3 Proposed Development

Contents

3.1	Introduction	3-1
3.2	Site Status and Context	3-1
3.3	Description of the Development	3-2
3.4	Construction	3-8
3.5	Environmental Management	3-10
3.6	Operation & Maintenance	3-11
3.7	Decommissioning	3-12
3.8	Climate Change & Carbon Considerations	3-12
3.9	Socio-Economic Benefit	3-14
3.10	Forestry	3-14
3.11	Summary	3-14
3.12	References	3-15

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3 Proposed Development

3.1 Introduction

3.1.1 This chapter provides a description of the Proposed Development and its geographical context. It also outlines the anticipated construction and operation activities connected with the Proposed Development. The final Proposed Development layout is presented in Figure 1.1.

3.2 Site Status and Context

Background and Site Description

3.2.1 The Proposed Development is located approximately 4.8 km south of Straiton, 11.3 km south-west of Dalmellington and 17.4 km east of Girvan, (distances to the nearest proposed turbine) in South Ayrshire (refer to Figure 1.2).

3.2.2 The Proposed Development comprises a main turbine development area and two access options (only one will be progressed) totalling approximately 540 hectares (ha) of land (including both access route options), consisting of upland moorland in the south and west of the site, and farmland in the north-east (Figure 1.1). Two access routes (northern and western) have been identified and assessed within this EIA. However, only one route to site will be progressed and utilised. This will be decided prior to construction. The site gradually rises from 120 m Above Ordnance Datum (AOD) in the north-east of the site, to 315 m AOD at Knockbuckle in the south-east of the site. The site possesses a strong wind resource.

3.2.3 The surrounding area is rural, with the land predominately used for agriculture and commercial forestry. The site borders (but does not enter) the buffer zone of Galloway Dark Skies Park. There are no listed buildings within the site boundary.

Environmental Designations

3.2.4 Figure 3.1 shows the key constraints within the Proposed Development Boundary. Figure 3.2 shows the key environmental constraints within 10km of the site boundary. A brief summary of these is provided below with full descriptions provided in the relevant technical Chapters of the EIA Report.

3.2.5 The following designations are situated outwith the site boundary but within 5km (distances below from the site boundary to the designation at its nearest point):

- Sites of Special Scientific Interest – Knockgardner (~740 m west), Auchalton (~2.5 km west) and Blair Farm (~2 km north-west);
- Garden and Designed Landscape - Blairquhan (~450 m north) and Kilkerran (~2.3 km west);
- Galloway Dark Skies Park (~2.7 km south) and Buffer Zone (borders southern site boundary);
- Conservation Area of Straiton (~850 m north-east) and Crosshill (~4 km north-west);
- Four Scheduled Monuments – Knockinculloch (~130 m west), Knockdon (~4.8 km west), Mote Knowe (~4.3 km west), and The Lady Chapel (~3.7 km north-west); and
- Several Listed Buildings.

3.2.6 There are further designations between 5 km and 10 km of the site boundary that can be identified within Figure 3.2.

Cumulative Developments

3.2.7 Figure 3.3 shows the locations of other relevant onshore wind farm developments, including those that are operational, under construction, consented, in planning, or in scoping within 10 km of the Proposed Development at the time of writing (November 2021 - refer to Table 3.1). Potential cumulative effects with these developments have been assessed throughout the EIA Report, where there is sufficient information.

3.2.8 Two wind farms, Dersalloch and Hadyard Hill, are located within 10 km of the proposed site boundary and are both operational. Craiginmoddie is in planning as of January 2021, situated to the west of the site boundary and Carrick is in Scoping, bordering the site boundary to the south west. Although Carrick Wind Farm has not yet submitted a planning application, the site has been included within the EIA due to its proximity to the Proposed Development.

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

Table 3.1 - Cumulative Developments within 10 km of Proposed Development Turbines

Development	Status	Number of turbines	Direction from site	Approx. distance to nearest turbine
Dersalloch	Operational	23	North-east	2.4 km
Hadyard Hill	Operational	51	West	7 km
Craiginmoddie	In Planning	14	West	3.7 km
Carrick	Scoping	13	South-west	0 km (borders Knockcronal)

3.3 Description of the Development

3.3.1 The final Proposed Development layout is illustrated in Figure 1.1 and would comprise nine three-blade horizontal axis turbines, six with a blade tip height up to 200 m (T1, T2, T3, T7, T8 and T9) and three up to 180 m blade tip height (T4, T5 and T6) with an indicative combined rated output in the region of 59.4 MW. The Proposed Development includes associated infrastructure as below and will be discussed in this section:

- Turbines and turbine foundations;
- Crane hardstandings;
- Site access;
- Access tracks (existing, upgraded or new as required);
- Watercourse crossings (existing, upgraded or new as required);
- Substation and energy storage facility;
- Underground cabling;
- Permanent meteorological mast;
- Up to five borrow pit search areas; and
- Temporary gatehouse and construction compounds.

Micro-siting

3.3.2 Whilst the location of the infrastructure described above has been determined through an iterative environmental based design process, there is the potential for these exact locations to be altered through micro-siting allowances prior to construction. A micro-siting allowance of up to 50 m in all

directions is being sought in respect of each turbine and its associated infrastructure in order to address any potential difficulties which may arise in the event that pre-construction surveys identify unsuitable ground conditions or unforeseen environmental constraints that could be avoided by relocation. No micro-siting will be undertaken that results in an increase in the significance of adverse effects. It is proposed that the final positioning will be addressed through an appropriately worded condition.

3.3.3 The assessments within this EIA report have included the considerations of this 50 m micro-siting and it does not alter the conclusions formed as to worst case effects.

Turbines and Turbine Foundations

3.3.4 The Proposed Development will comprise six turbines up to 200 m blade tip height (T1, T2, T3, T7, T8 and T9) and three turbines up to 180 m blade tip height (T4, T5 and T6) when vertical. The indicative combined generation capacity of the turbines is anticipated to be 59.4 MW. The specific turbine manufacturer and model has not yet been selected as this will be subject to a pre-commencement tendering exercise and will be confirmed post consent. Therefore, for the purposes of the EIA, maximum turbine dimensions and operational attributes have been established as the development scenario. The turbine parameters for the Proposed Development will be six turbines (T1, T2, T3, T7, T8 and T9) with a maximum overall height (to blade tip) of 200 m and an indicative hub height of 122.5 m, and three turbines (T4, T5 and T6) will have a maximum overall height (to blade tip) of 180 m and an indicative hub height of 102.5 m. The maximum blade length will be 78 m, and the maximum rotor diameter will be 155 m for all turbines.

3.3.5 These dimensions are indicative and final turbine dimensions will be determined based upon turbine availability and procurement prior to construction, but will not exceed the maximum dimensions that have been assessed.

3.3.6 The proposed final locations of the turbines have been defined in order to enable the EIA to describe fully the Proposed Development for which permission is being sought. The British National Grid coordinates denoting where each of the turbines are proposed to be located are listed in Table 3.2.

Table 3.2 - Wind Turbine Coordinates

Turbine	X-Coordinate	Y-Coordinate
T1	236759	599643
T2	237131	599863
T3	237491	599614
T4	237838	599922
T5	237972	599514
T6	238202	599132
T7	237720	599172
T8	237249	599234
T9	236820	599164

3.3.7 Whilst these locations have been determined through an iterative environmental based design process (Chapter 2), there is the potential for these exact locations to be altered through micro-siting allowances prior to construction. It is proposed that there will be a micro-siting allowance of

50 m in all directions for each turbine to allow for local variations in ground conditions, topography or unforeseen environmental constraints identified by pre-construction surveys.

3.3.8 Each of the turbines comprises the following components:

- Blades;
- Tower;
- Nacelle;
- Hub; and
- Transformer and switchgear.

3.3.9 Each turbine will be mounted on a tapered tubular concrete/steel tower and consist of a nacelle containing the associated equipment, to which are attached a hub and rotor assembly including three blades. An elevation drawing of a typical turbine is illustrated in Figure 3.4. The turbines will be of a typical modern, three-blade, horizontal axis design in semi-matt white or light grey with no external advertising or lettering except for statutory notices.

3.3.10 A full ground investigation will be completed prior to construction; however, typical foundations would comprise concrete and steel reinforcement. For the purposes of the EIA Report, it has been assumed that all nine turbines will have typical gravity base foundations with a typical radius of approximately 12 m and 4 m in depth.

3.3.11 The area above the foundations is backfilled up to the turbine with topsoil and seeded, with a native seed mix to encourage re-vegetation.

3.3.12 An illustration of a typical turbine foundation is provided in Figure 3.5. The final foundation design will be specific to the turbine selected and the site conditions as verified during detailed site investigations undertaken before construction commences. In the unlikely event that ground conditions are unsuitable for the standard foundation design described above, a piled foundation design may be required, involving the installation of a series of concrete piles per turbine, with each pile being bored or driven until the underlying bedrock is reached.

Crane Hardstandings

3.3.13 To enable the construction of the turbines, a crane hardstanding area and turning area at each turbine location will be required to accommodate assembly cranes and construction vehicles. This will comprise a crushed stone hardstanding area measuring approximately 195 m long by 65 m wide, with a typical thickness of approximately 1000 mm, but subject to the specifications required by the selected turbine manufacturer and crane operator and following detailed ground investigations prior to construction. It is proposed that there will be a micro-siting allowance of 50 m in all directions for each crane hardstanding to allow for local variations in ground conditions, topography or unforeseen environmental constraints identified by pre-construction surveys.

3.3.14 The crane hardstandings will remain in place during the lifetime of the Proposed Development to facilitate maintenance works.

3.3.15 Indicative crane hardstandings are illustrated as part of the site layout on Figure 3.6. Detailed construction drawings with final dimensions will be provided prior to commencement once the final turbine model has been selected.

Watercourse Crossings

3.3.16 A number of watercourses will be crossed by the proposed access tracks within the site. It is proposed that there will be a micro-siting allowance of 50 m in all directions for each watercourse crossing to allow for local variations in ground conditions, topography or unforeseen environmental constraints identified by pre-construction surveys. It is proposed that the final positioning will be addressed through an appropriately worded condition.

3.3.17 The new access tracks within the site will require new crossings to be put in place, or existing crossings may require some localised upgrading, refer to Figure 3.7. Further details of the water crossings (existing and proposed) are included in Technical Appendix 9.5 and discussed within Chapter 9.

3.3.18 It is proposed that the final solution and detailed design for all water crossings, including any potential upgrades or amendments required to existing crossings, will be addressed through an appropriately worded condition and in accordance with the requirements of the *Water Environment (Controlled Activities) (Scotland) Regulations 2011*.

Substation, Grid Connection & Energy Storage

3.3.19 The electrical power produced by the individual turbines will be fed to an onsite substation and separate energy storage compound via underground cables. The proposed substation is located towards the south-east of the site as shown on Figure 1.1. The design of the substation and control room building is relatively flexible and where appropriate may be clad in local materials to match in with the surroundings. Technology continues to develop in the field of energy storage, therefore the design of that element of the compound is proposed to be secured by an appropriately worded condition.

3.3.20 The Proposed Development's connection to the wider electricity network is still under assessment. The Applicant submitted a Bilateral Connection Agreement to the National Grid in September 2021 and are awaiting feedback. The final routing and design of the grid connection cable(s) between the on-site substation and the point of connection into the grid will be the responsibility of the Network Operator.

3.3.21 Within the site boundary, all cables would be buried underground running in trenches along the access tracks from each of the turbines to the on-site substation, the trenches would typically be 0.5m wide.

3.3.22 The substation compound will be approximately 100 m long by 50 m wide and have a building height of approximately 7 m, to incorporate a substation and control room building, and potentially some external electrical equipment (Figure 3.8). The building will accommodate all the equipment necessary for automatic remote control and monitoring of the Proposed Development in addition to the electrical switchgear, fault protection and metering equipment required to connect the Proposed Development to the electricity network. Depending on the nature of the connection, there may be external electrical infrastructure adjacent to the control building.

3.3.23 The energy storage facility is also located to the south-east of the site and is anticipated to be around 200 m long by 50 m wide and a height of around 6 m. Details of the final external design of all components of the substation and energy storage compound are proposed to be secured through an appropriately worded condition. An indicative energy storage facility drawing is provided in Figure 3.9.

3.3.24 It is proposed that there will be a micro-siting allowance of 50 m in all directions for the substation and energy storage compound to allow for local variations in ground conditions, topography or unforeseen environmental constraints identified by pre-construction surveys. It is proposed that the final positioning will be addressed through an appropriately worded condition.

Site Access Tracks & Site Tracks

3.3.25 Table 3.3 below displays the access track composition for the northern and western access routes, as previously stated, both routes have been assessed but only one option will be progressed and utilised:

Table 3.3 - Access Track Composition

Type	Description	Length	Total (%)
Northern Route		4,773 m	
Existing	Existing tracks, to be upgraded where necessary	2,776 m	58%
New	New tracks	1,997 m	42%
Western Route		3,644 m	
Existing	Existing tracks, to be upgraded where necessary	2,166 m	59%
New	New tracks	1,478 m	41%

3.3.26 The point after where the northern and western access tracks meet has been referred to as the site tracks, providing access to the turbine locations. All site tracks would be new tracks with a total length of 4,271 m. Table 3.4 below outlines the total track lengths (access and site tracks) for both northern and western routes and their composition:

Table 3.4 - Total Track Lengths & Composition

Type	Description	Length	Total Length
Northern Access Route	Existing tracks, to be upgraded where necessary.	2.8 km	9.0 km
	New tracks	6.2 km	
Western Access Route	Existing tracks, to be upgraded where necessary.	2.2 km	7.9 km
	New tracks	5.7 km	

3.3.27 The tracks will have a typical 5 m running width, wider on bends and at junctions. Where not possible to avoid areas of deepest peat, floating tracks would be required to be constructed. It is anticipated that approximately 250 m of floating track would be required where consistent peat depths of 1-1.5 m or greater are identified along with shallow topography in the area. Figure 3.10 shows indicative tracks.

3.3.28 It is proposed that there will be a micro-siting allowance of 50 m in all directions for all access tracks to allow for potentially unsuitable ground conditions or unforeseen environmental constraints identified by pre-construction surveys. It is proposed that the final positioning will be addressed through an appropriately worded condition.

3.3.29 A transport assessment (Technical Appendix 12.1) has been undertaken in support of the application for the Proposed Development and this provides detail on access routes to the site for construction vehicles and provides an estimate of trip generation during construction. The transport assessment includes a review of the proposed route, construction traffic impacts, and an abnormal load route review. Traffic and transport effects are discussed further in Chapter 12.

3.3.30 Prior to construction, any required improvements to public roads will be undertaken and appropriate highway safety measures will be agreed with South Ayrshire Council (SAC) and Transport Scotland, with necessary signage or traffic control measures implemented throughout the construction phase on the agreed basis.

Passing Places

3.3.31 Construction traffic passing places will be placed along the access routes at main bends and turns. The number of passing places will vary depending on the access route progressed (north or west).

Meteorological Monitoring Masts

3.3.32 There will be one permanent steel meteorological monitoring mast located within the site boundary at a location shown in Figure 1.1 and detailed in Table 3.5 below:

Table 3.5 - Meteorological Mast Details

Met Mast No.	X-Coordinate	Y-Coordinate
1	237043	599071

3.3.33 The mast will be used to record wind speeds across the site and will measure up to 130 m in height. The permanent met mast will have a hardstand area which will be 25 m wide by 45 m long. An elevation drawing of a typical mast is provided as Figure 3.11. It is proposed that there will be a micro-siting allowance of 50 m in all directions for the masts to allow for local variations in ground conditions, topography or unforeseen environmental constraints identified by pre-construction surveys. It is proposed that the final positioning will be addressed through an appropriately worded condition.

Gatehouse and Construction Compound

3.3.34 Two gatehouse compounds have been shown in Figure 1.1 each at the entrance to the site, one on the northern access route and one on the western access route. However, as only one access route will be progressed, only one gatehouse compound will be required. The gatehouse compound will comprise of an area of approximately 50 m long by 50 m wide.

3.3.35 One construction compound area is proposed as a control centre for all site activities and to provide facilities for the day-to-day needs of the project and the workforce. The compound will be located at the centre of the site in close proximity to turbine four. The location of the proposed construction compound is shown on Figure 1.1. The compound will comprise an area of approximately 50 m long by 100 m wide. An indicative layout of a typical construction compound is provided in Figure 3.12.

3.3.36 The compound area will house a temporary portable cabin structure to be used as the main site office and welfare facility, including toilets, clothes drying and kitchen, with the provision for sealed waste storage and removal. They will also be used for the storage and assembly of certain components, containerised storage for tools and small parts, and oil and fuel storage. A concrete batching plant could also be located in this location. Adequate parking will be provided for cars and light vehicles. A portable cabin controlling access to the main site with mandatory signing in and out procedures will be located at the entrance to the compound.

3.3.37 The detailed location, size and engineering properties of the construction compound will be confirmed prior to the start of construction, after the turbine supplier and model have been confirmed. It is proposed that there will be a micro-siting allowance of 50 m in all directions for the construction compound in order to allow operational flexibility. It is proposed that the final positioning will be addressed through an appropriately worded condition.

3.3.38 On completion of construction works, it is proposed that all temporary structures be removed and the compound area be restored.

Borrow Pits

3.3.39 To minimise the volume of imported material brought onto the site and any associated environmental impact, borrow pits located within the site will be used to source stone for track construction. A borrow pit is an area where material has been excavated for use at another location.

3.3.40 Five borrow pit search areas have been identified and it is proposed that the actual borrow pit(s) would be located within these search areas, however, would only require using a portion of the search area. The location of the search areas are shown on Figure 1.1. Further details are provided in Technical Appendix 3.2. A concrete batching plant could also be located within the borrow pit search areas.

3.3.41 Detailed site investigations prior to construction will be carried out to further confirm the rock type, rock characteristics and suitability, as well as potential volumes to be extracted from the search area. The final borrow pit(s) identified during the geotechnical evaluation will be defined within the Construction Environmental Management Plan (CEMP) (refer to Section 3.4 below and Technical Appendix 3.1 Outline CEMP). The pollution control measures to be implemented during usage of the borrow pit(s) and its reinstatement will also be covered within this document.

3.3.42 The borrow pit(s) will require the use of plant to both win and crush the resulting rock to the required grading. Noise associated with stone extraction is discussed further in Chapter 10.

3.3.43 Environmental considerations have influenced the location of the borrow pit search areas to minimise the effect on ecology, forestry, hydrology and landscape, and to allow successful reinstatement measures to be put in place as appropriate. Following construction, the borrow pit(s) will be restored and reinstated to agreed profiles.

3.4 Construction

3.4.1 The Proposed Development would be constructed over a period of approximately 18 months, anticipated to commence in 2024/2025. Construction would include the principal activities listed within the indicative construction programme as provided in table 3.6.

3.4.2 The construction working hours will be between 07:00 and 19:00 Monday to Friday and 07:00 to 13:00 on Saturday. These times have been chosen to minimise disturbance to local residents. It must, however, be noted that out of necessity due to weather conditions and health and safety requirements, some generally quiet activities, for example abnormal load deliveries (which are controlled by Police Scotland) and also the lifting of the turbine components, may occur outside the specified hours stated.

Table 3.6 - Indicative Construction Programme

Task	Month Number																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Mobilisation																		
Access & Site Tracks																		
Foundations																		
On-Site Cabling																		
Substation Civils Works																		
Substation Construction																		
Crane Hardstanding																		
Turbine Delivery																		
Turbine Erection																		
Commissioning & Testing																		
Site Reinstatement																		

Summary of Development Areas

3.4.3 Table 3.7 below summarises the approximate areas for which aggregate material will be required for each of the main infrastructure elements described in Section 3.3. The transport assessment in Chapter 12 has been prepared on a "worst-case" basis that all construction aggregate will be imported to site. However, if base materials (at least) are won on site this would result in a reduction in delivery volumes / traffic. Further detail on traffic volumes associated with the importation of construction materials is provided in Chapter 12.

Table 3.7 - Proposed Development Areas

Infrastructure	Area (m^2)
Existing Track Upgrades and New Tracks	67,400
Crane Hardstanding	63,000
Construction Compound and Gatehouse Compounds	7,500
Substation and Energy Storage Compound	15,000

Construction Materials

3.4.4 The main materials likely to be required in part or total for the construction of the track, turbine and substation/control/energy storage building foundations, hardstanding areas and cable trenches are described but not limited to below:

- Crushed stone;
- Geotextile;
- Cement;
- Sand;
- Concrete;
- Steel reinforcement;
- Electrical cable; and
- Timber – plus other material for a substation/control building.

3.4.5 Necessary excavations will be made, initially by stripping back the soil from the area to be excavated. This soil will typically be stored separately either in a mound adjacent to the excavation area for backfill, if required, or stored at a designated area on site for further use or reinstatement of temporary works areas. The handling of soils will be undertaken in accordance with best practice techniques.

3.4.6 Should surface water run-off or groundwater enter the excavation during construction of the turbine foundations, appropriate pumping measures away from watercourses will be implemented to ensure the works are safely carried out and the excavation is sufficiently dry to allow concrete placement. Once the concrete is cast, the excavated material will be used for backfill and compacted to the required design density. Once this backfill is completed, the crane hardstanding areas will be constructed.

3.4.7 The proposed method for constructing the turbines is as follows. The turbines will be erected using a large mobile crane or crawler crane, positioned on the hardstanding adjacent to the turbine base. A smaller tail crane will be positioned adjacent to the delivery position of the turbine components. The two cranes will lift the tower sections and blades into their assembly positions, and the main crane will lift the tower sections, nacelle and blades into their operational positions.

3.4.8 As soon as practical, once installation is complete, the immediate construction area will be restored to its original profile, although the crane hardstandings will be retained for future maintenance. The soils will be replaced and reseeded where appropriate and as advised by an onsite Environmental Clerk of Works (ECoW). Any surplus soils will be used to restore track edges after construction. This progressive reinstatement has been found to assist with re-establishment of the local habitats as it minimises the time soils are in storage.

3.5 Environmental Management

Outline Construction Environmental Management Plan (CEMP)

3.5.1 As part of the construction contract, the contractor responsible for undertaking the construction and/or decommissioning works (the Contractor) shall sign up to produce, and adhere to, a CEMP. The CEMP shall be developed in accordance with the joint Scottish Renewables, NatureScot, SEPA, and Forestry Commission Scotland guidance on *Good Practice During Windfarm Construction (SNH, 2015).* An outline CEMP is included in Technical Appendix 3.1.

Pollution Prevention & Health & Safety

3.5.2 Prior to commencement of construction activities, a pollution prevention strategy, contained within a CEMP, will be agreed with SEPA to ensure that appropriate measures are put in place to protect watercourses and the surrounding environment. Further details regarding the contents of the CEMP are provided later in this Chapter. An outline CEMP is included in Technical Appendix 3.1.

3.5.3 As with any development, during the construction stage there is the potential for impacts on the quality of the water environment in surrounding watercourses and local ditches. These mostly arise

from poor site practice and careful attention will be paid to SEPA's *Guidance for Pollution Prevention (GPPs) Guidance 5 (GPP5) – Works and Maintenance In or Near Water (2017)* and SEPA's *Pollution Prevention Guidelines, Guidance 6 (PPG6) – Working at Construction and Demolition Sites (2012)* to prevent impacts.

3.5.4 Any fuel or oil held on site will only be of an amount sufficient for the plant required. This will be stored in a bunded area, as noted above, and an oil interceptor will be installed to prevent pollution in the event of a spillage, in accordance with *GPP2 – Above Ground Oil Storage* (SEPA, 2018). There will be no long-term storage of lubricants or petrochemical products on-site.

3.5.5 High standards of health and safety will be established and maintained. At all times, all activities will be undertaken in a manner compliant with applicable health and safety legislation and with relevant good practice, as defined under applicable statutory approved codes of practice and guidance.

3.5.6 Further details of site specific storage and management of fuel and oil and protection of watercourses during construction are presented in Chapter 9 of this EIA Report.

Traffic & Transportation

3.5.7 A detailed transport assessment is provided within Technical Appendix 12.1, with the proposed access route to the site outlined in more detail.

3.5.8 Traffic associated with the construction and maintenance of the Proposed Development falls into two main categories, namely Abnormal Indivisible Loads (AIL) and Construction/Maintenance Loads. The abnormal loads are those that will require an escort, either by private contractor or by police escort. Construction/maintenance loads are those that do not require any special escort or permissions and are only influenced by normal traffic regulations.

3.5.9 The Applicant will ensure that the vehicles will be routed as agreed with SAC, Transport Scotland and Police Scotland, to minimise disruption and disturbance to local residents and road users. Further details regarding transport and access can be found in Chapter 12 of this EIA Report.

Pre-construction Surveys

3.5.10 As mentioned above, detailed surveys have informed the design process of the Proposed Development. However, certain design elements are dependent on turbine model and manufacturer, therefore detailed construction details will be decided once the turbine has been selected.

3.5.11 Pre-construction surveys will be undertaken to validate the ecological and ornithological baseline and to perform detailed geotechnical ground surveys, further details of these are provided in the relevant technical Chapters.

3.5.12 The Applicant will engage an Environmental Clerk of Works (ECoW) onsite during the construction phase. The ECoW will be responsible for pre-construction surveys and will monitor the construction process on site to provide advice and ensure that the measures within the CEMP are followed.

3.6 Operation & Maintenance

3.6.1 The lifetime of the Proposed Development is envisaged to be 30 years from the final commissioning to commencement of decommissioning.

3.6.2 The Proposed Development would be maintained throughout its operational life by a service team. The service team would comprise of operation management, operations technicians and support functions undertaking the scheduled and unscheduled maintenance throughout the year. This team would either be employed directly by the developer or by the turbine manufacturer. Management of the windfarm would typically include turbine maintenance, health and safety inspections and civil maintenance of tracks, drainage and buildings.

3.6.3 Turbine maintenance includes the following:

- Civil maintenance of tracks and drainage;

- Scheduled routine maintenance and servicing;
- Unplanned maintenance or call outs;
- HV and electrical maintenance; and
- Blade inspections.

3.6.4 In the unlikely event that a major turbine component requires replacement, vehicles will use the new access tracks and crane pads, which will be retained during the operational phase to allow access.

3.6.5 Health and safety will be controlled as set out in the construction phase.

Aviation Lighting

3.6.6 As structures over 150 m high, there is a statutory requirement for aviation lighting on the Proposed Development. Proposed lighting has been agreed with the Civil Aviation Authority (CAA) and Ministry of Defence (MOD), but will need final approval again with the CAA, prior to construction.

3.6.7 The specification of the lighting is detailed in full in Chapter 14 and Technical Appendix 14.1.

Operation Environmental Management Plan (OEMP)

3.6.8 The Applicant will implement an Operation Environmental Management Plan (OEMP). Similar to the CEMP, the OEMP will set out the mitigation measures proposed in the EIA Report and how the Applicant will manage and monitor environmental effects throughout the operation of the Proposed Development. The OEMP will also be developed in consultation with THC, SEPA, NatureScot and HES where relevant.

3.7 Decommissioning

3.7.1 At the end of the Proposed Development's operational lifespan of 30 years, it will be decommissioned, unless further consents are sought. It is expected that decommissioning will take approximately 12 months. The environmental effects of decommissioning are considered to be similar to those during construction, excluding the loss of habitat which will have already occurred under construction.

3.7.2 Prior to decommissioning, a Decommissioning Environmental Management Plan (DEMP) will be produced to reflect the current legislation and policy and will be agreed with the relevant statutory authorities.

3.7.3 During decommissioning vehicles will access the site by the same route used for delivery and construction of the Proposed Development.

3.7.4 It is anticipated that certain components of the turbines will be dismantled and removed from site for disposal and/or recycling as appropriate and in accordance with regulations in place at the time. It is proposed to leave the buried portion of the foundations of the turbines in situ on decommissioning. This is considered to have less impact on the hydrological system which will have established itself during the lifetime of the wind farm than complete removal of the foundations.

3.8 Climate Change & Carbon Considerations

3.8.1 Increasing atmospheric concentrations of greenhouse gases (GHGs), including carbon dioxide (CO_2) - also referred to as carbon emissions - are resulting in climate change. A major contributor to this increase in GHG emissions is the burning of fossil fuels. With concern growing over climate change, reducing its cause is of utmost importance. The replacement of traditional fossil fuel power generation with renewable energy sources provides high potential for the reduction of GHG emissions. This is reflected in UK and Scottish Government climate change and renewable energy policy and commitments. The relevant aspects of such policies are summarised in Chapter 5.

Energy Generation

3.8.2 Whilst the Proposed Development will reduce carbon emissions by replacing the need to burn fossil fuels for power, carbon emissions will result from the component manufacturing, transportation and installation processes associated with the Proposed Development. There is also the potential for carbon fixers and sinks to be lost through the clearing of vegetation during construction. There must, therefore, be a sufficient balance between the carbon reduction associated with renewable energy development and that which is produced through construction/ fabrication processes and lost through site preparation.

3.8.3 The combined electrical output capacity from the wind turbine generators within the Proposed Development is currently estimated to be approximately 59.4 MW, with the exact capacity depending on the model and type of turbine selected. It would be expected that the site would generate around 138 GWh[1] per year (depending on the turbine selected).

3.8.4 The average electricity consumption per household in Scotland in 2019 was 3,393 kWh (BEIS, 2020). Assuming generation of 138 GWh annually, the Proposed Development would generate enough power to supply approximately 40,500 average Scottish households.

3.8.5 Although future wind yields cannot be guaranteed, if the Proposed Development continued to generate, on average, at this load factor over its proposed 30-year lifespan, it is expected that a total of approximately 4,100 GWh of renewable energy could be generated.

Carbon Emissions Savings

3.8.6 A technical review of energy displacement by the UK Energy Research Centre (UKERC) considered over two hundred studies and papers from all around the world for the UK Government and concluded that *"it is unambiguously the case that wind energy can displace fossil fuel-based generation, reducing both fuel use and carbon dioxide emissions"* (UKERC, 2006).

3.8.7 Given the northern and western access tracks are partly covered by commercial forestry and peat depths identified from surveys of infrastructure locations within the Proposed Development ranging from 0.5 m – over 4.7 m. There is likely to be carbon sink loss as a result of the Proposed Development. However, the turbine layout has been designed to minimise the infrastructure on deep peat and reduce the felling along the proposed access tracks where possible. Full details of the Proposed Development forestry assessment are provided in Technical Appendix 3. and Chapter 17 for the Carbon Calculator.

3.8.8 The Scottish Government's online Carbon Calculator Tool 1.6.1 has been completed for the Proposed Development (ref. CZOH-G7WS-WG42). Input parameters are based on the proposed site design, infrastructure dimensions, results from peat depth surveys and laboratory testing of peat, and other information gained from site survey work, desk study and, where applicable, assumptions relating to groundwater, drainage, and habitat regeneration.

3.8.9 The output from the Carbon Calculator indicates the expected total carbon dioxide loss for the Proposed Development (from manufacture of turbines, construction, decommissioning, and carbon sink losses, also taking account of gains due to restoration of borrow bits) is just over 100,000 tonnes of carbon dioxide equivalent (tCO_2 eq). Input and output parameters are detailed in Chapter 17.

3.8.10 Scottish Government guidance on wind farm carbon savings (Scottish Government, 2008), states: "*carbon emission savings from wind farms should be calculated using the fossil fuel sourced grid mix…, rather than the grid mix."* Taking account of the expected total CO_2 loss from the Carbon Calculator result, the Proposed Development would be expected to result in a saving of approximately 36,000 tonnes of carbon dioxide (tCO_2) per annum, meaning a total of over one million tonnes over the 30-year operational lifetime of the Proposed Development, through displacement of carbon-emitting generation (RenewableUK, 2020).

[1] Calculated from 59.4 x 8760 (number of hours per year) x 0.2646 (onshore wind load factor).

3.9 Socio-Economic Benefit

3.9.1 Based on an installed capacity of 59.4 MW, the Proposed Development could generate approximately £8.9 million Community Benefit Contribution to communities in the region over the life of the project, comprising financial contributions of £5,000/MW/year. The aim of this funding will be to support the delivery of strategic projects in the area over the next 30 years.

3.9.2 If local residents are interested, the Applicant is also committed to exploring the potential for community investment in the Proposed Development for the local community, creating the opportunity for local community groups to acquire a share in the future revenue of the wind farm.

3.9.3 The Proposed Development represents a significant investment in the region and the Applicant has committed to taking a number of steps to ensure that benefits from the Proposed Development are maximised locally. The Applicant is committed to a local supplier approach that will endeavour to source supplier contracts that are sourced locally wherever possible, sustaining local businesses and providing employment opportunities for local people.

3.10 Forestry

3.10.1 The extent of forestry within the Proposed Development is limited to parts of the access routes. There would be a small loss of woodland areas depending on which access route is progressed. The northern route would see a loss to woodland of approximately 3.65 ha with the western route 3.46 ha.

3.10.2 In order to comply with the Scottish Government's Control of Woodland Removal Policy, compensation planting will be required to mitigate for the loss of woodland area. The Applicant is committed to providing appropriate compensatory planting. The extent, location and composition of such planting will be agreed with Scottish Forestry, taking into account any revision to the felling and restocking plans prior to the commencement of operation.

3.10.3 Further details are provided in Technical Appendix 3.3.

3.11 Summary

3.11.1 This Chapter has provided a description of the site and the surrounding area, alongside details of the Proposed Development and a summary of the associated infrastructure. A description of the likely activities to occur during the construction, operation and decommissioning phases is also provided.

3.12 References

BEIS (2020). Subnational Electricity and Gas Consumption Statistics. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/946968/sub-national-electricity-and-gas-consumption-summary-report-2019.pdf

BEIS - Department for Business, Energy and Industrial Strategy (2021). *Digest of United Kingdom Energy Statistics 2021*. Available at: https://www.gov.uk/government/statistics/renewable-sources-of-energy-chapter-6-digest-of-united-kingdom-energy-statistics-dukes

Digest of UK Energy Statistics (DUKES) (2021): *Main Report*. Available at: https://www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes

Scottish Government *Online Carbon Calculator Tool* V1.6.1. Available at: https://informatics.sepa.org.uk/CarbonCalculator/

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

Scottish Government (2012a). *Wind Farms and Carbon*. Available at: https://www.gov.scot/WindFarmsAndCarbon

SEPA (2007 & 2010). *Pollution Prevention Guidelines* (PPGs). Available at: http://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/

SEPA (2018) *Guidance for Pollution Prevention* (GPPs). http://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/

SNH (2015). *Good practice during windfarm construction*. Available at: https://www.nature.scot/professional-advice/planning-and-development/renewable-energy-development/types-renewable-technologies/onshore-wind-energy/wind-farm-construction

UKERC – United Kingdom Energy Research Council (2006). *The Costs and Impacts of Intermittency: An assessment of the evidence on the costs and impacts of intermittent generation on the British electricity network*. Available at: http://www.ukerc.ac.uk/support/Intermittency.

Renewable UK (2020). *UKWED Statistics Explained*. Available at: https://www.renewableuk.com/page/UKWEDExplained