3 Proposed Development

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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.

3.2 Site Status and Context

Background and Site Description

3.2.1 The Proposed Development site adjoins an established cluster of wind farms around Hagshaw Hill (known as the 'Hagshaw Cluster') in rural South Lanarkshire, (refer to Figure 1.2). The site is located approximately 4.3 km to the west of Coalburn, 5.6 km to the south-west of Lesmahagow, 7.2 km north-west of Douglas and 6 km north-east of Muirkirk (refer to Figure 1.1).

3.2.2 The site comprises a main Development Area of approximately 898 hectares (ha) of the existing Cumberhead Forest and adjoining land, consisting primarily of commercial coniferous plantation and existing forestry tracks plus a small parcel of farmland around Black Hill and Eaglinside (refer to Figure 16.1). The site boundary also includes the site access track (from junction 11 of the M74 motorway along existing and proposed tracks to the southern and western corners of the site) which is approximately 16 km long and comprises an area of 151 ha. The site gradually rises from 320 m Above Ordnance Datum (AOD) in the north to 522 m AOD at the summit of Nutberry Hill in the south of the site. The site possesses a strong wind resource.

3.2.3 The surrounding land comprises open moorland to the west and south-west, farmland with some scattered individual properties to the north and north-east, with further coniferous plantation to the south and south-east. Some of the moorland adjoining the site to the west lies within the northernmost extent of the Muirkirk and North Lowther Uplands Special Protection Area (SPA) and Site of Special Scientific Interest (SSSI).

3.2.4 The Birkenhead Burn Site of Special Scientific Interest (SSSI), covers a small section of the north of the site (3.11 ha) and is designated for its geological features. The SSSI is one of a network of Silurian sites in the Midland Valley of Scotland that yields important vertebrate fossil-bearing rocks.

3.2.5 A section of the Birk Knowes SSSI (approximately 4.03 ha) extends into the Proposed Development site, at its western boundary. The SSSI is designated for its localised exposures of fossiliferous rock, upland habitats. It is a location that represents late Llandovery age sediments with unusual and palaeontologically relevant arthropod and fish faunas.

3.2.6 A number of watercourses traverse the site including the Birkenhead Burn in the north-eastern corner and tributaries of the Logan Water. The River Nethan forms part of the southern boundary of the site.

3.2.7 No residential properties lie within the site boundary. The closest occupied residential property is Logan Farm, located to the north of the site, approximately 780 m north of the nearest proposed turbine (T10).

3.2.8 The M74 motorway is approximately 7.6 km east of the proposed turbines.

3.2.9 As shown in Figure 1.3 the surrounding landscape includes a number of wind farm developments including operational, consented and in planning sites.

A Coordinated Strategy for the Future of the Hagshaw Wind Cluster

3.2.10 The Proposed Development outlined here forms one component of a wider strategy for the future of the Hagshaw Wind Cluster. This overview intends to explain the background to the Proposed Development and how it fits into a wider strategic plan for the local area.

3.2.11 As neighbouring landowners to Cumberhead Forest, 3R Energy are working in partnership with SPR to develop a wind energy scheme on the eastern part of the forest as an extension to the consented

Douglas West Wind Farm – known as 'Douglas West Extension'. As landowners of Scotland's first wind farm on the neighbouring Hagshaw Hill, 3R Energy have also recently concluded arrangements with SPR to repower Hagshaw Hill Wind Farm at the end of its operational life. 3R Energy and SPR have now extended their partnership to develop the Cumberhead West Wind Farm (the Proposed Development) which would complete the wind farm picture within the western part of the forest. See Figure 1.2.

3.2.12 There are many benefits in taking these projects forward together in partnership, including: helping to create and sustain local employment, keeping income generated in the local area, and maximising renewable generation and community benefit opportunities from the sites. Together, these projects create a unique opportunity for the local area to secure a substantial 30 year income stream that could deliver a transformational change agenda for the villages of Coalburn, Lesmahagow, Douglas and outlying settlements, aligned to a strategic opportunity to develop a regional Adventure Tourism destination on the M74.

3.2.13 There are also many benefits from a physical perspective which can be achieved by these local projects being taken forward in a coordinated fashion, including:

• Delivery of an outcome which is better designed in landscape terms, more strategically efficient and cost-effective;

• Optimisation of renewable generation from an established wind farm location;

• More efficient use of existing infrastructure and grid connection assets;

• Consideration of energy storage options;

• Better coordinated habitat management proposals;

• Enhanced public access delivery across multiple sites; and

• A significant Community Benefit package which would generate a 30-year income stream to fund a Local Investment Strategy for the area.

Environmental Designations

3.2.14 Figure 3.3 shows sites with environmental designations (excluding landscape designations) within 5 km of the Proposed Development. A brief summary of these is provided below with full descriptions provided in the relevant technical chapters of the EIA Report.

3.2.15 There are two statutorily designated sites within the site boundary, these are the Birkenhead Burn and the Birk Knowes Sites of Special Scientific Interest (SSSI), both designated for their abundance in well preserved Silurian fossil assemblages. Both sites are also designated as Geological Conservation Review (GCR) sites.

3.2.16 Between the site boundary and up to 5 km from the site boundary, the relevant designations are as follows:

- one Special Area of Conservation (SAC), Coalburn Moss SAC;
- one Special Protection Area (SPA), Muirkirk & North Lowther Uplands;
- eight Sites of Special Scientific Interest (SSSI), Coalburn Moss, Birkenhead Burn, Dunside, Birk Knowes, Shiel Burn, Ree Burn and Glenbuck Loch, Blood Moss and Slot Uplands, and the Muirkirk Uplands;
- one Scheduled Monument (SM), Glenbuck Ironworks
- two B-listed buildings;
- six Geological Conservation Review (GCR) sites, Dippal Burn, Dunside, Birkenhead Burn, Birk Knowes, Ree Burn and Glenbuck Loch and Shiel Burn.

3.2.17 Additionally, between 5 and 10 km from the site boundary, the relevant designations are as follows:

- one SPA, Muirkirk & North Lowther Uplands;
- two SACs, Coalburn Mossand Clyde Valley Woods;
- eight SSSIs, Cander Moss, Greenock Mains, Kennox Water, Coalburn Moss, North Lowther Uplands, Miller's Wood, Upper Nethan Valley Woods and Muirkirk Uplands;
- seven SMs, including Muirkirk tar works, Cairn Table and Black hill fort;
- two A-listed Buildings, several B-listed Buildings;
- three GCR sites, Garpel Water, Kennox Water and Slot; and
- five Conservation Areas, Lesmahagow, Douglas, Strathaven, Sandford and Stonehouse.

3.2.18 Between 10 and 15 km from the site boundary the relevant designations are as follows:

- three SACs, Clyde Valley Woods (multiple separate areas), Airds Moss, and Red Moss;
- New Lanark World Heritage Site and Conservation Area, including several listed buildings and structures within;
- Five further Conservation Areas, Strathaven, Stonehouse, Glassford, Dalserf, and Rosebank;
- two Garden and Designed Landscapes (GDLs), Falls of Clyde and Lee Castle;
- 15 SSSIs including Tinto Hills and Upper Nethan Valley Woods; and
- a number of listed structures and SMs.

3.2.19 There are a number of areas of Ancient Woodland noted within 5 km of the site as well as across the 15 km study area, as shown on Figure 3.3.

Other Relevant Developments within 5km

3.2.20 Figure 3.4 shows the locations of other relevant large wind developments in planning, consented/under construction, and operational within 5 km of the Proposed Development turbines at the time of writing (Sep 2020 - refer to Table 3.1). Potential cumulative effects with these developments have been assessed throughout the EIA Report, where there is sufficient information.

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

Table 3.1 – Cumulative Developments within 5 km of Proposed Development Turbines

Development	Status	Number of turbines	Direction from site	Approx. distance to nearest turbine
Auchrobert	Operational	12	NNW	2.4 km
Cumberhead Revised	Consented	14	SSE	0.6 km
Dalquhandy Revised	Consented	15	E	1.8 km
Douglas West	Consented	13	ESE	3.6 km
Douglas West Extension	Application	13	ESE	3.2 km
Galawhistle	Operational	22	SE	2.1 km
Hagshaw Hill	Operational	26	SE	3.4 km
Hagshaw Hill Extension	Operational	20	SE	3.4 km

Development	Status	Number of turbines	Direction from site	Approx. distance to nearest turbine
Hagshaw Hill Repowering	Consented	14	SE	3.6 km
Hare Craig	Application	8	SSW	0.5 km
Kype Muir	Operational	26	NW	3.9 km
Kype Muir Extension Alternative	Consented	15	NW	3.5 km
Nutberry	Operational	6	SE	0.5 km

3.3 Description of the Development

3.3.1 The final Proposed Development layout is illustrated in Figure 3.1.

Turbines and Turbine Foundations

3.3.2 The Proposed Development will comprise 21 wind turbines of up to 200 m maximum tip height, each with a typical generating capacity of around 6 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 have been set as a maximum overall height (to blade tip) of 200 m, with a maximum blade length of 76 m, a maximum rotor diameter of 155 m, and a maximum hub height of 135 m. Blades at the maximum length of 76 m, would result in a hub height of 122.5 m (refer to Figure 3.5). Final turbine dimensions will be determined based upon turbine availability and procurement prior to construction.

3.3.3 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 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	273972	632452
T2	273971	633022
T3	273762	633452
T4	274485	632982
T5	275075	633428
T6	274498	633585
T7	273914	634053
T8	275121	633990
T9	274592	634184
T10	274504	634697
T11	275175	634616
T12	275267	635234

Turbine	X Coordinate	Y Coordinate
T13	275843	634840
T14	275761	634263
T15	275885	635450
T16	275615	635837
T17	276400	635359
T18	276351	634760
T19	276192	636031
T20	276626	634295
T21	276762	633841

3.3.4 Whilst these locations have been determined through an iterative environmental based design process (refer to Chapter 2 Site Selection and Design), there is the potential for these exact locations to be altered through micro-siting allowances prior to construction. A micro-siting allowance of 100 m in all directions is being sought in respect of each turbine 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. It is proposed that the final positioning will be addressed through an appropriately worded condition.

3.3.5 Each of the turbines comprises the following components:

- blades;
- tower;
- nacelle;
- hub; and
- transformer.

3.3.6 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 3.5. 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.

3.3.7 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 21 turbines will have gravity base foundations with a typical radius of approximately 15 m and 3.5 m in depth.

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

3.3.9 An illustration of a typical turbine foundation is provided in Figure 3.6. 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

3.3.10 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 50 m long by 30 m wide, with a typical thickness of approximately 500 mm, but subject to the specifications required by the selected turbine manufacturer and crane operator and following detailed ground investigations prior to construction.

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

3.3.12 Indicative crane hardstandings are illustrated as part of the site layout on Figure 3.1 and Figure 3.7. Detailed construction drawings with final dimensions will be provided prior to commencement once the final turbine model has been selected.

Access

3.3.13 Access to the Proposed Development site will be taken from junction 11 of the M74 motorway, via an existing private haul road through the Douglas West Wind Farm site, then into the Cumberhead Forest via the Douglas West Wind Farm Extension site (which is currently in planning) using existing access tracks and tracks which are to be created/upgraded as part of the Douglas West Wind Farm and Extension works.

3.3.14 The proposed access route for the turbines will be from the King George V Port in Glasgow. The route will follow the M8 and then onto the M74, exiting at junction 11 (Poniel) where there is direct access to the site via a private haul road. This access route to the site is shown in Figure 3.8.

3.3.15 The proposed access from the M74 to the turbine locations utilises the existing tarmac road from Junction 11 of the M74, through the consented industrial area (M74 Heat & Power Park) and consented Douglas West Wind Farm site and heads west, along the existing tarmac road to the eastern corner of the Cumberhead Forest where it is proposed to join tracks for the Douglas West Extension site. On leaving the Douglas West Extension site existing forest tracks will be utilised, through both the consented Cumberhead Wind Farm site and operational Nutberry Wind Farm site (refer to Figure 3.10). Crossings of various watercourses will be required along the way. There will be two entry routes into the main body of the Proposed Development site, which will be taken in the south western corner and south eastern edges of the main Development Area, as illustrated in Figure 3.1.

3.3.16 There are existing onsite access/forestry tracks and wayleaves throughout the forest blocks, where possible these access tracks will be retained, re-used and upgraded (where necessary). Some additional lengths of new access tracks will be required to connect turbines to the existing network of tracks.

3.3.17 All new access tracks have been designed to avoid any sensitive environmental receptors and will be made of locally sourced stone (within South Lanarkshire, potentially in part from on-site borrow pits (if suitable)), and have a typical running width of approximately 5 m, with an average stone thickness of 500 mm. An indicative cross section of the proposed access tracks is provided in Figure 3.9.

3.3.18 The Proposed Development would include approximately 8.8 km of new access tracks (10.2 km if Douglas West Extension is not previously built) of which approximately 410 m would be floated over deep peat if, following detailed site investigations, deep peat cannot be avoided by micro-siting. This short stretch of track over deep peat would be floated to avoid the requirement for excavation of peat. This would involve placing of a geotextile membrane on existing topsoil and vegetation followed by aggregate layers. Floating roads would be designed to ensure suitability for site traffic during construction and operation.

3.3.19 The total length of roads for the Proposed Development is approximately 37.5 km and can be sub-divided into the categories detailed in Table 3.3. New and existing access tracks are shown on Figure 3.10. The short section of new track that would be created for the Proposed Development if the proposed Douglas West Extension Wind Farm is not built in advance, has been assessed separately in Appendix 3.3 of this EIA Report. The appendix details the potential effects of the proposed section of track in relation to the environmental topics assessed in the main chapters of the EIA. Details of

this section of new track length and aggregate requirements are also included in Tables 3.3 and 3.7 below.

Table 3.3 – Access Track Composition

Type	Description	Length (km)	Percentage of Total
Existing	Existing haul road from the M74 towards the site, tarmac surfaced. Existing timber haul road through Forest. Existing haul road from Forest to Station Road at Douglas West (for timber removal only).	25.90	69%
Existing	Existing tracks, to be upgraded where necessary.	0.67	2%
Existing	Existing tracks to be straightened.	0.80	2%
New	New tracks to be created to connect turbines to existing tracks.	8.79	23%
New	*New track to be created if Douglas West Extension is not built*	*1.38*	*4%*
	Total	**37.55**	**100%**

3.3.20 It is proposed that there will be a micro-siting allowance of 100 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.

3.3.21 A transport assessment (Chapter 12) 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.

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

Watercourse Crossings

3.3.23 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 100 m in all directions for all watercourse crossings 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.

3.3.24 The new access tracks within the site will require new crossings to be put in place, or existing crossings may require some localised upgrading, for the following watercourses, as detailed Table 3.4 below (refer to Figure 3.1 and Figure 11.2). Further details of the water crossings (existing and proposed) are included in Appendix 11.3 and discussed within Chapter 11 Hydrology.

Table 3.4 – New Water Crossings Detail

Reference	Existing/ New	Type	New Track required for Access
New Water Crossing 1 (NWC1) NS 74120 32728	New	Proposed 450 dia uPVC piped crossing	Yes
New Water Crossing 2 (NWC2) NS 74896 34020	New	Proposed 900 dia reinforced uPVC piped crossing	Yes
New Water Crossing 3 (NWC3) NS 75075 34470	New	Proposed 900 dia reinforced uPVC piped crossing	Yes
New Water Crossing 4 (NWC4) NS 75348 35209	New	Proposed 900 dia reinforced uPVC piped crossing	Yes
New Water Crossing 5 (NWC5) NS 75775 36070	Existing to be upgraded	Existing piped crossing to be upgraded to 900 dia reinforced uPVC piped crossing	Yes
New Water Crossing 6 (NWC6) NS 76632 34990	New	Proposed 900 dia reinforced uPVC piped crossing	Yes
New Water Crossing 7 (NWC7) NS 76549 34393	New	Proposed galvanised steel bottomless arched culvert	Yes

3.3.25 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*.

Drainage

3.3.26 Surface or sub-surface water flow within the vicinity of the access tracks and hardstanding areas will be routed into drainage channels or will flow across the hardstanding areas. The drainage channels will be situated on the upstream side of the infrastructure and run in parallel with them. These channels will pass under the hard areas, via small diameter carrier drains, to the downstream side where the run-off will percolate to the riparian zone.

3.3.27 Where ground conditions permit, channels may connect with infiltration trenches on the downhill side of the hard areas, with a small sump at the inlet to collect silt and treat run-off prior to infiltration to the surrounding soils. Silt traps will also be located along trenches to further facilitate the collection of silts. These will be cleaned out periodically, as required.

3.3.28 The edges of the access tracks will be flush to allow the surface water from the road to route directly into the collection channels or infiltration trenches. On steeper sections of track, regular cross drains, connected to infiltration trenches, will be installed to collect surface run-off and ensure longitudinal flow is intercepted, thus avoiding rutting and subsequent breakup of the track surface. Trenches will maintain linear flows to downstream areas avoiding point discharge of large flows.

3.3.29 Where the access tracks follow contours, earthworks may be required to accommodate these. Where earthworks are required a collection ditch will be installed at the head of the cutting, with appropriate dams and sumps, to collect silt and prevent sediment transfer to watercourses.

3.3.30 A detailed drainage design will be undertaken and submitted to the Scottish Ministers, in consultation with the Scottish Environment Protection Agency (SEPA), for approval prior to construction.

Grid Connection & Energy Storage

3.3.31 The electrical power produced by the individual turbines will be fed to an onsite substation and energy storage compound via underground cables. The proposed substation and energy storage compound is located in the centre of the site as shown on Figure 3.1 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.

3.3.32 The Proposed Development will most likely be connected to the wider electricity network via the Coalburn Transmission Substation to the north-east of the site. The final routing and design of the grid connection cable(s) between the on-site substation and Coalburn Transmission Substation will be the responsibility of the Network Operator. An underground cable solution is presently proposed.

3.3.33 The wind farm array cables on site will be laid in trenches, typically approximately 0.5 m deep and 1 m wide, laid on a sand bed and backfilled using suitably graded material. The trenches will also carry earthing and communication cables for the operation of the Proposed Development. Cabling will mainly be located adjacent to the access tracks (refer to Figure 3.9) within the wind farm itself, and (as noted above) fibre optic telecommunication cables are also anticipated to continue from the on-site substation, alongside the internal access track and existing tarmac road and haul road to a connection at the roundabout at Junction 11 of the M74.

3.3.34 The substation and energy storage compound will be approximately 100 m by 60 m, to incorporate a substation and control room building, energy storage facility, and potentially some external electrical equipment. The substation and control building is anticipated to be around 30 m long by 10 m wide have a height to ridge of around 5 m. 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 transmission network. Depending on the nature of the connection, there may be external electrical infrastructure adjacent to the control building. Subject to economic viability, a separate energy storage facility with battery capacity with an output of around 40MW will be located adjacent to the control building. Details of the final design of all components of the substation and energy storage compound are proposed to be secured through an appropriately worded condition. An indicative substation elevation drawing, and energy storage facility elevation drawing are provided in Figure 3.11.

3.3.35 It is proposed that there will be a micro-siting allowance of 100 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.

Meteorological Monitoring Masts

3.3.36 There will be two steel lattice tower meteorological monitoring masts located within the site boundary at locations shown in Figure 3.1 and detailed in Table 3.5 below:

Table 3.5 – Meteorological Mast Details

Met Mast No.	Easting	Northing
1	273868	633403
2	275368	634774

3.3.37 The masts will be used to record wind speeds across the site and each will measure up to 100 m in height. An elevation drawing of a typical mast is provided as Figure 3.12. It is proposed that there will be a micro-siting allowance of 100 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.

Construction Compound

3.3.38 Two construction compounds are 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 first compound will be located at the south western entrance to the site, and a second compound will be located in the northern section of the site. The locations of the proposed construction compounds are shown on Figure 3.1. Each compound will comprise an area of approximately 100 m long by 60 m wide. An indicative layout of a typical construction compound is provided in Figure 3.13.

3.3.39 The compound areas will house temporary portable cabin structures to be used as the main site office and welfare facilities, 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. Concrete batching plants will also be located in these locations. 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.

3.3.40 The proposed locations of the compounds are on firm ground and avoid habitats of highest sensitivity. Prior to commencing construction work, a detailed appraisal of the areas will be required, including an assessment by the project ecologist and also trial pits and /or boreholes to confirm the nature of the sub-strata.

3.3.41 The detailed location, size and engineering properties of the construction compounds 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 100 m in all directions for the construction compounds in order to allow operational flexibility. It is proposed that the final positioning will be addressed through an appropriately worded condition.

3.3.42 A concrete batching plant will be located within each construction compound. The concrete batching plants will comprise aggregate and cement hoppers, water bowsers/tanks, a mixer and a control cubicle is proposed on site. Aggregates and sand would be stockpiled and contained adjacent to the plants. It will be necessary to provide a limited private water supply and foul drainage; this is considered further in Chapter 11 Hydrology.

3.3.43 On completion of construction works, it is proposed that all temporary structures be removed and the compound areas be restored for forestry purposes.

Temporary Turbine Laydown Area

3.3.44 A temporary turbine laydown area will be required to enable construction of the Proposed Development. It will comprise an area of hardstanding of approximately 150 m long by 70 m wide. The proposed location of the laydown area will be located at the south-western entrance to the site. (refer to Figure 3.1).

3.3.45 The proposed location of the laydown area is on firm ground and avoids habitats of highest sensitivity. Prior to commencing construction work, a detailed appraisal of the area will be undertaken, including an assessment by the project ecologist, and trial pits and /or boreholes to confirm the nature of the sub-strata.

3.3.46 The detailed location, size and engineering properties of the temporary turbine laydown area 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 100 m in all directions for the temporary turbine laydown area in order to allow operational flexibility. It is proposed that the final positioning will be addressed through an appropriately worded condition.

3.3.47 On completion of construction works, it is proposed that the laydown area be restored for forestry purposes.

Borrow Pits

3.3.48 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.

3.3.49 Three 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 3.1. It is noted that existing borrow pits for forestry purposes already exist within each of the three borrow pit search areas identified.

3.3.50 Detailed site investigations prior to construction will be carried out to further confirm the rock type, rock characteristics and suitability, as well 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 Appendix 3.1 Draft 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.

3.3.51 The borrow pit(s) will require the use of plant to both win and crush the resulting rock to the required grading. It is anticipated that rock will be extracted by breakers and other relevant methods that may be required. Noise associated with stone extraction is discussed in Chapter 9.

3.3.52 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 on-site construction period for the Proposed Development is expected to be approximately 18 months (refer to Table 3.6 and Figure 3.1. Normal construction hours will be between 07:00 and 19:00 Monday to Friday and 07:00 to 13:00 on a Saturday. These times have been chosen to minimise disturbance to local residents. It must, however, be noted that during the turbine erection phase, operations may proceed round the clock to ensure that lifting processes are completed safely. Delivery of abnormal loads may be made out with normal construction hours, as agreed with the relevant authorities. Table 3.6 provides an indicative programme for the main items of work to be carried out.

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																		
Off-site Cabling																		
Turbine Delivery																		
Turbine Erection																		
Commissioning & Testing																		
Site Reinstatement																		

Summary of Development Areas

3.4.2 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 a reduction in delivery volumes / traffic. Further detail on traffic volumes associated with the importation of construction materials is provided in Chapter 12 Transport.

Table 3.7 - Proposed Development Areas

Infrastructure	Area (m^3)
Existing Track Upgrades and New Tracks	99,364
Crane Hardstanding	35,325
Construction Compound and Laydown Areas	22,599
Substation and Energy Storage Compound	6,000
Imported Stone for short section of road if Douglas West Extension is not built	*17,280*

Construction Materials

3.4.3 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 below:

- crushed stone;
- geotextile;
- cement;
- sand;
- concrete;
- steel reinforcement; and
- electrical cable.

3.4.4 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.

3.4.5 For the purposes of the transport assessment, it has been assumed that concrete will be batched on site within the identified concrete batching areas and materials will be delivered to site on a spread programme.

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 wind 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.

Traffic & Transportation

3.4.9 A detailed transport assessment is provided within Chapter 12, and the proposed access route to the site is shown on Figure 3.8.

3.4.10 Construction 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.

3.4.11 The Applicant will ensure that the vehicles will be routed as agreed with SLC, 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.

Pollution Prevention & Health & Safety

3.4.12 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. A draft CEMP is included in Appendix 3.1.

3.4.13 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) t*o prevent impacts.

3.4.14 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.

3.4.15 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.

3.4.16 Further details of site specific storage and management of fuel and oil and protection of watercourses during construction are presented in Chapter 11 Hydrology.

Construction Environmental Management Plan (CEMP)

3.4.17 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).* A draft CEMP is included in Appendix 3.1.

3.4.18 The CEMP shall describe how the Contractor will ensure suitable management of, but not limited to, the following environmental issues during construction of the Proposed Development:

- noise and vibration;
- dust and air pollution;
- surface and groundwater;
- ecology and ornithology (including protection of habitats and species);
- forestry management;
- agriculture (including protection of livestock and land);
- cultural heritage;
- waste (construction and domestic);
- details of the size, location and volumes to be extracted from borrow pits;
- pollution incidence response (for both land and water); and
- site operations (including maintenance of the construction compound, working hours and safety of the public).

3.4.19 The Contractor shall provide the following for the above environmental issues:

- details of all the environmental mitigation which is described within this Environmental Statement (Chapter 18) that is required during construction (and decommissioning) of the Proposed Development, and of how the Contractor will implement this mitigation and monitor its implementation and effectiveness;
- details of how the Contractor will abide by the local and national legislative requirements e.g. *The Water Environment (Controlled Activities) (Scotland) Regulations 2011*;
- details of how the Contractor will implement and monitor construction best practice techniques e.g. the control of noise and dust;
- details of a Waste Management Plan that will include opportunities to reduce and re-use waste on site, recycling of waste which cannot be reused and disposal of waste to landfill; and
- details on how the Contractor will liaise with the public and local landowners and how they will respond to any queries and/or complaints.

3.4.20 The Contractor and/or Applicant shall consult with the Scottish Ministers, NatureScot, SEPA, Historic Environment Scotland (HES) and SLC on the production of the CEMP. The Contractor shall amend and improve the CEMP as required throughout the construction and decommissioning period.

3.4.21 The CEMP shall, where applicable, cross-reference and correspond with the Construction Traffic Management Plan (CTMP). The CTMP will detail the management of traffic to and from site, including abnormal loads and daily workers commute. It shall also include mitigation for impacts to public transport, local private access and public footpaths/rights of way, cycleways and bridleways. The Contractor and/or Applicant shall amend and improve the CTMP as required throughout the construction and decommissioning period.

3.4.22 Specific requirements of the CEMP for each of the environmental topics assessed in the EIA are provided in the relevant EIA Report chapters.

3.5 Operation & Maintenance

3.5.1 During operation, only site maintenance vehicles and local utility company vehicles will normally be required on the site for the Proposed Development. Daily visits to the control building by site

management personnel in four-wheel drive or conventional passenger vehicles will occur following the commissioning phase.

3.5.2 Any diesel or oil stored on-site will be held within an appropriately bunded location.

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

3.5.4 Once the Proposed Development is operational, daily routine maintenance inspections and servicing visits by site management / technicians in one to two vehicles are expected.

3.5.5 In the unlikely event that a major turbine component requires replacement, vehicles will use the new access tracks and crane pads.

Operation Environmental Management Plan

3.5.6 The Applicant will implement an Operation Environmental Management Plan (OEMP). Similar to the CEMP, the OEMP will set out how the Applicant will manage and monitor environmental effects throughout operation. Much of the focus will be on the application of mitigation measures as specified through consent condition. Most of which are likely to be based on the Schedule of Mitigation. The OEMP will be developed in consultation with the Scottish Ministers, NatureScot, SEPA and SLC and will include but not be limited to:

- details on the track, water crossings and turbine maintenance;
- the control and monitoring of noise;
- the control and monitoring of surface and groundwater;
- a pollution prevention plan and a pollution incidence response plan;
- details of how the Applicant will abide by the local and national legislative requirements e.g. *The Water Environment (Controlled Activities) (Scotland) Regulations 2011*; and

3.6 Decommissioning

3.6.1 This assessment assumes that the operational lifespan of the Proposed Development would be 30 years, after which it would be appropriately decommissioned. It is expected that decommissioning would take approximately 12 months. The environmental effects of decommissioning are considered to be similar to those during construction but excluding habitat loss which would have already occurred under the construction phase.

3.6.2 During the decommissioning phase, vehicles would access the site by the same routes used for delivery and construction.

3.6.3 Either the main construction compounds and laydown area would be re-established or a new compound would be developed as agreed with the Scottish Ministers/Local Authority at the appropriate time, to temporarily store decommissioned plant and equipment. The nacelles and blades would be removed using cranes situated on the crane pads as previously constructed. The towers would then be dismantled.

3.6.4 All components would be removed from the site for disposal and/or recycling as appropriate and in accordance with regulations in place at that time.

3.6.5 If required, exposed parts of the concrete foundations would be ground down to below sub-soil level, however, the remaining volume of the foundations would remain in situ.

3.6.6 The turbine base areas and crane pads would be returned to their original appearances unless further consents were granted. The additional onsite access tracks (with the exception of the temporary tracks) created for the Proposed Development would be narrowed to forestry-width and retained. The tarmac road from the M74 that exists at present would remain.

3.6.7 If, after the operational lifespan of the Proposed Development has expired there is potential for repowering, this would be subject to a new and separate application.

3.7 Climate Change & Carbon Considerations

3.7.1 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

3.7.2 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.

3.7.3 The combined electrical output capacity from the wind turbine generators within the Proposed Development will be around 126 MW, with the exact capacity depending on the model and type of turbine selected. It would be expected that the site would generate around 325 GWh per year (again depending on the turbine selected).

3.7.4 The average electricity consumption per household in the UK quoted by RenewableUK is 3,618 kWh (RenewableUK, 2019). Assuming generation of 325 GWh annually, the Proposed Development would generate enough power to supply approximately 89,829 average UK households.

3.7.5 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 9,750 GWh of renewable energy could be generated.

Carbon Emissions Savings

3.7.6 A technical review of energy displacement by the UK Energy Research Centre (UKERC) considered over two hundred studies and papers from all round 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).

3.7.7 Whilst the wind turbines will reduce carbon emissions by replacing the need to burn fossil fuels for power, there is the potential for carbon fixers and sinks to be lost through the clearing of vegetation and materials for construction. There must therefore be a sufficient balance between the carbon reduced and that which is produced and lost through associated processes.

3.7.8 The Proposed Development site is mostly covered in commercial coniferous forestry. Peat depths identified across the site range from 0 m – 3.8 m. The turbine layout has been designed to minimise the impact on deep peat and the commercial forestry operations on site, and limit the number of woodland blocks that would need to be clear felled as part of the construction of the Proposed Development. Turbines will be keyholed within the forestry block and any new forestry will not be planted within these keyholed areas. Full details of the Proposed Development forestry assessment is provided Chapter 16. The overall carbon sink loss from the Proposed Development will therefore be small.

3.7.9 The Scottish Government's online Carbon Calculator Tool V1.6.1 has been completed for the Proposed Development (ref.WS4U-PV65-5TI8). 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.

3.7.10 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 244,762 tonnes of carbon dioxide (tCO_2 eq). Input and output parameters are detailed in Appendix 3.2.

3.7.11 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 173,842 tonnes of carbon dioxide (tCO_2) per annum, meaning a total of over 5.2 million tonnes over the 30-year operational lifetime of the Proposed Development, through displacement of carbon-emitting generation. (RenewableUK, 2018).

3.8 Public Access

3.8.1 There are no core paths listed across the Proposed Development site. There is one path listed as part of the Wider Network of paths in the SLC Core Paths Plan (adopted November 2012): EK/5847/1 that traverses the northern extent of the site (refer to Figure 3.11). The infrastructure associated with the Proposed Development will provide improved access across the site throughout the operational life of the Proposed Development.

3.8.2 In the interests of health and safety, the Wider Network paths (as noted above in paragraph 3.8.1) that do exist within the site may need to be temporarily diverted during construction. If required, a temporary diversion will be put in place for the construction period for affected path sections, with suitable alternatives clearly signposted. It is proposed that details of temporary path diversions can be secured by an appropriately worded condition.

Outdoor Access Plan

3.8.3 During its period of operation, the Proposed Development access tracks will be open for non-motorised public access and will provide a greater network of paths in the local area. These new tracks will also connect with both the consented Cumberhead Wind Farm, Hagshaw Hill Wind Farm and Douglas West Wind Farm.

3.9 Socio-Economic Benefit

3.9.1 Based on an installed capacity of 126 MW, the Proposed Development will generate an 18.9 million Community Benefit Contribution to communities in the Douglas Valley over the life of the project, comprising financial contributions of £5,000/MW. The aim of this funding will be to support the delivery of strategic projects in the Douglas Valley over the next 30 years.

3.9.2 The Applicant is exploring the potential to establish a new mechanism to receive and manage community benefit income from the Proposed Development (alongside income from the neighbouring Douglas West Extension and Hagshaw Wind Farms) which would yield the financial resources to deliver a Community-Led Investment Strategy for the local villages of Glespin, Douglas, Coalburn, Lesmahagow, Rigside and Douglas Water. The Strategy would seek to deliver on the aims of the Coalburn, Douglas and Glespin Community Action Plan (August 2016), the Rigside and Douglas Water Community Action Plan (2018 – 2023) and the Lesmahagow, Brocketsbrae and Hawksland Community Led Action Plan (2019-2024) in the first instance.

3.9.3 The communities in each of these villages have prepared Action Plans for how they would like to see their communities develop over the coming years and the Applicant would very much like the Proposed Development to provide a dedicated stream of funding to deliver on the objectives of each Action Plan, and any other future projects identified. The overarching objective of any new mechanism would be to deliver real improvement to the physical and recreational environment of Glespin, Douglas, Coalburn, Lesmahahgow, Rigside and Douglas Water.

3.9.4 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.

3.9.5 The Applicant proposes that any interested local groups should initially engage with Local Energy Scotland, who manage the Scottish Government's Community and Renewable Energy Scheme (CARES), to seek advice on the ways in which to acquire a revenue share in the Proposed Development.

3.9.6 The Proposed Development creates opportunities to develop and fund (through the Community Benefit Contribution) outdoor recreation infrastructure in the local area which could act as a catalyst to grow an Adventure Tourism offering in the Douglas Valley, capitalising upon the significantly increased visitor numbers calling at the renovated Cairn Lodge Service Station and the branding and promotional work that is ongoing for J11 of the M74.

3.9.7 The final community benefit arrangements are to be agreed with local communities, SLC and the Scottish Ministers.

3.9.8 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 are sourced locally wherever possible, sustaining local businesses and providing employment opportunities for local people.

3.9.9 An independent assessment of the socio-economic impact of the Proposed Development has been undertaken and included as Chapter 13 of this EIA Report. The assessment concludes that the Proposed Development represents a major investment in the South Lanarkshire and Scottish economies and will therefore deliver a range of positive economic impacts. During the development and construction phase the Proposed Development would invest approximately £152 million that could generate a positive economic impact of up to £42.6 million GVA and 657 job years of employment in the Scottish economy, of which £13.3 million GVA and 202 job years could be within South Lanarkshire. During each year of the operational phase (30 years) the Proposed Development would spend around £3.3 million on operations and maintenance which could generate a positive economic impact of up to £1.2 million GVA and 18 jobs in the Scottish economy, of which £0.7 million GVA and 10 jobs could be in South Lanarkshire. There would also be wider socio-economic benefits associated with the Proposed Development as a result of the Community Benefit Contribution of £5,000 per MW per year, and the opportunity for local communities to acquire a revenue share in the Proposed Development. There would additionally be benefits to the public sector from payment of non-domestic rates estimated to be worth around £1.3 million each year. The positive economic impacts of these benefits are discussed further in Chapter 13 Socio-economics, Tourism and Recreation.

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.

3.11.2 The Socio-Economic benefits created by the Proposed Development have been summarised, as have the main Community Benefit and Shared Ownership proposals (refer to Chapter 13 for full details).

3.11.3 Finally, a high-level assessment of the predicted carbon savings has been conducted for the Proposed Development

3.12 References

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