# 3. Description of the Proposed Development

## 3.1 Introduction

3.1.1 Paragraph 1 of Schedule 4 of the EIA Regulations states that the scheme description should include:

*a.* "*A description of the location of the development;*

*b.* *A description of the physical characteristics of the whole development, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases;*

*c.* *A description of the main characteristics of the operational phase of the development (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used;*

*d.* *An estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation, and quantities and types of waste produced during the construction and operation phases).*"

3.1.2 These requirements are addressed in the sub-sections below.

## 3.2 Development Description

### Site Location

3.2.1 The Development Site is located approximately 6km south-west of the settlement of New Cumnock and approximately 9km to the east of Dalmellington in East Ayrshire (see Figure 1.1). It is centred at coordinates E258250, N606680. The Development Site boundary encompasses an area of approximately 128 hectares (ha), although the wind farm infrastructure would occupy approximately 1.6ha of this. For descriptive purposes, the 'main' part of the Development Site, where the turbines and most of the associated infrastructure would be located, is to the west and this is connected to Afton Road in the east by an existing access track through Pencloe Forest.

3.2.2 The derelict Monquhill Farmhouse is located within the Development Site. The nearest residential property to the Development Site is Brockloch, which is located at Rough Hill adjacent to the B741 Road. Brockloch is located approximately 3.2km to the North of the main part of the Development Site and approximately 4.2km from the nearest turbine.

### Existing Site and Surroundings

3.2.3 Access to the Development Site is via an existing track off Afton Road to the east of the site and then following an existing access track through Pencloe Forest.

3.2.4 The topography of the Development Site ranges between 230m-531m Above Ordnance Datum ('AOD') with the summit of Strandlud Hill located in the main part of the

Development Site and Meikle and Auchincally Hills located close to the access track to the east.

3.2.5 Open moorland used for grazing lies to the north of the Development Site, where the site of the consented Enoch Hill Wind Farm is situated. The consented Pencloe Wind Farm is located to the east, and the operational Brockloch Rig (formerly Windy Standard and Windy Standard Extension Wind Farms) is approximately 1.3km to the south. The Carsphairn and Pencloe forests surround the west, south and east of the Development Site.

## Development Proposals

3.2.6 The Proposed Development comprises the infrastructure listed within **Table 3.1** and shown on **Figure 3.1a** and **Figure 3.1b**. and would have an operational life of 35 years.

### Table 3.1 Key Features of the Proposed Development

| Component | Description |
|---|---|
| **Wind Turbines** | Number: up to 2 (see **Table 3.2** for location coordinates).<br>Turbine Heights up to 149.9m to blade tip.<br>Installed capacity: up to 5MW (per turbine) |
| **Turbine Foundations** | Number: up to 2 |
| **Turbine Crane Pads** | Number: up to 2 |
| **Auxiliary Turbine Crane Pads** | Number: up to 4 |
| **Blade Laydown Areas** | Number: up to 2 |
| **Control Building and Substation Compound**[5] | Location: Approximately centred on coordinates: E 259191, N 606917 |
| **Battery Storage Compound** | Installed capacity: up to 11MW (1 hour)<br>Location: Approximately centred on E 259155, N 606890 (Located on a 0.25ha area vacated by temporary construction compound) |
| **Access Tracks (including turning heads[6] and junctions)** | Length: approximately 8km (i.e., approximately 2km of new tracks & 6km of upgraded existing tracks).<br>Running Width: up to 6m (wider on bends). |
| **Passing Places** | Number: estimated 16<br>Indicative dimensions: 30m in length, up to 3m wide |

[5] This will include infrastructure required to provide a point for a connection to be constructed by Scottish Power Energy Networks (SPEN) to the 132/33kV substation to be located at the consented Enoch Hill Wind Farm. The connection between the control building of the Proposed Development and the consented Enoch Hill Wind Farm SPEN substation would be by overhead line. Permission for this would be sought through a separate application submitted under Section 37 of the Electricity Act 1989.

[6] Minor infrastructure not shown on Figure 3.1 due to scale.

| Component | Description |
|---|---|
| | |
| **Watercourse Crossings (shown on Figure 13.6)** | Number: Up to 6 culverts (comprising one new culvert and five upgrades, as detailed in **Table 13.11**) |
| **Temporary Construction Compound** | Location: Approximately centred on coordinates E 259138, N 606872. |
| **Cable Trenches** | Cables will be installed alongside access tracks. (Indicative dimensions are: 1m depth and up to 1.2m width). |
| **Micrositing Allowance** | 50m for wind turbines, battery storage facility and all new associated infrastructure. |

## Wind turbines

### Turbine Layout

3.2.7 The layout of the Proposed Development has taken account of the findings of environmental and engineering studies, including desktop studies, field visits, peat depth surveys, planning designations and wind yield analysis (as noted in **Chapter 2 - Site Selection and Design Evolution**). It is illustrated within **Figure 3.1-A** and **Figure 3.1-B**. The turbine locations are presented in **Table 3.2**.

**Table 3.2 Wind Turbine Locations**

| Component | Location |
|---|---|
| **Turbine 1** | E 258449, N 606402 |
| **Turbine 2** | E 258032, N 605796 |

### Wind Turbine Parameters

3.2.8 A number of turbine models would be suitable for installation at the Proposed Development. The final choice of turbine will depend upon technical and commercial considerations and will be decided by the Developer following planning consent.

3.2.9 **Figure 3.2** shows the structure of a typical wind turbine. This is a typical modern horizontal axis, upwind design comprising four main components: a rotor (consisting of a hub and three blades), a nacelle (containing the generator gearbox) to which the rotor is mounted, a tower, and a foundation. Turbines will be fitted with Ministry of Defence (‘MoD’) accredited infrared aviation safety lighting to safeguard general use of the area by military aircraft during operation (refer to **Chapter 8 – Aviation**).

3.2.10 A transformer / switchgear, located within the nacelle or tower of the turbine, or immediately adjacent to it in a small kiosk (typically 5m x 3m x 3m, such that they are generally indistinct from the tower base unless viewed close up or in silhouette against the skyline at greater distances), steps up the voltage to 33kV; power from the turbines at this voltage is fed to the control building via underground electrical cabling. For the purpose of the Proposed Development, it is assumed that external kiosks will be required.

3.2.11 The electricity generated by the Proposed Development will be metered and fed into the electricity transmission system to which it will be connected. The Proposed Development will be connected into the transmission system at 33kV.

3.2.12 This EIA Report has been undertaken using the maximum turbine parameters shown in **Table 3.1**, with which the final turbine used must comply.

## Infrastructure Layout

### Crane Pads

3.2.13 Each proposed wind turbine requires an area of hardstanding to be built adjacent to the turbine foundation. This provides a stable base on which to lay down turbine components ready for assembly and erection, and to site the cranes necessary to lift the tower sections, nacelle and rotor into place. A typical crane hardstanding is shown in **Figure 3.4**.

3.2.14 The crane hard standings will be left in place following construction, to allow for future use of similar plant, should major components need replacing during the operation of the Proposed Development. These pads could also be utilised during decommissioning. The total area of hardstanding at each turbine location will be approximately 1,710m$^2$ (excluding blade fingers that will be dressed back once construction is complete).

### Temporary Construction Compound and Laydown Area

3.2.15 One temporary main site compound will be constructed for the Proposed Development. An area measuring 100m x 50m has been allowed for the compound which will be enclosed by appropriate security fencing. The indicative location of the construction compound is shown on **Figure 3.1A & B**, and a typical compound configuration is shown in **Figure 3.5**.

3.2.16 The construction compound area will be constructed of compacted stone to approximately 500mm depth depending on ground conditions.

### Control Building and Substation Compound

3.2.17 A control building and substation compound will be proposed, and its location is shown on **Figure 3.1A & B**.

3.2.18 One control building will be constructed for the Proposed Development that will house switchgear, metering, protection and control equipment, Direct Current (‘DC’) battery power supply unit, Low Voltage (‘LV’) auxiliary supply and distribution consumer unit as well as welfare facilities. The control building will comprise a single storey building measuring approximately 20m x 10m and have a maximum height of 6m. The control building shall be located within the control building compound, which will be enclosed by appropriate security fencing. Attached to the control building will be a secure steel palisade fenced compound, consisting of a hardstanding for the auxiliary transformer. There will also be allocated areas used for storage and maintenance purposes.

3.2.19 The control building and substation compound will include an area allocated to a small external substation, which would accommodate an auxiliary transformer (if required). **Figure 3.7** provides an illustration of the control building and substation compound (indicative footprint of ~0.14ha). Final details including external finishes and screen planting will be agreed with East Ayrshire Council (‘EAC’).

3.2.20 The main compound area will be constructed of compacted stone to approximately 500mm depth depending on ground conditions. The control building will be founded on a concrete foundation and elevated from the surrounding surface.

3.2.21 The turbines will be connected through suitable switchgear to be installed in the control building on-site.

3.2.22 The Proposed Development will ultimately connect to the substation of the Consented Enoch Hill Wind Farm. Transmission System Operator (‘TSO’) for the area, SPEN, will construct the infrastructure to connect between the control building of the Proposed Development and the Consented Enoch Hill Wind Farm SPEN substation. This would be by overhead line. Permission for this would be sought through a separate application submitted under Section 37 of the Electricity Act 1989.

## Battery Storage Compound

3.2.23 One battery storage compound will be constructed for the Proposed Development. An indicative area measuring approximately 50m x 50m has been allowed for the compound which will be enclosed by appropriate security fencing. The area used will be a vacated portion of the area previously allocated for the temporary construction compound. The indicative location of the construction compound is shown on **Figure 3.1A & B**, and a typical battery compound configuration is shown in **Figure 3.8**. Final details, including screen planting and any bunding necessary, will be agreed with EAC. The battery storage system will be installed once the main civil works and wind turbine installation process is completed.

3.2.24 The battery storage equipment shall comprise up to four containerised inverters, up to four battery control and fire panels, up to 32 battery modules and an auxiliary transformer. The battery modules are liquid cooled and installed with fire a detection and aerosol fire extinguishing system. The associated battery modules, panels and transformer would be enclosed by a 2.4m high perimeter fence with a low visibility style and colour.

3.2.25 The battery storage compound shall be constructed of compacted stone to approximately 500mm depth, depending on ground conditions. The energy storage equipment will be founded on concrete plinths and elevated from the surrounding surface by a height of approximately 400mm.

3.2.26 Underground cables will link the battery storage facility to the on-site control building. The details of the construction and trenching specification will be the same as for the turbine cables.

## On-site Electrical Connections

3.2.27 Wind turbines generally produce electricity at 690V which is typically transformed to 33kV via the turbine transformers. As previously stated, the turbine transformer may be located inside the turbine tower, or nacelle, or it may be installed in a small external kiosk located adjacent to the turbine.

3.2.28 Underground cables will link the turbines to the on-site control building. Detailed construction and trenching specifications will depend on the ground conditions encountered at the time, but typically cables will be laid in a trench approximately 1m deep and up to 1.2m wide. Cables will be laid in coarse sand or other granular material, and the trenches will then be backfilled with excavated soil/peat and sub-soil which has been sieved and graded to remove stones. **Figure 3.6** shows a typical cable trench. Approximately 1.8km of cable trench will be required.

3.2.29 To minimise ground disturbance, cables will be routed alongside the access tracks wherever practicable. Approximately 3.5km of 33kV underground cable will be required on-site to connect the turbines and the control building.

## Micrositing

3.2.30 Micrositing refers to the precise locating of wind farm infrastructure following more detailed ground investigations that would be carried out post consent. This allows the location of infrastructure to be revised within a specified distance in response to the findings of the more detailed ground investigations that would be carried out as part of the preparations for construction.

3.2.31 Any such repositioning will be limited so as not to involve encroachment into any environmentally or technically constrained areas. In addition, micrositing provides scope to mitigate potential geo-environmental and geotechnical constraints which may only be identified during detailed site investigation works or preparatory ground works. The following can potentially be achieved through carefully designed micrositing:

- Reduction of peat disturbance;
- Avoidance of the most sensitive habitats;
- Avoidance of need for foundation piling; and
- Avoidance of currently undetected archaeological remains.

3.2.32 Where environmental and technical constraints may fall within a micrositing area, further encroachment on such areas can be restricted in any condition attached to the grant of consent (e.g., micrositing may be restricted in a particular direction if this encroaches upon a buffer around a water course for example).

## On-site Access Tracks

3.2.33 A total of approximately 2km of new on-site tracks and 6km of upgraded on-site access tracks will be constructed.

3.2.34 Owing to the size of some of the turbine components, all on-site access tracks will generally be up to 6m wide, with some additional localised widening required at bends in the track and for passing places to a maximum of approximately 12-14m. It is however noted that tracks are more likely to be 4.5m to 5m wide for most of their length. For the purposes of this EIA Report, a maximum width of 6m has been assumed. Access tracks will be constructed to a depth and quality suitable to bear the load of all envisaged traffic.

3.2.35 The proposed alignment of access tracks was developed initially through desk study and refined following a site visit by Civil Engineers seeking to:

- Minimise the overall track length; and
- Avoid identified constraints (ecologically sensitive areas, areas of deep peat, waterbodies, etc.).

Depending on the ground conditions identified on the Development Site, a range of road construction methods may be used, for example floating roads where peat deeper than 1m has been identified as being present. Based on current knowledge of the Development Site, approximately 500m of floating tracks will be required. Typical road construction is illustrated in **Figure 3.3**.

## Temporary and Permanent Land Take

The indicative temporary and permanent land take is shown in **Table 3.3** (where, “temporary” refers to the area required during construction works, whilst “permanent” refers only to Proposed Development footprint post-construction).

**Table 3.3 Indicative Temporary and Permanent Land Take Areas**

| Component | Indicative Temporary Land Take Areas (ha) | Indicative Permanent Land Take Areas (ha) |
|---|---|---|
| **Turbine Foundations** | 0.36 | 0.18 |
| **Turbine Crane Pads (inc. auxiliary pads)** | 1.05 | 0.35 |
| **Blade Laydown Areas** | 0.25 | N/A |
| **Temporary Construction Compound** | 0.5 | N/A (0.25ha will be used to locate the battery storage compound, so captured in the corresponding row below) |
| **Control Building and Substation Compound** | 0.14 | 0.14 |
| **Battery Storage Compound** | N/A | 0.25 |
| **Access Tracks (including turning heads and junctions)** | 8.5 | 4.73 |
| **Passing Places** | (Accounted for in the access track temporary land take area) | 0.24 |
| **Cable Trenches** | (Accounted for in the access track temporary land take area) | N/A |
| **Staging Area (beside track)** | 0.11 | N/A |
| **Total** | **10.9** | **5.9** |

# 3.3 Proposed Site Access

## Site Entrance

3.3.1 Access to the Development Site is via an existing track off Afton Road to the east of the site and then an existing access track through Pencloe Forest. This track will be upgraded as necessary.

3.3.2 The upgraded access will be used for all phases of the Proposed Development (construction operation and decommissioning). A typical general arrangement for the upgraded junction is shown on **Figure 3.12**.

### Abnormal Loads

3.3.3 Due to the abnormal size and loading of wind turbine delivery vehicles and the crane, it is necessary to review the public roads that will provide access to the Development Site to ensure they are suitable, and to identify any modifications (e.g., widening) required to facilitate access for delivery vehicles.

3.3.4 Access studies incorporating swept path analysis (see **Appendix 14.A** for further information) have been carried out to review potential access routes. The proposed route for abnormal loads (shown on **Chapter 14 – Traffic and Transport** of the EIA Report, **Figure 14.2**) is from the Port of Glasgow, and would follow the designated 'wind farm access route' from the Jura Terminal along Waggon Road. From here the access route would follow the A719, A77, A76, B741 and Afton Road, entering the Development Site at an upgraded junction off Afton Road to the east of the Development Site. As the turbine delivery vehicles are abnormal indivisible loads, a Special Order is required under The Road Traffic Act 1984, which will be obtained prior to any deliveries taking place.

3.3.5 A Construction Traffic Management Plan ('CTMP') will be developed in discussion with EAC, and Ayrshire Roads Alliance following the grant of planning permission and will set out all traffic management measures including any diversions, programming, stacking areas and vehicle movements on and off-site etc. An outline plan which would form the basis of these discussions is presented in **Chapter 14 – Traffic and Transport** of the EIA Report.

### General Construction Traffic

3.3.6 General construction traffic, which would include flatbed trucks and Heavy Goods Vehicles ('HGVs') delivering plant and equipment (e.g., excavators) as well as vans and cars associated with construction staff movement, will also access the Development Site from the east via upgraded access off Afton Road. Prior to Afton Road, the access routes for these vehicles will vary depending on the origin of the contractors and materials (depending on location of any quarries used to source stone).

## 3.4 Construction Process

### Proposed Programme

3.4.1 The Development Site is located in an area of commercial plantation forestry. Prior to the commencement of construction, approximately 12.7ha of tree crop will require felling. Access for tree felling will be via the existing access track that Scottish Forestry currently use for that activity. Details of tree felling are provided in **Appendix 3A**.

3.4.2 The construction period for the Proposed Development would be up to 12 months for the wind farm elements and an additional six months for battery storage facility installation, with a total duration of up to 18 months. It will comprise the following activities broadly listed in sequence:

- Upgrading of the Development Site access point and tracks to the main part of the Development Site;
- Formation of the temporary construction compound including hardstanding and temporary site office facilities;
- Construction of on-site access tracks and passing places (as required), inter-linking the turbine locations and control building/substation compound;

- Construction and upgrade of culverts under roads to facilitate drainage and maintain existing hydrology;
- Construction of crane hard standing areas;
- Construction of turbine foundations;
- Construction of on-site control building/substation compound and infrastructure required to provide a connection point to the SPEN substation located at the consented Enoch Hill Wind Farm;
- Construction of battery compound, which will be a modification to half of the temporary construction compound;
- Installation of battery storage compound and commissioning;
- Excavation of trenches and cable laying adjacent to site roads;
- Connection of on-site distribution and signal cables;
- Delivery and erection of wind turbines;
- Commissioning of site equipment; and
- Development Site restoration (e.g., reinstatement of vegetation at track edges etc.).

3.4.3 Where possible, operations will be carried out concurrently (thus minimising the overall length of the construction programme). In addition, the Proposed Development will be phased such that, at different parts of the Development Site, the civil engineering works can continue whilst the proposed turbines are being erected. Development Site restoration will be programmed and carried out to allow restoration of disturbed areas as early as possible and in a progressive manner.

3.4.4 An indicative programme for construction activities is shown in **Figure 3.9**. The starting date for construction activities is largely dependent upon the date planning permission might be granted (which is outside the Applicant's control), and the grid connection date; subsequently the programme will be influenced by constraints on the timing of delivery and duration of any mitigation measures required, as outlined in the technical chapters of this EIA Report and/or conditions to the planning permission.

3.4.5 The length of the programme will be dependent on seasonal working and weather conditions. Summer months are favoured for construction due to longer periods of daylight allowing longer working days (subject to any restrictions on construction hours). Summer months are generally also drier which aids the construction progress and reduces the amount of site debris (mud etc.) reaching the public road. A watching brief will be maintained on the cleanliness of the public roads, with cleaning carried out by contracted road sweepers (if required). Weather, particularly wind, has a strong influence on the timing of construction activities. Crane lifting activities are generally limited during strong winds (>11 m/s) and erection of cranes and/or turbines during these weather conditions may be avoided for safety reasons. The actual limiting conditions will be reviewed as part of the crane lifting plan. During periods of cold weather, concrete pouring for the turbine bases may be prohibited (temperatures <4°C) and/or subject to specific cold weather working practices.

## Hours of Working

3.4.6 For the purposes of this EIA Report, construction activities have been assumed to take place between 07:00 to 19:00 hours on weekdays (Monday to Friday) and 07:00 to 13:00 hours on Saturdays. Quiet on-site working activities (for example electrical commissioning) have been assumed to extend outside the core working times noted (where required). Working hours may be reduced at times due to seasonal or weather restrictions. Some works such as delivery of the components of turbines may take place outside the core working hours to reduce disturbance to other users of the road network.

3.4.7 Work outside these hours is not usual, though if required to meet specific demands (e.g., during foundation pours and highly weather dependent activities), permission for short term extensions to these hours would be sought from EAC as required.

## Standard Construction Working Practices

3.4.8 Contractors' working areas will be clearly delineated on-site to ensure that no unnecessary disturbance is caused to any potentially sensitive areas.

3.4.9 Particular attention will be given to the storage and use of fuels for the plant on-site. Oil will be stored in accordance with the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) ('CAR Regulations'). Drainage within the temporary construction compound, where construction vehicles will park and where any diesel fuel will be stored, will be directed to an oil interceptor, to prevent pollution in the event of any spillage occurring. Storage of diesel fuel will be within a bunded area or self-bunded tank in accordance with the CAR Regulations and the Scottish Environment Protection Agency ('SEPA') Pollution Prevention Guidelines ('PPGs') and Guidance for Pollution Prevention ('GPP').[7] Standard construction working practices will be implemented during construction, operation and decommissioning in order to ensure adherence to Construction Industry Research and Information Association ('CIRIA') guidance and other current best practice, including the following the PPG and GPP:

- GPP 1 Understanding your environmental responsibilities – good environmental practices;
- GPP 2 Above Ground Oil Storage Tanks;
- GPP 3 Use and Design of Oil Separators in Surface Water Drainage Systems;
- GPP 4 Treatment and Disposal of Sewage Where No Foul Sewer is Available;
- GPP 5 Works and Maintenance in, or near Water;
- PPG 6 Working at Construction and Demolition Sites;
- GPP 8 Safe Storage and Disposal of Used Oils; and
- GGP 21 Pollution Incident Response Planning.

3.4.10 The Proposed Development will be constructed in accordance with a construction site licence under the CAR Regulations ('CAR Licence') which will also contain such documents as the Pollution Prevention Plan to be approved by SEPA.

3.4.11 Due consideration will also be given to the following guidance documents:

- *Good Practice during Windfarm Construction* produced by Scottish Renewables ('SR'), Scottish Natural Heritage ('SNH'), SEPA, Forestry Commission Scotland ('FCS') and others (Version 4, 2019);
- *Control of Water Pollution from Linear Construction Projects* (CIRIA C648, 2006), produced by CIRIA;

[7] The GPP are the documents that replace the former PPGs. At the time of writing, some documents remain PPGs.

- *Constructed Tracks in the Scottish Uplands* 2nd Edition, 2013, updated 2015, published by SNH; and
- *Floating Roads on Peat*, 2010, published by FCE and SNH.

## Health and Safety during Construction

3.4.12 Health and Safety is of vital importance to the Applicant and the requirements of the Construction (Design and Management) Regulations 2015 (CDM 2015) will be observed throughout the construction stage of the Proposed Development. If planning permission is granted, the Principal Contractor will be required to produce a Construction Phase Health and Safety Plan in accordance with CDM 2015 to outline and define the approach to Health and Safety that will be adopted specifically for the Proposed Development. In addition to CDM 2015, the Developer and its Contractors will also adhere to other relevant UK Health and Safety legislation including:

- Health and Safety at Work Act 1974;
- Management of Health and Safety at Work (Amendment) Regulations 2006;
- Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR), (2013); and
- Onshore Wind Health and Safety Guidelines, Renewable UK, 2015.

3.4.13 Method statements will be prepared, and risk assessments undertaken for each work package, prior to activities taking place.

3.4.14 The Developer will directly appoint suitably experienced Contractors for the detailed design, procurement and construction of the Proposed Development. Selection will be based partly upon a Contractors' record in dealing with Health, Safety, Security and Environment ('HSSE') issues and on the provision of evidence that it has incorporated HSSE considerations into its method statements, staffing and budgetary provisions.

3.4.15 The Developer will also appoint a Project Manager for the duration of construction to act as an interface between it and the Contractors. The Project Manager will also monitor the construction works and undertake the duties as defined in the CDM Regulations 2015.

3.4.16 Appropriate signage will be provided on the Development Site to highlight any hazards, areas that should be avoided or where unauthorised entry is prohibited. During the construction phase, public access on-site will be restricted for health and safety reasons.

## Environmental Management during Construction

### Construction Method Statement ('CMS')

3.4.17 The Applicant will engage a Contractor to construct the Proposed Development. During the construction process, the Applicant will retain the services of any specialist advisers that may be required, for example relating to archaeology, ecology, and peat restoration, to be called on as required to advise on specific issues, including micrositing. More detailed information on the role of such specialist advisors during construction is provided in the relevant chapters of this EIA Report.

3.4.18 The final range of measures to be taken to reduce or mitigate the environmental impact of the construction phase will be captured in the Construction Environmental Management Plan ('CEMP'), Pollution Prevention Plan ('PPP'), Site Waste Management Plan ('SWMP') and emergency procedures that will all fall under the wider Construction Method

Statement ('CMS'). The Contractor will employ an independent and appropriately qualified environmental scientist or ecologist as an Environmental Clerk of Works ('ECoW'). The ECoW will be employed on a part time basis during the construction phase and will take a key role in the preparation of the CEMP. The CEMP will ensure that the mitigation measures outlined in this EIA Report are fully implemented and environmental specialists will support the ECoW as required.

3.4.19 The CEMP will, as a minimum, implement all of the mitigation measures required during construction as identified as necessary within this EIA Report to mitigate any likely significant adverse effects, and will outline a suite of control measures to manage the potential environmental impacts during this phase (including noise, pollution, surface water runoff and waste). It would draw on the standard construction practices outlined in this chapter in **Sections 3.4.8** to **3.4.11**.

3.4.20 The CMS and supporting documents will be submitted for approval by EAC following consultation with bodies such as SEPA, prior to construction and development. In order to ensure that they are being suitably adhered to by the appointed contractors, an independent and suitably qualified Engineer, who will also liaise with the various environmental advisers employed during the construction phase, will be appointed by the Applicant to monitor implementation and provide specialist advice.

## Dust and Air Quality

3.4.21 There is the potential for an increase in dust during construction. However, as established and effective dust control measures are used during the construction of wind farms, it is not expected that air quality will be affected. The main measures for managing dust, which will be used where necessary, are:

- Adequate dust suppression facilities will be used on-site. If required, this will include the provision of on-site water bowsers with sufficient capacity and range to dampen down all areas that may lead to dust escape.
- Any on-site storage of aggregate or fine materials prone to dust generation will be managed using enclosures and screening, if required, so that dust escape from the Development Site is avoided. Sheeting can also be provided for the finer materials that are prone to *'wind whipping'*.
- Where required, HGVs entering and exiting the Development Site will be fitted with adequate sheeting to totally cover any load carried that has the potential to be *'wind whipped'* from the vehicle.
- Vehicles used on-site will be regularly inspected and maintained, to minimise vehicle emissions and the risk of leaking diesel or hydraulic fluids.
- Good housekeeping or *'clean up'* arrangements will be employed so that the Development Site is kept as clean as possible. There will be regular inspections of the working areas and immediate surrounding areas to ensure that any dust accumulation, litter or spillages are removed/cleaned up as soon as possible.
- A site liaison person will investigate and take appropriate action where complaints or queries about construction arise.

3.4.22 These measures would be included in the CEMP.

## Site Waste Management

3.4.23 Where possible, and subject to geotechnical testing, any topsoil material generated by excavation of foundations is expected to be re-used on site. This would be re-used on the working areas or allocated for restoration purposes in cutover areas of the Development Site. Excavated material will (depending on type) be used to backfill excavations and for general restoration purposes where appropriate. It is not expected that any material will be unsuitable for re-use in this way, though in the unlikely event that such materials arise, they would be disposed off-site in line with relevant waste disposal regulations.

3.4.24 Soil movement would be undertaken with reference to best practice guidelines available in the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (Defra, 2009). Soil excavation would be undertaken during dry periods with backacters and dump trucks wherever possible. Topsoil and subsoil would not be mixed or stored together.

3.4.25 The stockpiling of materials would be minimised, and any essential stockpiles would be located as far away as possible from watercourses.

3.4.26 Steps would be taken to minimise the extraction of peat as per the Outline Peat Management Plan (PMP) described in **Chapter 6 - Carbon Balance and Peat Management** of the EIA Report (**Appendix 6A**). The final PMP would ensure that peat excavated during construction is safely and suitably re-used within the extent of the Development Site wherever possible.

3.4.27 Construction waste is expected to be restricted to normal non-hazardous materials such as off-cuts of timber, wire, fibreglass, cleaning cloths, paper and similar materials. These will be sorted and recycled if possible or disposed of to an appropriately licensed landfill by the relevant contractor.

# 3.5 Construction Details

## Infrastructure Construction

3.5.1 Construction of the Proposed Development would consist of two main elements. Firstly, civil and electrical construction of the infrastructure and secondly, erection and commissioning of turbines. Construction of the control building and the grid connection are lengthy processes which will commence early in the construction programme to allow a live grid connection to coincide with the commissioning of the turbines. It should be noted that many individual construction processes would run partly or fully concurrently whilst others would progress in a sequence with or without some overlap in time.

3.5.2 The location of the Development Site infrastructure is shown in **Figure 3.1A & B**.

## Temporary Works: Construction Compound and Lay Down Area

3.5.3 It is proposed that one temporary construction compound with a maximum area of 5,000m$^2$ will be constructed. A typical compound arrangement is shown in **Figure 3.5**.

3.5.4 Surface vegetation and topsoil will be removed from the area of the construction compound and laid on geogrid over the surrounding undisturbed vegetation until required for reinstatement, post-construction. Geogrid will be laid on the exposed ground and stone added to an approximate depth of 500mm and compacted to a suitable engineering specification.

3.5.5 The compound will be located inside an area contained by security fencing, if required by the Contractor. During periods of darkness, directional security lighting may be used. This lighting would conform to the institute of lighting professionals' guidance for Zone E1 (Guidance Notes for the Reduction of Obtrusive Light GN01:2021) and would use a shielded downwards pointing installation.

3.5.6 The temporary compound will include: an area for portable temporary offices (to be used as site offices and for the storage of various materials and small components); car parking; and welfare facilities including toilets, a kitchen and a mess room; storage and laydown areas for equipment, plant and construction vehicles; areas for storage of oils and fuel. Foul drainage will be collected in a holding tank for regular collection and disposal off-site. Areas of the compound which represent an increased pollution risk, e.g., oil or fuel storage and vehicle refuelling, would be self-bunded.

3.5.7 Water will be provided by a bowser or smaller containers. Compliant drinking water arrangements will be put in place.

3.5.8 Approximately half of the construction compound will be repurposed for the battery storage compound, the remaining area will be reinstated at the end of the construction phase.

3.5.9 The detailed configuration, layout and size of the temporary compound would be finalised post grant of planning permission and after appointment of a construction contractor.

### General Plant and Equipment

3.5.10 A range of plant and equipment is expected to be delivered to the Development Site near the onset of the works and will be removed as soon as practical at the end of the activity for which the equipment relates.

### Turbine Foundations

3.5.11 The final foundation design will be informed by the choice of turbine and detailed geotechnical investigation prior to construction. Foundation design will be undertaken by geotechnical engineers and structural designers, once ground conditions are established and the final turbine model selected.

3.5.12 Wherever ground conditions permit, turbine foundations will be constructed from reinforced concrete using a 'submerged gravity base' approach. If, following intrusive geotechnical investigation works, ground conditions are proven to be unsuitable for this approach, other forms of foundation will be used, such as piled turbine foundations (though this is not anticipated as being necessary at this stage due to the depths of peat encountered on-site and the desk-based assessment of the Development Site geology; and it is considered that gravity base foundations will be suitable).

3.5.13 A typical gravity foundation is presented in **Figure 3.11**. Construction of gravity base foundations will involve the excavation of soil/peat and subsoil to expose the underlying load bearing strata or bedrock. Any topsoil and other vegetation removed will be laid on geogrid over the surrounding undisturbed vegetation until required for reinstatement once the turbine is installed.

3.5.14 An area of approximately 910m$^2$ will be excavated for the gravity foundations, due to the excavation depth and batter angle of the side wall. The depth of the excavation will be approximately 3-4m, depending on the depth of the load bearing strata or bedrock. The sides of the excavation will be battered back to ensure that they remain stable during construction.

3.5.15 The load bearing strata or bedrock will be levelled, and stone added to an approximate depth of approximately 1.4m and compacted to a suitable engineering specification to create a formation layer. The formation layer is then blinded[8] prior to the in-situ casting of the steel-reinforced concrete slab that will be approximately 25m in diameter. Each foundation will be made up from approximately 750m$^3$ of concrete and approximately 100 tonnes of reinforcing steel.

3.5.16 On top of the slab, a concrete up-stand will then be cast, to which the turbine tower will later be bolted. The excavated area will be backfilled with compacted layers of graded material from the original excavation and capped with topsoil. The exact details of each foundation will vary across the Development Site in response to the actual ground conditions encountered. A detailed ground investigation will be undertaken prior to construction to establish the requirement at each foundation.

3.5.17 Turbine excavations may be open for four to eight weeks during the construction programme. During this time, excavations will be kept free from water (rainwater and run-off). If local topography permits, the excavations will be free draining. If not, excavations may be mechanically pumped, with all dewatering works carried out in accordance with the CAR Regulations and SEPA's PPGs and GPPs including discharges through either settling ponds, swales or mechanical silt traps.

3.5.18 Alternative methods of turbine foundation construction will be considered if required in light of the results of a detailed geotechnical site investigation.

## Crane Pads and Blade Laydown Areas

3.5.19 Each wind turbine requires an area of hardstanding to be built adjacent to the turbine foundation. A typical crane hardstanding arrangement is shown in **Figure 3.4**. The total area of hardstanding at each turbine location, including the crane pads and blade laydown areas will be approximately 2,950m$^2$.

3.5.20 Surface vegetation and soil/peat will be removed from the area of the crane pad and laid on geogrid over the surrounding undisturbed vegetation until required for reinstatement. The area will then be covered with geo-grid overlain with compacted stone to approximately 500mm depth, dependent on ground conditions and load capacity.

3.5.21 As noted, crane hard standings will be left in place following construction in order to allow for the use of similar plant should major components need to be replaced during the operational phase of the Proposed Development. These could also be utilised during decommissioning phase. The blade laydown areas will be reinstated at the end of the construction phase.

## Control Building and Substation Compound

3.5.22 The control building and substation compound will comprise a hardstanding with maximum dimensions of approximately 35m x 40m and contain a single storey building approximately 10m x 20m. Concrete foundations will be required to take the weight of the components housed within the control building.

3.5.23 Foul drainage will be collected in a septic tank (>5m from the building) with soakaway. Water extraction for welfare facilities (non-potable) will be provided via mains water supply where available, and if not available, water will be provided by a water harvesting and UV filter system.

3.5.24 **Figure 3.7** provides an illustration of the indicative control building and compound. The external finishes/materials would be chosen to blend in with the local vernacular of the

[8] A process whereby a 50mm layer of low-grade concrete is placed directly onto the bedrock to provide a level and firm working base to support the foundation reinforcing cage.

area. Final details including external finishes would be agreed with EAC as a condition following planning permission being granted.

3.5.25 Surface vegetation and soil/peat will be removed from the area of the compound and laid on geogrid over the surrounding undisturbed vegetation until required for reinstatement, post-construction. The area of the compound will then be overlain with compacted stone to approximately 500mm depth depending on ground conditions. The area of the control building is then blinded[9] prior to the in-situ casting of the steel-reinforced concrete slab that will form the building foundation. The control building foundation will be made up from approximately 120m$^3$ of concrete and 27 tonnes of reinforcing steel. The transformer / generator plinth will be made up of approximately 12m$^3$ of concrete and 1 tonne of reinforcing steel.

## Battery Storage Compound

3.5.26 The Battery Storage Compound will comprise hardstanding with maximum dimensions of approximately 50m x 50m. The compound shall house battery energy storage equipment mounted on concrete plinths, which will be approximately 400mm high. The inverter foundation dimensions are approximately 6m x 2.5m. The dimensions of the Battery Modules and the battery Control and Fire Module foundations are approximately 1.5m x 1.5m. The Auxiliary transformer foundations are approximately 3m x 3m. **Figure 3.8** provides an illustration of the indicative battery storage compound and final details, including screen planting and any bunding necessary, will be agreed with EAC.

3.5.27 Surface vegetation and soil/peat will be removed from the area of the compound and laid on geogrid over the surrounding undisturbed vegetation until required for reinstatement, post-construction. The area will then be overlain with compacted stone to approximately 500mm depth depending on ground conditions. The areas of the inverters, battery controllers, and battery modules is then blinded[3] prior to the in-situ casting of the steel-reinforced concrete plinths that will form the foundations, which will be made up from approximately 60m$^3$ of concrete and 5 tonnes of reinforcing steel.

## Power Cabling

3.5.28 Underground cables will link the turbines to the on-site control building. Detailed construction and trenching specifications will depend on the ground conditions encountered at the time, but typically cables will be laid in a trench approximately 1m deep and up to approximately 1.2m wide. To minimise ground disturbance, cables will be routed alongside the access tracks wherever practicable and, if not, the total footprint of construction activity will be stated within the CMS. Approximately 1.8km of cable trenches will be required to connect the turbines to the on-site control building, with installation methods potentially including burial in ducts across the tracks, burial in trenches and mole-ploughing. **Figure 3.6** shows a typical cable trench detail.

3.5.29 Any excavations will be cordoned off and marked clearly. Cable hauling operations will be coordinated with traffic movements, especially when hauling is being carried out from the roadway. Cable off-cuts and waste from terminations will be systematically collected, stored, and recycled or disposed of properly.

3.5.30 The trenches would be dug during periods of relatively dry weather. The electric cables would be placed within the trenches, and soils quickly replaced to minimise the ingress of water into the trenches. Regularly spaced clay bunds may be required in the trench backfill to prevent the introduction of preferential flow paths within the cable trenches.

[9] A process whereby a 50mm layer of low-grade concrete is placed directly onto the bedrock to provide a level and firm working base to support the foundation reinforcing cage.

## On-site Access Tracks

3.5.31 Typical track cross sections are shown in **Figure 3.3**. The design of a particular length of Development Site access track will depend on local geological, topographical and drainage conditions. In terms of design, the primary objectives that have informed the access tracks are:

- Requirements to maintain water flows across tracks and minimise disruption to the current hydrology;
- Minimisation of peat spoil by routing tracks through areas of shallow or no peat where possible;
- Mitigation and management of silt run off and surface water;
- Serviceability requirements for construction and wind turbine delivery vehicles; and
- Constructability considerations.

3.5.32 To achieve a track structure that meets the conditions encountered on the Development Site, whilst meeting the primary track design objectives, two different designs have been developed (each with associated construction techniques) as summarised in **Table 3.4**.

### Table 3.4 Typical Access Track Construction Techniques

| Design | Construction Method | Typical Site Conditions | Peat Depth (m) |
|---|---|---|---|
| **1** | Floating road | Deep, flat, stable areas of peat (track thickness estimated 600mm to 1,000mm) | ≥1 m |
| **2** | Excavated road | Flat with simple drainage condition (track thickness estimated 450mm to 600mm) | <1 m |

3.5.33 The alignment of the on-site tracks has been subject to initial review by an experienced Civil Engineer and re-routed to respond to any constraints identified during surveys. The final decision on alignment and on the appropriate type of access track design to adopt for a particular length of track will be made in advance of construction and may involve input from the ECoW as well as site engineers (and any other environmental specialists as required).

3.5.34 A peat depth survey has been carried out (See **Appendix 13B**, Peat Slide Risk Assessment) and identified several areas of deep peat, some sections of track therefore have the potential to require floating roads. The weight of a floating road is supported by the peat beneath, thereby avoiding the need for construction foundations to extend through to the underlying solid bedrock.

3.5.35 Based on current knowledge of the Development Site, approximately 500m of floating tracks will be required. These will be constructed in line with Good Practice during Windfarm Construction produced by SR, SNH, SEPA, FCS and others (Version 4, 2019) and Floating Roads on Peat by FCE and SNH (2010) and will include the use of geogrids.

3.5.36 Within the main part of the Development Site (i.e., excluding the existing track from Afton Road through Pencloe Forest), it is anticipated that approximately 2km of new access track will be required for the Proposed Development. Approximately 6km of existing track from Afton Road will be upgraded. All access tracks will be unpaved and constructed from material imported from a suitable quarry, the effects of which have been assessed in **Chapter 14 – Traffic and Transport** of the EIA Report.

3.5.37 As previously noted, the running width of all on-site access tracks will be a maximum of 6m wide, with some additional localised bend widening to a maximum of approximately 12-14m (for the purposes of this EIA Report, a maximum running width of 6m has been assumed).

3.5.38 In general terms, the construction method for access tracks and passing places will see the topsoil removed (and laid on geogrid over the surrounding undisturbed vegetation until required for reinstatement) to expose a suitable sub-soil horizon on which a track can be constructed. A geogrid will then be placed to minimise the need for imported stone and to reduce the impact on the sub-soils. The track will then be built up on the geo-grid by laying and compacting graded rock to a depth of approximately 450-600mm, dependent on ground conditions and load bearing capacity.

3.5.39 Post-construction, the stripped topsoil will be re-laid along the edges of the access track allowing the verges to re-vegetate whilst maintaining a suitable width throughout the operational period of generally up to 6m.

3.5.40 The detailed drainage design will be finalised following planning permission being granted but, for the purpose of this EIA Report, the basic principles are that the drainage system would be developed:

- Based on Sustainable Drainage Systems (‘SuDS’) principles;
- In accordance with the CAR Regulations; and
- In accordance with the CAR Licence.

## Watercourse Crossings

3.5.41 The number of watercourse crossings have been minimised as far as possible. Six watercourse crossings with culverts are proposed, five being upgrades on existing track and one being new (RX01). The water crossing locations are detailed in **Table 3.5** and are shown on **Chapter 13 – Geology, Hydrology (including flood risk) and Hydrogeology** of the EIA Report, **Figure 13.6**.

### Table 3.5 Watercourse Crossing Locations

| Watercourse Crossing ID | E and N |
|---|---|
| **RX01 (new)** | 58972 06790 |
| **RX02** | 59273 06965 |
| **RX03** | 59316 06985 |
| **RX04** | 59478 06744 |
| **RX05** | 60860 07361 |
| **RX06** | 60957 08294 |

3.5.42 At this stage, it is proposed that a simple culvert type construction will be employed, using a cross sectional area that will not impede flow of water. Design of culverts shall be to at least CIRIA Culvert Design and Operation Guide (RP901) standard. A typical culvert detail is shown in **Figure 3.10**. All crossings would be designed to accommodate 1-in-200-year peak flows (with an allowance for climate change) to reduce the risk of flooding and would be developed in accordance with Engineering in the Water Environment Good Practice Guide - River Crossings: Second Edition (SEPA, 2010) and River Crossings and Migratory Fish: Design Guidance (Scottish Executive 2000). Watercourse crossings will be subject to detailed design following the granting of planning permission.

3.5.43 The need for drainage will be established on-site during pre-construction surveys. The access tracks will have a suitable cross-fall to allow rainwater to be shed and, where gradients are present, lateral drains will intercept any flow along the road. Where ground conditions are of a permeable nature, swales will be utilised for drainage to allow natural filtering of surface water into the ground. Where areas are less free draining, land drains or drainage ditches will be installed where the topography and ground conditions dictate.

3.5.44 To prevent silt entering water courses, an ongoing scheme of silt mitigation will be carried out, which may include use of silt traps; silt fences; silt mats etc, all installed to suit the local conditions. The silt mitigation measures will be monitored throughout the construction period by the Contractor and ECoW.

## Peat Management during Construction

3.5.45 The Development Site is situated in an area where peat deposits are found. The infrastructure design and construction methodology has been refined to minimise peat excavation from tracks and turbine infrastructure, but it has not been possible to avoid it entirely.

3.5.46 Peat is likely to be excavated during the construction of tracks, foundations, hard standings, control building and temporary compounds. The majority of peat spoil will come from foundations, hard standings and track construction and, to a lesser extent, temporary compounds.

3.5.47 An Outline PMP has been prepared and it will be finalised prior to construction and following completion of detailed ground investigations and micro-siting. The Outline PMP will be further refined, and detailed methods and specifications agreed with SEPA and NatureScot. This will address methods in respect of peat excavation, haulage, storage, re-use. The Outline PMP will ensure that peat excavated during construction is safely and suitably re-used within the extent of the Development Site wherever possible. The Outline PMP indicates that, where suitable, all excavated peat could be reused onsite.

3.5.48 Details of the Outline PMP are provided in **Chapter 6 – Carbon Balance and Peat Management** and **Chapter 13 – Geology, Hydrology (including flood risk) and Hydrogeology** of the EIA Report.

## Track Drainage

3.5.49 The need for drainage on the access track network will be considered for all parts of the track network separately, since slope and wetness vary considerably across the Development Site. In flat areas, drainage of floating tracks is not required as it can be assumed that rainfall on the road will infiltrate to the ground beneath the tracks or along the verges. Track-side drainage will be avoided where possible, in order to prevent any local reductions in the water table or influences on the tracks structure and compression (the latter can occur where a lower water table reduces the ability of the peat to bear weight, increasing compression).

3.5.50 Where tracks are to be placed on slopes, lateral drainage will be installed on the upslope side of the track. The length of drains will be minimised, to prevent either pooling on the upslope side or, at the other extreme, creating long flow paths along which rapid runoff could occur. Regular cross-drains will be required to allow flow to pass across the track (as recommended in SEPA's Position Statement WAT-PS-06-02 Culverting of Watercourses (June 2015)), with a preference for subsequent re-infiltration on the downslope side, rather than direct discharge to the drainage network.

## Drainage Ditches along Excavated Tracks

3.5.51 Excavated tracks can impede the natural drainage across them and consequently drainage ditches are required. It is anticipated that at times, the water in the ditches will contain high concentrations of sediment from excavations, track construction and possibly other accidental pollutants from construction activities. Therefore, no water from a drainage ditch will be discharged directly to a watercourse. Instead, water from drainage ditches will pass through silt fences, silt traps or other best practice pollution control features. Drains will not be discharged directly into natural channels, ephemeral streams or old ditches.

3.5.52 If required, any discharge, once sediment has been removed as described above, would occur under the appropriate SEPA consent.

3.5.53 The ditch design will be considered in line with the recommendations of the FCE and SNH guidance (2010), including the use of flat-bottomed ditches to reduce the depth of disturbance.

3.5.54 In instances of drainage close to surface watercourses, discharge from the drainage may be to surface water rather than re-infiltration. In these situations, best practice control measures including sediment settlement will be undertaken before the water is discharged into surface water systems. The discharges will be small and collect from only a limited area, rather than draining a large area to the same location.

3.5.55 Although drainage will be provided in areas of disturbance as required, areas of hardstanding will be minimised so that this need is reduced. This includes careful design of construction compounds and minimising the size of crane pads at each turbine location.

## Cross Drainage

3.5.56 Where tracks are to be placed on slopes, lateral drainage will be required on the upslope side of the road. The length of drains should be minimised, to prevent either pooling on the upslope side or, at the other extreme, creating long flow paths along which rapid runoff could occur. The spacing of cross drains will depend on the area draining to the cross drain, gradient, choice of material for the drain, and design objective. Where cross drains are required, depending on-site conditions, the aim will be for subsequent re-infiltration on the downslope side rather than direct discharge to the drainage network.

3.5.57 Cross-drainage may be achieved using culverts or pipes beneath the track, again in line with the FCE and SNH (2010) guidance. Drainage will be installed before or during track construction, rather than afterwards, to ensure that the track design is not compromised. The cross drainage will flow out into shallow drainage, which will allow diffuse re-infiltration to the peat on the downslope side. The cross drains will flow out at ground level and will not be hanging culverts: the avoidance of steep gradients for the tracks will also reduce the risk of erosion occurring at cross-drain outflows.

### Check Dams

3.5.58 Check dams (small dams built across channels or ditches) may be required at regular intervals in the drainage ditches alongside an excavated track. They are required for two principal reasons. Firstly, they act as a silt/pollution trap slowing the flow of water so allowing sediment to settle out. Secondly, they help to direct water into the cross drains and so allow natural drainage paths to be maintained as much as possible. The spacing of the check dams will depend on the following factors:

- The gradient of the track;
- The spacing of cross-drains; and
- The depth of excavation.

3.5.59 Regular maintenance and clearing of the check dams are imperative to ensure their effectiveness is maintained.

### Interface between different Types of Road Drainage

3.5.60 Where the track construction method changes, the drainage methods will also change. If this results in an end point for a drainage ditch, the ditch will be piped across the road and allowed to discharge to land on the downward side of the slope (taking into account the precautions against pollution and erosion discussed in paragraphs 3.5.58 to 3.5.59).

## Employment Proposals

3.5.61 It is envisaged that the Proposed Development would be constructed employing several main contractors; one for the civil infrastructure works, one for the electrical works, one for the supply, erection and commissioning of the wind turbines and a battery installation contractor - all of whom would be coordinated and overseen by a Project Manager. In order to monitor the works, a number of site representatives would be employed full time to ensure the quality and health and safety aspects of the construction, and to ensure the development is carried out in accordance with the Construction Method Statement ('CMS') methodologies.

3.5.62 The site representatives would be individuals with previous experience of wind farm construction and would be supported on site by a suitably qualified ecology/environmental clerk of works, as required. The site representatives would carry out daily checks on the Development Site to monitor on-going activities, particularly when subcontractors are being used on site. In addition to this, and, in conjunction with the ecologist and hydrologist, environmental audits of the site operations would be undertaken on a regular basis accompanied by representatives of the relevant contractors. Where necessary, additional specialists may attend the site including geotechnical and archaeological representatives.

3.5.63 In line with appropriate guidance, competent operatives would be employed for handling, storing and arranging for the disposal of potentially polluting substances. Licensed waste disposal companies would be used to dispose of potentially polluting wastes.

3.5.64 During the construction period, there will be construction operatives carrying out the works on site that have been described. There would be indirect local benefits arising from the construction phase, including use of hotels, Bed & Breakfasts and other accommodation, hire of local equipment and plant, temporary employment of local work force and potential contracting of local subcontractors. The construction mobilisation would likely be spread over an approximate 12-month period.

## Materials Import

### Rock Requirements.

3.5.65 Construction of access tracks, hard standings, foundations, and compounds within the Proposed Development will require approximately 30,000m$^3$ of rock. **Table 3.6** below provides a breakdown of the required rock volumes for each construction element.

**Table 3.6 Summary of Indicative Rock Volumes Required During Construction**

| Infrastructure | Total Rock Volume (m$^3$) |
|---|---|
| **Hard standings and foundations** | ~4670 |
| **Access tracks** | ~16,500 |
| **Temporary construction compound** | ~2500 |
| **Control building compound** | ~700 |
| **Total Rock Volume** | **~24,370** |
| **~20% Contingency** | **~30,000** |

### Concrete Requirements.

3.5.66 Construction of foundations within the Proposed Development will require approximately 1,710m$^3$ of concrete. **Table 3.7** below provides a breakdown of the required concrete volumes for each construction element.

**Table 3.7 Estimated Volume of Concrete**

| Infrastructure | Total Volume of Concrete (m$^3$) |
|---|---|
| Wind turbine foundation x 2 | Up to 1500 |
| Control building foundation | ~120 |
| Transformer / Generator Plinth | ~12 |
| Battery Storage Plinths | ~60 |
| Turbine kiosk foundations | ~9 |
| **Total Concrete Volume** | ~1,710 |

## Post-Construction Development, Site Restoration and Commissioning

3.5.67 If required for major works, the crane hard standing can be re-used in its entirety by removing the dressed vegetation. Excavated material which does not have a viable and suitable identified use will be classified as waste material and would be managed and removed from the Development Site and disposed of in accordance with the relevant legislation (including the Environmental Protection Act 1990, Landfill (Scotland) Regulations 2003 (as amended) and the Waste Management Licensing (Scotland) Regulations 2011).

3.5.68 The temporary construction compound area not repurposed for use as the battery storage compound and the associated facilities will be removed and fully re-instated with vegetation/peat displaced from elsewhere on the Development Site and landscaped to match the local topography.

3.5.69 There will be a period of commissioning and testing prior to the start of the full operational phase of the Proposed Development.

## 3.6 Operational Details

### Land Management

3.6.1 It is anticipated that the long-term land management practices in relation to the forestry undertaken at the Development Site will continue unaffected by the Proposed Development, with normal practices within retained forestry continuing unimpeded after completion of construction.

### Meteorological Effects and Turbine Control

3.6.2 A Supervisory Control and Data Acquisition ('SCADA') system will be implemented which would obtain information from each of the turbines on their performance and would allow them to be controlled remotely. This would allow any faults with the equipment at the Proposed Development to be highlighted.

3.6.3 Although wind turbines are designed to stop generating at wind speeds over 25m/s, they are built to withstand very high wind speeds, and are normally certified against structural failure for wind speeds up to 60m/s (in excess of 120mph).

3.6.4 Turbines are fitted with a lightning protection system as part of their design. Snow does not generally pose problems other than for gaining access to the Development Site. Occasionally, very heavy snow and ice may affect anemometers or the aerodynamics of the turbine blades resulting in temporary automatic shutdown. After shutdown due to icing, the turbine can be restarted remotely further to a manual, visual or technical inspection to ensure that the turbine blades are free of ice, thereby eliminating the potential for *'ice-throw'*. The wind turbines will also be fitted with vibration sensors which would detect any imbalance which might be caused by icing, which would allow the turbines to be shut down automatically.

3.6.5 While ice-throw is unlikely for the reasons described, notices would be installed at access points to the Proposed Development to warn visitors and members of the public of this possibility during colder weather.

### Turbine Maintenance

3.6.6 Turbines will be maintained at regular intervals, in accordance with manufacturer recommendations and industry best practice.

## Environmental Management during Operation

3.6.7 The Applicant's wind energy developments are operated in accordance with documented ISO 14001 environmental management procedures which ensure compliance with applicable environmental legislation and best practice.

3.6.8 Although activity at the Development Site will be limited during the operational period, the measures outlined in site and task specific risk assessments and method statements including control measures in relation to surface water runoff, dust, pollution control and waste will remain in place to cover any maintenance works which may be required.

3.6.9 The Proposed Development will be managed by a team of wind energy engineers whose duties will include compliance with statutory HSE requirements. Where potential environmental or health and safety hazards are identified, a site-specific risk assessment is completed, and control measures implemented to ensure that the risks are minimised as far as possible.

3.6.10 The operational phase of the Proposed Development would be managed under the requirement of RWE's internal Environmental Management Systems ('EMS').

3.6.11 The battery cells are a Lithium-ion polymer rechargeable batteries. The cells contain Hexafluoropropylene-vinylidene, which is hazardous to the environment, and Lithium Hexafluorophosphate, that is toxic and corrosive. Under normal conditions, the battery is hermetically sealed, and does not pose a risk of exposure. Therefore, safe handling procedures will be followed.

3.6.12 No electrical shock Hazard was found for single cell, or battery module with voltage less than 50V DC (the safety voltage). Where the voltage of a battery pack was greater than 50V DC, the electrical shock will be controlled.

3.6.13 The battery fire extinguishing system will be activated in the event of a fire. The proposed battery modules employ an aerosol fire extinguishing system composed of ultra-fine potassium salt particles and inert gas. A certain concentration of the aerosol fills the enclosed volume of the battery cabinet, extinguishing the fire. The cabinet has been certified to IP6X ingress protection, with the extinguishing aerosol contained within the physical structure. Potassium salt is not classified as hazardous.

3.6.14 The battery modules use a 1:1 monoethylene glycol – water mix as a coolant. Monoethylene glycol is most commonly encountered as a vehicle windscreen de-icing agent or antifreeze, but is considered an irritant and harmful if swallowed, as well as hazardous to the environment. However, the coolant is a dense fluid, not persistent and if released in the environment is broken down usually within a few weeks. The coolant is located within a self-contained system within the battery cabinet. Therefore, the leakage of coolant from the battery cabinet is considered low risk due to the density of the fluid and cabinet design.

3.6.15 Bunding is usually required for the medium voltage ('MV') / high voltage ('HV') transformers. However, in the event that an SMA (System, Mess and Anlagentechnik) skid solution is deployed, the transformers will use Ester as the coolant. The skid solution includes an oil containment tray, which can hold the entire capacity (+10%) of the coolant. The transformer enclosure is fitted with a filter that allows water to pass but closes when it detects oil/ester.

3.6.16 Sufficient emergency spill response kits to support adequate provision shall be situated at key locations across the operational site area. In the event of a modular defect such as a leak the Battery Management System ('BMS') would typically shut down the rack containing the faulty module and emit an issue signal to the central control room.

3.6.17 However, in the unlikely event that an environmental pollution incident occurred, SEPA would be informed, and any spillage will be cleaned in a safe and timely manner.

### Site Waste Management

3.6.18 Operational waste will generally be restricted to small volumes of waste associated with machinery repair and maintenance disposed of by the maintenance contractors in line with normal waste disposal practices.

## 3.7 End of Life

3.7.1 As the Proposed Development nears the end of its operational life, a decision will be taken as to whether or not a life extension, repowering or decommissioning will be required.

3.7.2 Repowering operations would involve the installation on the Development Site of new turbines, which would require a new application and further environmental assessment. Decommissioning would involve the removal of the wind turbines, kiosks, control building and substation, battery storage and re-instatement of the Development Site.

3.7.3 However, for the purpose of the assessment of the likely significant effects of the Proposed Development, the EIA Report assumes that the project will be decommissioned at the end of its operational life.

3.7.4 A description of the decommissioning activities considered within the EIAR is provided in the sections below.

### Wind Farm Decommissioning Requirements

3.7.5 As part of the decommissioning process, it is generally proposed that the above ground structures (wind turbines, kiosks, and control building/battery storage will be removed (per any condition attached to the consent if granted) and the hardstanding areas re-instated where appropriate. It is assumed that access tracks will be left in situ for use by the landowner as the environmental impacts of removal are considered to be greater than leaving in situ.

3.7.6 Prior to infrastructure removal, due consideration will be given to any potential impacts arising from these operations. Some of the potential issues could include:

- Potential disturbance by the presence of cranes, HGVs and engineers on-site;
- On-site temporary construction compound would need to be located appropriately;
- Time of year and timescale (to be outside sensitive periods); and
- Access tracks may remain in use for the benefit of the landowner and other stakeholders.

3.7.7 A comprehensive plan for the work will be drawn up in advance of decommissioning to ensure safety of the public and workforce and the use of the best available techniques at that time.

### Decommissioning Process

3.7.8 The wind turbines (towers, nacelle, hub, blades and electrical kiosk) will be completely removed using a crane and taken off-site for recycling. The only parts which are currently difficult to recycle are the composite blades. Most items will be broken down so that specialist vehicles are not required unless there is a potential follow-on use for the components in one piece.

3.7.9 During decommissioning, the bases will be broken out to below ground level and covered by soil/peat, which will be reinstated and re-vegetated (this is considered to be less environmentally damaging than removing them completely). All cables would be cut off below ground level, de-energised and left in the ground.

3.7.10 A Restoration and Decommissioning Plan (‘RDP’) would be submitted and agreed with the relevant authorities close to the Proposed Development’s end-of-life. Any applicable new legislation or guidelines published prior to decommissioning would be considered and taken into account in relation to any design of mitigation prior to decommissioning taking place.

## Control Building / Substation Compound, Battery Storage and Distribution System Decommissioning

3.7.11 The battery storage facility, control building / substation compound and associated equipment will be removed, and the components reused or recycled. As with turbine bases, the foundations themselves will be cut down to below ground level and left in situ covered in soil/peat which will be re-vegetated.

3.7.12 The buried distribution cables will be de-energised and will be cut off below ground level at the ends. An assessment will be carried out closer to the time to take into account any changes in best practice, and if it is considered to be viable, cables may be recovered for recycling where appropriate.

## Access Track Decommissioning

3.7.13 The access tracks are unlikely to be removed. The current view is that the disturbance associated with the removal and disposal of the material would have a greater environmental impact than leaving them in place. Upon decommissioning the tracks would therefore likely be left in situ for future use by the landowner and other stakeholders.