2 Project Description

2.1 Introduction

2.1.1 This chapter of the EIAR provides a description of the Proposed Development for which consent and deemed planning permission is being sought, for the purposes of informing the identification and assessment of likely significant effects. This includes details of the proposed infrastructure components, information on the proposed construction methods and programme, the operation of the development, and the approach to decommissioning.

2.1.2 This chapter is supported by the following appendices:

- Technical Appendix 2.1: Outline Construction Environmental Management Plan (CEMP); and
- Technical Appendix 2.2: Outline Borrow Pit Management Plan (BPMP).

2.1.3 A number of figures have also been prepared to support the chapter, which provide an overview of the key components of the Proposed Development.

2.2 Site Location

2.2.1 The Proposed Development is located north of the A980, approximately 6 km[1] north of Banchory in Aberdeenshire (**Figure 1.1**).

2.2.2 The site is centred on British National Grid NJ 70063 02717 and covers an area of approximately 1,380 ha. The site is predominantly moorland with small areas of commercial forestry. The Site is characterised by upland plateaus and surrounding hillslopes. In the west and centre of the Site, five distinct hill tops are present with associated flatter plateaus (Hill of Fare, Hill of Corfiedly, Tornamean, Craigrath and Blackyduds), the highest of which being Hill of Fare in the west of the Site (peak of 470 metres Above Ordnance Datum (mOAD)). The ground gradually slopes towards the Burn of Lythebauds in the north, and towards the Burn of Corrichie in the south-east. Relatively flatter upland moorlands are present in the centre of the Site, including the flat plateau of Brown Hill. The ground then slopes up to the steeper slopes of three remaining hilltops, Marquis's Hillock and Meikle Tap in the south of the Site and Greymore in the north. Relatively flatter heather moorlands are present in the east of the Site. Ground levels in the Site range between approximately 312 mAOD to 470 mAOD.

2.2.3 The majority of the site is unforested. However, there is a portion of forested land in the east of the site near the site entrance and central southern section at the Howe of Corrichie. The forestry in the east of the site forms part of the Midmar Forest and is designated as Ancient Woodland.

2.2.4 There are no residential properties located within the site boundary. However, there are numerous residential properties surrounding the Proposed Development. The nearest settlements are Torphins, located approximately 3.4 km to the west, Midmar located 3.6 km to the north, Echt located approximately 4 km to the north-east and Banchory located approximately 6 km to the south of the site.

Cumulative Developments

2.2.5 There are 13 other onshore wind developments in operation or consented / under construction within 20 km of the Proposed Development at the time of writing the EIAR (August/September 2023 – refer to **Table 2.1** and **Figure 6.28**). Potential cumulative impacts with these developments have been assessed throughout the EIAR.

2.2.6 Further detailed discussion on the approach to cumulative assessment is presented in each technical assessment chapter as relevant.

Table 2Error! No text of specified style in document.1 Cumulative Developments within 20 km of Proposed Development

Development	Status	Installed Capacity (MW)	Number of turbines	Direction from Site	Approx. distance to nearest turbine
Auchorie Farm	Operational		2	NE	17.6 km
Auchmore	Operational		2	N	1.6 km
Land to Northwest of Thistley Crook	Operational		2	W	2.1 km
Fordie Farm	Operational		1	W	2.1 km
Easter Tolmauds	Operational		2	NW	6.4 km
Upper Sauchen	Operational		1	N	6.1 km
Craigneil Wind Farm	Consented / Under Construction	38	11	SE	13.9 km
Fetteresso	Consented / Under Construction	42	10	SE	17.4 km
Kildrummy Wind Farm	Operational	18.4	8	NW	15.3
Mid Hill I	Operational	57.5	25	S	14.4 km
Mid Hill II	Operational	18.4	8	S	14.4 km

[1] This distance is given to the approximate centre point of the site.

South Lasts Farm	Operational		2	E	8.6 km
Meikle Carewe	Operational	10	12	SE	15.6 km so

2.3 Description of the Development

2.3.1 The Proposed Development comprises:

- 16 three-bladed horizontal axis turbines; 5 of up to 200 m tip height and 11 up to 180m tip height;
- associated low to medium voltage transformers and related switchgear at each turbine;
- turbine foundations;
- temporary and permanent hardstand areas for erection cranes at each turbine location;
- a network of access tracks including one watercourse crossings, passing places, turning heads and site entrance from the public road network;
- up to 6 borrow pits;
- a substation compound containing electrical infrastructure, control building, welfare facilities and a communications mast;
- a Battery Energy Storage System (BESS), rated at approximately 100 MW and associated compound;
- a network of buried electrical and communication cables;
- felling and replanting of forestry (refer to **Chapter 14: Aviation and Other Issues**);
- temporary construction compounds;
- signage; and
- habitat management and biodiversity enhancement (refer to **Chapter 8: Ecology** for details).

2.3.2 The Proposed Development is expected to operate for up to 50 years following which decommissioning of the wind turbines and other infrastructure would be undertaken or an application may be submitted to repower the site.

Proposed Development Layout

2.3.3 **Figure 1.2** presents the infrastructure layout of the Proposed Development and **Figure 1.3** presents the turbine layout. **Table 2.2** gives the proposed centre point location, tip height and hub height for each of the proposed turbines.

Table 2.2: Turbine Locations

Wind Turbine	Easting	Northing	Tip Height (m)
T1	368524	803990	200
T2	367938	803584	180
T3	367494	803236	180
T4	366981	803057	180
T5	366953	802515	180
T6	367415	802232	200
T7	367917	802895	180
T8	367930	802400	200
T9	368075	801743	180
T10	368623	801831	180
T11	368481	802506	200
T12	368796	802950	200
T13	369001	803453	180
T14	369387	803064	180
T15	369915	803201	180
T16	370404	803434	180

2.3.4 For the purpose of assessment, 5 turbines have a tip height of 180 m and 11 have a tip height of 200 m. Where necessary for assessment purposes a rotor blade diameter of 155 m has been used although the blade length may vary (within the maximum turbine tip height) depending on turbine availability at the time of construction.

2.4 Construction Phase

Proposed Infrastructure

2.4.1 Prior to the commencement of construction, a Construction Environmental Management Plan (CEMP) will be produced setting out in detail the individual items of works associated with the construction of the Proposed Development (refer to **Technical Appendix 2.1: Outline Construction Environmental Management Plan**).

2.4.2 Below is a high-level overview of the infrastructure that forms the Proposed Development including reference to relevant figures submitted with the application. Where applicable, it includes construction and reinstatement methodologies. For the purposes of carrying out the assessments on construction activities in the EIAR, the reasonable worst-case scenario has been adopted.

Turbines

2.4.3 This EIAR is based upon the installation and operation of 16 three-bladed horizontal axis turbines.

2.4.4 The specific turbine model will be procured post-consent in two sizes; 180 m and 200 m blade tip height above ground level. The turbines would have a rotor

diameter of approximately 155 m with, nominally, 6.6 MW generating capacity. Whilst similar nameplate capacity, taller models have potential to capture greater wind yields. Indicative drawings of the proposed turbines are presented in **Figures 2.1a** and **2.1b**.

2.4.5 Each of the wind turbines consist of the following components:

- blades;
- hub;
- nacelle;
- tower; and
- external or internal transformer.

2.4.6 Three blades will attach to the hub forming the rotor assembly which is mounted to the nacelle. The nacelle contains the gearbox, generator and associated control and monitoring equipment. The nacelle and rotor assembly are mounted atop a tapered tubular tower mounted onto a reinforced concrete foundation.

2.4.7 All turbine components are prefabricated off-site. Towers would likely be three to four sections and typically made from steel and the blades typically from fibreglass.

2.4.8 It is proposed that the turbine tower, nacelle and blades be finished in a semi-matt, off-white/pale grey colour.

2.4.9 Turbines shall not carry any symbols, logos or other lettering except where required under legislation. However, it is proposed to add turbine numbers to the base of each tower to aid service engineers during the operational phase of Proposed Development. Numbers would be up to 1,000 mm tall by 900 mm wide and would be positioned up to 3 m from finished ground level in order to be visible from the approaching access track.

2.4.10 A transformer will be required for each turbine which is assumed, for the purpose of the EIA, to be located external to the turbine.

2.4.11 External transformer housing would be situated adjacent to each of the turbine towers. The requirement for such structures, along with their dimensions, would vary based on the final turbine choice. It is possible that the transformer will be internal to the turbine structure however an indicative design for a typical external transformer housing is included in **Figures 2.1a-2.2b**.

2.4.12 Since all turbines in the Proposed Development exceed 150 m above ground level to blade tip height, they are within scope of Article 222 of the Air Navigation Order, which requires all obstructions of 150 m or more above ground level to be fitted with medium intensity steady red lights on the highest practicable point.

2.4.13 **Chapter 14: Aviation and Other Issues** provides details of a reduced lighting scheme proposed for the turbines which was agreed with the Civil Aviation Authority (CAA) on 18 September 2023. This provides for the lighting of seven turbines only (Turbines 1, 4, 6, 7,10, 12 and 16) with no intermediate lighting on the towers. **Chapter 6: Landscape and Visual Impact Assessment** assesses the associated impacts of the agreed lighting scheme.

Turbine Foundations

2.4.14 Foundations will be required to support the turbines. These are typically steel reinforced concrete structures constructed in the ground to which the turbines are bolted. Final design of each foundation is dependent upon site-specific ground conditions at the turbine locations and the type of turbine chosen and will take place once detailed ground investigations are carried out. Turbine foundations are typically either gravity type foundations or piled type foundations.

2.4.15 Regardless of the sub-structure, the above ground finish will consist of approximately a 4.5 m – 5.5 m diameter foundation plinth protruding from the ground to support the turbine. An approximately 5 m wide maintenance path will connect the plinth to either the adjacent access track or crane hardstand.

2.4.16 **Figures 2.2a** and **2.2b** present the typical design for a both gravity type and piled type foundations.

Crane Hardstands

2.4.17 Adjacent to each turbine, an area of permanent hardstand approximately 35 m x 55 m will be constructed of compacted stone bearing directly on a suitable formation stratum for use by the erection cranes. The exact geometry and position of the crane hardstands will depend on the wind turbine supplier's specifications, the cranes selected for erection and the findings of detailed ground investigations prior to construction. An indicative crane hardstand arrangement is presented in **Figure 2.3**.

2.4.18 The crane hardstands would be constructed using the same method as the excavated access tracks.

2.4.19 After turbine erection is complete, the temporary hardstand areas (as shown on **Figure 2.3**) would be reinstated. There would be a need to use cranes from time to time during the operational phase of the Proposed Development. The 'Good Practice during Wind Farm Construction' (NatureScot, 2019) guide recommends that crane hardstand areas are not covered with peat or topsoil. Therefore, the crane

hardstands would be left uncovered, which would ease maintenance activities and comply with best practice guidance.

Access Tracks

2.4.20 Approximately 17.6 km of access track will be constructed for the Proposed Development as shown in **Figure 1.2**. This comprises 7.3 km of new track construction and 10.3 km of upgrade to existing access tracks. The access track layout has been designed in order to maximise the use and upgrade of existing tracks as far as reasonably practicable.

2.4.21 For construction of access tracks, alternative methods would be utilised for different areas of the site, depending on site specific conditions. For each method, the access track running width shall be approximately 4.5 m and will be constructed of compacted crushed stone. Access track widths may also be wider for short sections such as at passing places, at sharp bends or turning heads and junctions. Four passing places, four turning heads and two full Abnormal Indivisible Load (AIL) turning heads have been included within the track design. Full AIL turning heads are required to facilitate both forward and reverse delivery of turbine blades to each turbine location.

2.4.22 The majority of access tracks will be excavated whereby overlying soil or peat material would be removed to a suitable formation stratum upon which the access track would be built in compacted stone.

2.4.23 Where peat depths are greater than 1 m deep, it is generally more efficient to "float" the access track over peat using geogrid. Typical access track construction details are presented in **Figure 2.4.**

2.4.24 Only one new watercourse crossing is required as part of the Proposed Development. This will require the construction of a new bridge over the Landerberry Burn. The watercourse crossing shall be designed to ensure that fish and mammal movement is not restricted. An application will need to be made to SEPA under The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR) for authorisation for this watercourse crossing. A typical bridge design, similar to what may be adopted for the crossing of the burn, is presented in **Figure 2.5**. Further information on the watercourse crossing is provided in **Chapter 10: Hydrology, Geology and Hydrogeological Assessment.**

2.4.25 For safety reasons, marker posts may be placed in the ground by the edge of the access track in order to guide on-site vehicles during times of poor visibility.

Public Road Access

2.4.26 The Proposed Development will be accessed directly from the B977 via an upgraded site entrance to the east of the site (refer to **Figure 2.14**). The site entrance will be designed to accommodate deliveries for turbine components and with sufficient visibility splays.

2.4.27 If deemed necessary during construction, wheel cleaning facilities will be set up at the above-mentioned entrance to site from the B977 to remove mud from the wheels of vehicles leaving the Proposed Development during the construction phase. Public roads will be inspected daily, and a lorry-mounted road brush will be employed to remove any mud or debris transferred onto the public roads from on-site activities.

Description of Abnormal Access

2.4.28 The delivery of the Abnormal Indivisible Loads (AILs) will likely be from the Port of Aberdeen via the A956 and then follows the A90 Aberdeen Western Peripheral Route (AWPR) northbound, then the A944 westbound until Dunecht before continuing south on the B977 to the proposed site entrance.

2.4.29 Public roads would be utilised and repaired where necessary. An assessment of the public road access is provided in **Chapter 11: Access, Traffic and Transport Assessment**.

Onsite Cabling and Turbine Transformers

2.4.30 The turbines envisaged for use on the Proposed Development would initially generate electricity at 690 – 1,000 V. This typically needs to be stepped up to the on-site distribution voltage of 33 kV via an ancillary transformer. Each wind turbine will be connected to the substation compound via underground electrical cables.

2.4.31 Cable trenches will accommodate these electrical cables, including communication cables and the earthing cable network. **Figure 2.6** presents the typical cable trench cross section that shall be adopted across the site. Where cables need to cross access tracks or hardstands, they will be routed through ducts.

2.4.32 The layout of the cable trenches within the site would generally run adjacent to the access tracks where possible. The route would be marked above ground with clearly identified posts, spaced at suitable intervals along the length.

Substation and Battery Energy Storage System (BESS) Compounds

2.4.33 A substation compound is required to collect the electricity generated and distribute it off-site to the electricity grid system. A substation compound with an area of approximately 4,050 m^2 is proposed at approximate Ordnance Survey grid reference

E369996, N802456, as shown in **Figure 1.2**. It will be constructed of compacted stone bearing directly on a suitable formation stratum, including reinforced concrete foundations for the buildings and ancillary equipment. The substation compound would contain 33 kV/132 kV step-up transformers, associated switchgear, telecommunications mast and ancillary equipment suitable for a transmission connection to the electricity grid system. The wind farm control building required at the substation compound would accommodate metering equipment, switchgear, the central computer system and electrical control panels. In addition to the control building, a welfare building will be installed for all personnel.

2.4.34 **Figures 2.7a** and **2.7b** present an indicative substation compound layout and elevations. This is indicative and the design and layout are subject to change once the expected point of connection is known, refer to the section on Grid Connection, below.

2.4.35 In order to match on-site energy generation to energy demand, as well as facilitate options such as a reduction in any possible grid constraint requirements, the Proposed Development also includes a BESS.

2.4.36 The BESS compound is likely to have an area of 15,000 m^2. **Figures 2.9a** and **2.9b** present indicative BESS compound layout and elevations. The BESS is located at approximate Ordnance Survey grid reference E369897, N802431, as shown in **Figure 1.2.** It will be constructed of compacted stone bearing directly on a suitable formation stratum, including reinforced concrete foundations for the building and ancillary equipment. Within the BESS compound permanent containers, mounted on small concrete foundations, would house an energy storage device, inverters and other ancillary equipment. For each container there would be a transformer located on the hardstand.

2.4.37 The BESS is optimised with appropriate container spacing to minimise the risk of propagation across the facility in the unlikely event of a fire. Additionally, fire breaks or spacing from forestry is designed again to minimise fire propagation. A battery management system is also implemented for continuous monitoring of the BESS through its lifetime. The containers housing the batteries typically include dry aerosol fire suppression solutions, favoured over water suppression, as it is successful at reaching all areas within containers and doesn't require a dedicated water supply.

2.4.38 For both the substation and BESS compounds foul drainage will be provided in accordance with Building Control requirements and in agreement with SEPA.

Grid Connection

2.4.39 The grid connection does not form part of the application for the Proposed Development. Any required consent for the grid connection would typically be sought by SSEN Transmission, the Transmission Owner (TO) for this area of grid network. The TO will be responsible for the consenting, construction and operation and maintenance of the grid connection. For information, the proposed point of connection for the Proposed Development into the electricity grid system is at the substation compound. The Proposed Development would most likely be connected at Fetteresso Substation, approximately 32 km southeast of the site.

2.4.40 The Applicant has been advised by SSEN Transmission that the connection would be completed via a 132 kV trident wooden pole overhead line (OHL). The exact arrangement of this grid connection is subject to detailed design by the TO.

2.4.41 Should further detailed studies determine that a grid connection to another transmission entry point prove more suitable, the TO will advise the Applicant in due course. Any final grid connection route and associated consents would be the responsibility of the TO and this route would require further studies and would be subject to a separate consenting process and EIA if required.

Telecommunications Mast

2.4.42 The telecommunications mast is expected to be up to 10 m tall, set within the control building and substation compound area. A typical elevation of the telecommunications mast is presented in **Figure 2.8**.

Borrow Pits

2.4.43 Borrow pits may be used to provide the stone for the construction of access tracks, compounds and hardstands, subject to sufficient quality and quantity of stone being available at the 6 identified borrow pit search areas, as indicated on **Figure 1.2.** These borrow pit search areas are shown as the maximum potential area of borrow pit extraction, but it is not anticipated that these areas would be fully exploited. An indicative borrow pit arrangement is shown in greater detail in **Figure 2.10**.

2.4.44 Final borrow pit locations within the borrow pit search areas would be subject to detailed ground investigations to confirm suitability of material.

2.4.45 There are local contractors near the Site from which concrete could potentially be sourced. However, if an on-site batching plant is required, a location for a temporary batching plant has been identified on **Figure 1.2. Figure 2.11** presents a typical batching plant layout.

2.4.46 The batching plant equipment will include:

- concrete and aggregate storage bins;
- concrete batching equipment;
- wash out facilities;
- testing facilities;
- water supply; and
- waste storage area.

2.4.47 It is anticipated that a borehole would be sunk to provide a reliable water supply for the batching plant. Any borehole would be subject to suitable yields being available, which will be determined through future detailed ground investigation. Any borehole would require suitable authorisation from SEPA under CAR.

2.4.48 **Temporary Compounds**

2.4.49 A temporary construction compound will be built to provide a secure area for office facilities and storage of materials and components. A temporary enabling works compound will be established at the site entrance primarily for controlling access to the site during construction. This compound will be made permanent for public car parking during operation of the Proposed Development. The construction compounds will be built of compacted stone bearing directly on a suitable formation stratum.

2.4.50 The temporary construction compound of approximately 50 m x 60 m will be required at approximate Ordnance Survey grid reference E370136, N803290, as shown in **Figure 1.2**. The temporary enabling works compound will be approximately 30 m x 30 m, located at approximate Ordnance Survey grid reference E374261, N803605.

2.4.51 The temporary compound will be used to accommodate construction facilities including site offices and meeting rooms, staff welfare facilities, storage and laydown areas for construction vehicles, plant, equipment, turbine components, other materials and aggregate recycling. The compound will also provide sufficient parking for the on-site personnel, deliveries and visitors.

2.4.52 There will be a sealed bunded area where fuel and oil storage tanks will be situated, to prevent potential contamination. In accordance with SEPA guidance the bunded area will be situated a minimum of 50 m from any watercourse to reduce the risk of pollution entering watercourses.

2.4.53 Depending on the time of year and the stage of the construction programme, temporary downward lighting may be required at the temporary compounds and at work areas during working hours for health & safety of personnel. It is not anticipated that will be required outside of working hours.

2.4.54 A typical layout of a temporary compound is presented in **Figure 2.12a** and **12b**.

Signage

2.4.55 There would be a requirement for signage at the Proposed Development to provide safe day-to-day navigation, for emergency vehicles to navigate to emergencies, should they arise, as well as aid the development of comprehensive risk assessment for those visiting and using the site.

Habitat Management & Biodiversity Enhancement

2.4.56 To deliver significant biodiversity enhancement, an Outline Biodiversity Enhancement and Management Plan (BEMP) will be implemented during the construction and operation phases that will amongst other things, provide for enhancement and restoration of blanket bog within areas showing more severe signs of erosion and within reasonable distance of Proposed Development infrastructure. Refer to **Chapter 8: Ecology Assessment** and **Technical Appendix 8.5: Outline Biodiversity Enhancement and Management Plan** for further details.

Construction & Reinstatement

2.4.57 Construction of the Proposed Development will consist of the following key construction activities:

- ground investigation;
- construction of the site entrance from the B977;
- construction of the temporary compounds;
- construction of the access tracks, including passing places, turning heads, junctions, utilities crossings, drainage and water crossing;
- extraction of stone from borrow pits;
- construction of the substation compound;
- construction of the BESS compound;
- construction of the turbine foundations;
- construction of crane hardstands;
- excavation of trenches and laying of cabling adjacent to the access tracks connecting the turbines to the substation compound;
- delivery and erection of turbines;
- testing and commissioning of site equipment including turbines; and
- site restoration.

Site Entrance

2.4.58 The construction method for the site entrance would generally be as follows:

- Traffic management to be installed;

- Topsoil shall be removed and carefully stockpiled;
- New drainage shall be installed taking care to ensure that existing drainage will not be compromised;
- Road pavement works to be completed to the design requirements; and
- Line marking, signage, fencing, visibility splay clearance and vehicle restraint systems required as part of the design will be installed.

Working of Borrow Pits

2.4.59 Excavation of material from the borrow pits will be carried out using standard quarrying techniques, which may include blasting and mechanical excavation.

2.4.60 The general methodology set out below for careful management of the borrow pit will be adhered to in order to minimise potential environmental impacts.

2.4.61 A Borrow Pit Management Plan will be agreed with SEPA and the planning authorities prior to the commencement of construction. Provisions for the control of surface run-off during and post construction and the re-vegetating of working faces post construction will be included.

2.4.62 As a worst case, it is anticipated that blasting may occur up to 2-5 times a week for the first six months, before tapering off and becoming less frequent. Blasting operations will be included as part of the Borrow Pit Management Plan.

2.4.63 Appropriate dust suppression at the borrow pits and any materials storage areas will be provided as required.

2.4.64 Once operations are sufficiently underway, restoration will take place progressively behind the working area to encourage revegetation. This will minimise any impact to the surrounding environment by minimising the working area at any point.

2.4.65 An Outline Borrow Pit Management Plan is provided as **Technical Appendix 2.2**.

2.4.66 **Construction of Excavated Tracks, Hardstands and Compounds**

2.4.67 The construction method for excavated tracks, hardstands and compounds would generally be as follows:

- The topsoil will be excavated and stored to one side for reuse during the reinstatement of the structure;
- Excavation will be undertaken to competent material. Excavated subsoil material may be stockpiled temporarily adjacent to the excavation for later use as backfill or stored elsewhere on the site. Temporary and permanent drainage shall be installed at the same time as the excavation works for the structure;
- In the case where competent material is lower than the required formation level the foundation will likely be over-excavated to competent material and compacted engineering fill placed to the required formation level;
- Where excavation is required to extend below the water table or in material which does not drain freely, appropriate pumping will be employed to keep the excavation dry. Water pumped from an excavation shall not be discharged directly to any watercourse;
- If ground conditions dictate, a geotextile membrane will be applied;
- Crushed stone will be placed and compacted in layers to achieve the required structural dimensions;
- For the compounds, ducting and reinforced concrete foundations will be constructed at the required design level;
- Prefabricated buildings and electrical equipment will be delivered to site and lifted into place;
- Drainage will be excavated adjacent to the structures where required. Surface water runoff will not be allowed to discharge directly into existing watercourses but will be routed through a sustainable drainage system (SuDS) in accordance with the Pollution Prevention Plan. An Outline Pollution Prevention Plan is included as part of the outline CEMP, refer to **Technical Appendix 2.1**;
- A surface water cut off ditch may be installed on the slope above the earthworks footprint where achievable given the topography; and
- Depending on depth and type of material, cut slopes are anticipated to be between 1:1 to 1:3.

Construction of Floated Access Tracks

2.4.68 Floated access track construction may be adopted where the ground conditions dictate. This system involves installing a geosynthetic reinforcement directly onto the organic vegetated layer and placing layers of crushed stone and additional geosynthetic reinforcement (if required by the design) above. If ground conditions dictate, a geotextile membrane may also be applied. The proposed areas of floating track are indicated on **Figure 1.2**.

Installation of Cabling

2.4.69 The cable trench construction and installation method would generally be as follows:

- Trenches will be excavated and a suitable bedding material placed for which to lay the cables upon;

- The cables shall be laid directly onto the bedding material and spaced according to the design;
- The trench will then be backfilled and compacted with suitable material up to the required level and finished with a layer of topsoil to aid in the trench reinstatement;
- A suitable marking tape will be installed between the cables and the surface; and
- The cables will terminate at each turbine and at the substation compound.

Construction of Wind Turbine Foundations

- The gravity type foundation construction method would generally be as follows:
- The topsoil will be excavated and stored to one side for reuse during the reinstatement round the finished foundation;
- Excavation will be undertaken to competent material. Excavated subsoil material may be stockpiled temporarily adjacent to the excavation for later use as backfill or stored elsewhere on the Proposed Development. Temporary and permanent drainage shall be installed at the same time as the excavation works for the foundation;
- In the case where competent material is lower than the required formation level the foundation will likely be over-excavated to competent material and compacted engineering fill placed to the required formation level;
- Where excavation is required to extend below the water table or in material which does not drain freely, appropriate pumping will be employed to keep the excavation dry. Water pumped from an excavation shall not be discharged directly to any watercourse;
- A layer of concrete blinding will be laid directly on top of the newly exposed formation, finished to ensure a flat and level working surface;
- Steel reinforcement, the turbine anchorage system and cable ducts will be fixed in place and formwork erected around the steel cage;
- Concrete will be placed using a crane, pump or other suitable lifting device and compacted using vibrating pokers;
- The foundation will be backfilled with suitable material, and landscaped using the topsoil set aside during the initial excavation; and
- A maintenance path will be built leading from the access track or crane hardstand to the turbine door or access steps and around the turbine for maintenance.

2.4.70 The piled type foundation construction method would generally be as follows:

- The topsoil will be excavated and stored to one side for reuse during the reinstatement round the finished foundation;
- A suitable level piling platform will be constructed which will likely consist of compacted stone designed to comply with the requirements of the piling rig being used;
- Formation of the pile shaft will be achieved by rotary methods to the required depth and embedment in the competent soils or bedrock. Any spoil produced shall be removed and stored at the selected location within the site. Depending on the selected piling technique, it may be necessary to insert temporary casing into the ground to support the pile bore;
- Delivery and placement of the concrete into the pile bore will be undertaken using a concrete pump;
- The pile reinforcement cage may be installed before or after the concrete placement depending on the selected technique;
- On completion of all the piles within a wind turbine foundation, the piling rig and ancillary equipment shall be moved to the next turbine location as required; and
- A reinforced concrete pile cap, connected to the piles below, would then be constructed in much the same manner as the gravity type foundation.

Erection of Turbines

2.4.71 The following general steps will be undertaken in order to erect the turbines:

- Some components will be pre-delivered in sections and offloaded at the crane hardstands;
- The remaining components will be delivered on a just-in-time basis and be lifted directly from vehicle trailers;
- Components will be lifted by adequately sized cranes (one main crane and one smaller assist crane) and positioned on the foundations / other sections until the entire turbine is erected;
- Upon completion of the erection all fasteners will be tightened and the internal fit out of the turbine undertaken;
- The turbines will then be connected to the substation compound; and
- Turbine testing and commissioning will be undertaken before the turbines will be handed over as complete.

Reinstatement

2.4.72 Following construction, areas of the site will be reinstated. The anticipated type and extent of reinstatement is outlined below and full details would be provided in a CEMP pre-construction.

2.4.73 Where a re-turfing method is appropriate, such as along access track verges, the surface layer of soil and vegetation will be stripped and stored separately from the lower soil layers and replaced as intact as possible once construction is complete.

2.4.74 Local restoration will be carried out to retain the structure and composition of the original plant communities, as well as forming a stable area over reformed ground, thus reducing erosion by rain, run-off and wind.

2.4.75 Bare soil areas will be allowed to re-vegetate naturally in combination with reseeding using a low density (~20 kg per hectare) seed mix which mirrors local vegetation to help bind the soil more quickly.

2.4.76 The site entrance, access tracks, hardstands and compounds are required throughout the operation of the Proposed Development to permit access for maintenance and repair operations. They will also be necessary to allow access during the decommissioning stage. Generally, the sloping verges of access tracks, hardstands and compounds will be dressed with site sourced turf or seed bank material. If suitable material is generated during the construction of the structure, this material can be used to form a low-lying screening verge along the downhill side of the structure. This will assist in reducing the visibility of the structure. Further detail is provided in **Technical Appendix 10.2:** Peat Management Plan.

2.4.77 The temporary construction compounds will be reinstated into the surrounding landscape and restored to its original condition. The enabling works compound will be retained as public car parking during operation. **Figure 2.13** provides the layout of the temporary enabling works compound / permanent public car park during operation.

2.4.78 It is essential that the access track width is retained during the operation of the Proposed Development to allow occasional crane access if required, hence no works to reduce the access track width, post turbine erection, are proposed.

2.4.79 Cable trenches would be similarly reinstated. Where practicable, vegetation over the width of the cable trenches would be lifted as turves and replaced after trenching operations to reduce disturbance.

Micrositing

2.4.80 Micrositing allows the locations of the turbines and infrastructure to be modified post-consent within specified parameters, following detailed ground investigation and ground clearance. Through industry experience, a micrositing allowance of up to 100 m is considered appropriate for turbines and associated infrastructure, subject to certain conditions, such as ensuring buffers from watercourses are maintained.

The assessments within this EIAR accounts for the potential micrositing of the turbines and associated infrastructure and it does not alter the conclusions formed as to worst case effects. No micrositing will be undertaken which results in an increase in the significance of adverse effects.

Construction Programme

2.4.81 Construction of the Proposed Development is estimated to last 18-24 months. An indicative programme for the construction activities of the Proposed Development is shown in **Table 2.3**.

Table 2.3: Indicative Programme

Month	Mobilisation	Site Entrance & Access Tracks	Crane Hardstand	Turbine Foundations	Substation & BESS	Cable Installation	Turbine Deliveries	Turbine Erection	Demobilisation & Operational Take Over
1	■	■							
2	■	■	■						
3		■	■						
4		■	■						
5		■	■	■					
6		■	■	■	■				
7		■	■	■	■				
8			■	■	■				
9				■	■				
10				■	■				
11				■	■	■			
12					■	■			
13					■	■			
14					■	■	■	■	
15					■	■	■	■	
16					■	■	■	■	
17								■	
18								■	
19								■	■
20									■
21									■
22									■
23									■
24									■

Construction Hours

2.4.82 In general, working hours for construction will be from 07:00 to 19:00 Monday to Saturday. No working is proposed on Sundays or public holidays except for the following exceptions.

2.4.83 Exceptions to the proposed working hours will be made for foundation pours and turbine erection. Concrete pouring for an individual wind turbine foundation must take place continuously and so activity will only cease when the pour has been completed. Turbine erection can only occur during periods of low wind speeds and so to minimise the construction programme, lifting operations may need to be scheduled outwith the above hours. In addition, it may be necessary to complete a particular lifting operation to ensure the structure is left safe.

Environmental Management

Construction Environmental Management Plan

2.4.84 A Construction Environmental Management Plan (CEMP) will be prepared prior to the start of construction, detailing measures to avoid or mitigate potential effects associated with key construction activities. These will reflect and expand upon measures identified in the EIAR, and will be agreed with the planning authorities, SEPA, NatureScot and other stakeholders where appropriate. An Outline CEMP is provided as **Technical Appendix 2.1**.

2.4.85 The CEMP will, as a minimum, include details of:

- design philosophy and construction methodologies;
- surface and ground water management;
- water quality monitoring;
- flood risk management;
- private water supply management;
- waste and resource management;
- wastewater and water supply monitoring and control;
- sound and vibration control;
- control of dust and other emissions to air;
- spoil management;
- peat slide monitoring and control;
- oil and chemical delivery and storage;
- temporary lighting management;
- existing on-site utilities management;
- construction traffic management;
- health and safety management;
- post construction reinstatement;
- public liaison provision; and
- outline decommissioning and restoration methodologies.

2.4.86 The CEMP will typically contain the following supporting documents:

- Pollution Prevention Plan;
- Peat Management Plan;
- Construction Traffic Management Plan;
- Site Waste Management Plan;
- Borrow Pit Management Plan;
- Outdoor Access Management Plan; and
- Water Quality Monitoring Plan.

Pollution Prevention Plan

2.4.87 CAR dictates that a Construction Site License will be required from SEPA for the Proposed Development prior to commencement of construction. To make this application it is proposed that a Pollution Prevention Plan (PPP) would be prepared. Once approved by SEPA it would act as a supporting document to the CEMP. An Outline Pollution Prevention Plan is included with the outline CEMP provided as **Technical Appendix 2.1**.

Peat Management Plan

2.4.88 Prior to construction of the Proposed Development a detailed ground investigation will be carried out. This will allow for a post consent update of the Peat Management Plan (PMP), following the principles set out in the draft Peat Management Plan provided as Technical **Appendix 10.2.**

Construction Traffic Management Plan

2.4.89 As detailed in **Chapter 11: Access, Traffic and Transport Assessment**, a Construction Traffic Management Plan (CTMP) would be developed to ensure road safety for all users during transit of loads to the Proposed Development. The CTMP would outline measures for managing convoys of construction vehicles on public roads and would set out procedures for liaising with the emergency services to ensure that police, fire and ambulance vehicles are not impeded by the loads. The CTMP would be developed in consultation with the planning authorities, the police, Transport Scotland and the local community and agreed with Aberdeenshire Council before deliveries to the Proposed Development commence.

Site Waste Management Plan

2.4.90 The Proposed Development would produce small amounts of general, municipal and hazardous waste during its construction, operation and decommissioning. A Site Waste Management Plan (SWMP) would be put in place to ensure waste generated from the Proposed Development is kept to a minimum and does not have a significant cumulative impact on local waste management infrastructure.

Borrow Pit Management Plan

2.4.91 Prior to construction of the Proposed Development a detailed ground investigation will be carried out. This will allow the applicant to confirm suitability of the proposed borrow pits and update the Borrow Pit Management Plan (BPMP). An Outline Borrow Pit Management Plan is provided as **Technical Appendix 2.2**.

Outdoor Access Management Plan

2.4.92 Prior to construction of the Proposed Development an Outdoor Access Management Plan (OAMP) will be prepared in liaison with Aberdeenshire Council. It will detail the maintenance of safe public access routes on and around the site during construction and long-term public access during the operation of the Proposed Development.

Water Quality Monitoring Plan

2.4.93 A Water Quality Management Plan (WQMP) will be prepared following receipt of planning consent. The plan will detail proposed monitoring locations, monitoring frequency and analytical parameters based on the findings of the EIAR and any subsequently submitted documents / information. The plan will also include trigger / action levels and outline protocols and procedures required in the event of an incident.

Ecological Clerk of Works

2.4.94 An Ecological Clerk of Works (ECoW) would be appointed to undertake site surveys, monitor the construction activities and report to both the Applicant and planning authorities of any incidences. The ECoW will monitor compliance with the CEMP and any other environmental documentation required by planning condition. The ECoW would liaise closely with the Applicant and principal contractor, providing expert advice to help rectify any potential environmental matters that arise during the construction phase.

2.5 Operational Phase

2.5.1 Once operational, the Proposed Development is unlikely to be permanently staffed, and it is envisaged that the amount of traffic associated with the Proposed Development will be minimal. Traffic generated will comprise routine maintenance and service team visits, together with the occasional need for more extensive maintenance or repair. Turbine operations will be overseen by suitably qualified contractors.

2.5.2 Routine maintenance and servicing will take place two to four times per year. Servicing will include the performance of tasks such as adjustment of blades, inspection of blade tip brakes and inspection of welds in the tower. Other visits to the site will take place more frequently to ensure that the turbines are operating at their maximum efficiency. In the event of any unexpected events on-site appropriate repair works will be carried out.

2.5.3 The vehicle used for the majority of these visits is likely to be a small four-wheel drive vehicle, although there may be an occasional need for an HGV or crane to access the site for heavier maintenance and repairs.

2.5.4 Ongoing access track maintenance will generally be undertaken in the summer months when access tracks are dry. Safe access will be maintained all year round.

2.5.5 The Proposed Development would have a sophisticated overall Supervisory Control and Data Acquisition system (SCADA) that would continually interrogate each of the turbines and the high voltage (HV) connection. If a fault were to develop which required an operator to intervene then the SCADA system would make contact with duty staff via a mobile messaging system. The SCADA system can be interrogated remotely. The SCADA system would have a feature to allow a remote operator to shut down one, some or all of the turbines.

2.5.6 An operator will be employed to monitor the turbines, largely through remote routine interrogation of the SCADA system. The operator will also look after the day-to-day logistical supervision of the Proposed Development and would be on-site intermittently.

2.5.7 If a fault should occur, the operator would diagnose the cause. If the repair warranted the Proposed Development being disconnected from the grid network then the operator would make contact with the TO. However, this is a highly unlikely occurrence as most faults can be rectified without reference to the grid network. If the fault was in the electrical system then the faulty part or the entirety of the Proposed Development would be automatically disconnected.

2.5.8 Signage will be placed on the Proposed Development giving details of emergency contacts. This information would also be made available to the local police station and the TO.

2.6 Decommissioning Phase

2.6.1 In the event of decommissioning, or replacement of the turbines, it is anticipated that, in general, the environmental effects would be similar to, or less than, that expected during construction. Decommissioning would be undertaken in line with best practice processes and methods at that time and will be managed through an agreed CEMP.

2.6.2 Decommissioning will involve the following:

- dismantling and removal of turbines and electrical equipment;
- restoration of the turbine areas, hardstands and access tracks; and
- dismantling and removal of the substation and BESS compounds.

2.6.3 Turbine components and electrical equipment will be dismantled and removed in a similar manner to their delivery and erection. The turbines will be split into sections which will then be transported from the site by HGVs unless the components are sold on, in which case, they will be removed as AILs. Turbine components will be cut up off-site in controlled environments ready for reuse, recycling or appropriate disposal.

2.6.4 The removal of the top of the turbine foundation will be undertaken requiring an excavated trench around the upstand to provide a working area. Breakout of the top part of the upstand will be undertaken using an excavator mounted jack hammer. The cables will be cut level with the remaining concrete. Once the broken-out concrete has been removed, the area will be reinstated by backfilling with topsoil / peat.

2.6.5 The cables will be left in place to avoid unnecessary ground disturbance.

2.6.6 The CEMP will be updated as required to ensure best practice is adopted during decommissioning of the Proposed Development.

2.6.7 An assessment of the decommissioning of the Proposed Development has not been undertaken as part of the EIA as:

- the future baseline conditions (environmental and other developments) cannot be predicted accurately at this stage; and
- the proposals for refurbishment / decommissioning are not known at this stage.

2.7 Health and Safety

Construction Phase

2.7.1 The construction site would be managed and operated in accordance Health and Safety at Work etc. Act 1974 and comply with relevant Health and Safety Regulations, including:

- The Management of Health and Safety at Work Regulations 1999;
- Electricity Safety, Quality and Continuity Regulations 2002; and
- Construction (Design and Management) (CDM) Regulations 2015.

2.7.2 In awarding any civil, electrical or other contracts for the construction of the Proposed Development the appointed contractor is obligated by law to follow the CDM Regulations implemented by the Health and Safety Executive (HSE). These are based on standard procedures that are adapted to take account of all site specific requirements. The CDM Regulations require due consideration is given to construction workers and the public, with risk assessments and method statements created to cover all risks identified including access rights across the site.

2.7.3 The Applicant will appoint a Principal Designer to ensure all the CDM Regulations are correctly implemented, and to compile a Health and Safety File, which would be used in the operational phase of the Proposed Development. Additionally, a representative from the Applicant would be at the Proposed Development during the construction period. This person would be empowered to halt any or all construction works if they believe correct health and safety procedures are not being adhered to. Similar procedures for site workers, visitors and civilians must be drawn up for the operational phase. The HSE can investigate safety aspects of the Proposed Development and visit at any time if they have concerns.

Public Safety

2.7.4 Throughout the construction phase of the Proposed Development, the relevant statutory requirements would be adhered to. All potentially hazardous areas would be fenced off and all unattended machinery will be stored in the temporary construction compound or immobilised to prevent unauthorised use. In addition, signage will be placed at each possible entrance to the Site and in areas where there may be further danger, for example around open borrow pits.

2.7.5 Throughout construction, measures to manage diversion routes would be agreed with the relevant authorities. The diversion routes would be clearly marked and for safety reasons would direct the user away from any areas of construction. It is

proposed that further details would be provided in an Outdoor Access Management Plan post consent.

2.7.6 Although members of the public have the right to roam land in Scotland under the Land Reform (Scotland) Act 2003 there will be restricted access around the Proposed Development during the construction phase for health and safety purposes.

Operational Phase

2.7.7 Wind farms have a proven track record for safety. A very small number of turbines have been known to suffer mechanical damage through lightning strikes or mechanical failure. Experience on operational wind farms has shown that allowing the public to access an operating wind farm does not lead to a compromise with respect to safety issues.

2.7.8 Companies supplying products and services to the wind energy industry operate to a series of international, European and British standards. A set of product standards for wind energy equipment has been developed by the International Electrotechnical Commission - IEC 16400. There are a number of British Standards that correspond to it, for example; BS EN 61400-1 ed3.0: 2005 “Wind turbines – Part 1: Design requirements”.

2.7.9 The Applicant will commit to installing turbines and components that meet BS EN 61400-1 ed3.0.

2.7.10 Public access to the site after construction has been completed would be returned, although with some specific improvements to footpath infrastructure to facilitate public access which have been proposed as part of the Proposed Development. Appropriate warning, directional and identification signs for the purposes of health & safety would be installed on the turbines, transformers and at the substation and BESS compounds. Access to these would be restricted to wind farm personnel. At all times these facilities will be locked. Additionally, safety and/or directional signs will be placed at strategic points across the site, particularly on the public routes to inform members of the public that they are entering a wind farm, to make them aware of potential hazards and provide direction for emergency services should the need arise. Any signage would be agreed with the relevant authorities prior to installation. It is proposed that further details would be provided in an Outdoor Access Management Plan post consent.

2.7.11 No resulting safety risks are expected as a result of public access to the Proposed Development. Turbine models being considered for the site would operate automatically and have sensors to detect any instabilities or unsafe operation during high wind speeds. Should sensors placed within the nacelle and tower of the turbine detect any other malfunction in operation or should wind speeds increase over maximum operational thresholds, the brakes would be automatically applied in order to rapidly shut the turbine down.

2.7.12 Blade icing in Scotland is likely to be a rare occurrence, therefore icing conditions are expected to be benign. The design of the Proposed Development has taken into account the possibility of ice throw occurring and turbines have been sited in locations to ensure that the rotor blades do not oversail any public roads to minimise the risk from ice fall. To further minimise the risk, public notices will be displayed at new and existing access points to the site, alerting members of the public and staff accessing the site of the possible risk of ice throw under certain weather conditions.

2.7.13 If the cause of the shutdown was high wind speeds, then the turbine would automatically begin operation once the average wind speed reduced to within operational levels. Under other causes of shutdown, e.g. through malfunction, the turbine would remain shut down and in a safe condition (i.e. commonly with the blades orientated 90° to the wind direction) until restarted by wind farm personnel following satisfactory investigation. This procedure ensures safe operation of turbines to protect members of the public walking, cycling or riding past turbines during the operational phase. In addition, the vibrometers in the nacelles would detect rotor imbalance in blades caused by icing and the turbine’s control and monitoring system would shut the turbines down under these conditions. The turbines are also equipped with lightning protection equipment so that strikes would be conducted from the nacelle down the tower into the earth.

2.8 Conclusion

2.8.1 This chapter has set out a description of the Proposed Development and provided details of the activities that would be undertaken throughout the construction, operation and decommissioning phases of the Proposed Development.

2.9 References

NatureScot (2019). Guidance – Good Practice during Wind Farm construction. Available at: https://www.nature.scot/doc/guidance-good-practice-during-wind-farm-construction