the wind turbine components would require vehicles and transport configurations that are longer and/or wider and/or heavier than standard road vehicles. This is discussed in Chapter 11: Traffic and Transport.

4.3.4 Waste Management

Wherever possible, excavated stone or soils will be re-used on site, primarily for the restoration of disturbed ground.

All waste will be removed off-site for safe disposal at a suitably licensed waste management facility in accordance with current waste management regulations. Waste handling is included within Technical Appendix A4.1: Outline Construction Environmental Management Plan (oCEMP), a final version of which is to be submitted to The Highland Council for approval, in consultation with SEPA, prior to the commencement of the construction phase.

The main items of construction waste and their sources are:

- Timber from temporary supports, shuttering and product deliveries;
- Miscellaneous building materials left over from construction of the control building;
- Sanitary waste from chemical toilets (if used);
- Plastic packaging materials; and
- Excess lubricating oils and diesel.

Waste oils and diesel will be removed from the Site and disposed of by an approved waste contractor in accordance with provisions of the Special Waste Regulations 1996⁷.

4.3.5 Health and Safety Related Issues

Health and safety issues during construction and decommissioning fall under the Construction (Design and Management) (CDM) Regulations 2015⁸. Health and safety will be initially addressed as part of the Pre-Construction Information Pack prepared by the Applicant. The Contractor will be required to prepare a Construction Phase Health and Safety Plan and to forward information to the Applicant during the works to enable the Health and Safety File to be completed.

Turbines are designed to be safe and are built to withstand extreme wind conditions. The turbines selected for the Development will have a proven record in terms of safety and reliability.

⁷ UK Government (1996) The Special Waste Regulations 1996. Available at: <https://www.legislation.gov.uk/uksi/1996/972/contents/made> [Accessed 23/05/2025].

⁸ UK Government (2015) The Construction (Design and Management) Regulations 2015. Available at: <https://www.legislation.gov.uk/uksi/2015/51/contents/made> [Accessed 23/05/2025].

Day-to-day operational and maintenance activities will be co-ordinated with the landowner's operational requirements.

4.3.6 Public Access During Construction

Public access to the Site will be restricted throughout the construction working area during construction for health and safety reasons.

4.4 OPERATION PHASE

The application for Section 36 consent for the Development requests an operation phase of up to 40 years from full commissioning of the proposed turbines, and it is expected that the Development will operate for this time.

4.4.1 Turbine and Infrastructure Maintenance

Turbine maintenance will be carried out in accordance with the manufacturer's specification. The following routine turbine maintenance would typically be undertaken:

- Initial service;
- Routine maintenance and servicing;
- Gearbox oil changes;
- Blade, gearbox and generator inspections; and
- Replacement of blades and components as required.

Operational site inspections will be undertaken on a regular basis and the servicing of turbines will be undertaken as per the turbine manufacturer requirements, usually once per year, but with monthly visits by the manufacturer's servicing team.

Ongoing track maintenance will be undertaken to ensure safe access is maintained to all parts of the Development all year round.

All wastes arising as a result of servicing and maintenance (e.g., lubricating oils, cooling oils, packaging from spare parts or equipment, unused paint etc.) will be removed from the Site and reused, recycled or disposed of in accordance with legal and best practice.

4.4.2 Lighting

During operation, no part of the Development will be continuously lit. It is likely that movement-triggered lighting and passive infra-red sensors would be deployed for security purposes at the substation and BESS compound.

In order to limit impacts on sensitive receptors, lighting would be directed downward and away from boundaries.

4.4.3 Snow Clearance

Safe access to the Development is required year-round. There is potential for the Development to experience snowfall and therefore clearance of snowdrifts may be necessary via grading of the track using suitable ploughing plant.

4.5 DECOMMISSIONING

Following the completion of the operation phase, or if all turbines are non-operational for a continuous period of 6 months or more, an application may be submitted to retain or replace the turbines, or alternatively they will be decommissioned.

Decommissioning will involve the removal of all above-ground infrastructure, except for elements that the landowner intends to re-use for future land management purposes at that time. Turbine components will be dismantled by crane and removed from the site by Heavy Goods Vehicle, unless they are being sold for installation elsewhere in which case they will be removed by abnormal load, similar to their delivery during the construction phase.

The upstand plinth and the top surface of the turbine foundation base will be broken out and removed to approximately 1 m below ground level. All land affected will be re-instated, in accordance with good practice at the time. It is not anticipated that the access tracks or underground cabling would be removed. No stone will be removed from the site during decommissioning. The control / substation building may, if the landowners prefer, be left for

their use beyond the life of the wind farm or otherwise will be removed as for other above-ground infrastructure.

This approach is considered to have less potential for environmental damage than seeking to remove all foundations, underground cables and roads entirely.

All material arising from demolition during decommissioning will be recycled where possible or otherwise will be disposed of to a suitably licensed waste management facility, in accordance with current waste management regulations at the time.

Overall, it is estimated that the decommissioning period for the Development would be approximately 12 months.