3 The Revised Development

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3 The Revised Development

3.1 Introduction

3.1.1 This chapter provides a description of the Revised Development and its geographical context.

3.2 Site Status and Context

3.2.1 The site is located approximately 11 km to the south west of Lanark, 1.6 km north of Douglas and 1.3 km south of Coalburn (to the nearest turbine), in rural South Lanarkshire. The site forms part of the former Dalquhandy Opencast Coal Site that was once the largest opencast in Europe which operated between 1988 and 2004. The elevation of the site ranges from 220 m to 310 m above ordnance datum (AOD). The site occupies an area of approximately 2.45 km². The central grid reference for the site is NS 81791 32782. The site location and Planning Application boundary are shown in Figure 1.1.

3.2.2 The Revised Development lies within two landscape character types (LCT); the Plateau Farmland Open Cast Mining LCT and the Rolling Moorland LCT. The site of the Revised Development is composed of low grade agricultural land, much of which has been disturbed by previous opencast operations. Figure 3.1 shows the extent of the mining operations which are largely concentrated to the north of the existing access road, used for transporting coal from the site to market.

3.2.3 There are significant redundant building foundations located to the east of the site where the coal Disposal Point (DP) was located. At present, a wood gas combined heat and power (CHP) plant, recently commissioned by 3R Energy (Planning Reference: CL/16/0157), is operational within the northern extent of the DP area. Planning permission in principle (Planning Reference: CL/17/0157) has also been granted for the phased development of the wider extent of the DP area for a mix of Class 4 (Business), 5 (General Industrial) and 6 (Storage or Distribution) uses including associated landscaping, service facilities, SUDS/drainage features, internal roadways, infrastructure, parking and other ancillary works (refer to Figure 3.2).

3.2.4 There is also a property ruin towards the west of the site at Brackenside. There are no residential properties located within the site boundary.

3.2.5 Douglas and Coalburn are the nearest communities to the site. There are a few scattered dwellings in closer proximity to the Planning Application boundary which will be taken into account during the Environmental Impact Assessment (EIA) process as set out below:

- Blackwood Cottage (0.72 km from closest turbine), owned by the Applicant;
- Station House (0.73 km from closest turbine), financially involved in the Revised Development;
- Westerhouse, near Coalburn (0.76 km from closest turbine), financially involved in the Revised Development;
- Craigend, near Coalburn (0.81 km from closest turbine);
- 1 Westoun Steadings (0.97 km from closest turbine);
- 3 Westoun Steadings (1.02 km from closest turbine);
- West Toun House, near Coalburn (1.05 km from closest turbine);
- Braidlea, Douglas West (1.18 km from the closest turbine);
- 8 Middlemuir Road, Coalburn (1.32 km from the closest turbine);

- Gardens House, Long Plantation (1.46 km from the closest turbine); and
- Scrogton, Douglas West (1.47 km from the closest turbine).

3.2.6 Hargreaves Surface Mining Ltd renewed in 2014 an outline planning permission for the development of housing at Gunsgreen, on the southern outskirts of Coalburn (Ref. CL/08/0313). The proposed housing development is located approximately 0.90 km north of the closest turbine, Turbine 2 (T02). *This is similar to the distance between the proposed housing site at Gunsgreen and the consented Dalquhandy Wind Farm adjacent.* Potential effects of the Revised Development on the proposed housing are discussed within the technical assessments where relevant.

3.2.7 The site has direct access to the M74 motorway at junction 11, which lies to the east of the site (Figure 1.1).

Environmental Designations

3.2.8 Figure 3.3 shows sites with environmental designations (excluding landscape designations) within 15 km of the Revised Development. A brief summary of these is provided below with full descriptions provided in the relevant chapters of the Environmental Statement (ES).

3.2.9 There are no designated sites within the site boundary.

3.2.10 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;
- four Sites of Special Scientific Interest (SSSI), namely Coalburn Moss, Miller's Wood, Shiel Burn, and Birkenhead Burn;
- two Scheduled Monuments (SM), Thorril Castle and St Bride's Chapel;
- two A-listed buildings and nineteen B-listed buildings;
- one Conservation Area, Douglas; and
- two Geological Conservation Review sites, namely Birkenhead Burn and Shiel Burn.

3.2.11 Between 5 and 10 km from the site boundary the relevant designations are as follows:

- one Special Protection Area (SPA), namely Muirkirk & North Lowther Uplands;
- one SACs, namely Red Moss;
- nine SSSIs, including Muirkirk Uplands and North Lowther Uplands;
- New Lanark World Heritage Site and Conservation Area, including several listed buildings and structures within;
- three A-listed Buildings and several B-listed Buildings; and
- one Garden and Designed Landscapes (GDL), namely Falls of Clyde.

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

- New Lanark World Heritage Site;
- 12 GLDs including Lee Castle;
- 16 SSSIs, including Tinto Hills and Upper Nethan Valley Woods;
- a number of listed structures and SMs.

3.2.13 There are a number of areas of Ancient Woodland noted within the 15 km study area – those closest to the site are shown on Figure 7.1.

Other Relevant Developments within 5 km

3.2.14 Figure 3.4 shows the locations of other relevant large wind developments at scoping, in planning, consented/under construction, and operational within 5 km of the Revised Development (refer to Table 3.1). Potential cumulative effects with these developments have been assessed throughout the ES where there is sufficient information. Potential effects with the developments at scoping have not been assessed due to the lack in certainty with regard to their design, layout and turbine choice (and in accordance with page 71 *Scottish Planning Policy* (2014).

Table 3.1 – Cumulative Developments within 5 km

Development	Status	Number of turbines	Direction from site	Approx. distance to nearest turbine
Dalquhandy Wind Farm	Consented	15	west northwest	0.35 km
Cumberhead Wind Farm	Consented	11	west	2.12 km
Poniel Wind Farm	Consented	3	northeast	1.59 km
Nutberry Wind Farm	Operational	6	west	2.83 km
Hagshaw Hill Wind Farm & Extension	Operational	26 & 20	southwest	0.84 km
Galawhistle Wind Farm	Operational	22	southwest	3.32 km
Hazelside Farm	Operational	2 (1 operational)	south	1.34 km
Broken Cross Wind Farm	Consented	7	northeast	4.37 km
Glentaggart	In Planning	6	south	5.14 km

3.3 Description of the Development

3.3.1 The final Revised Development layout is illustrated in Figure 3.5 (and Figure 1.2 aerial mapping).

Turbines and Turbine Foundations

3.3.2 The Revised Development will comprise 13 wind turbines of up to 149.9 m maximum tip height, each with a typical generating capacity of around 3.8 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 Revised Development have been set as a maximum overall height (to blade tip) of 149.9 m, with a maximum hub height of 85 m, a maximum blade length of 64 m and a maximum rotor diameter of 132m (refer to Figure 3.6).

3.3.3 The proposed final locations of the turbines have been defined in order to enable the EIA to describe fully the Revised 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 (British National Grid)

Turbine	Easting	Northing
T1	280331	633205
T2	280690	633124
T3	281111	633045
T4	281579	633144
T5	281788	632753
T6	282274	632926
T7	282570	632685
T8	282070	632421
T9	282430	632168
T10	282119	631854
T11	281771	631965
T12	281398	631680
T13	281579	631486

3.3.4 Whilst these locations have been determined through an iterative environmental based design process (refer to Chapter 2), there is the potential for these exact locations to be altered through micro-siting allowances prior to construction. A micro-siting allowance of 50 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 steel tower and consist of a nacelle containing the gearbox, generator and 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 3.6. 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 The backfill locations and depth of the former opencast workings have been identified and analysed and the layout designed so as to avoid previously excavated land as far as possible. A full ground investigation will be completed prior to construction, however, typical foundations would comprise of concrete and steel reinforcement. For the purposes of the ES it has been assumed that all 13 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 to encourage re-vegetation.

3.3.9 Therefore, for the purposes of this ES, the following approximate dimensions have been used:

- central concrete pedestal 5 m in diameter;
- reinforced concrete slab approximately 15 m in diameter; and
- maximum depth of the foundations approximately 3.5 m.

3.3.10 An illustration of a typical turbine foundation is provided in Figure 3.7. 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

3.3.11 To enable the construction of the turbines, a crane hardstanding area and turning circle 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.

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

3.3.13 The crane hardstandings are illustrated as part of the site layout on Figure 1.2 and Figure 3.5.

Access

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. The access route to the site is shown in Figure 3.8.

3.3.15 The final layout for the Revised Development, as shown on Figure 3.5, involves the re-use of the exiting tarmac surfaced coal haul road that runs from junction 11 of the M74 motorway through the centre of the site. This asset significantly reduces the amount of new roadway required to construct the Revised Development.

3.3.16 Onsite access tracks will be required to link the various turbines to the existing tarmac spine road that runs through the site. Any new or upgraded access tracks have been designed to avoid any sensitive environmental receptors and will be made of locally (within South Lanarkshire) sourced stone, 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.

3.3.17 The total length of roads for the Revised Development is approximately 10.26 km and can be sub-divided into two main categories, as detailed in Table 3.3.

Table 3.3 – Access Track Composition

Type	Description	Length (km)	Percentage of Total
Existing Road	The Existing tarmac spine road which serves the development and is the main artery running through the site from the M74 motorway. This requires minimal upgrading or repair.	5.36 (total length to J11)	52%
New Track	New spur roads that will serve either individual turbines or small groups of turbines.	4.90	48%
	Total	**10.26**	**100 %**

3.3.18 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.

3.3.19 A transport assessment (Chapter 12) has been undertaken in support of the planning application for the Revised Development and this provides greater 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.

3.3.20 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), with necessary signage or traffic control measures implemented throughout the construction phase on the agreed basis.

Watercourse Crossings

3.3.21 A number of watercourses, both natural and artificial, 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 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.

3.3.22 The access tracks within the site will cross the following watercourses (Figure 1.2 and Figure 3.5), as detailed Table 3.4 below. Further details of the water crossing are included in Appendix 11.1 and discussed within Chapter 11 – Hydrology, Hydrogeology and Geology.

Table 3.4 – Water Crossing Detail

Reference	Existing / New	Type	New Track required for Access
WC01	New /Replace existing	Circular culvert	T01 & T02
WC02	New/ Replace existing	Bridge structure	T01 & T02
WC03	New	Circular culvert	T01, T02 & T03
WC04	Existing	Existing circular culvert	
WC05	New	Small circular culvert	T09, T10, T11, T12 & T13
WC06	Existing	Existing three pipe culvert	

3.3.23 It is proposed that the final solution and detailed design for all water 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

3.3.24 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 (refer to Figure 3.9). 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.

3.3.25 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.

3.3.26 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.

3.3.27 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.

3.3.28 A detailed drainage design will be undertaken and submitted to SEPA and the Local Authority for approval prior to construction.

Electrical Connection

3.3.29 The electrical power produced by the individual turbines will be fed to an onsite substation via underground cables. The substation is located adjacent to the main spine road in the east-central part of the site as shown on Figure 3.5. 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. The Revised Development will be connected to the Transmission or Distribution Network via the Coalburn Substation to the north east of the site. The final routing and design of the grid connection will be subject to a separate application under Section 37 of the Electricity Act 1989.

3.3.30 The cables 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 Revised Development. Cabling will mainly be located adjacent to the access tracks (refer to Figure 3.9), and, depending on the nature of the connection, may continue alongside the main access track from the on-site substation to the roundabout at Junction 11 of the M74.

3.3.31 The typical dimensions of the substation and control room building will be approximately 30 m by 10 m with a height to ridge of around 5 m. The building will accommodate all the equipment necessary for automatic remote control and monitoring of the Revised Development, in addition to the electrical switchgear, fault protection and metering equipment required to connect the Revised Development to the electricity transmission/distribution network. It will be constructed and finished in accordance with details to be approved through an appropriately worded condition. A typical substation elevation drawing is provided in Figure 3.10. Depending on the nature of the connection, there may be external electrical infrastructure adjacent to the control building.

3.3.32 It is proposed that there will be a micro-siting allowance of 50 m in all directions for the substation 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.

3.3.33 As well as providing power to the grid, a proportion of the electricity produced at the site may be used to supply new businesses within the recently consented Industrial Area, making the Revised Development a fully integrated renewable energy project.

Meteorological Monitoring Masts

3.3.34 A 50 m high anemometer mast is currently located on site at grid reference NS 82535 32365, at an altitude of 258m AOD. It is proposed that this will be removed after a new on-site met mast is erected.

3.3.35 A new mast will be required to monitor wind speeds for the operational life of the Revised Development. It is proposed that this mast will be of a height no greater than 80 m.

3.3.36 The final location and heights of the additional meteorological mast will be determined in consultation with the confirmed wind turbine manufacturer prior to construction of the Revised Development.

3.3.37 The additional meteorological mast proposed will comprise a robustly-engineered 80 m triangular lattice structure. The mast column is made of galvanized steel with circular hollow section legs and solid round diagonal bracing members. It is anticipated that the mast foundation and ground anchors would be reinforced concrete however final details of the materials will be confirmed at the detailed design stage. The guy wires will be secured at locations on the ground using soil anchors. A typical meteorological mast elevation drawing is provided in Figure 3.11.

3.3.38 It is proposed that these details and any requirements for aviation lighting will be addressed through an appropriately worded condition. An indicative location for the new mast is shown on Figure 3.5 at the location NS 81954 31824.

Construction Compound

3.3.39 A construction compound will be required as a control centre for all site activities and to provide facilities for the day-to-day needs of the project and the workforce. This will be located adjacent to the main spine road in the east-central part of the site as shown on Figure 1.2 and 3.5. It 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 3.12.

3.3.40 The compound area 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. It will also be used for the storage and assembly of certain components, containerised storage for tools and small parts, and oil and fuel storage. Adequate parking will be provided for cars and light vehicles.

3.3.41 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.

3.3.42 The proposed location of the compound on land that was previously disturbed is, based upon a visual inspection of the area, generally on firm ground clear of sensitive habitats. Prior to commencing construction work, a detailed appraisal of the area will be required, including an assessment by the project ecologist and also trial pits and /or bore holes to confirm the nature of the sub-strata.

3.3.43 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.

3.3.44 On completion of construction works, it is proposed that all temporary structures be removed and the compound area be retained for agricultural purposes, as was the case with the former DP hardstanding from the opencast coal site adjacent. Depending on the nature of the grid connection, it is possible that some electrical infrastructure may be retained at this location for the duration of the windfarm.

Concrete Batching Area/ Temporary Turbine Laydown Area

3.3.45 A temporary turbine laydown and concrete batching area will be required (as part of the overall construction compound/substation area) to enable construction of the Revised Development. It will comprise an area of approximately 100 m long by 60 m wide. The proposed location of the batching / laydown area will be located adjacent to the main spine road in the centre of the site (refer to Figure 3.5), on land that was previously disturbed and is, based upon a visual inspection of the area, generally on firm ground clear of sensitive habitats. Prior to commencing construction work, a detailed appraisal of the area will be required, including an assessment by the project ecologist and also trial pits and /or bore holes to confirm the nature of the sub-strata.

3.3.46 The concrete batching area 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 plant.

3.3.47 The detailed location, size and engineering properties of the temporary turbine laydown and concrete batching 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 50 m in all directions for the temporary turbine laydown and concrete batching area in order to allow operational flexibility. It is proposed that the final positioning will be addressed through an appropriately worded condition.

3.3.48 On completion of construction works, it is proposed that all temporary structures be removed and the area be retained for agricultural purposes, as was the case with the former DP hardstanding from the opencast coal site adjacent.

3.3.49 It will be necessary to provide a limited private water supply and foul drainage; this is considered further in Chapter 11 (Geology, Hydrology and Hydrogeology).

Wood Fuel Drying Facility

3.3.50 The Consented Development included a Wood Fuel Drying Facility (WFDF) alongside the 15 wind turbines on site but subsequently a separate planning permission (CL/16/0157) was granted in 2016 to allow the WFDF to be constructed as a stand-alone development. The WFDF is now built and operational within the northern extent of the DP area of the site. Therefore, as well as seeking permission to vary conditions to allow the revised turbine locations and turbine dimensions, this application also seeks permission to delete conditions 17 – 21 of planning permission ref. CL/15/0273 which relate to the WFDF.

3.4 Construction

3.4.1 The on-site construction period for the Revised Development is expected to be approximately 12 months and includes a programme to reinstate all temporary working areas, as shown in Table 3.5 (a weekly programme including estimated traffic numbers is shown in Chapter 12). 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. A fully detailed construction programme will be provided in a Construction Environmental Management Plan (CEMP) prior to the commencement of construction

– this will be addressed through an appropriately worded condition (refer to paragraphs 3.4.22 to 3.4.27 below). Table 3.5 provides an indicative construction programme for the main items of work to be carried out.

Table 3.5 – Indicative Construction Programme

Task	Month Number											
	1	2	3	4	5	6	7	8	9	10	11	12
Mobilisation												
Access & Site Tracks												
Foundations												
On-site Cabling												
Crane Hardstanding												
Substation												
Off-site Cabling												
Turbine Delivery												
Turbine Erection												
Commissioning & Testing												
Site Reinstatement												

3.4.2 The Revised Development will be phased so that certain activities will take place concurrently.

Summary of Development Areas

3.4.3 Table 3.6 below summarises the approximate areas and volume of aggregate material required for each of the main infrastructure elements described in Section 3.3. Further detail on construction volumes and materials is provided in Appendix 12. 1.

Table 3.6 - Revised Development Areas

Infrastructure	Area (m^2)	Depth of Aggregate (m)	Volume of Aggregate (m^3)
Turbine foundations	2,310	varies	varies
Crane hardstandings	19,500	0.5	9,750
Access track (new)	25,000	0.5	12,500
Construction Compound	6,000	0.5	3,000
Concrete Batching & Laydown Area	6,000	0.5	3,000
Substation	1,650	0.5	825
Miscellaneous (bedding for culverts and electricity cables etc)	various	various	approx.1,000

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 building foundations, hardstanding areas and cable trenches are described below:

- crushed stone;
- geotextile;
- cement;
- sand;
- ready mixed concrete;

- steel reinforcement; and
- electrical cable.

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 For the purposes of this assessment, it has been assumed that the concrete required for the foundations will be batched on-site within the identified concrete batching /temporary laydown area.

3.4.7 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.

3.4.8 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.

3.4.9 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. 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.

Construction Compound/Concrete Batching Area/Turbine Laydown Area

3.4.10 The compounds and lay-down areas will be prepared by removing surface soils to a depth of about 500 mm. It is noted that this area was previously disturbed as part of the opencast mining activities on the site, therefore, soil cover may be less than 500 mm. These materials will be stockpiled temporarily in separate storage mounds around the perimeter. The exposed subgrade would then be excavated and filled as necessary to produce an even and regular formation on which to place and compact a 500 mm thick carpet of well-graded crushed stone.

3.4.11 A shallow drainage ditch will be formed around the perimeter of the compounds by means of retaining a 'V' shape between the excavated surface and the crushed stone platform. This will be in the order of 500 mm to 600 mm deep, with short sections filled with 'clean' stone (i.e. free of fines) into which geotextiles will be inserted to trap sediments. The ditch would be 'blind', in that it would have no specific outlet. Water collecting in the ditch would be allowed to drain away naturally into the sub-strata, or into the undisturbed soil at low points along the line of the ditch.

3.4.12 Contaminated waste water generated from the offices and welfare facilities would be discharged into a septic tank.

3.4.13 The servicing and storage area will contain tanks for diesel fuels and oil, all of which will be double-skinned and surrounded by earth bunds or breeze block walls to safeguard against accidental spillage. Other materials to be stored in the area will generally be those required for intermittent use, or where delivery direct to point of use would be impractical, such as sand for bedding electricity cables and

gravel for culverts. Parking areas will be set aside for site vehicles and for mobile plant and equipment undergoing routine repairs and servicing.

Traffic and Transportation

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

3.4.15 Construction traffic associated with the construction and maintenance of the Revised Development falls into two 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.

3.4.16 The Applicant will ensure that the vehicles will be routed as agreed with SLC and Transport Scotland, to minimise disruption and disturbance to local residents. Further details regarding transport and access can be found in Chapter 12 of this ES.

Pollution Prevention and Health & Safety

3.4.17 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.

3.4.18 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 *Pollution Prevention Guidance 5 (PPG5) – Works and Maintenance In or Near Water and PPG6 – Working at Construction and Demolition Sites* (SEPA, 2007) to prevent impacts.

3.4.19 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 *PPG2 – Above Ground Oil Storage* (SEPA, 2010). There will be no long-term storage of lubricants or petrochemical products on-site.

3.4.20 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.

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

Construction Environmental Management Plan

3.4.22 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, SNH, SEPA, and Forestry Commission Scotland guidance on *Good Practice During Windfarm Construction* (SNH, 2015).

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

- noise and vibration;
- dust and air pollution;
- surface and groundwater;

- ecology and ornithology (including protection of habitats and species);
- agriculture (including protection of livestock and land);
- cultural heritage;
- waste (construction and domestic);
- pollution incidence response (for both land and water); and
- site operations (including maintenance of the construction compound, working hours and safety of the public).

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

- details of the all the environmental mitigation which is described within this Environmental Statement (Chapter 17) that is required during construction (and decommissioning) of the Revised 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.

3.4.25 The Contractor and/or Applicant shall consult with SNH, SEPA, Historic Scotland and the relevant Local Authorities on the production of the CEMP. The Contractor shall amend and improve the CEMP as required throughout the construction and decommissioning period.

3.4.26 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, cycleways and bridleways. The Contractor and/or Applicant shall amend and improve the CTMP as required throughout the construction and decommissioning period.

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

3.5 Operation and Maintenance

3.5.1 During operation, only site maintenance vehicles and local utility company vehicles will normally be required on the site for the Revised 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 within the substation building.

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

3.5.4 Once the Revised 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. The OEMP will be developed in consultation with SNH, 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
- a Habitat Management Plan and Species Protection Plan.

3.6 Decommissioning

3.6.1 This assessment assumes that the operational lifespan of the Revised Development would be 25 years, after which it would be appropriately decommissioned. It is expected that decommissioning would take approximately twelve 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 retained temporary construction compound would be re-established or a new construction compound would be developed as agreed with SLC 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 created for the Revised Development would be narrowed to farm-width and retained. The tarmac road that exists at present through the spine of the site would remain. As noted above, it is proposed that the construction compound and temporary turbine laydown area be retained for agricultural purposes.

3.6.7 If, after the operational lifespan of the Revised Development has expired there is potential for re-powering the development, for example by installing new nacelles, blades or other components, this would be subject to a new and separate application.

3.7 Climate Change and 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 Revised 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 Revised 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 maximum electrical output from the Revised Development will be around 49 MW, with the exact capacity depending on the model and type of turbine selected. It would be expected that the site would generate around 137 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 3,994 kWh (BEIS, 2016). Assuming generation of 137 GWh, the Revised Development would generate enough power to supply over 34,300 average UK households, noting however that some of the total output from the site may be used to power the industrial area onsite.

3.7.5 Although future wind yields cannot be guaranteed, if the Revised Development continued to generate on average at this load factor over its proposed 25-year lifespan, it is expected that around 3,425 GWh would 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 Revised Development site is covered in low grade agricultural land that has recently been re-established due to opencast mining operations across the central and northern extents of the site (refer to Figure 3.1). Little (less than 0.5 m in depth) or no peat that would act as a carbon sink was identified within the development footprint and no tree felling is proposed as part of the development proposals. It is therefore assumed that the overall carbon sink loss from the Revised Development will be minimal.

3.7.9 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*." The Revised Development would therefore be expected to result in a saving

of approximately 58,910 tCO_2 per year through displacement of carbon-emitting generation (RenewableUK, 2017).

3.8 Access Strategy

3.8.1 There are at least 5 Core Paths that either cross or are adjacent to the Revised Development site and the neighbouring Hargreaves' wind energy development, as well as a number of 'Aspirational Core Paths' and 'Wider Network Paths' (as designated in the South Lanarkshire Core Paths Plan).

3.8.2 Prior to the opencast mining activities at the site, there existed a network of paths and links between the Douglas and Coalburn communities. These were inevitably lost during the mining operations and whilst there is a network of tracks which remain on site today, the Revised Development and adjoining wind energy project on the neighbouring part of Dalquhandy owned by Hargreaves Surface Mining Ltd (Hargreaves) present a great opportunity to reconnect the villages of Douglas and Coalburn through the site and enhance the outdoor recreational offering in the local area.

3.8.3 Therefore, to maximise the potential benefit to the local area an Access Strategy has been developed for the Revised Development site, and is presented within Appendix 3.1. The formalisation of a network of paths across the site as part of the Revised Development will build on and enhance the existing path network in the local area which is already well used.

3.8.4 There is much of historical interest in and around the Revised Development site and it is proposed to develop a Heritage Trail to mark points of interest on the site and adjoining land (subject to the agreement of adjoining landowners where necessary - refer to Appendix 3.1, Figure A3.2). The development of this path network creates more opportunities to attract those from further afield to use the path networks around Douglas and Coalburn through the creation of further linked walkways and the development of features of interest in the local area.

3.8.5 As the area is already well used, it is important that public access is maintained during the construction phase, subject to standard health and safety requirements. A co-ordinated approach between the Applicant, local communities and adjoining landowners will be taken to agree the exact final route of the Heritage Trail once the physical path improvements are agreed (where they are within the Applicant's control) and an interpretive strategy prepared.

3.8.6 It is anticipated that it would be a condition of any planning approval for the Revised Development (as it is for the Consented Development) that detailed plans for the Access Strategy & Heritage Trail be submitted to and approved by SLC prior to the commencement of development, and the approved Strategy being implemented within a timescale agreed with the local community and SLC. The detailed Access Strategy will also take into account the recently permitted Industrial Area at the entrance to the site.

3.9 Socio-Economic Benefits

3.9.1 Based on an installed capacity of 49 MW, the Revised Development will generate a £6.1 million Community Benefit Contribution to communities in Coalburn and 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 Douglas, Coalburn and the immediate surrounding area over the next 25 years. The final community benefit arrangements are to be agreed with local communities and SLC.

3.9.2 The Revised Development represents a significant investment in the Douglas Valley and the Applicant has committed to taking a number of steps to ensure that benefits from the Revised Development are maximised locally. The Applicant is committed to a local supplier approach that will ensure that supplier contracts are sourced locally wherever possible, sustaining local businesses and providing

employment opportunities for local people. Construction companies will also be encouraged to offer local apprenticeship and work experience places during the construction phase of the Revised Development as part of a Responsible Contracting Policy.

3.9.3 An independent assessment of the socio-economic impact of the Revised Development has been undertaken and included as Chapter 13 of this ES. The assessment concludes that Revised Development represents a major investment in the South Lanarkshire and Scottish economies and will therefore deliver a range of positive economic impacts. The total construction and operational spend on the Revised Development over its 25 year lifetime is estimated at £ 220.4 million. Of this, well over half (69 %) is expected to be retained within Scotland.

3.9.4 As noted above, the Applicant is also proposing the development of a Heritage Trail and formal footpath network linking Douglas and Coalburn through the site, with interpretation areas informed by community consultation. The Heritage Trail through the site and adjoining land also has the potential to become an interesting addition to the Clyde Walkway Extension which is currently being developed to link the Clyde Walkway at New Lanark with the end of the River Ayr Way at Glenbuck. Existing long distance path networks in Scotland have proven to boost tourism, the economy, the health of local people and the environment of communities through which they pass and it is considered that the development of this path network through the Revised Development could enhance the existing tourism and recreation facilities in the local area, bringing more passing trade and visitors to Douglas and Coalburn.

3.10 Summary

3.10.1 This chapter has provided a description of the site and the surrounding area, with details of the Revised Development provided, in addition to a summary of the associated infrastructure. A description of the likely activities to occur during the construction, operation and decommissioning phases is also provided.

3.10.2 The proposed Access Strategy for the Revised Development has been summarised (refer to Appendix 3.1), as have the main Community Benefit proposals (refer to Chapter 13)

3.10.3 Finally, a high level assessment of the predicted carbon savings has been conducted for the Revised Development.

3.11 References

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