Chapter 3

Description of the Proposed Development

SCOTTISHPOWER RENEWABLES

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3.1 Executive summary

1. ScottishPower Renewables (SPR) intend to construct a renewable energy development comprising advanced renewable technologies. The proposed Development comprises 21 three-bladed horizontal axis wind turbines, up to 230 m tip height, with a combined rated output of around 126 megawatts (MW). An energy storage facility of around 31.5 MW in capacity would also be installed to store generated renewable energy and provide flexible management of energy delivery and ancillary support services to the national grid.

2. As highlighted in earlier Chapters, the proposed Development supports the reduction of carbon dioxide emissions by replacing forms of power generation which are burning fossil fuels and contributing to global warming. The UK and Scottish governments have made this reduction need a firm commitment by recently setting new 'net zero' carbon dioxide emissions targets, with the Scottish Government committing to achieve this by 2045. This proposed Development contributes to the Scottish Governments target of 50% of all energy being generated from renewables by 2030.

3. SPR's experience through operation of the UK's largest portfolio of windfarms suggests that there is no operational need to limit the lifetime of a renewable energy development. Therefore, consent is being sought for the proposed Development in perpetuity. Increasing the operational period allows the costs of renewable energy to be driven down and fulfils the long term need for renewable energy sources to meet our future energy needs and decarbonisation targets. As there is no proposal to limit the lifetime of the proposed Development, the assessment of all technical areas considers the effects of the operational phase of the proposed Development, without time limitations.

4. The proposed Development would connect to the Scottish Power Energy Networks plc (SPEN) transmission network and a new overhead or underground power line would be built and connected to a new substation which would be located within the Site. The grid connection may require consent under section 37 of the Electricity Act 1989 which is the subject of a separate consenting process to this section 36 application and would be developed and consented by the electricity network operator, SPEN.

5. The Site would be accessed from the A76 by one of two potential access points and the existing timber haul roads would be used by the proposed Development where possible; however, some new access tracks would be built along with other associated infrastructure. The wind turbines would be delivered in component parts with the longest deliveries being up to 75 m long, these components are likely to be delivered to the Site via either King George V port in Glasgow, or from Port of Ayr with other components and materials being delivered using the existing road network.

6. An energy storage facility would be installed adjacent to the onsite substation and control building, with a storage capacity of around 31.5 MW. This is likely to consist of around eight containers, similar to shipping containers. The final design of the energy storage facility would be based upon the technology available at the time of construction.

7. The construction of the proposed Development would also lead to some other temporary works, such as the development of borrow pits and tree felling. A substantial proportion of the forestry within the Site is planned to be felled under the existing felling plan within the proposed construction timeframe, which would take around 22 months starting in 2024. Earthworks and most borrow pits would be subject to restoration and net tree loss due to the proposed Development would be compensated in line with the requirements of the Control of Woodland Removal Policy.

8. In addition to site restoration and compensatory planting, SPR has identified opportunities to restore some areas of the Site which have been affected by historical land use (e.g. forestry and land drainage). An area of 23 ha has been identified for habitat management with the aim of damming small ditches to restore water levels in drained peat to encourage the restoration of peat forming vegetation. SPR has used this technique successfully on other windfarm projects to restore peat

habitats. This would also help control runoff from the Site which could benefit Euchan Water, Scaur Water, the Water of Ken and Shinnel Water, all of which can experience periods of flooding.

9. Finally, SPR also intends for the proposed Development to offer opportunities for local communities. A range of site enhancements are incorporated into the plans to enhance the recreation value of the Site, by providing an alternative route through the forest, stone seating and archaeological features with information boards. Further details are provided in **Chapter 14: Socio-economics, Recreation and Tourism**, and **Figure 14.2.**

3.2 Introduction

10. This Chapter describes the components parts of the proposed Development and construction methods including a general description of the proposed renewable energy technologies (i.e. wind turbines and an energy storage facility) and their associated infrastructure.

11. The layout for the proposed Development is shown on **Figure 3.1** including proposed infrastructure. Additional details on construction methods are provided in the outline Construction and Environmental Management Plan (CEMP) included in **Technical Appendix 3.1: Outline CEMP.** Details on the forestry aspects of the proposed Development are included within **Technical Appendix 3.2: Forestry.**

3.3 Proposed development

3.3.1 Development outline

12. The proposed Development is a renewable energy development that intends to make use of available renewable energy technologies to maximise and optimise the renewable energy potential of the Site. For this consent application, SPR intends to construct a blend of renewable energy technologies, including 21 three-bladed horizontal axis wind turbines up to 230 m tip height, with a combined rated output in the region of around 126 megawatts (MW) producing an annual output of over 386 GWh[1] of electricity. This equates to the annual power consumed by approximately 101,689[2] average UK households. Around 31.5 MW of energy storage would also be installed, enabling flexibility in the balance of energy output to supply ancillary services that support the demands of the national grid.

13. The proposed Development will comprise of the following main components:

- 21 wind turbines, up to 230 m in height, including foundations and aviation lighting;
- energy storage facility, likely to be containerised battery units;
- crane hardstandings for wind turbine installation;
- transformer/switchgear housings located adjacent to turbines;
- new (32.6 km) and upgraded (19.8 km) access tracks including watercourse crossings where necessary, passing places and turning heads;
- access to site from the A76, with a new access track constructed linking the Site to the existing SPR Hare Hill Windfarm, or access from Blackaddie Road;
- underground electrical cabling;
- compound containing substation, control building and energy storage facility;
- one main site construction and maintenance compound, two secondary construction compounds, one laydown area and a security compound;
- a permanent lattice construction meteorological mast, up to 149.9 m high;
- health & safety and other directional site signage;
- search areas for up to seven borrow pits;

[1] For example using a 35% capacity factor, figures are derived as follows: 126 MW × 8,760 hours/year × 0.35 (capacity factor) = 386,316MWh. The actual capacity factor on the site is likely to be higher than 35%.

[2] This is calculated using the most recent statistics from BEIS showing that annual UK average domestic household consumption is 3,799kWh. The figure is calculated as follows: Annual energy generation / (UK average domestic electricity consumption/1000).

- improved access paths for the section of the Southern Upland Way crossing the site;
- signage and access to archaeological features within the site such as Allan's Cairn; and
- habitat improvements, as outlined in the proposed Habitat Management Plan, found in **Appendix 8.8**.

14. The proposed Development would also require forest restructuring works to enable construction and operation of the renewable energy development.

15. The proposed Development would re-use and share existing infrastructure from the existing onsite forestry operations and either the existing Hare Hill Windfarm access tracks or the Whiteside Hill Windfarm bypass road (which runs parallel to the section of the U432n close to the Site) where possible. This includes sharing much of the existing timber haul routes as access tracks, thus maximising efficiency and minimising the need to construct new roads.

3.3.2 Operational life

16. SPR's experience through operation of the UK's largest portfolio of windfarms suggests that there is no operational need to limit the lifetime of a renewable energy development. In order to support the long-term need for renewable energy to meet, and drive down the costs of meeting the carbon dioxide reduction targets, there is no proposal to limit the lifetime of the proposed Development.

17. There are no current statutory or legislative limits to the duration of consent for a proposed development. Our approach, as now set out in SPP (2014), is that areas identified for wind farms should be suitable for use in perpetuity. Paragraph 41 of the Scottish Government Onshore Wind Position Statement (OWPS) (2017) confirms that there is no current statutory or legislative durational period and reiterates the position in Scottish Planning Policy that areas identified for wind energy developments should be suitable for use in perpetuity. It provides that the operating period of an individual wind energy development is a matter which developers can discuss and consider prior to the submission of an application but identifies that decommissioning provisions will still be required.

18. Further discussion of planning policy is found in **Chapter 4: Climate Change, Renewable Energy and Planning Policy.**

19. Where operational components of the proposed Development require to be replaced, SPR would replace the appropriate renewable energy infrastructure with a similar model of the same dimensions and appearance. Such operations would be similar to construction and these effects are examined in this EIA Report.

20. Should consent be granted, it is expected that there would be a condition which would deal with the requirement to either remove any renewable energy infrastructure that becomes non-operational for a defined period of time or to replace the infrastructure like for like. Therefore, the assessment of all technical areas considers the effects of the operational phase of the proposed Development without time limitations.

3.3.3 Grid connection

21. SPR holds a grid connection agreement to connect the proposed Development to the electricity transmission network at the SPEN substation at Black Hill, approximately 5 km to the west of the Site. The grid connection point for the proposed Development is subject to confirmation by the network operator/owner.

22. The grid connection may require consent under section 37 of the Electricity Act 1989 which is the subject of a separate consenting process to this section 36 application. SPEN, who is the network owner in the area of the proposed Development would own the assets beyond the Site substation. An indicative substation compound is shown in **Figure 3.2**.

3.3.4 Design principles and embedded mitigation

23. A number of design principles and environmental measures, otherwise known as embedded mitigation, have been implemented and incorporated into the proposed Development as standard practice, as described in **Chapter 2: Site Description and Design Evolution.**

24. Embedding mitigation has been a feature of the process that has led to the final design of the proposed Development; and this embedded mitigation, therefore, forms part of the proposed Development which has been assessed in this EIA Report.

25. Reference to good practice and standards, guidelines and legislation relied upon in the assessment methodology are referred to within each of the individual specialist topics in **Chapters 7 to 15**. Such environmental measures are also included in **Technical Appendix 3.1: Outline CEMP**.

3.3.5 Micrositing

26. During the construction process there may be a requirement to microsite elements of the proposed Development infrastructure (e.g. due to unsuitable ground conditions, environmental constraints). It is proposed that a 50 m micrositing tolerance for turbine locations, along with 100 m micrositing tolerance of all other site infrastructure would be applied to the proposed Development. Within this distance any changes from the consented locations would be subject to approval of the Ecological Clerk of Works (ECoW) as required and in consideration of other known constraints. It is anticipated that the agreed micrositing distance may form a planning condition accompanying consent for the proposed Development.

3.3.6 Consents prior to the commencement of development

27. Prior to commencing construction on the Site, it may be necessary for SPR to obtain a number of other statutory authorisations and consents to enable the proposed Development to be implemented. Where relevant these are explained in the technical Chapters of this EIA Report.

3.3.7 Wind turbines

28. The proposal includes the installation and operation of 21 three-bladed horizontal axis wind turbines at the Site. The proposed turbine locations are shown on **Figure 3.1** and the coordinates for each are provided in **Table 3.1**.

Table 3.1: Turbine coordinates

Turbine No.	OS Easting	OS Northing	Turbine No.	OS Easting	OS Northing
1	268456	606531	12	269104	601408
2	268000	606036	13	269707	601291
3	267494	605259	14	269225	600793
4	267071	604688	15	269933	600718
5	266509	604256	16	270156	600193
6	267749	603314	17	269348	599928
7	266646	602924	18	270724	599799
8	267942	602664	19	269363	599239
9	266175	602607	20	270032	599218
10	266848	602093	21	270983	599044
11	267381	601757			

29. The wind turbines would have a rating of around 6 MW based on wind turbine technology which is expected to be available at the point of tendering. The turbines would have a maximum height to blade tip of 230 m. Each wind turbine would incorporate a tapered tubular tower and three blades attached to a nacelle that would house a turbine generator and other operating equipment e.g. gear box. The turbines would be semi-matt pale grey or a finish agreed with Dumfries and Galloway Council (DGC).

30. The exact model of wind turbine to be installed at the proposed Development would be selected through a competitive procurement process. In each technical assessment undertaken as part of the EIA, a worst-case scenario of the turbine dimensions/characteristics has been used. An indicative turbine for the proposed Development is shown on **Figure 3.3**.

31. Each turbine would be served by an electrical transformer/switchgear unit that would be located externally adjacent to the turbine base. The transformer housing would measure approximately 6.25 m(l) x 4 m(w) and 3.6 m(h). The external finishes would typically be metal or glass reinforced or moulded plastic. An indicative external transformer is shown on **Figure 3.4**.

32. Visible aviation lighting is required on all turbines and met mast in excess of 150 m to blade tip with a medium intensity (2000 candela) steady red aviation warning light on the nacelle (with dimming option to 200cd when visibility is good) and a low intensity light (25cd) half way down the tower as well as infra-red lights.

33. More information on aviation lighting can be found in **Chapter 15: Other Issues** of this EIAR, and the landscape and visual aspect of the aviation lighting is considered in **Chapter 7: Landscape and Visual Impact Assessment.**

3.3.8 Wind turbine foundations and crane hardstandings

34. Wind turbine foundations would be designed to accommodate the final choice of turbine and to suit site specific conditions. The final design would depend on the findings of detailed ground investigation at each turbine location. An illustration of a typical wind turbine foundation is provided on **Figure 3.5**.

35. The turbines would have gravity foundations with a diameter of around 28 m and would be laid using reinforced concrete. The depth of the excavation would depend on the ground conditions; typically, the foundations would be 3 m deep (approximately 1.5 m foundation depth + 1.5 m of minimum fill). The sides of the excavation would be graded back, from the foundation to approximately a 38 m diameter and battered to ensure that they remain stable during construction. The wind turbines would be erected using mobile cranes brought on to the Site for the construction phase.

36. A crane hardstanding would be built adjacent to each wind turbine and is likely to have a footprint of 30 m x 100 m, with the depth dependant on the underlying bearing strata. The depth of each crane hardstanding is expected to be about one metre depending on underlying ground conditions. The actual crane pad design and layout would be determined by the wind turbine supplier according to their preferred erection method.

37. An indicative crane hardstanding design has been considered for the purposes of this assessment and is provided on **Figure 3.6**. The crane hardstanding would also include a number of smaller crane pads along the access track typically 12 m x 12 m. These areas would remain in situ for the duration of the operational phase of the proposed Development.

38. Two smaller areas measuring approximately 20 m x 4 m will also be constructed. These will be used for storing the turbine blades prior to erection and requires the area around the blade storage areas to be cleared of vegetation. This results in a non-regular footprint with a disturbance area of 80 m x 25 m.

39. Soils that are excavated during construction would be set aside for backfilling of foundations and reuse in restoration of disturbed areas around the turbine locations and hardstandings. Further details of soil storage will be developed through the CEMP.

3.3.9 Permanent meteorological mast

40. One permanent meteorological mast, up to 149.9 m in height may be erected, dependant on the final turbine selected (**Figure 3.7**). The mast would require a concrete foundation measuring approximately 14 m x 14 m, with a depth of up to 3 m. The construction method of the foundation would be similar to that used for the turbines. In addition, a crane hardstanding, measuring 30 m x 40 m would be required adjacent to the mast to allow for the erection of the mast. The meteorological mast would have a security fence around its base to control access.

3.3.10 Substation and control building

41. A substation and control building would be located within a larger compound, measuring around 100 m by 75 m, which would also house the energy storage facility, described in the following section (**Figure 3.2**). The substation would be constructed and owned by the electricity grid network operator (SPEN). The substation and control building for the renewable energy technologies would be able to undertake a range of services for the national grid, including exporting and importing power (to the storage facility), frequency control, reactive power compensation and re-starting the electrical grid in the event of failure ('black start').

42. The substation would comprise a range of electrical grid equipment, such as, but not limited to:

- transformers;
- heating, ventilation and air conditioning (HVAC) Coolers;
- electrical cabling; and
- other electrical equipment.

43. The proposed Development would be connected to the substation and electricity network via an onsite control building located at NGR 267490, 603230. Indicative control building plan and elevations are shown on **Figure 3.8A and Figure 3.8B**. The control building would be single storey, built on a concrete base and would measure approximately 14 m x 23 m and

would be around 7 m in height. The control building would also host solar panels on the roof to reduce the carbon footprint of the building and will likely include other energy efficient measures, such as electric vehicle charging points and rainwater harvesting for flushing of toilets. A small car park will also be located adjacent to the control building.

44. A metal palisade security fence (painted green or otherwise agreed with DGC) of around 3 m in height would be installed around the perimeter of the substation compound and the site would be served via a locked access gate. Please see **Figure 3.2**.

3.3.11 Energy storage facility

45. An energy storage facility, in the form of around eight units, likely to be in a containerised form, would be installed within the substation/control building compound (**Figure 3.2**). It would have an energy storage capacity of around 31.5 MW. The energy storage facility would store excess power generated by the proposed Development and also provide grid support services providing stability to the electricity supply network, the importation of electricity from the national grid and the integration of the additional renewable energy generation.

46. The container housings would be of steel construction, similar to shipping containers in appearance. It is likely that each container would typically measure 17 m (l) x 8 m (w) x 4 m (h) with external ancillary equipment such as inverters. The final design of the energy storage facility would be based upon the most appropriate technology available at the time of construction. It is likely that a separate switchgear container for the necessary electrical plant to operate the batteries would be required, and this too would be accommodated within the compound.

3.3.12 Electric cables

47. The proposed Development includes buried electric cables which would connect the renewable energy technologies to the substation and control building compound. The majority of the underground power cables would run along the side of the access tracks in trenches to the proposed control building compound. The route will be marked above ground clearly with identification posts, spaced evenly along the length. The cables would be buried to a depth of approximately 1 m. Indicative cable trench arrangements are provided on **Figure 3.9**.

3.3.13 Access tracks, passing places and turning heads

48. Approximately 32.6 km of new onsite access tracks and approximately 19.8 km of upgraded track would be required to provide access to the wind turbines, substation and control building compound and construction compounds (**Figure 3.11**), as well as providing access to coupes for preconstruction felling. Indicative track construction details are shown on **Figure 3.10**.

49. Tracks would have a typical 5 m running width, with isolated wider sections on bends and at junctions. Where it is not possible to avoid areas of deepest peat, floating track construction would be used. It is expected that there would be approximately 3.6 km of floating track, where consistent peat depths of between 1-1.5 m or greater are identified along with shallow topography in the area (below 5 %).

50. Construction traffic passing places would be placed along the track in addition to passing opportunities at site junction and crane hardstandings. The exact location of these would be determined prior to construction.

51. Turning heads would be constructed at some turbine locations, in addition to turning areas at site junction locations. These would measure 30 m x 5 m and be located close to the wind turbines on the access track and orientated perpendicular to the track. These would allow compacted blade delivery vehicles (and other site traffic) to turn around following delivery of the blades.

3.3.14 Access from the trunk road network to Site

52. It is proposed that the wind turbine components would be delivered to King George V (KGV) Docks in Glasgow, or Port of Ayr. Both proposed routes are regularly used for wind turbine delivery and have been assessed in detail to ensure that they can accommodate delivery of the components to the proposed Development. Please see **Chapter 12: Access, Traffic and Transport** for further details. The preferred port of for the delivery for wind turbine components is KGV.

53. A preliminary Route Survey Report has determined that, based on the wind turbine components considered, transport loads from KGV will follow a predetermined route which involves exiting KGV docks onto Kings Inch Drive, before joining the M8 eastbound. Abnormal loads would merge onto the M74 southbound to junction 5, before exiting the M74, navigating the

roundabout and re-joining the M74 northbound, before merging back onto the M8 westbound. The M8 then merges with the M77, which in turn then merges with the A77. At the roundabout with the A76, abnormal loads will then continue south on the A76 before reaching either the site access junction with the A76 for Access Route A, or the junction with Blackaddie Road for Access Route B, as described below. The turbine transport loads would be moved from the port of entry (KGV) to the Site under escort.

54. If turbines are delivered to the Port of Ayr, then the transport route to site would exist the docks onto Wagon Road, before joining Allison Street. At the roundabout with the A719 the loads would turn left onto the A719 and continue until the roundabout with the A77, where the loads would turn left onto the A77. Abnormal loads would continue along the A77 for approximately 4 miles to the roundabout with the A78, whereby loads would turn right and continue onto the A77. Abnormal loads would then continue along the A77 until the roundabout with the A76 on the outskirts of Kilmarnock, where loads would join the A76 and progress to the site entrance. The turbine transport loads would be moved from the port of entry (Port of Ayr) to the Site under escort.

55. Following consent, a detailed access assessment would be undertaken which would identify the requirements for any road modifications, vegetation or tree trimming required along the access route.

56. Two access routes to the Site from the public highway have been identified as being suitable for the delivery of wind turbine blades and other components, as well as general construction traffic. These are referred to as Access Route A and Access Route B, as follows. Both routes involve accessing the general area via the A76.

57. Both access routes form part of the application, but following further feedback gained during the planning process, results of detailed engineering design and ground investigation studies, and a review of commercial considerations, only one option will be used for abnormal load access to the site. Should Access Route A be constructed and used for abnormal load delivery, Blackaddie Road may still be used for material delivery and staff access during construction, and for operation and maintenance access once the Site is operational.

58. For other material delivery and technologies that will be installed on site, it is likely that they will be delivered using standard heavy goods vehicles utilising the local road network, including the A76.

Access Route A

59. This route makes use of the existing SPR Hare Hill Windfarm access junction from the A76 and existing site roads as far as practicable, before approximately 8.5 km of new access track would be constructed running from the existing Hare Hill Windfarm south past Laglass Hill and Blackcraig Hill, before turning east at Greenlorg Hill and entering the Site near Graystone Hill. Some upgrading of the existing Hare Hill Windfarm track would be required to allow for larger components to access the Site.

Access Route B

60. This route accesses the Site via a combination of Blackaddie Road (which becomes the U432N), which runs from the A76 along the north western edge of Sanquhar, and the bypass road purpose-built for the construction of Whiteside Hill Windfarm. It enters the Site close to Glenglass cottage.

61. The existing access route to Site (Blackaddie Road – from the A76 to the Site) is in good condition, having been widened for other windfarms, forestry operations and delivery of the Glenglass substation and is generally suitable for very large turbine component deliveries. It is not expected to have to carry out any significant engineering works to the public highway along this route; however, there may be a number of sections which require minor upgrades or limited repair works within the existing road corridor.

62. The routes and location of both access points to the Site are shown on **Figure 3.12.** Further details of the access routes are found in **Chapter 12: Access, Traffic and Transport.**

3.3.15 Watercourse crossings

63. New watercourse and ditch crossings have been avoided in the design of the access track layout as far as possible; however, there would be 18 new watercourse crossings required for the proposed Development (coordinates and details provided in **Table 3.2**). Eight of these watercourse crossings are to be new for access to the wind turbines, ten are new crossings associated with Access Route A and there would also be 25 upgraded existing watercourse crossings.

64. Further details are provided in **Technical Appendix 10.5: Watercourse Crossing Assessment**.

Table 3.2: Watercourse crossings

Watercourse crossing	Type	Easting	Northing	Location within proposed Development
1	Existing	271247	606538	Access Route B
2	Existing	269671	606685	Access Route B
3	Existing	268977	606534	Access Route B
4	Existing	268607	606330	Access Route B
5	Existing	268222	605782	Access Route B
6	Existing	268134	605632	Access Route B
7	Existing	268208	605331	Access Route B
8	Existing	268100	604882	Access Route B
9	Existing	267781	604399	Access Route B
10	New	267717	606025	Main Site
11	New	266797	605485	Main Site
12	New	266745	604766	Main Site
13	New	266695	604671	Main Site
14	New	266664	604488	Main Site
15	New	266829	604102	Main Site
16	Existing	266973	604053	Main Site
17	Existing	266423	603721	Main Site
18	New	268266	602107	Main Site
19	New	268510	602157	Main Site
20	Existing	268429	601887	Main Site
21	Existing	269058	601195	Main Site
22	Existing	269919	599940	Main Site
23	Existing	269624	599441	Main Site
24	Existing	269474	599300	Main Site
25	New*	266713	605527	Access Route A
26	New	265910	605065	Access Route A
27	New	265726	605018	Access Route A
28	New	265585	604943	Access Route A
29	New	265457	605121	Access Route A
30	New	265245	605353	Access Route A
31	New	265299	606284	Access Route A
32	New	265320	606365	Access Route A
33	New	265356	606900	Access Route A
34	New	265355	606938	Access Route A
35	Existing	267938	611589	Access Route A
36	Existing	267220	612392	Access Route A
37	Existing**	267090	612438	Access Route A
38	Existing	267075	612443	Access Route A
39	Existing	266904	612517	Access Route A

Watercourse crossing	Type	Easting	Northing	Location within proposed Development
40	Existing	266589	612575	Access Route A
41	Existing	266351	612778	Access Route A
42	Existing	266131	612870	Access Route A
43	Existing	266050	612904	Access Route A
* survey subsequently indicated no watercourse crossing required. ** survey subsequently identified no watercourse crossing present				

3.3.16 Borrow pits

65. Seven borrow pit search areas have been identified **(Figure 3.1**), to provide a total of approximately 480,600 m^3 of material to construct the proposed Development (coordinates provided in **Table 3.3** and details presented in **Technical Appendix 10.6: Borrow Pit Assessment**). The use of all of these borrow pits would provide a greater volume of rock than would be needed for the construction of the proposed Development but the identification of search areas allows for the current uncertainty of the quality of the rock at these locations. It is likely that only some of the borrow pit search areas would be required. For the purposes of the assessment all seven borrow pits have been assessed.

Table 3.3: Borrow pit information

Borrow Pit No.	NGR Reference	Approximate Dimensions (m)	Volume (m^3)
BP01	269140, 606650	150 m x 50 m	75,000
BP02	269175, 602150	120 m x 50 m	24,000
BP03	268970, 606151	120 m x 60 m	57,600
BP04	270040, 599770	170 m x 100 m	204,000
BP05	270640, 599970	100 m x 70 m	42,000
BP06	265225, 606035	100 m x 60 m	48,000
BP07	265410, 607230	100 m x 50 m	30,000
Total			**480,600**

66. It is assumed that Type 1 crushed rock for the track and hardstanding surface layers would be won on site from the onsite borrow pits.

67. At least one borrow pit would remain open during the operating period of the proposed Development to provide aggregate for any maintenance works. All other borrow pits would be restored following the construction phase and it is expected that there would be a consent condition to agree the restoration approach.

3.3.17 Construction lighting

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

3.3.18 Felling

69. The proposed Development would require 217.8 ha of woodland to be directly felled in order to facilitate the construction of wind turbines and associated infrastructure. While a key holed approach is favoured, it is anticipated that some forestry coupes will be clearfelled to the nearest windfirm edge to allow for the construction of the proposed Development. However, there is also likely to be some recently felled areas where a mature crop is yet to be established, rather than whole coupes being clearfelled.

70. Following construction, the majority of felled areas will be replanted however, a 50 m keyholed radius from each turbine location within woodland will be maintained for operation and maintenance. Further details are provided in **Technical Appendix 3.2: Forestry**.

3.3.19 Compensatory planting

71. The construction of the proposed Development is predicted to result in a net loss of woodland development area. The area available for stocked woodland would decrease by 67.7 ha. Further details are provided in **Technical Appendix 3.2: Forestry.**

72. SPR is committed to providing appropriate compensatory planting in accordance with the criteria of the Scottish Government's Control of Woodland Removal Policy. The extent, location and composition of such planting is to be agreed with Scottish Forestry, taking into account any revision to the felling and restocking plans prior to the commencement of operation of the proposed Development.

3.3.20 Habitat Management Plan

73. Parts of the Site comprise peatland which has been historically degraded through installed drainage, which dries out the peat leading to the introduction of poorer quality habitats. As part of the proposed Development, SPR would implement a number of habitat improvement proposals to restore these areas and encourage the formation of the high quality and important habitats that establish when they are undrained.

74. SPR and the EIA team have worked together to identify one area in the central part of the site close to Allan's Cairn, and a second, smaller area to the west of Greystone Hill. These areas total 23 ha and are considered to compensate for the estimated 17 ha of peatland habitat predicted to be directly and indirectly lost as part of the proposed Development. It is planned to undertake a number of measures in the habitat improvement area, including the damming of ditches using in-situ peat with the aim of raising the water table to re-wet surrounding areas of peat and to re-establish peat forming species, such as sphagnum. Details of the habitat management proposals are described in the Habitat Management Plan (HMP) which is provided in **Technical Appendix 8.8: Habitat Management Plan.**

3.4 Construction

3.4.1 Construction timetable

75. The proposed Development would be constructed over a period of approximately 22 months, expected to commence in quarter one of 2024. Construction would include the principal activities listed within the indicative construction programme as provided in **Table 3.4**.

3.4.2 Construction employment

76. The number of people employed during the construction period would vary depending on the stage of construction and the activities ongoing onsite. It is expected that the peak workforce requirement would be around 150 construction staff.

3.4.3 Construction hours

77. The construction working hours for the proposed Development would be 07:00 to 19:00 Monday to Friday and 07:00 to 16:00 on weekends, though some activities on weekends would be restricted to reduce disturbance to nearby properties. It should be noted that out of necessity due to weather conditions and health and safety requirements, some activities, for example, abnormal load deliveries (which are controlled by Police Scotland) and also the lifting of the turbine components, may occur outside the specified hours stated.

Table 3.4: Indicative construction programme

Indicative Construction Activity	Months																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Forestry felling and tree crop export, and construction of access tracks required for felling	■	■	■																			
Site establishment		■	■																			
Access road improvements			■	■	■	■																
Construction of haul road & site access to borrow pits					■	■	■	■														
Construction of access tracks, crane pad and building compounds						■	■	■	■	■	■											
Turbine foundation construction							■	■	■	■	■	■										
Substation/storage - civil and electrical works								■	■	■	■	■	■									
Cable Trenching, Installation and Backfilling									■	■	■	■	■									
Crane delivery													■									
Turbine delivery, erection and commissioning														■	■	■	■	■	■	■		
Reinstatement and Restoration Works																			■	■	■	■

3.4.4 Construction and maintenance compounds and laydown area

78. The construction and maintenance compounds, laydown area and security compound would be required for the duration of the construction phase as shown on **Figure 3.1** and **Table 3.5.**

Table 3.5: Construction compound and laydown area

Compound Type	Dimensions	Grid Reference
Main Construction Compound	100 m x 100 m	E 267170, N 605310
Secondary Construction Compound 1	100 m x 75 m	E 269540, N 600725
Secondary Construction Compound 2	50 m x 50 m	E 267750, N 603780
Laydown Area	100 m x 50 m	E 268775, N 606475
Security Compound	30 m x 30 m	E 270735, N 606470

79. The main construction and maintenance compound would have a footprint of around 100 m x 100 m (10,000 m^2) and would contain the following:

- temporary modular building(s) to be used as a Site office;
- welfare facilities;
- parking for construction staff and visitors;
- reception area;
- fuelling point or mobile fuel bowser;
- secure storage areas for tools; and
- waste storage facilities.

80. Onsite concrete batching would take place at the main construction compound. Water would be required for onsite batching. An abstraction licence, if required, would be carried out under authorisation from the Scottish Environmental Protect Agency (SEPA) with relevant regulation/permits to be obtained by SPR.

81. Fuel and oil storage and foul effluent from the welfare facilities would be managed in line with the relevant SEPA Guidance for Pollution Prevention (e.g. GPP 4: Treatment and disposal of wastewater where there is no connection to the public foul sewer).

82. Two secondary construction compounds are also proposed for the Site. These would be used for similar purposes as the main compound i.e. welfare facilities, storage and parking to service different sections of the site during construction. Dimensions for these compounds are provided in **Table 3.5.**

83. The main and secondary construction compound and components would be a permanent construction, and would be retained after the construction of the proposed Development is complete for operational and maintenance purposes.

84. A small security compound area has been provided for at the junction of the existing haul route and the new access route approximately 100 m from the site entrance of the access from Euchan Water Road (**Figure 3.1.2**). This would be used to control access onto the Site during construction, in the event Access Route B is used, and would consist of a portacabin, welfare facilities and parking. The security compound would be a temporary construction, and would be reinstated after the construction of the proposed Development is complete.

85. Two locations for blade laydown area have been identified for the Site, one each on Access Route A and Access Route B. Only one laydown area would be constructed, dependent on which access route is used to deliver turbine blades to Site. These areas would be used to transfer blades from the specialist blade lifter transport onto more traditional blade vehicles for use around the Site. They may also be used for the temporary laydown of other deliveries, plant and construction equipment which may need to be temporarily stored before being transported into position on the Site.

86. **Figure 3.11** illustrates a typical main construction and maintenance compound although the layout may differ depending on site topography and contractor requirements. Crane hardstanding areas, along with the construction and maintenance compound, would be used for laydown during construction.

87. Water would also be required for welfare facilities and to dampen tracks during dry weather. However, this would be minimal and would likely be collected via rainwater harvesting.

3.4.5 Materials sourcing and waste management

88. The proposed Development would require a range of construction materials (e.g. aggregates, concrete). Where possible, stone from the onsite borrow pits would be used for construction purposes, but it may also be necessary to import aggregates onto the Site, especially for use in higher specification uses such as concrete. Due to the remote location of the Site onsite concrete batching has been assumed and so deliveries of cement and sand will be made to Site.

89. A Site Waste Management Plan would be developed for implementation during construction, as discussed in the CEMP (**Technical Appendix 3.1: Outline CEMP**). This outlines details of the materials requirements and waste generation during construction and how SPR intends to consider the management of these aspects.

90. Excavated material from the turbine bases and access tracks would be used onsite for restoration/reinstatement.

3.4.6 Temporary peat storage

91. The construction process would both extract peat and reuse peat. Where possible, “restore-as-you-go” techniques would be used to place excavated peat in its final destination rather than in temporary stockpiles. However, in some circumstances, there may be a time-delay between these actions. During the interim period, peat would be stored on-site. It is important both for the peat itself and for the surrounding environment that the peat is not allowed to substantially erode or become dry while it is stored.

92. Procedures to control the hydrology of stored peat would be covered by the CEMP (**Technical Appendix 3.1: Outline CEMP**) and the Peat Management Plan (**Technical Appendix 10.2: Peat Management Plan**). These would include:

- prior to the excavation of relevant infrastructure, vegetation, peat and superficial geology would be removed and stored in overburden stockpiles (or used directly in restoration of other areas; see below);
- care would be taken to segregate peat from other materials, to ensure that turves are kept reasonably intact, and to store turves right-side-up to form a protective layer on top of any deeper peat stockpiles;
- overburden stockpiles will be located adjacent to the infrastructure at least 50 m from watercourses in order to reduce the potential for sediment to be transferred into the wider hydrological system;
- runoff from overburden stockpiles would be directed through the infrastructure SUDS measures (as described in the CEMP), including silt fences and mats, drainage measures and settlement lagoons, as appropriate; and
- peat would not be allowed to dry out in the overburden stockpiles.

93. The catotelm layer would not be used for the dressing of roads and hardstandings. The detail for peat storage areas and dimensions would be determined when site work has commenced and the peat condition and requirements are better understood. Further detail is provided in **Technical Appendix 10.2: Peat Management Plan**.

3.4.7 Paths and rights of way

94. A number of paths open to the public including rights of way, core paths and the Southern Upland Way (SUW) cross the Site, predominantly following along the routes of the existing logging tracks within the Site. The proposed Development will make use of the existing track network for deliveries for construction and will, in places, require temporary diversions to allow construction works to build new access tracks to provide access to turbine locations.

95. In addition, the Site is subject to general rights of public access under the Land Reform (Scotland) Act 2003.

96. In order to maintain public safety, SPR proposes that temporary diversions will be put in place if required and fences, signage and / or barriers and security personnel will be used as required to:

- segregate vehicles from pedestrians;
- restrict or control access to members of the public where this is necessary for public safety or site security;
- avoid construction encroachment on areas containing crops or livestock; and
- indicate rights of way, safe walking routes or landowners’ boundaries.

97. Further details of a proposed, temporary diversion to the SUW during construction is shown on **Figure 3.1**, and permanent improvements with regards public access are discussed in **Chapter 14: Socio Economics, Land Use and Recreation**, and **Figure 14.2**. Any requirement for temporary diversions or other access mitigation measures will need to be agreed with DGC's Countryside Access Team. If required, the temporary diversions could be retained permanently, subject to agreement with FLS and SUW Rangers.

3.4.8 Site restoration

98. Soils would be used for reinstatement works associated with access tracks, cable trenches, turbine foundations, crane hardstandings, borrow pits and the temporary construction areas. The upper vegetated turfs would be used to dress infrastructure edges and to reinstate the surface of restoration areas. It is expected that most of the soil resources within areas directly affected by construction activities would be able to be stored and reinstated as close as possible to where they were excavated in accordance with good practice; so that the Site would be restored with minimal movement of material from its original location. No excavated material would leave Site.

99. Further detail on Site restoration would be provided within the CEMP, an outline of which is provided in **Technical Appendix 3.1: Outline CEMP**.

3.4.9 Environmental management and good practice construction

100. The construction of the proposed Development would be based on the adoption of good practice, supported by robust project management and the supervision of an Environmental Clerk of Works (ECoW). Details of the good practice and the role of the ECoW are set out in **Technical Appendix 3.1: Outline CEMP.**

101. Good practice includes the adoption of Pollution Prevention Guidelines (PPGs) and replacement Guidance for Pollution Prevention (GPPs). The services of other specialist advisors would be retained as appropriate, such as an Archaeological Advisor, to be called on as required to advise on specific environmental issues. The Principal Contractor (PC) would ensure construction activities are carried out in accordance with the mitigation measures outlined in this EIA Report and any planning conditions, and this would be monitored by SPR and the ECoW.

102. To ensure all mitigation measures outlined within this EIA Report are carried out onsite, contractors would be required to develop a site-specific CEMP which would form an overarching document for all site management requirements, including:

- a Traffic Management Plan (TMP);
- a Construction Methodology Statement (CMS);
- a Pollution Prevention Plan (PPP) (including monitoring, as appropriate);
- a Site Waste Management Plan (SWMP); and
- a Water Management Plan (WMP).

3.5 Operation and maintenance

103. As highlighted in **Section 3.3.2**, the proposed Development would operate in perpetuity as a renewable energy development. Should consent be granted, it is expected that there would be a condition of the consent requiring removal of any operational plant if it ceases to function for a, defined, extended period of time, without permission of the local planning authority.

3.5.1 Electricity generation

104. The wind turbines would start to generate electricity at wind speeds of around 3 m/s. Electricity output would increase as the wind speeds increase, with maximum output being reached around 15 m/s[3]. The turbines would continue to operate at maximum capacity up to wind speeds of around 25 m/s. During very high winds the turbines pitch the blades out of the wind and come to a gradual stop as a safety precaution.

[3] A bat mitigation and monitoring plan is proposed for the site, which will be in effect when wind speeds are under 5.5 m/s, and apply between 30 minutes post-sunset and 40 minutes pre-sunrise and be implemented at each turbine between 1st April – 31st October each year. See **Chapter 8: Ecology** for more details.

105. The energy storage facility storage would respond to the need of the national grid and would start operating once connected to the Site substation and grid connection.

3.5.2 Aviation lighting

106. As turbines would be in excess of 150 m to blade tip they would need to be lit with medium intensity (2000 candela) steady red aviation warning lights (with dimming option to 200 candela when visibility is good) as per Article 222 of the UK Air Navigation Order (ANO) 2016.

107. The potential visual effects of the proposed aviation lighting are assessed in **Chapter 7: Landscape and Visual Amenity**. An Aviation Lighting Landscape and Visual Impact Mitigation Plan (ALLVIMP), found in **Technical Appendix 15.3: ALLVIMP,** is proposed for the site and the final lighting specification would be agreed with aviation and landscape consultees and the Scottish Ministers.

108. The proposed Development's turbines are located within the Ministry of Defence (MOD) Low Flying Area 20T within which military fixed wing aircraft are permitted to fly down to 250 feet (76.2 metres) above terrain features.

109. The MOD was consulted during the Scoping stage and they have requested that the turbines be fitted with MOD accredited aviation safety lighting in accordance with the Civil Aviation Authority, Air Navigation order 2016. It is proposed that the turbines would be lit with infra-red lighting to meet the MoD's low flying requirements.

3.5.3 Maintenance

110. The proposed Development would be maintained throughout its operational life by a service team comprising up to five full time equivalent employees made up of operation management, operations technicians and support functions. In addition, during periods of scheduled maintenance up to four technicians would be required for up to seven weeks per year, whilst additionally the technicians would be required to undertake unscheduled maintenance throughout the year.

111. This team would either be employed directly by the developer or by the turbine manufacturer. Management of the proposed Development would typically include wind turbine maintenance, health and safety inspections and periodic civil maintenance of tracks, drainage and buildings.

112. Maintenance includes the following:

- scheduled routine maintenance and servicing;
- unplanned maintenance or call outs;
- HV and electrical maintenance;
- blade inspections; and
- civil maintenance of tracks and drainage.

3.6 Climate change, carbon considerations & commitments

113. The proposed Development would have a rated capacity of approximately126 MW and generate around 386 GWh per year of renewable carbon free energy. As highlighted in **Chapter 2: Site Description and Design Evolution**, this would support the UK and Scotland's targets for cutting carbon dioxide (CO_2) emissions and especially supports the recent commitments to cut CO_2 emissions to net zero by 2045 in Scotland. Carbon dioxide is a greenhouse gas which is contributing to climate change.

114. Whilst the proposed Development would generate renewable energy free from carbon emissions, it is recognised that the project would generate carbon emissions during the construction of the proposed Development. Carbon emissions would result from manufacturing, transportation and installation of components for the proposed Development. There is also the potential for carbon fixers and sinks to be lost through the clearing of trees and vegetation during construction. Trees would be replaced on site as part of a compensation planting scheme which has been previously described in section 3.3.18 of this

Chapter, and peat would be used for restoration and habitat improvement as described in sections 3.3.20 and 3.4.8. However, it is important to consider the balance between carbon reduction associated with renewable energy development and that which is produced through the manufacturing and construction of the proposed Development.

115. SPR has undertaken an assessment of this carbon balance using the Scottish Government Carbon Calculator tool specifically designed for wind energy development. Further details, the methodology used, and the results of the carbon balance assessment are presented in Section 15.7 **of Chapter 15: Other Issues**. In summary, the proposed Development is expected to take around 18 months (1.5 years) to repay the carbon exchange to the atmosphere (the CO_2 debt) through construction and manufacture; Beyond this period the Site would then be contributing to CO_2 reduction and progress toward the related national targets.

116. As SPR is applying for consent in perpetuity, the proposed Development would make a long-term contribution to meeting the requirements for renewable energy generation and reductions of carbon emissions to the atmosphere.

3.7 Improved recreation & public access

117. SPR is proposing to enhance several aspects of the Site by improving local access and recreation opportunities. The enhancements being proposed are as follows:

- An additional route for users of the Southern Upland Way, in particular for a circular route which allow visitors to take an alternative route through the forest, with more open views across the hills;
- stone seating, using locally cut rock from the Site borrow pits, would be placed at various locations around the Site;
- access and information boards to heritage and landscape features near to the Southern Upland Way, which will provide a description of the features and some interesting context for the Site and the surrounding area;
- improved access and signage for Allan's cairn with potential to include restoration subject to agreement with relevant Stakeholders; and
- improved access and signage for the Striding Arch on Colt Hill from the SUW.

118. As highlighted above, the proposed Development would provide information boards at heritage features identified on Site, such as Allan's Cairn located just east of the Southern Upland Way between T11 and T13, where the monument to covenanters is located. This feature is described in more detail in **Chapter 11: Archaeology and Cultural Heritage**. The information boards would provide some background information on the Cairn and the history behind it. Other features of interest include the Striding Arches sculpture which is currently accessed via a boggy moorland area and appreciated from within the Site. **Figure 3.1.4** also illustrates the location of these features.

3.8 References

Civil Aviation Authority Statement (June 2017). Lighting of Onshore Wind Turbine Generators in the United Kingdom with a maximum blade tip height at or in excess of 150 m Above Ground Level. Available at: https://publicapps.caa.co.uk/docs/33/DAP01062017_LightingWindTurbinesOnshoreAbove150mAGL.pdf [Accessed 03/09/2020]

Scottish Government Onshore Wind Position Statement (2017). Available at https://www.gov.scot/publications/onshore-wind-policy-statement-9781788515283/ [accessed 03/09/2020]

The Electricity Act 1989

The Air Navigation Order 2016

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