Environmental Impact Assessment Report

Teindland Wind Farm

Volume 1

Chapter 4: Development Description

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April 2025

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4 DEVELOPMENT DESCRIPTION

4.1 INTRODUCTION

This Chapter of the Environmental Impact Assessment Report (EIAR) provides a description of the proposed Teindland Wind Farm (the Development) and forms the basis of the assessments presented within Chapters 5 to 15. It provides details of the construction phase, the 40-year operational phase and decommissioning phase of the Development.

The Development is situated approximately 9.6 kilometres (km) southeast of Elgin, and approximately 3 km north of Rothes (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 15 present mitigation and enhancement measures where specifically relevant to their assessment topic. Chapter 16 presents the summary of mitigation measures proposed for the Development.

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

- Figure 4.1: Site Layout;
- Figure 4.2a and b: Typical Wind Turbine (200 m and 230 m to tip, respectively);
- Figure 4.3: Typical Foundation Design;
- Figure 4.4: Typical Crane Hardstanding;
- Figure 4.5: Typical Cable Trench;
- Figure 4.6: Typical Substation Layout;
- Figure 4.7: Typical BESS Layout;
- Figure 4.8: Typical Control Building & BESS Elevations;
- Figure 4.9: Typical Construction Compound;
- Figure 4.10: Typical Access Track;
- Figure 4.11: Typical Watercourse Crossings;
- Figure 4.12: Proposed Site Entrance; and
- Figure 4.13: Typical Meteorological Mast.

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

- TA A4.1: Forestry; and
- TA A4.2: Outline Construction Environmental Management Plan (OCEMP).

Given the current stage of the Development, in which some of the 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 known as Teindland Wind Farm with a generation capacity exceeding 50 Megawatts (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 12 wind turbines, eight with a maximum tip height of up to 230 m and four with a maximum tip height of 200 m;
- Associated foundations and crane hardstandings at each wind turbine location;

- Access tracks linking the turbine locations comprising of a combination of new and upgraded existing tracks (14.1 km of track in total, 6.3 km of which is upgraded and 7.8 km of which is new);
- Battery Energy Storage System (BESS) compound containing approximately 19 battery containers with a total of approximately 85 MW export capacity;
- One meteorological mast;
- Network of underground cabling;
- New substation compound; and
- One construction and storage compound.

Access to the Site will be taken from the north of the Site from the B9103 at National Grid Reference (NGR) 330207, 856430, as shown in Figure 4.1.

No borrow pits are proposed.

Trees would be removed, planted and managed as required in accordance with the Forest Plan (see TA A4.1).

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 micrositing, 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 following any required tree felling, pre-construction. These details would be submitted to Moray Council for approval, and this is anticipated to be secured through a planning condition.

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 12 turbines, eight with a maximum tip height of up to 230 m, and four with a maximum tip height of 200 m. Each turbine will require a small transformer located either inside the tower or adjacent to the turbine. Trees will be cut in a 'key-hole' shape centred on the turbine base. This area will be kept clear of trees during the operation phase of the wind farm in order to reduce any potential impact of the wind turbines on bats.
Foundations and Crane Hardstandings	Each foundation would be designed according to the geotechnical site investigations undertaken during the enabling 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, 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 B9103, at approximately NGR 330203, 856423 (Figures 4.1 and 4.10). Taking access via the north of the Site, the length of onsite access tracks will total approximately 14.1 km of track in total, 6.3 km of which is upgraded and 7.8 km of which is new. New tracks will be constructed of a graded stone as appropriate for the ground conditions. Access tracks require five new watercourse crossings and the upgrade of three existing watercourse crossings. It should be noted that three of these five new watercourse crossings are related to the widening of tracks where there are existing crossings.

Element	Details
	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 329141, 854248. This will be made up of approximately 19 BESS units and will measure approximately 100 m by 100 m. It will have capacity to store up to 171 MegaWatt-hours (MWh) of energy and an instantaneous power output of approximately 85 MW. The battery units will be supported by Power Control System (PCS) units, comprising inverters and transformers, required to connect the batteries to the electrical grid.
Meteorological Mast	One meteorological mast, of height up to 149.9 m, will be installed. It will be secured with guy wires. An area within 25 m of the guy wires will be kept clear of trees for the operation phase of the wind farm, to avoid risk of damage to the wires and mast.
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. Cables will be marked above ground with white poles, c. 2 m tall.
Substation Compound	A substation compound with a control building will be located in the southeast of the Site at approximately NGR 330775, 853072, 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 and Storage Compound	A construction compound 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; this will measure approximately 100 m by 50 m and be located within the north of the Site, at approximately NGR 329077, 855910. Part of this area will be used during the operation phase for storing stone from deconstructed tracks, for when it is needed for maintenance and/or decommissioning.

4.2.2 Wind Turbines and Associated Infrastructure

4.2.2.1 Wind Turbines

The Development comprises 12 three-bladed horizontal axis wind turbines, eight with a maximum tip height of 230 m, and four with a maximum tip height of 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	328975	855377	200	179
T2	328543	854715	200	208
T3	329214	853691	200	238
T4	329575	853252	230	229
T5	328598	853271	230	245
T6	328302	853741	230	259
T7	327650	853877	230	260[1]
T8	327475	854327	230	251
T9	327962	853140	200	241
T10	328775	852677	230	233
T11	328139	852711	230	240
T12	328350	852177	230	223

Table 4.2 notes:

1. At this turbine location, there is discrepancy between Ordnance Survey datasets (OS 1:25,000 mapping, and the OS Terrain 5 datasets) as to the elevation of the ground. OS Terrain 5 indicates 251 m, where OS 1:25,000 mapping indicates it is between the 255 and 260 m contour. As a worst-case, for the purposes of this table, the elevation has been assumed to be at the upper value of 260 m.

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 12 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 more typically 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.

4.2.2.2 *Turbine Foundations*

The foundation for the turbines would comprise a standard concrete gravity foundation constructed on poured concrete with steel reinforcement. Designs vary depending on ground conditions but typically, turbine foundations typically consist of an octagonal or circular base approximately 21 m in diameter, which sits on the underlying rock or suitable substratum. Concrete volumes for turbines of this size are typically 1,200 m^3 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 the enabling 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 processes would be as follows:

- Trees would be removed and managed in accordance with Technical Appendix A4.1;
- 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;

- 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.

4.2.2.3 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 m^2. 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 Site 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.

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.

4.2.2.4 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).

4.2.2.5 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 this lighting has been presented to the CAA and, at the time of writing this EIAR, a response from the CAA is awaited.

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 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 north via an existing entrance point off the B9103, as shown on Figures 4.1 and 4.10. This access point will need to be widened on its north-western side, to accommodate delivery of the turbine components. It will be metalled in a bell-mouth shape for the c. 10 m nearest to the public highway.

This location is currently the main access for forestry traffic. Immediately adjacent to the track, c. 20 m from the public road, is an area of hardstanding used for public parking, typically for people using the forest for recreation purposes. This will remain accessible by the public during all phases of the Development, except for a short period of the construction phase when works to the access point and the first section of the access track will preclude access. Further commentary on how this will be managed during the construction and decommissioning phases is provided in section 4.4.

There is a gate on the access track into the forest, just past the public parking area. This will be maintained during all phases of the Development.

4.2.3.2 On-Site Tracks

The total length of onsite access tracks used by the Development will total approximately 14.1 km of track in total, 6.3 km of which is upgraded and 7.8 km of which is new of new track. Existing tracks have been used wherever practicable, whilst minimising the impact on trees and other environmental receptors.

New tracks will be constructed and existing tracks upgraded, where required, to connect the turbine locations to the wider track network and 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 an elevation of both new and upgraded tracks shown in Figure 4.10.

Access tracks will be approximately 5.5 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, including both new and upgraded access track. 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 two new watercourse crossings and the likely upgrade of six existing watercourse crossings across all sections of the Development. It should be noted that the upgrade of the six watercourse crossings would be required if track widening or structural upgrades are required. The watercourse crossings are set out in Technical Appendix A12.2: 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 2017[3].

4.2.4 BESS Compound

The BESS compound will be constructed at approximately NGR 329141, 854248. This will be made up of approximately 19 BESS units and will measure approximately 100 m by 100 m. The indicative layout of the BESS compound is shown in Figure 4.6, and 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, however at this stage it is anticipated that it will have capacity to store up to 171 MegaWatt-hours (MWh) of energy and an instantaneous power output of approximately 85 MW. The battery units will be supported by Power Control System (PCS) units, comprising inverters and transformers, required to connect the batteries to the electrical grid.

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 operational.

4.2.5 Meteorological Mast

One meteorological mast, of height up to 149.9 m, will be installed. It will be secured with guy wires. As guy wires tend to be difficult to see for birds, these will possibly have line markers or bird diverters installed. An area within 25 m of the guy wires will be kept clear of trees for the operation phase of the wind farm, to avoid risk of damage to the wires and mast. Details of the meteorological mast are shown in Figure 4.11.

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[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 24/02/2025].

[3] Scottish Government (2017) Water Environment (Miscellaneous) (Scotland) Regulations 2017. Available at: https://www.legislation.gov.uk/ssi/2017/389/contents/made [Accessed 24/02/2025].

4.2.6 Electrical Infrastructure

4.2.6.1 Cabling

Turbines will be connected by 33 kV single phase 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. 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.

4.2.6.2 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 330775, 853072, as shown on Figure 4.1.

The substation compound will be partitioned into two broad sections, accommodating 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 4.7.

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 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 down lit and linked to timers and movement sensors so that light pollution is kept to a minimum.

4.2.6.3 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 Distribution Network Operator (DNO), SSEN, via a separate Section 37 application. The connection point is expected to be at the Blackhillock substation, near Keith.

4.2.7 Construction and Storage Compound

A compound will be created for the duration of the construction phase, centred at approximately NGR 329077, 855910 as shown on Figure 4.1.

Part of the construction compound is likely to be used during the operation phase for storage of stone used for access tracks that is required by the landowner to be taken up following completion of the construction process. The stone would be stored in case it is required for maintenance purposes during operation and for use to upgrade the tracks to facilitate the decommissioning phase. This is likely to have less environmental impact than disposing of the stone off-site, then re-procuring new stone and transporting it to site as/when required.

The location has been chosen within a relatively level area of the Site, relatively close to the access point, on existing tracks and with suitable separation distance from any environmental constraints identified during the EIA process. The area of the compound will measure approximately 100 m by 150 m and 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 4.8. 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 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. The buried cables will be marked by 2 m tall white poles with labelling at the top, in accordance with Forest and Land Scotland (the landowner) requirements.

4.2.9 Micro-Siting

In addition to the design iterations described in Chapter 3: Site Selecton & Design Evolution of this EIAR, 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 EIAR, 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, or closer to noise sensitive receptors, unless further assessments conclude that any relevant planning conditions would

[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 24/02/2025].
[5] UK Government (2011) PPG 7: Refuelling Facilities. Available at: https://www.gov.uk/government/publications/operating-refuelling-sites-ppg7-prevent-pollution [Accessed 24/02/2025].
[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 24/02/2025].

be met. 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 EIAR (chapters 5 to 15). In addition, any micrositing will be agreed with the Ecological Clerk of Works (ECoW) and archaeological advisors to be appointed prior to the micro-sited elements being constructed.

4.2.10 Forestry

The Site is owned by Forest and Land Scotland and managed as a commercial timber forest. This would continue during the operational phase of the Development.

The forestry proposals are set out in Technical Appendix A4.1.

It is proposed that some trees within the Site be felled during the Development construction phase, to make space for the turbines, any new or widened access tracks including space for turbine delivery vehicles to pass (and oversail), the substation, BESS and construction compounds. “Key-hole” areas around the wind turbines will be cleared of trees and kept clear, to minimise impacts on bats (see Chapter 6: Ecology for further detail on this). Where trees are required to be felled that are in forest blocks that are unstable (that is, where felling part of the block only would result in substantial levels of wind blow of the remaining trees), the whole block will be felled. These areas would be replanted following completion of construction, unless required to be kept clear of trees for key-holes or infrastructure.

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.

4.3 ENABLING PHASE

As the Site is forested, pre-construction works are required to prepare the site for construction activities. These would occur before the commencement of construction. These may include:

- Tree clearance and associated timber movements;
- Implementation of mitigation measures that may be required pre-construction, such as artificial bird nest platforms;
- Ground condition survey works; and
- Other works that may be agreed between the Applicant and Moray Council.

4.4 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;
- Upgrade of existing access tracks and construction of new access tracks, including watercourse crossing points;
- Construction of the BESS compound area;
- Construction of the meteorological mast;
- Construction of the substation compound area;
- 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 BESS compound;

- Commissioning of the site equipment; and
- Site restoration, including any proposed tree planting.

4.4.1 Construction Period

The on-site construction period is estimated at approximately 6-12 months in duration following enabling works and has been assumed to start in 2028 for the purposes of this EIAR.

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.

4.4.2 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.

All materials will be sourced and transported to the Site from local suppliers, where possible. Borrow pits are not proposed.

4.4.3 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: Access and Transport.

4.4.4 Waste Management

All waste will be removed off-site for safe disposal at a suitably licensed waste management facility in accordance with current waste management regulations. Wherever possible, excavated stone or soils will be re-used on site, primarily for the restoration of disturbed ground. As noted in section 4.2.7, stone that is used for construction tracks, and required by the landowner to be taken up again following construction, will be stored in the construction and storage compound during the operation phase.

Waste handling is included within Technical Appendix A4.2: Outline Construction Environmental Management Plan (oCEMP), a final version of which is to be submitted to Moray 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:

- Hardcore, stone, gravel from temporary surfaces to facilitate construction waste, and concrete;
- Subsoil from excavations for foundations and roads;
- 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);
- Plastics packaging of material; and
- Lubricating oils, diesel - unused quantities at end of construction period.

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 1996[7].

4.4.5 Health and Safety Related Issues

Health and safety issues during construction and decommissioning fall under the Construction (Design and Management) (CDM) Regulations 2015[8]. 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 Plan (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.

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

4.4.6 Public Access During Construction

Public access to the Site will be restricted throughout the construction working area during construction for health and safety reasons and will be reinstated following cessation of construction activities. The restrictions will be limited to the construction working areas, however, rather than the whole Site. Restricted areas will be clearly demarcated.

Immediately adjacent to the main access track, c. 20 m from the public road, is an area of hardstanding used for public parking, typically for people using the forest for recreation purposes. This will remain accessible by the public during all phases of the Development, except for a short period of the construction phase when works to the access point and the first section of the access track will preclude access. Once the access point, construction compound and the track between the access point and the construction compound are created to wind farm standards, the public parking area will be re-opened to the public. The period of closure of the parking is expected to be limited to c. 1-2 months.

During construction, once the parking is re-opened to the public, a fence will be erected between the parking area and the access track (currently there is nothing separating these). This will direct visitors to enter the parking area at one end, park in marked bays, and leave through an opening at the other end. This will ensure that visitors always drive forwards onto the access track, rather than reversing, hence minimising safety issues. There is sufficient room for this within the current hardstanding area, although the condition and layout of the parking area will be reviewed by the construction contractor at detailed design stage and any amendments required to ensure efficient functioning of this will be put in place prior to it being re-opened to the public.

Alternatives to this arrangement, to separate the public from the construction access tracks, were investigated, and two potential solutions were examined. One would have required substantial forestry works (which were not justified for a relatively small, temporary parking area). The other would have required the public to park on the east side of the road and cross the road, then walk along the verge for 70 m, before entering the forest, which was considered less safe than the approach proposed above.

Currently, recreational users of the forest that park at the proposed Site entrance typically use the existing track to go up into the forest. This will be part of the construction site and will be closed to the public during the construction phase. Instead, a route will be created from the parking area to link up to existing tracks and paths within the forest that will not be impacted by the construction works. Details of this will be set out in an Access Management Plan to be submitted to Moray Council for approval prior to commencement of construction.

[7] UK Government (1996) The Special Waste Regulations 1996. Available at: https://www.legislation.gov.uk/uksi/1996/972/contents/made [Accessed 24/02/2025].
[8] UK Government (2015) The Construction (Design and Management) Regulations 2015. Available at: https://www.legislation.gov.uk/uksi/2015/51/contents/made [Accessed 24/02/2025].

4.5 OPERATION PHASE

The Development will have an operational lifespan of up to 40 years from full commissioning of the proposed turbines.

4.5.1 Turbine and Infrastructure Maintenance

Turbine maintenance will be carried out in accordance with the manufacturer's specification. The following routine turbine maintenance will 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 best practice.

4.5.2 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.

4.6 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 windfarm 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 eight months.