EnergieKontor

Breackerie Wind Farm

Environmental Impact Assessment Report
Volume 1
Chapter 3: Project Description

October 2023 (amended December 2024)

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3 PROJECT DESCRIPTION

Introduction

3.1 This chapter provides an outline description of the proposed development, the Site, and its surroundings. Details of the construction, operational and decommissioning phases of the proposed development are also considered in this chapter.

3.2 Details of the iterative design process that resulted in the final design as set out in this chapter are detailed in Chapter 4: Design Evolution.

3.3 The proposed development will consist of the construction, 35-year operation and subsequent decommissioning of up to 13 wind turbines, along with ancillary infrastructure as described within this chapter.

The Site and Its Surroundings

3.4 The Site location is highlighted within Figure 1.1 within Volume 2 of this EIA Report, whilst the site boundary to which the proposed development relates is contained within Figure 1.2 and subsequent figures.

3.5 Spanning approximately 1373 hectares (ha), the site is situated at the southern end of the Kintyre peninsula within an area of active commercial coniferous forestry. It is around 8km south-west of Campbeltown, approximately 5.5km north of Southend, and 5km south of Machrihanish.

3.6 The core of the site comprises a basin created by the surrounding hills with the Lecknacreive Burn running generally north-west to south-east. The summit of Tirfergus Hill (260m AOD) to the north is outwith the site boundary, while the summits of Cnoc na Gabhar (239m AOD) and Cnoc Odhar (277m AOD) to the east, as well as Achnaslishaig Hill (307m AOD) to the south and The Slate (384m AOD) to the north-west all lie within the site boundary.

3.7 The landscape comprises a rolling plateau of densely forested hills, contrasting with local summits, with a small-scale valley to the immediate east which the B842 passes through. This contains most of the settlement within the area. Land to the west and south-west comprises steep coastal hills which drop steeply to the sea. To the north, the landform flattens into a broad lowland plain between Machrihanish and Campbeltown.

3.8 Settlement within the wider area is relatively sparse, with some small settlements, farms, and scattered residential properties located predominately to the eastern side of the site. Within 5km of the site, the small settlements of Machrihanish, Drumlemble, Stewarton, Killellan and Killeonan/Knocknaha are located to the north and north-east of the site. Other small settlements within 10km of the site include Kilchenzie to the north, Peninver to the north-east, and Millpark and Southend to the south-east.

3.9 The nearest trunk road is the A83, which terminates in Campbeltown. The B842 extend south of Campbeltown via Stewarton towards Southend and serves as the primary route south of Campbeltown. It passes the site approximately 1km to the east in a north-south orientation. The B843 extends east/west from Campbeltown to Machrihanish.

3.10 There are a number of minor watercourses on the site including Allt Mor, Allt Brandon, Allt Seilich, Allt a Ghillean Dubh, Allt Airighe Glaise and Allt Criche, which flow into the Lecknacreive Burn. This runs in a generally south-easterly direction on the site and feeds into the Breakerie Water to the south of the site. The site straddles a number of hillsides to form a rough bowl and as such is generally well drained with an absence of lochans or pools.

3.11 A local landscape designation covers the majority of the area south of Campbeltown including the site: the Mull of Kintyre Area of Panoramic Quality. This is designated at a Council level and has no published citation or descriptions setting out the reasons for its designation and qualities it aims to protect.

3.12 The site is described in detail in respect of environmental baseline conditions within each technical EIA Report chapter.

Description of Proposed Development

3.13 The proposed development is illustrated on Figure 3.1 and would consist of the following principal components.

- Up to 13 turbines;
- Associated turbine compound areas including foundations and hardstanding areas for erecting cranes at each turbine location;
- On-site tracks connecting each turbine, using existing forestry tracks where appropriate (approximately 4.02km) and construction of new tracks elsewhere (approximately 7.47km);
- An energy storage compound to store batteries with a 5MW capacity which would be within the construction compound footprint;
- Underground cables linking the turbines to the substation;
- Use of up to four onsite existing borrow pits for the extraction of stone on-site (indicated on Figure 3.1);
- A temporary construction compound including provision for onsite concrete batching;
- On-site 132kv substation;
- Forestry felling and restocking as proposed within Chapter 14: Forestry; and
- Revised Habitat Management provisions as proposed within Technical Appendix 8.5 dated 13th November 2024.

3.14 The proposed development would be time-limited to 35 years from the first date of final commission. The construction phase would last approximately 18 months and decommissioning would last approximately six months.

3.15 Deemed planning permission is sought to permit a period of ten years between the date of the Decision Notice and expiry of consent (should works not be commenced) rather than the usual three years. This is to accommodate any potential grid delays.

3.16 The proposed development would provide approximately 85.8MW of installed capacity (depending on the turbine model chosen) in addition to 5MW of battery storage capacity. It is estimated by the Applicant that this installed capacity could generate approximately 365,678MWh of renewable electricity each year which would be expected to power the equivalent of approximately 93,811 homes on average each year[1], or provide 2.03 million full battery charges for electric vehicles per year[2].

3.17 The planning application includes an allowance for micrositing of the wind farm infrastructure. If planning permission is granted, the Applicant will commission detailed ground investigations and geotechnical surveys to determine the ground conditions. A 100m micrositing allowance is sought for the wind turbines (with restrictions in place to safeguard constraint buffers as applicable), and all other new elements of the proposed development.

3.18 The construction and decommissioning of the wind turbines, ancillary equipment and on-site infrastructure are described in more detail in the following sections of this chapter and within Chapter 4: Design Evolution. The principal elements include:

- **Wind turbines** – 13 wind turbines (see Figure 3.2 for typical wind turbine elevations). The co-ordinates of the turbines are given in Table 3.1 below;
- **Turbine foundations** – The foundations of the turbines could be either reinforced concrete gravity structures or piled foundations. This would be dependent on the ground and hydrological conditions at the turbine location which would also determine the overall size of the support structure. Typical foundations for the size of turbine proposed are shown in Figure 3.3;
- **Crane hardstandings** – To provide a level and firm base for the cranes at the location of each turbine. Each would be approximately 150m x 70m depending on the turbine model chosen and would be surfaced with coarse aggregate (see Figure 3.7 for a typical crane hardstanding layout);
- **Site tracks** – A total of 11.49km of new or upgraded tracks to provide access for construction and maintenance vehicles from the Site access to the substation and wind turbines. These would be constructed at the commencement of the construction phase and would remain in-situ following decommissioning. They would have a running width of approximately 5m, the final width dependant on turbine supplier requirements. The tracks would feature local widening on corners and would be surfaced with coarse aggregate (see Figure 3.4 for typical track cross sections). Site tracks include new sections of track and upgrading of existing access tracks. New sections of track across areas of peat deeper than 1m would be floated, comprising a total of approximately 1.97km. Turning heads would also be required;

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1 Based on an average annual UK domestic electricity consumption figure of 3,898KWh as set out in the BEIS publication "Energy Consumption in the UK" July 2022

2 Based on a large electric vehicle requiring 180kWh for a full charge.

- **High voltage and control cables** – To form power and control circuits linking each turbine to the on-site substation, cables would be placed in trenches (dimensions to be determined by the ground conditions but typically 0.5m wide by 1m deep) routed alongside the tracks (see Figure 3.8 for typical cable trench construction details);
- **Borrow Pits** – As a source of material for the creation of other ground infrastructure. Four on-site borrow pits provide opportunity to win stone and material on-site. The locations of these are shown in Figure 3.1;
- **Energy Storage Compound** - The energy storage equipment would be housed within ISO shipping containers with a 2.4m high palisade fence in a compound 17.5m by 32m. Battery containers will be positioned a minimum of 2.5m apart to facilitate access to all sides. Battery energy storage equipment will be factory assembled and delivered to site in standard 12.2m long x 2.4m wide ISO shipping containers. A plan and elevation are presented as figures 3.10. Figure 3.6 shows the construction compound area that this would be housed within;
- **Construction compound/storage area** – The compound to facilitate construction of the proposed development, which would also provide a storage area for plant and materials and is temporary during the construction phase (see Figure 3.6 for a typical compound design);
- **Substation building** – A 90mx90m space would be required for the construction of a 132kV substation (subject to a future planning application; and
- **Site access** – site access would be taken from the Dalsmirren Road, following a right turn at the fork in the B842 before Killellan. The site boundary begins as traffic would continue straight into the site boundary and onto the existing forestry tracks rather than taking a sharp turn past Homeston Farm.

Wind Turbines

3.19 Turbines would be of tubular steel construction, finished in a typical off-white matt colour and comprise three blades. The final turbine choice would be made post-consent during the procurement phase, but for the purposes of this EIA Report, representative candidate turbines of 200m tip with 155m rotor diameter and hub height of 122.5m.

3.20 Turbine co-ordinates, subject to a maximum of 100m micro-siting dependent upon localised constraints, are as follows within Table 3.1.

Table 3.1: Proposed Wind Turbine Coordinates (subject to a 100 m micrositing allowance)

Turbine	Easting	Northing	Tip Height (m)
1	163138	615658	200
2	163750	615767	200
3	164360	615733	200
4	163567	615304	200
5	164018	615017	200
6	164835	615464	200
7	164507	614687	200
8	165162	615071	200

Turbine	Easting	Northing	Tip Height (m)
9	164896	614338	200
10	165566	614652	200
11	165799	614219	200
12	165950	613765	200
13	166092	613304	200

3.21 To carry the power generated to the local electricity network, each turbine would require a transformer to step up to a high voltage. Transformers will be internal to the turbine.

3.22 Monitoring and controlling the performance of the wind turbines would be achieved by way of a sophisticated Supervisory Control and Data Acquisition (SCADA) system. The SCADA system would gather data from all the turbines and provide the facility to control them from a remote location. Communication cables connecting to each turbine would be buried in the electrical cable trenches to facilitate this.

Site Tracks

3.23 In summary the proposed development requires approximately 11.49km of tracks, which comprises:

- The construction of approximately 5.5km of new cut track;
- The construction of approximately 1.97km of new floating track; and
- Dependent upon localised constraints and condition, potential upgrading to delivery standard of 4.02km of existing forestry track.

3.24 Micrositing of 100m is sought for tracks as well as turbine positions in order to optimise post-Ground Investigation design and avoid any unforeseen constraints, and minimise cut and fill.

3.25 Where new sections of access track are required, whether cut or floating, these would have a running surface of approximately 5m with local widening at bends. The actual running width would be dependent on eventual turbine selection and manufacturer requirements. The routing of new access tracks has been designed to minimise track length, and to avoid environmental and technical constraints such as watercourse crossings and critical slope angles where practical to do so.

3.26 Following detailed Ground Investigation, localised re-profiling of existing tracks may be required to fulfil turbine manufacturer specifications on permissible gradients.

3.27 The construction of new cut tracks would involve the stripping and storage of topsoil and any peat deposits present (where applicable). Mineral soil and subsoil excavated during cut track construction would be set aside for re-use in site reinstatement at a later date. The crushed stone track would be laid to a nominal depth of up to 450mm and aggregates required for the access tracks would be obtained from the on-site borrow pits and/or local suppliers. The tracks would incorporate swales, cut-off ditches, settlement ponds and soakaways. All surface drainage will be controlled with regards to surface flow and sediment to ensure no untreated discharge to watercourses, even under heavy rain conditions. All drainage management mitigation will be carefully monitored daily by the Environmental Clerk of Works and suitably trained site staff.

3.28 The fill would be placed to a depth corresponding approximately to the original ground level. This would be levelled and compacted by compaction equipment and by the construction traffic that uses the track for access to the various parts of the Site.

3.29 Cross drains would be designed to divert the water at various points along the track alignment and to transmit it underneath the track. As far as is practicably possible, any water collected would be re-distributed via appropriately sized settlement ponds to replicate the original surface / sub-surface flows.

3.30 On completion of construction, the remaining excavated mineral soil and subsoil would be levelled alongside the access tracks or used to reinstate borrow pits. A typical new track cross section is shown on Figure 3.4.

3.31 Where new tracks are proposed across areas of peat deeper than 1m, floating construction techniques would be used. Generally, the process would incorporate an approximately 7m to 8m wide strip of geogrid laid on the surface of the turf. The additional width allows downward bearing pressure to be spread across the track rather than being focussed on a single line of soft substrate. A layer of approximately 700mm to 1000mm of crushed stone would then be laid on the geogrid to form the track, with the edges of the track forming batter slopes raised above the soft surface. The track would incorporate an upper layer of approximately 250mm hard-wearing rock and the geogrid system, which would be designed for floating road construction, would aim to avoid the potential for tracks to penetrate into the ground.

3.32 The batter described above will have excavated peat (layered as catotelm and then acrotelm) placed on top which would then be reseeded with native peatland species.

3.33 The access tracks would be retained throughout the operational life of the proposed development to enable maintenance of the turbines, and also allow the forestry operations present on-site additional track for the continual harvesting of timber.

Turbine Compounds

3.34 At the location of each turbine foundation, a hardstanding area would be constructed to provide support for the cranes used for turbine erection. These hardstandings could also be used for storing turbine components, such as the nacelle, until they are installed. When not being used for turbine erection, the crane hardstanding may also be used as passing places at each turbine location where appropriate.

3.35 The layout of the turbine compound for this project is shown on Figure 3.7. Each hardstanding would cover an irregular shaped area of around 7,207m^2 to allow sections for cranes, laydown areas and turbine foundation, whilst the access road will pass through the centre of the compound.

3.36 Hardstandings are present for the main crane, an assist crane, for boom assembly and for the superlift ballast. The compound area also contains a storage and assembly area, a trestle area for blades and a storage area.

3.37 The hardstandings would be excavated to bedrock and any peat present would be appropriately stored and re-used (see Chapter 10: Geology, Hydrology and Hydrogeology).

3.38 The design of the wind turbine foundations would be a function of the loads from the turbine and the topographical, geotechnical and hydrological Site conditions. For the conditions typically encountered at the Site, the wind turbine foundations would likely be designed as reinforced concrete gravity structures and be subject to a final design depending upon ground conditions. A typical foundation for the size of turbine proposed for this project is shown on Figure 3.3.

3.39 The loads from the turbine, combined with the ground and hydrological conditions at the turbine location would also determine the overall size of the support structure.

3.40 Where the groundwater is below the bottom of the foundation, then the structure would be designed for dry and drained conditions, i.e. with no water pressure on the bottom of the foundation. Where there is a high groundwater table (above the underside of the foundation) the foundation would be designed for buoyant conditions arising from water pressure acting upwards on the underside of the structure. This would be subject to detailed Ground Investigation post-consent.

3.41 Following associated forestry removal, the first task in constructing each wind turbine foundation would be to remove any peat or mineral soil to the perimeter of the proposed foundation excavation, with the acrotelm and catotelm appropriately stored. The underlying subsoil would then be excavated to the required foundation depth, normally by conventional construction equipment. Excavated materials would be set aside for re-use as backfill around the foundation following completion of construction.

3.42 The foundation formation would then be prepared to receive concrete blinding by placing timber shuttering around the edge of the excavation. Concrete blinding would be poured on the foundation formation to level the area in preparation for fixing the steel reinforcement bars. The blinding would be a weak mix of concrete with low slump and would normally be placed fairly dry. Little if any loss of cement would therefore occur during placement of the lean-mix levelling layer.

3.43 A bottom mat of reinforcement would be placed on the weak mix concrete blinding. Additional reinforcement would be fixed to the bottom mat to form the main reinforcement cage for the foundation. Starter bars would then be fixed to the main cage to form the up stand, which would support the bottom tower section. Temporary shuttering would be placed on the reinforcement cage to ensure that there would be sufficient concrete cover to the top layer of steel. Side shuttering would also be positioned around the cage to form the sides of the concrete slab and to prevent loss of concrete and cement paste into the ground.

3.44 Concrete would then be poured to form the main slab either by a concrete pump or by being placed in small hoppers / skips that would be lifted over the area being concreted and then tipped. Conventional concrete lorries of approximately 8m³ capacity would be used for each foundation. During the pour, the concrete would be compacted using poker vibrators. As the concrete placements are completed, the temporary shuttering on the top steel would be removed, and the concrete tamped and floated to a smooth finish.

3.45 A curing compound is often used to stop the concrete drying out too quickly (which can lead to hairline cracking of the top surface). This is sprayed onto the surface concrete. Plastic sheeting or hessian may also be used to assist with curing of the concrete if considered appropriate. This reduces evaporation of water at the surface of the concrete and also assists in preventing shrinkage of cracking material.

Turbine Route to Site, Delivery and Erection

3.46 Turbines would likely be manufactured in Northern Europe and transported by boat to the Port of Campbeltown, where specialist vehicles would carry the blades and towers to site via police-escorted convoy. It is likely this would occur during the night to minimise disruption to local residents and traffic, particularly that using the A83.

3.47 The route to site is fully noted within Chapter 13: Transport and Access. Initial assessment has identified the likely port of entry for the turbines would be Campbeltown Harbour from where the abnormal loads vehicles would navigate onto the A83 trunk road, travelling north-west until the left-hand turn towards Machrihanish. From here, a further left turn would be taken to proceed southwards past Campbeltown Airport towards Stewarton. At Stewarton, the turbine delivery vehicles would proceed southwards on the B842 until the fork just before Killellan. The vehicles would use the right-hand fork to Dalsmeran, proceeding down an Unclassified Road leading to the edge of the site and existing forestry tracks, where a site entrance would be created.

3.48 Mechanical installation would comprise the delivery and erection of turbine components at the turbine locations. Delivery of the turbine components would be undertaken by specialist contractors using purpose-built vehicles. Erection of the turbine components is normally undertaken by the turbine supplier using specialist heavy lifting subcontractors and cranes.

3.49 The connection of the tower to the foundation would be made by using holding down bolts or with a short cylindrical steel section embedded in the foundation slab. The choice of holding down system would depend on the wind turbine supplier. The sequence of construction of the connection between the tower and foundation depends on which system is used.

3.50 For a holding down bolt solution, the upstand foundation anchor bolt assembly would be placed, along with additional reinforcement in the upstand following completion of the base slab. At this stage, partial backfilling of the foundation would be undertaken to aid access to the turbine location during the rest of the foundation construction. Once the upstand reinforcement and anchor bolt assembly is complete, timer or steel shutters would be placed to form the upstand of the turbine foundation.

3.51 If the tower is connected to the foundation by a steel cylindrical section then the upstand reinforcement and holding down bolts would not be required. For this holding down solution, there would be only one phase of concrete pour because the embedded section would form a permanent shuttering for the mass concrete inside it.

3.52 Electrical ducts would then be placed through the shuttering and reinforcement (for the holding down bolt solution), or the steel cylinder. These would include conduits for the high and low voltage cables and earthing tapes. The configuration of the ducts and the earthing tape would depend on the turbine model being used and the nature of the electrical layouts. The holding down bolts are held in place within the shuttering by a template which would be fixed to the shuttering. Concrete would then be poured to form the foundation upstand. The upstand concrete would be compacted with poker vibrators in a similar way to that described for the base slab.

3.53 The wind turbine earthing ring and tails would then be placed within the backfill. In some cases, earthing rods would be needed around the foundations. The need for these would depend on the ground conditions at the Site. If required, they would be installed as self-boring rods, drilled into the ground, in contact with the weathered rock. The depth of the rods would depend on the electrical characteristics of the ground. Once the earthing ring is completed, the cable ducts would be extended to the edge of the foundation and backfilling to the top of the upstand would commence.

3.54 The wind turbine foundation would then be backfilled. Weathered rock material from the foundation excavation would be used for the bulk of the backfill. It would then be placed in thin layers and compacted mechanically.

3.55 The bottom section of the wind turbine tower would be placed over the foundation bolts and fixed to the foundation. Cementitious grout would be placed between the bottom flange of the tower and the foundation. The grout would be retained in position by temporary formwork, which would prevent it from spilling outside the foundation. The material would be allowed to cure and the nuts would be tightened to pre-tension the bolts.

3.56 The area around each turbine tower and over the turbine foundations would be reinstated by using topsoil stripped during the foundation construction excavation and other surplus excavated material.

High Voltage Cabling

3.57 The turbines would be interconnected using armoured underground cables placed in trenches forming a power circuit within the Site. The underground cables would be taken into the on-site substation where the electrical control equipment would interface with the local distribution network.

3.58 The design of the high voltage (HV) cable trenches would be a function of the electrical rating of the cables, the ground conditions and the depth of protection required for the cables. The electrical rating and the ground conditions would provide data to assess the thermal performance of the cables. This would determine the likely spacing between each electrical circuit and therefore the width of the trench. Typical cable trench construction details are shown in Figure 3.8.

3.59 Cable trenches would be excavated using conventional construction equipment. The mineral soil would be dug out and set aside for re-use in the reinstatement of the trenches. The trench would then be excavated to the required overall depth. Subsoil material from the excavation would be temporarily stockpiled alongside the trench, but kept separate from any mineral soil. Detailed method statements for materials handling would be prepared in accordance with a restoration and management plan.

3.60 The cable would be placed on a bed of previously dug stone free excavated soil material. The trench would then be backfilled with excavated subsoil taken from the temporary stockpile alongside the trench and the top of the excavation reinstated with topsoil. Cable tiles or a warning marker tape would be laid in the trench during backfilling at a pre-specified depth. Any surplus excavated material would be stockpiled at an agreed location and used later in the reinstatement of the Site.

Site Substation – 132kV

3.61 The proposed development will potentially require a 90mx90m, 132kV substation compound which would be located to the north-east of the site as demonstrated within Figure 3.1. Within this there would be a requirement for a wind farm substation compound of 45m by 20m, with a separate compound belonging to SSE Networks which would be provided to their own specifications.

3.62 Wind farm substation buildings are typically of conventional masonry construction, on concrete foundations with a pitched roof constructed of trussed rafters finished in slates or tiles. A security slab of reinforced concrete can be incorporated into the roof construction. In most cases, cable ducts and trenches are formed in the slab of the building. The trenches can be up to 1.5m deep depending on the electrical requirements and the layout of the Site, and also on whether the switchgear in the control building utilises top or bottom entry cables. A typical substation building is illustrated on Figure 3.9.

3.63 The substation would house the switchgear and control equipment needed for the grid connection and would also provide some secure storage space that may occasionally be required for the wind farm. A typical substation floor and roof plan is illustrated in Figure 3.10. The building would not be permanently manned as the wind farm would be controlled remotely from a central control facility.

Watercourse Crossings

3.64 A total of nine new watercourse crossings would be required, with a further watercourse crossings on-site that may require to be upgraded. Technical Appendix 10.1 sets out a watercourse crossing inventory where requirements for each crossing are discussed in detail. The locations of these crossings can be viewed on Figure 3.1 within Volume 2 of this EIA Report.

Forestry

3.65 The proposed development is situated within an active commercial coniferous forestry plantation, dominated by sitka spruce. As a result of the proposed development, a total of 271.43ha would require to be felled to accommodate permanent felling from both the infrastructure footprint, buffer for bats, and management felling. Given the permanent forestry to bog enhancement measures proposed within the revised Technical Appendix 8.5 , a total of 187.54ha would be restocked on site, with 52.93ha requiring to be replaced as off-site compensation.

Habitat Management

3.66 Habitat management proposals are required to provide enhancement of the natural environment during operation of the proposed development. These are fully described and explained within the revised Technical Appendix 8.5 within a draft Habitat Management Plan (HMP), dated 13th November 2024. In outline, the measures include:

- Restoration of degraded peatland on The Slate within the northern section of the site;
- Commitment to a forestry to bog restoration project totalling approximately 30.96ha to the south of turbine 2, in line with NatureScot's requirements for peatland loss and subsequent mitigation and enhancement;
- Measures to manage deer in line with existing Deer Management provisions; and
- Measures to protect and enhance raptor and bats.

Other Construction Considerations

3.67 All construction activities will be managed within the requirements of the Construction (Design and Management) Regulations 2015 and will not conflict with the Health and Safety at Work etc. Act 1974. The design of the Development has taken full account of these regulations

3.68 Best practice waste management guidelines and relevant regulations will be complied with as part of the construction programme. A Site Waste Management Plan (SWMP) will be prepared as part of the post-consent CEMP.

Pre-Construction Works

3.69 A detailed Construction Method Statement (CMS) would be produced by the construction contractors and agreed with Argyll and Bute Council prior to the commencement of works. The CMS will typically include:

- A description of construction methods;
- Pollution prevention measures, including dust, emissions, drainage design and materials management;
- Water quality management and monitoring;
- Mitigation measures;

- Management of construction traffic (typically addressed separately in a traffic management plan);
- Noise and vibration management; and
- Public liaison.

3.70 Prior to commencement of construction, detailed Site surveys would be undertaken to provide data for the final design of the civil and electrical engineering infrastructure for the proposed development. These would comprise detailed topographical and geotechnical surveys and investigations.

3.71 The geotechnical survey would incorporate the excavation and sampling of trial pits at each turbine location and other infrastructure (e.g. substation) and possibly boreholes to obtain information about the underlying strata and groundwater conditions. This data will determine the need to microsite any infrastructure within the 100m tolerance.

3.72 All of the above will take cognisance of best practice guidance and be agreed with all applicable regulators.

Temporary Highway Works

3.73 Some off-site access works would be required including the temporary removal or relocation of street furniture, pruning/removal/replanting of shrubs/trees, and road widening. The detail of these enabling works would be provided in a detailed Traffic Management Plan, likely to be required by a condition to the consent.

3.74 Widening and resurfacing of the public road leading to the site entrance would also be required including the implementation of passing places. A running width of at least 5m would be required. Localised widening would be required on both sides of the road dependent on the position, so as to avoid watercourses and private property. It is understood at this stage that the junction with the B842 and the Dalsmirren Road is appropriate for turning and sightlines.

3.75 Should the proposed development obtain consent, a local planning application would be lodged for this localised widening following detailed analysis of ground conditions, vegetation and upon likely final turbine supplier.

Construction Works Duration and Sequencing

3.76 The exact commencement of construction works is not yet known given there is a long and complex series of consenting, grid works and procurement to complete. However, given a potential 18-month construction period, for the purposes of an EIA 'worst-case' scenario it is assumed that the earliest grid connection may be 2029, and therefore the earliest construction could potentially commence is late 2027.

3.77 There would be construction phasing, with civil engineering works progressing in some areas whilst turbines are being erected elsewhere. In order to minimise disruption to land use, site restoration would be undertaken as early as possible in development areas.

3.78 Should deemed planning permission be granted then, it is likely that construction hours would be restricted via means of a planning condition imposed by Argyll and Bute Council as part of the consent.

3.79 At this stage it is proposed that construction activities on site shall only take place between the hours of 07:00 to 19:00 on Monday to Friday inclusive and 07:00 to 13:00 hours on Saturday, with no construction works on Sundays or Bank Holidays, unless otherwise agreed with Argyll and Bute Council. Outside of these hours, there may be a requirement to take advantage of low wind speeds for the erection of turbines. In addition, turbine erection works cannot suddenly cease; in the event of a delay or complication it may be necessary to continue works beyond normal hours until they can end safely. Other activities that may take place outside these hours are limited to emergency works and dust suppression, unless otherwise agreed in writing by Argyll and Bute Council.

3.80 It is proposed that the delivery of any construction materials or equipment, other than turbine blades, nacelles and towers, shall be restricted to the above hours, unless otherwise agreed in writing by Argyll and Bute Council.

3.81 Depending on the time of year and the stage of the construction programme, temporary lighting may be required at the temporary compound and substation during working hours. It is not proposed that the lighting will be on outside of working hours, unless essential construction work outside normal working hours is required.

Construction Compound

3.82 The construction compound would be installed as soon as possible at the start of the construction phase, which would be the hub of construction operations.

3.83 The construction compound would be approximately 9,800m^2. The indicative location, shown in Figure 3.1, takes account of the local terrain and its distance from watercourses. Space would be provided for 'portacabin' style site offices; welfare and mess facilities; secure containers for tool and equipment storage; an area for the storage of various materials with bunding as required; and car parking areas. The compound would be secured by means of a perimeter fence and lockable gates if deemed necessary.

3.84 On completion of construction, the site compound would be removed and the area reinstated to its former condition in accordance with an approved method statement.

Energy Storage Compound

3.85 Prior to the commissioning of the wind turbines activities the Energy Storage Compound will be constructed using the western side of the temporary construction compound. Batteries would use lithium-ion technology and have been incorporated into wind farm developments for some time.

3.86 It is expected that there would be up to 5MW of battery storage capacity available.

3.87 Battery energy storage compound would be factory assembled and delivered to site in standard 12.2m long x 2.4m wide ISO shipping containers. Each container will be positioned on cast in-situ concrete foundations of approximately 1m2 area, located at each corner of the container and centrally. The level of the foundations will be finished approximately 100mm above finished ground level to assist with drainage and air flow beneath the shipping container.

3.88 Battery containers will be positioned a minimum of 2.5m apart to facilitate access to all sides. Dependent upon design and manufacturer's requirements, access may be necessary from the sides of containers as well as from each end.

3.89 A Power Conversion System (PCS) container, of similar dimensions to the battery containers, would be located adjacent to each battery storage container. The contents of the container would be factory assembled and tested. Foundations for PCS containers would be similar to the battery containers. A transformer, located either within the PCS container or externally, would transform the LV to EHV or HV voltages depending on the voltage of the point of connection to the local network, or vice versa. The battery and PCS containers would be connected via underground cables. If the unit transformer is located externally, underground cables will connect the PCS and transformer. Underground cables would take power to and from the proposed wind farm control building. Switchgear, communications and protection equipment would be located within the proposed wind farm control building, located to the east. The battery containers, PCS and transformer(s) will be located within a secure compound fenced with steel palisade fencing 2.4m high. A standard double width gate would facilitate personnel and vehicle access into the compound. The compound would be surfaced with crushed aggregate, suitably compacted in layers and incorporating geotextile / geomembrane where necessary. The depth of the aggregate will be dependent upon the underlying geology and suitable to support all anticipated loadings with minimal deflection / rutting.

Concrete Requirements

3.90 Onsite batching will occur as the physical size of the compound can accommodate this and that the nearest ready-mix location is located some distance away which is suboptimal for mass concrete pours. It is assumed that this would occur within the construction compound area.

Maintenance

3.91 Wind farm maintenance would be carried out by the turbine supplier and later by suitably qualified contractors to carry out regular inspections and maintenance activities.

3.92 Routine maintenance and servicing would necessitate monthly visits to the Site by a maintenance crew (if necessary), typically two persons in a small van or similar sized vehicle. Maintenance staff would be able to park on the turbine compound for each turbine and would utilise access tracks for maintenance visits to the substation.

3.93 Routine servicing would include the performance of tasks such as maintaining bolts to the required torque, adjustment of blades and inspection of welds in the tower. In addition, oil sampling and testing from the main gearbox would be required and oil and components replaced at regular intervals.

3.94 In the event of any unexpected breakdowns on-site, such as the failure of a generator, appropriate maintenance works would be carried out as soon as practicable. The replacement of major components may require a crane and heavy transport vehicles.

3.95 On-going track maintenance, if required, would generally be undertaken in the summer months when tracks are dry. Safe access for maintenance purposes would be maintained all year round. Maintenance of the public access features, such as boards and bin emptying would occur regularly.

Commissioning of Mechanical and Electrical Equipment

3.96 The testing and commissioning of a wind farm is normally undertaken by the turbine supplier. It involves a series of tests on the high voltage electrical network, the electrical equipment in the turbines and control building and the SCADA system. No construction activities are required and it only entails the use of small vehicles.

Reinstatement and Removal of Temporary Works

3.97 On completion of construction, all temporary fencing and the temporary construction compound would be removed from Site and all areas disturbed by the works would be reinstated. Reinstatement works would be subject to a Construction Method Statement to be approved by Argyll and Bute Council.

Construction Methodology and Programme

3.98 This chapter provides an outline description of the methodology and programme that would be employed during the construction phase of the proposed development.

3.99 It is estimated that the construction of the proposed development would take up to 18 months and would consist of the operations set out below.

3.100 The programme of construction deliveries shown in Table 3.2 has taken into account of all that is currently known about the Site and proposed development. The precise duration and timing of each activity may be modified, as necessary, to take into account the findings of the pre-construction works and surveys. The use of construction method statements through a planning condition will provide the detail design and time frame.

Table 3.2: Indicative monthly programme of construction activities

Activity	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Site Mobilisation																		
Required felling																		
Construction of main construction compound																		
Track and turbine compound construction																		
132kv Substation construction																		
Energy Storage Compound																		
Excavating trenches and laying electrical and communication cabling																		
Turbine delivery and installation																		
Turbine fit out, restoration and grid connection																		
Turbine commissioning																		

Wind Farm Operation

Operational Timescales and Decommissioning

3.101 Following construction and commissioning, the proposed development would be operational and generating electricity for a period of approximately 35 years, after which it would be decommissioned and removed, or alternatively, a further application could be made to extend the period of operation.

3.102 If a further application is not submitted, decommissioning would involve the total removal of above-ground infrastructure. This would involve retention of existing access tracks for estate operations. Reinstatement of the Site would be carried out in accordance with an approved method statement. A decommissioning bond would be agreed with Argyll and Bute Council and this is expected to be enforced by way of an appropriately worded planning condition.

Maintenance

3.103 Wind farm maintenance would be carried out by the turbine supplier and later by suitably qualified contractors to carry out regular inspections and maintenance activities.

3.104 Routine maintenance and servicing would necessitate monthly visits to the Site by a maintenance crew (if necessary), typically two persons in a small van or similar sized vehicle. Maintenance staff would be able to park on the crane pad for each turbine and would utilise access tracks for maintenance visits to the substation.

3.105 Routine servicing would include the performance of tasks such as maintaining bolts to the required torque, adjustment of blades and inspection of welds in the tower. In addition, oil sampling and testing from the main gearbox would be required and oil and components replaced at regular intervals.

3.106 In the event of any unexpected breakdowns on-site, such as the failure of a generator, appropriate maintenance works would be carried out as soon as practicable. The replacement of major components may require a crane and heavy transport vehicles.

3.107 On-going track maintenance, if required, would generally be undertaken in the summer months when tracks are dry. Safe access for maintenance purposes would be maintained all year round.