Chapter 4: Description of the Proposed Development

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Chapter 4: Description of the Proposed Development

Contents

4 Description of the Proposed Development

4.1 Introduction

4.1.1 This Chapter describes the elements that constitute the proposed Appin Wind Farm (hereafter referred to as 'the Proposed Development') for which consent is being sought and which is assessed in this Environmental Impact Assessment (EIA) Report. It includes details of the Proposed Development infrastructure as well as a description of the construction, operation and decommissioning phases and associated main activities.

4.1.2 This Chapter is support by **Figures 4.1-4.11** which show the detail of the Proposed Development infrastructure. The Chapter is also supported by the following appendices:

- Technical Appendix 4.1: Outline Construction and Environmental Management Plan (OCEMP);
- Technical Appendix 4.2: Forestry Assessment and Management Plan;
- Technical Appendix 4.3: Schedule of Mitigation;
- Technical Appendix 4.4: Borrow Pit Report;
- Technical Appendix 4.5: Outline Access Management Plan;
- Technical Appendix 4.6: Aviation Lighting and Mitigation Report; and
- Technical Appendix 4.7: Carbon Balance Calculation.

4.1.3 The layout of the Proposed Development is shown on **Figure 4.1** and **4.2**. A number of best practice construction measures are considered to be 'embedded' in the design and construction of the Proposed Development. These are therefore considered to be in place for the purposes of the environmental assessment. These measures, as well as further information on construction methods to be employed, are provided in the outline CEMP (**Technical Appendix 4.1**). The final CEMP would be secured via a planning condition as per the Standard Conditions submitted as part of the Proposed Development application.

4.2 Proposed Development

Overview

4.2.1 The Site is centred on National Grid Reference (NGR) 272887, 597709 and covers an area of approximately 1,130 ha in total. The characteristics of the Site are described in **Chapter 3: Site Description and Evolution**.

4.2.2 The key components of the Proposed Development (as shown on **Figure 4.1** and **4.2**) which would be constructed in accordance with the Construction (Design and Management) Regulations 2015 including detailed design and relevant Health and Safety requirements, comprise the following:

- up to nine variable pitch (three bladed) turbines, each with a maximum blade tip height of up to 200 m and a combined rated output of over 50 MW;
- it is anticipated that four of the turbines (T1, T2, T5 and T9) will be fitted with visible aviation warning lights;
- turbine foundations (up to 30 m diameter) and a crane hardstanding area which includes areas for blade, tower and nacelle storage at each turbine;
- approximately 13 km of new access track with a typical running width of 5 m (wider on bends) and 14.8 km of upgraded existing access track (widened to 5 m) and associated drainage, five turning heads and on-site passing places (location and size to be determined by the turbine supplier);
- a network of underground cabling and electrical infrastructure along access tracks to connect the turbine locations, and the on-site electrical substation;
- fifty-four watercourse crossings and associated infrastructure (48 upgraded existing crossings and six new crossings);
- one on-site substation compound (70 m x 150 m) which would accommodate a control building for the Scottish Power Energy Networks (SPEN) substation and the wind farm substation;
- one SPEN construction compound (50 m x 100 m);
- one temporary construction compounds for the Applicant (50 m x 100 m);
- search area for up to three borrow pits (covering approximately 16,888 m^2); and

- clearance of approximately 62.52 ha of on-site forest and restocking within the Site of approximately 40.72 ha.

4.2.3 Indicative details of the proposed turbines, foundations, new and upgraded access tracks, hardstandings, electrical infrastructure, borrow pits, construction and substation are shown on **Figures 4.3 to 4.11**.

4.2.4 In total, up to 23.67 ha of land would be used for the Proposed Development including the upgraded sections of access tracks. The extent of the Proposed Development permanent infrastructure represents approximately 2.09% of the area of the Site.

4.2.5 The Proposed Development has been designed with an operational life of up to 50 years at the end of which it would be decommissioned, or an application may be submitted to extend the operational period or repower the Site.

Wind Turbines

4.2.6 Consent is being sought for the installation and operation of nine, three-bladed horizontal axis turbines with a maximum tip height of 200 m. The proposed turbine locations are shown on **Figure 4.1** and **4.2a** and the coordinates for each are provided in Table 4.1.

Table 4.1 – Turbine Coordinates and Specifications

Turbine No	Easting	Northing
1	271329	598727
2	270343	598885
3	270607	598414
4	270920	598031
5	271268	597665
6	271751	597457
7	272089	597035
8	272534	596725
9	272764	596380

4.2.7 The exact model of the turbines to be installed as part of the Proposed Development would be selected through a competitive procurement process and would be dependent upon technology available at that time. This EIA Report has considered the use of an indicative turbine type shown on **Figure 4.3**.

4.2.8 It is anticipated that the turbines would be rated at approximately 7.2 MW, depending upon the dimensions of the selected turbines. A realistic minimum capacity for electricity generation by the Proposed Development would be in the region of 64.8 MW based on current turbine availability.

4.2.9 The turbines would each incorporate a tapered tubular tower and three blades attached to a nacelle that would house a turbine generator and other operating equipment e.g. a gear box. The turbines would be non-reflective pale grey or white semi-matt or a finish agreed with Dumfries and Galloway Council (DGC).

Aviation Warning Lighting

4.2.10 As the turbines of the Proposed Development will exceed 150 m maximum blade height tip height, they will need to be lit in accordance with the requirements of the Civil Aviation Authority (CAA) Air Navigation Order (ANO), in addition to meeting the lighting requirements of the Ministry of Defence (MOD). It is proposed that T1, T2, T5 and T9 are provided with 2000 candela (cd) lights at hub height to satisfy the CAA-ANO requirement, with additional infra-red (IR) lighting being provided to satisfy the MOD requirements. Aviation lighting requirements is detailed further in **Technical Appendix 4.6**.

Turbine Foundations and Crane Hardstandings

4.2.11 Turbine foundations would be designed to accommodate the final choice of turbines and to suit site specific ground conditions. The final design specification for each foundation would depend on the findings of detailed ground investigation of the land on which each turbine would be located. An illustration of a typical turbine foundation is provided on **Figure 4.4**.

4.2.12 The turbines would have gravity foundations laid using reinforced concrete and would have a diameter of approximately 30 m. The depth of the foundation excavation would depend on the need to reach suitable ground. Excavations would be on average approximately 4 m deep. The sides would be graded back, from the foundation and battered to ensure that they remain stable during construction.

4.2.13 The turbines would be erected using mobile cranes brought on to the Site for the construction phase. A crane hardstanding would be built adjacent to each turbine and is likely to have a footprint of approximately 30 m x 80 m and 1 m in depth. The actual crane pad design and layout would be determined by the turbine supplier according to their preferred erection method. An indicative design, considered to be the worst-case in terms of size, has been considered for the purposes of this assessment and is provided on **Figure 4.6**. The crane hardstanding (permanent) would also be utilised

as a laydown area. Additional temporary laydown areas for turbine components and crane lifting would be located adjacent to the main hardstanding and would be reinstated post construction.

Forestry

4.2.14 The Proposed Development is partially located within commercial forestry. The forest is comprised largely of commercial conifers with small areas of mixed broadleaves and open ground planted in the late 1990s.

4.2.15 A total of 62.52 ha will require to be felled to enable the construction and operation of the Proposed Development. Of the total 65.25 ha, 40.73 ha is temporary felling which includes some 'advanced felling' to minimise wind blow by leaving isolated stands of trees. Temporary felling areas would be restocked where possible, including 10.55 ha of which would be replanted as broadleaved species as part of the Nature Enhancement Management Plan, as outlined in **Technical Appendix 7.6**.

4.2.16 Felling to accommodate the operation of the Proposed Development would result in a permanent loss of 22.03 ha of stocked woodland. Therefore 22.03 ha of off-site compensatory planting will be undertaken. **Technical Appendix 4.2** further describes the potential implications of the Proposed Development on the woodland resource within the Site boundary, plans for restocking and compensatory planting and its long-term management.

Access to the Site from the Public Road Network

4.2.17 Access to the Site will be taken from the C35s north of Strahanna at an existing access junction.

On-site Access Tracks

4.2.18 In total, approximately 27.8 km of track will be utilised for the Proposed Development. Approximately 14.8 km of existing track will be used with upgrades where required. In addition, approximately 13 km of new access track will be constructed for the Proposed Development.

Watercourse Crossings

4.2.19 To access the turbines and associated infrastructure, six new watercourse crossings and 48 upgraded existing crossings will be required. further details are provided in **Technical Appendix 6.1**.

Turbine Transformers and Cables

4.2.20 All turbine transformers would be internal, located within the tower of the turbines. All cables between the turbines and the substation would be underground as shown in **Figure 4.7**.

Grid Connection, Security Building and Substation

4.2.21 The grid connection point for the Proposed Development is subject to confirmation by the network operator. It is currently anticipated that the Proposed Development will connect to Rowancraig Collector and then on to the Glenglass substation. The precise route of the grid connection cabling has not yet been determined and its effects are not identifiable/assessable because it has yet to be designed and an application has not yet been made. The grid connection will require separate statutory environmental impact assessment consent under Section 37 of the Electricity Act 1989 and the grid connection application will be made by SPEN who are responsible for the transmission and distribution of electricity in central and southern Scotland. As a result, potential environmental effects as a result of off-site grid connection cannot be considered within this EIA Report, but will be subject to a separate consenting and impact assessment process undertaken by SPEN.

4.2.22 A typical on-site substation compound layout is shown in **Figure 4.8** and proposed substation elevations on **Figure 4.9**. The substation compound will measure approximately 120 m x 70 m. It will contain a control building and electrical equipment, including switchgear, communications equipment, and protection equipment. The control building will also contain toilets and a storeroom. Waste will be held in a closed system and removed by a licensed contractor at regular intervals. The buildings will be constructed in keeping with the local built environment.

Temporary Construction Compounds

4.2.23 Two temporary construction compounds would be required for the duration of the construction phase as shown on **Figure 4.1** and **4.2a**.

4.2.24 One of these will be for use by SPEN in the construction in their part of the substation. The other will be used by the Applicant to construct the Proposed Development. Each construction compound are likely to contain the following:

- temporary modular building(s) to be used as a site office;
- welfare facilities;
- parking for construction staff and visitors;
- reception area;

- fuelling point or mobile fuel bowser;
- secure storage areas for tools; and
- waste storage facilities.

4.2.25 **Figure 4.10** illustrates a typical construction compound although the layout may differ depending on site topography and contractor requirements. The buildings (e.g. welfare facilities, storage areas, offices and fuelling point) that form part of the temporary construction compounds would be removed at the end of the construction phase.

Temporary Borrow Pits

4.2.26 Three borrow pit search areas have been identified on-site and a Borrow Pit Assessment is included as **Technical Appendix 4.4**.

4.2.27 Quarrying of these borrow pits would provide a greater volume of rock than would be needed for the construction of the Proposed Development (including permanent access tracks, structural fill beneath turbine foundations and crane hardstandings), but would allow for the current uncertainty of the quality of the rock at these locations. It is the aim of the Applicant to source as much of the rock as possible from on-site, as this would minimise the need to transport large quantities of aggregate.

4.2.28 For purposes of the EIA, it has been assumed that 100% of aggregate would be imported to Site. This will provide a worst-case assessment of traffic movements as a result of the Proposed Development. It is likely that a high proportion (potentially up to 100 %) of aggregate would be sourced from the on-site borrow pits. Further details are provided in **Chapter 11**.

Table 4.2: Proposed Borrow Pit Locations

Borrow Pit Search Area	Approx Area (m^2)	Grid Reference (BNG)
Borrow Pit 1	3,666	264995, 595617
Borrow Pit 2	3,960	270338, 597808
Borrow Pit 3	9,262	273112, 596712

Operational Life

4.2.29 It is anticipated that the Proposed Development would have an operational life of up to 50 years. At the end of the operational life, the Proposed Development would be decommissioned, or an application may be submitted to extend the operational period or repower the Site.

4.3 Embedded Mitigation and Good Practice

4.3.1 A key benefit of the EIA process is the opportunity it provides to integrate environmental considerations into the iterative design of a project. Embedded mitigation proposals are those mitigation measures which are inherent to the Proposed Development and are integral to and should be included in consideration of the application.

4.3.2 Throughout the design evolution, embedding mitigation has been a feature of the process that has led to the final layout of the Proposed Development; and this embedded mitigation therefore forms part of the Proposed Development which is assessed.

4.3.3 During the construction phase of the Proposed Development, effects will be further managed in line with the Construction (Design and Management) Regulations 2015 and as part of the detailed design process taking into account the adoption of good practice (including Pollution Prevention Guidelines (PPGs) and replacement Guidance for Pollution Prevention (GPPs), supported by robust project management and an Environmental/Ecological Clerk of Works (ECoW). The role of the ECoW is defined in the outline CEMP (**Technical Appendix 4.1**).

4.3.4 Reference to good practice and standards, guidelines and legislation relied upon in the assessment methodology are referred to within each of the individual specialist topics in **Chapters 5-11**. Such environmental measures are also included in the outline CEMP (**Technical Appendix 4.1**), the final version of which would be secured via planning condition (refer to Standard Conditions which accompany this planning application).

Micrositing

4.3.5 During the construction of the Proposed Development, there may be a requirement to microsite elements of the Proposed Development infrastructure. This is an important measure which allows for further minimisation of environmental effects, under the supervision of the ECoW who is responsible for overseeing and managing the implementation of environmental policies and procedures on a construction site, and for ensuring that the construction activities comply with relevant environmental legislation, regulations, and best practices. The ECoW would be on-site during construction in certain areas / months to be agreed with DGC and NatureScot and in line with proposals set out in the outline CEMP (**Technical Appendix 4.1**).

4.3.6 It is proposed that a 100 m micrositing tolerance of turbines and all other infrastructure would be applied to the Proposed Development (so long as infrastructure does not move into the watercourse buffers or other environmental constraints identified on-site and remains within the Site boundary. Within this distance, any changes within 50 m of the consented locations would be subject to approval of the ECoW, any changes within 50-100 m of the consented locations will require approval of DGC in consultation with statutory consultees or will treated as a formal variation to the consent. Where relevant, the specialist chapters detail individual proposed directional limits on micrositing.

4.4 Pre-commencement Works

Tree Felling

4.4.1 Prior to the construction phase, felling of the trees as outlined on **Figure 4.12** would be required. The 62.52 ha of forest to be cleared is required to facilitate construction of the turbines and associated infrastructure as well as some additional felling classified as 'advanced felling' which is felling to minimise wind blow by leaving isolated stands of trees. Full details are provided in **Technical Appendix 4.2**.

4.5 Construction Phase

4.5.1 The construction phase for the Proposed Development will consist of the following principal activities:

- construction of temporary security compound and car parking within the construction compound;
- the working of the temporary borrow pits;
- construction of the substation compound;
- the upgrading/creation of the Site access tracks, including passing places, turning heads, junctions and drainage;
- construction of turbine foundations and crane hardstandings at each turbine location;
- excavation of trenches and laying of electrical and control cables adjacent to the Proposed Development tracks connecting the turbines to the control building;
- delivery to Site and erection of turbines (including the installation of aviation warning lighting);
- testing and commissioning of Site equipment including turbines; and
- site restoration and implementation of habitat enhancement and management measures.

4.5.2 These construction activities are discussed further below.

Construction Programme

4.5.3 It is anticipated that construction of the Proposed Development would commence in 2029 and would last approximately 18 months. A detailed construction programme will be prepared by the Contractor at the outset of construction. Construction would include the principal activities listed within the indicative construction programme as provided in **Table 4.3**.

4.5.4 Many of the Proposed Development's construction operations will be carried out concurrently, although predominantly in the order identified, reducing the overall length of the construction programme. Site restoration will be programmed and carried out to allow the restoration of disturbed areas as early as possible and in a progressive manner. An ECoW will be on-site during construction in certain areas/months as agreed with DGC.

4.5.5 Anticipated construction traffic deliveries at the Site per month during the construction phase, assuming the principal activities listed above, is set out in **Technical Appendix 11.1**. This shows that the peak of construction occurs in Month 4. A Construction Traffic Management Plan (CTMP) will be implemented to minimise disturbance on the local road network during construction.

Table 4.3 – Construction Programme

Construction Activity	Month																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Mobilisation & compounds																		
Access & Site Tracks																		
Crane Hardstanding																		
Turbine Foundations																		

Construction Activity	Month																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
On-site cabling																		
Substation civils work																		
Substation construction																		
Turbine Delivery																		
Turbine Erection																		
Commissioning & Testing																		
Site Reinstatement																		

Construction Employment

4.5.6 The number of construction staff present on-site during the construction phase would vary depending on the stage of construction and the activities being undertaken, with the maximum number of staff expected on-site likely to be around 45 per day during the peak construction activities. As construction is anticipated to take 18 months employment during construction has been calculated as Person Year of Employment (PYE), which allows a comparison to be made between full time and fixed duration employment. The construction of the Proposed Development is anticipated to create up to 620 PYE, 74 of which will be in Dumfries and Galloway and up to 223 in Scotland as a whole.

4.5.7 In addition to the direct employment opportunities, the construction of the Site will bring benefits to local business such as in the supply of materials or services for construction and in accommodation for workers and catering. Further information on construction employment provided in the Socio-Economic Benefits Report which accompanies the application.

Construction Hours

4.5.8 In general, the construction working hours for the Proposed Development would be 07:00 to 19:00 Monday to Friday and 07:00 to 16:00 on Saturdays. No working is proposed on Sundays and public holidays unless otherwise agreed with DGC.

4.5.9 Exceptions to the proposed working hours will be required for some activities, for example abnormal load deliveries, concrete deliveries during foundation pours, the lifting of the turbine components and emergency works. Concrete pouring for an individual turbine foundation must take place continuously and so activity will only cease when the pour has been completed. As indicated above, turbine erection can only occur during periods of low wind speeds and so to minimise the construction programme, lifting operations may need to be scheduled out with the above hours. In addition, it may be necessary to complete a particular lifting operation to ensure the structure is left safe.

4.5.10 The Contractor would keep local residents informed of the proposed working schedule, where appropriate, including the times and duration of any abnormally noisy activity that may cause concern, all under the terms of a traffic management plan as set out in **Chapter 11: Access, Traffic and Transport**.

Construction Environmental Management Plan

4.5.11 An outline CEMP is provided as **Technical Appendix 4.1**. In acknowledgement that the CEMP is a live document that would evolve throughout the construction phase of the Proposed Development, only the principles of the CEMP are outlined at this stage. It is anticipated that submission and approval of a more detailed CEMP, following site investigation works and further detailed design, would be a condition of the consent for the Proposed Development as outlined in the Standard Conditions accompanying this application.

Site Preparation and Establishment

4.5.12 Site preparation works would include the following key tasks, some of which would be undertaken concurrently:

- set up of welfare facilities;
- formation of the construction compound areas;
- establishment of borrow pits; and
- establishment of new section of access tracks and upgrading of existing tracks.

<u>Construction of Temporary Construction Compounds</u>

4.5.13 The construction of the temporary construction compounds will be formed by the creation of a hardstanding area using aggregate from the borrow pits. Temporary portacabins to serve construction

staff will be placed in the compound along with storage space, car parking spaces, waste disposal units, fuel storage and pollution prevention kits.

4.5.14 Depending on the time of year and the stage of the construction programme, temporary lighting may be required at the temporary construction compound during working hours. This will be designed to minimise light-spill on sensitive habitat features such as watercourses and waterbodies.

Working of Borrow Pits

4.5.15 Excavation of material from the borrow pits will be carried out using standard quarrying techniques, which may include blasting and mechanical excavation. However, all blasting work will be undertaken by a specialist contractor who will assume responsibility for blast design and implementation. The extent of any blasting requirement cannot be determined until intrusive site investigation tests are completed which will be undertaken following the issue of a consent for this application.

Construction of Access Tracks and Track Drainage

4.5.16 It is proposed that track formation would be by cut and fill or by a cut operation where there is a slope.

4.5.17 Tracks would be unpaved and constructed of a graded local stone with a typical running width of 5 m. Adjacent to this track will be an assumed 1 m width verge at either side for cabling and drainage, subject to local ground conditions. Track widths may vary in some sections to accommodate bends in the track alignment. On-site passing places, the location and size to be determined by the turbine supplier, will be required along with five turning heads. It is proposed that the majority of the stone required for construction of the tracks and hardstanding areas could be obtained from the identified borrow pits. Typical track arrangements are shown on **Figure 4.5**.

4.5.18 The tracks would be left in place following construction to provide access for maintenance, repairs, and eventual decommissioning of the Proposed Development. At the end of the construction phase the edges of all new tracks would be restored using materials stripped from excavations.

Watercourse Crossings

4.5.19 To access the turbines and associated infrastructure, six new watercourse crossings and 48 upgraded existing crossings will be required. Watercourse crossings will be subject to appropriate SEPA CAR licencing and mitigation will be put in place to control and attenuate run-off, and crossings will be regularly checked and maintained during construction and operation. All watercourse crossings are detailed in **Technical Appendix 6.1** and shown in **Figure 6.2**. Typical new water crossing structures will be bottomless arch or bottomless box culverts as shown on **Figure 4.11**.

4.5.20 Monitoring of water quality and water flow will be undertaken during construction of the Proposed Development and a water quality monitoring plan will be devised prior to construction through consultation with SEPA. Further information in relation to watercourse crossings and water quality monitoring is provided in **Chapter 6** and associated appendices.

Lighting

4.5.21 Artificial lighting may be required during construction to ensure safe working conditions, during periods of limited natural light. Examples include vehicle and plant headlights, construction compound lighting, floodlights and mobile lighting units, to be used around specific construction activities. It is intended that the type of lighting would be non-intrusive (e.g. directed towards works activity and away from Site boundary), to minimise impact on local properties and any other environmental considerations.

Materials Sourcing and Waste Management

4.5.22 For construction, the Proposed Development would require a range of materials (e.g. stone for access tracks, the temporary site compounds and the substation compounds). Excavated material from the turbine bases and access tracks would be used on-site for restoration/reinstatement.

4.5.23 A Site Waste Management Plan (SWMP) would be developed for implementation during construction, as discussed in the outline CEMP (**Technical Appendix 4.1**). This outlines the material requirements and waste generation during construction and how the Applicant intends to consider the management of these aspects.

4.5.24 Water would be required for welfare facilities and to dampen tracks during dry weather, although this would be minimal, and an abstraction license (which are granted by SEPA under the Water Environment (Controlled Activities (Scotland) Regulations 2011) is not anticipated to be required for the activity.

Construction Traffic

4.5.25 The proposed abnormal load route required to transport turbine components to the Site is shown on **Figure 11.4** and is based on an assessment from George V Docks on the River Clyde via the M8 and M73 / M74 and on to the M77. South of Ayr, the Proposed Development would be accessed via the A713 to the south of Carsphiarn. Loads would then proceed south of Carsphairn until the B729 and

travel east to Smittons Bridge. Here they would join the C35s road to Strahanna where they would access the Site.

4.5.26 Turbine blades will be loaded on to a blade lifter south of Carsphairn using an existing blade laydown area. They would then follow the route outlined above until reaching Site. Full detail of the assessment of effects on the road network is provided in **Chapter 11**.

4.5.27 A CTMP will be implemented to minimise disturbance on the local road network. The CTMP will also contain details of the temporary measures (such as signage) to be put in place on the approach to the Site to ensure the safe access and egress of construction vehicles from and onto the major road network. Further details are provided in **Technical Appendix 11.1**.

Foundations and Crane Hardstandings

4.5.28 The area of the foundations and crane hardstandings will be excavated with the soils that are excavated set aside for backfilling the batter areas around the turbine bases and hardstandings and use of small bankings either side of access tracks.

4.5.29 Concrete batching is expected to be undertaken on-site. All turbine and substation foundation concrete will be mixed on-site, with deliveries of cement powder and water (bowsers) being delivered by HGV tankers. It is proposed that the facility will be located within the construction compound or one of the borrow pits, with suitable pollution prevention measures in place, which will be developed in conjunction with the ECoW and incorporated into the CEMP. If abstraction of water is required for batching, this will be subject to a separate abstraction license from SEPA, if required.

4.5.30 A detailed Method Statement for the excavation and construction of the foundations and hardstandings will be contained within the final CEMP.

On-site Substation Compound and Electrical Cabling

4.5.31 The Proposed Development would be connected to the electricity network via an on-site substation control building located within the substation compound (approximately 70 m x 120 m). The compound would include an area for car parking and High Voltage (HV) equipment, such as transformers and circuit breakers. This indicative on-site substation compound is shown on **Figure 4.8**.

4.5.32 The main control building would be single storey and would measure approximately 6 m x 35 m with a pitched roof which would be 5.5 m high at its tallest point. It is proposed that the buildings would have a cement render with wet dash finish and the final external finishes would be agreed with DGC. A typical control building elevation is shown on **Figure 4.9**.

4.5.33 Underground power cables would run along the side of the access tracks in trenches from each of the turbines to the substation. Indicative cable trench arrangements are provided on **Figure 4.7**.

Access Management

4.5.34 During construction, measures would be required to ensure that the public understand that restricted access to the forestry tracks would be in place throughout the works. There is no option for alternative access in place of the Core Paths due to the presence of forestry and limited alternative routes within the area. Plans for temporary access management, including traffic management and access restrictions, would be communicated with the public prior to taking place, where feasible. The Applicant will aim to keep all access restrictions and limitations to a minimum.

4.5.35 The Applicant is committed to safeguarding the safety of members of the general public, whilst also ensuring that construction progress is not compromised.

4.5.36 An Outline Access Management Plan (AMP) is provided in **Technical Appendix 4.5** with the final version of the AMP to be agreed with DGC in advance of construction.

Erection of Turbines

4.5.37 The erection process for each turbine will take approximately 2 to 5 days, although this will depend on weather conditions, as generally, turbines are erected in wind speeds not exceeding 8 to 10 metres per second (m/s) for health and safety reasons. Turbine erection will be undertaken by a specialist contractor and cranes will be used for the off-loading of turbine components from the abnormal load vehicles and to assist in turbine assembly. A ‘crawler’ or mobile wheeled crane of larger capacity, working in tandem with the main crane, will be used to erect the turbines. The turbine erection contractor will specify the type of cranes used during the erection process. The cranes will be positioned on the hardstanding area adjacent to each turbine and will include outriggers for support.

Cumulative Wind Farm Construction

4.5.38 Within the vicinity of the Proposed Development, it is noted that a number of other wind farms have been consented, some of which propose to use part of the same access route as the Proposed Development.

4.5.39 Should the Proposed Development be undergoing construction at the same time as any other development using the same transport routes, it is acknowledged that this would require coordination between developers and contractors to mitigate any transport effects. Mitigation measures for this eventuality would be contained within the CTMP, expected to be agreed, via condition (refer to Standard Conditions submitted with this application), with DGC and Transport Scotland prior to the commencement of construction.

4.6 Site Restoration

4.6.1 Soils would be used for reinstatement works associated with access tracks, cable trenches, turbine foundations, crane hardstandings, borrow pits and the temporary construction areas. The upper vegetated turfs would be used to dress infrastructure edges and to reinstate the surface of restoration areas. It is anticipated that most of the soil resources within areas directly affected by construction activities would be able to be stored and reinstated as close as possible to where they were excavated in accordance with best practice; so that the Site would be restored with minimal movement of material from its original location. It is not anticipated that any excavated material would leave the Site.

4.6.2 Further detail on Site restoration would be provided within the CEMP, an outline of which is provided in **Technical Appendix 4.1**.

4.7 Outline Nature Enhancement Management Plan

4.7.1 An outline Nature Enhancement Management Plan (NEMP) is provided in **Technical Appendix 8.6**. The outline NEMP includes proposals for:

- ditch blocking to improve carbon-rich soils;
- riparian planting;
- pond creation;
- native broad-lead woodland creation;
- feathering of commercial forestry; and
- installation of bird and bat boxes.

4.8 Operation and Maintenance Phases

Duration

4.8.1 The Proposed Development would have an operational life of up to 50 years from the first commissioning (export to the electrical grid).

Electricity Generation

4.8.2 The turbines would start to generate electricity at wind speeds of around 3 m/s (6.7 mph). Electricity output would increase as the wind speeds increase up to a maximum of around 13 m/s (29.1 mph), when the turbines would reach their maximum capacity. The turbines would continue to operate at maximum capacity up to wind speeds of around 19 m/s (42.5mph). Above 19 m/s the turbines would operate at a reduced output under a storm-control mode up to wind speeds of around 25 m/s (55.9 mph). Above 25 m/s the turbines would cut-out and automatically stop as a safety precaution.

4.8.3 The electricity generation by the Proposed Development would provide enough power for over 82,600[1] average Scottish households.

Maintenance

4.8.4 The Proposed Development would largely be controlled and managed remotely, however there would be technicians on-site regularly and it would be maintained throughout its operational life via servicing at regular intervals. It is anticipated that there would be approximately four annual service visits per turbine by a service team of up to three people. Inspections of high-voltage equipment and general site safety are expected to be carried out monthly. Faults would be responded to as required, most likely by a team of two technicians.

[1] Based on a 64.8 MW installed capacity, average Scottish domestic consumption of 3,078 Kwh per year (BEIS December 2022) and the average load factor detailed in the CfD Allocation Round 6: Standard Terms Notice (Department for Energy Security & Net Zero, 6th March 2024) which states a load factor for new build projects (for delivery years 2026-2029) of 44.8% for onshore wind (>5MW) (https://assets.publishing.service.gov.uk/media/65e85ee662ff48001a87b243/cfd-ar6-standard-terms-notice.pdf).

4.8.5 This team would either likely be employed directly by the Applicant or by the turbine manufacturer. Management of the Proposed Development would typically include turbine maintenance, health and safety inspections and annual civil maintenance of tracks, drainage and buildings. It is anticipated that the Proposed Development would employ up to three local members of staff during its operational period.

Socio-Economic Benefits

4.8.6 As outlined in the Socio-economic Benefits Statement, should the Proposed Development gain consent, a Community Benefit Fund would be made available to the community. This is offered on the basis of a payment per MW of installed electricity generating capacity at the Scottish Government recommended rate at the time of commissioning the Proposed Development. At present the recommended rate is £5,000 per MW (index linked) of installed electricity generating capacity. The Proposed Development will also provide a Science, Technology, Engineering and Mathematics (STEM) fund for the locally community of £10,000 per annum during the operational period of the Proposed Development..

4.8.7 Should there be an interest for local groups or organisations to have a financial interest in the Proposed Development, the Applicant would be willing to engage locally in order to bring this forward. This would offer local community groups the ability to invest in and acquire a share of the Proposed Development. The local communities would see a return on investment through profits produced throughout the lifetime of the Proposed Development. Local Energy Scotland can provide independent advice and support to communities interested in the shared ownership opportunity. Further details of the consultation effort associated with and response from communities is provided in the PAC Report accompanying the application.

4.9 Decommissioning Phase

4.9.1 At the end of its operational life, which would be defined by condition on the grant of any consent, the Proposed Development would be decommissioned unless an application is submitted to extend the operational period or to repower the Site. The decommissioning period would be expected to take up to one year.

4.9.2 The ultimate decommissioning protocol would be agreed with DGC and other appropriate regulatory authorities in line with best practice guidance and requirements of the time. This would be done through the preparation and agreement of a Decommissioning, Restoration and Aftercare Strategy in line with current legislation, guidance, policy at that time. A financial guarantee for the decommissioning would be provided prior to the commencement of construction, and both of these would be subject of a planning condition as per the Standard Conditions accompanying this planning application.

4.9.3 The final detailed Decommissioning and Restoration Plan (DRP) would reflect the relevant legislation, and best practice current at the time of decommissioning and restoration.

4.9.4 Table 4.4 sets out the potential decommissioning requirements for each element of the Proposed Development. These would be outlined further in the outline DRP and then updated in the detailed DRP.

Table 4.4 – Decommissioning Requirements for Infrastructure

Element	Decommissioning Requirement
Turbines	Turbines would be dismantled and removed from Site. Turbine components would be dismantled on-site using standard engineering techniques similar to those used for the original installation. The re-use or recycling of components would be prioritised, this would include exploration of any viable second hand turbine market. Turbine oils or any other oils would be removed from the Site and disposed of appropriately.
Turbine Foundations	Top soil material that has revegetated the foundations would be excavated first and temporarily stored for re-use following partial removal of foundations. The top 1 m of the turbine foundation would be removed and disposed of appropriately. This is considered preferential to removing all infrastructure, due to the potentially lower environmental impacts associated with excavating, processing and removing concrete from the Site. The excavated foundation would be reprofiled with soil and reseeded.
Crane Hardstandings	Top soil material that has revegetated the crane hardstandings would be excavated first and temporarily stored for reuse following partial removal of crane hardstandings. The top 1 m of the crane hardstandings would be removed and disposed of appropriately. This is considered preferential to removing all infrastructure, due to the potentially lower environmental impacts associated with excavating, processing and removing aggregate from the Site. The excavated hardstandings would be reprofiled with soil and reseeded. Recovered geogrids and geotextiles would be disposed of appropriately. All granular materials would be excavated and removed from the Site, for re-use where practicable.
Upgraded Access Tracks	All access tracks which were in existence before the construction of the Propsoed Development but upgraded as part of construction would be left in-situ for the use of forestry management and extraction.
New Access Tracks & Recreational Heritage Trail	New access tracks and the recreational heritage trail will be removed during decommisioning. The top 1 m of the material will be removed and disposed of appropriately and the excavated tracks/trail would be reprofiled with soil and reseeded.

Element	Decommissioning Requirement
Underground Cabling	These are underground and therefore all cables would be made safe and left in-situ subject to them being 1 m below ground. This is considered preferential to extracting cables from the cable trenches due to the potentially greater environmental impacts associated with excavating, processing and removing the cable from the Site.
Substation Compound	All equipment from within the substation compound would be removed from Site and either reused, recycled or disposed of appropriately. Oils or lubricants from the compound would be removed and disposed of appropriately. The control building, and related infrastructure, would then be demolished and all materials would be reused, recycled or disposed of appropriately.
Substation Compound Foundation	The top 1 m of the compound foundations would be removed and disposed of appropriately. The excavated hardstandings would be reprofiled with soil and reseeded.

4.10 Health and Safety

4.10.1 All construction, operation and decommissioning 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[2]. The design of the Proposed Development has taken full account of these regulations. To further reduce possible health and safety risks, a Health and Safety Plan for the Proposed Development will also be drawn up. All staff and contractors working on the construction, operation or decommissioning will be required to comply with the safety procedures and work instructions outlined in the Health and Safety Plan at all times.

4.10.2 To ensure that hazards are appropriately managed, risk assessments will be undertaken for all major construction activities, with measures put in place to manage any hazards identified.

4.11 References

UK Government (2015) *The Construction (Design and Management) Regulations 2015.* Available at: https://www.legislation.gov.uk/uksi/2015/51/contents/made

Water Environment (Controlled Activities (Scotland) Regulations 2011). Available at https://www.legislation.gov.uk/ssi/2011/209/contents

[2] Or appropriate legislation at the time of undertaking the works.