Chapter 3

Description of the proposed Development

SCOTTISHPOWER RENEWABLES

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3.1 Introduction

1. This Chapter describes the way in which the proposed Development would be constructed including a general description of the windfarm layout and its associated infrastructure. It also outlines the anticipated construction activities connected with the proposed Development and a description of the operational elements of the windfarm.

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

3.2 Proposed Development

3.2.1 Scheme outline

3. The proposed Development would comprise 13 three-bladed horizontal axis turbines up to 200 m tip height with a combined rated output in the region of 72.8 megawatts (MW). As an extension of Arecleoch Windfarm the proposed Development would re-use and share existing infrastructure from Arecleoch Windfarm where possible. This includes sharing much of the access track, re-using some of the existing borrow pits, the construction compound and other existing hardstandings, thus maximising efficiency and reducing the cost to the consumer. The proposed Development includes associated infrastructure including:

- turbine foundations;
- crane hardstandings;
- transformer/switchgear housings located adjacent to turbines;
- new and upgraded access tracks including watercourse crossings where necessary;
- underground electrical cabling;
- substation compounds including control buildings, external equipment and ancillary grid service equipment/battery storage;
- one permanent anemometer mast;
- up to four temporary Power Performance Masts;
- close circuit television mast(s);
- communication mast(s);
- site signage;
- search areas for up to six borrow pits; and
- one temporary construction compound area **(Figure 3.4**).

4. The proposed Development would also require forest restructuring works to enable construction and operation of the windfarm.

5. The proposed Development would produce between 200 GWh and 230 GWh of electricity annually. This equates to the annual power consumed by approximately 53,000 – 60,000 average UK households. By using the latest turbine technology, each turbine at the proposed Development could produce 4 to 4.5 times the annual electricity of an existing Arecleoch Windfarm turbine and in total around 75 – 85% of the annual output of Arecleoch Windfarm. This would be achieved with an additional 22% of the number of turbines (13 turbines compared to 60 at Arecleoch). Turbines with a maximum height of 200 m to blade tip have been selected due to the increased yield that can be achieved from taller turbines and also the environmental benefits intrinsic to larger turbines. Using taller turbines means that the overall number of turbines required on a per MW basis is reduced, which in turn reduces the scale of the associated infrastructure required. With larger turbines the amount of concrete per MW produced is lower than a scheme with smaller turbines, and similarly the length of new access track (km) required per MW produced is also generally less. Fewer but taller turbines also reduces the felling required by increasing the rotor clearance above the tree canopy which reduces the impacts upon existing forestry operations Broadleaf planting in some areas will be brought forward in terms of the felling plan and thus the associated benefits will be realised sooner. Overall, larger turbines of this scale would help to deliver new onshore wind capacity required to help the Scottish Government meet its climate goals and provide low-carbon power that assist in the reduction of consumer bills.

6. In recent years, the onshore wind industry has experienced the reduction in supply of smaller turbines across Europe due to lack of demand from mainland Europe, where the tendency is to install turbines at higher tip heights (e.g. 175 – 240m to blade tip). Therefore, it is highly unlikely that a range of smaller turbines (e.g. 120m) would be available at competitive prices by the time the proposed Development is ready to be constructed, if consented. Larger turbines need to be considered if onshore wind development is to continue to make a contribution to both the UK and Scottish Government's renewable energy targets.

3.2.2 Access to the Site

7. Following ScottishPower Renewables (SPR) recent experience of constructing the Kilgallioch Windfarm, it is proposed that a dual port strategy is considered for the delivery of the wind turbine components. The wind turbines would be delivered to the George V Dock in Glasgow, but with the possibility of the port of Cairnryan. The port of Cairnryan has some restrictions including limited water depth and port handling facilities/component storage and may limit the use of this port. The turbines would be moved from the port of entry to the Site under escort. In the case of George V Dock the turbine components would be moved along the M8 then A74 (M) to the M6 where they would be turned northwards at junction 44 or 42, along the A75 to the unclassified road past Newton Stewart where they would join the A714 proceeding to the Site entrance at Wheeb Bridge. In the case of Cairnryan turbine components would be moved south along the A77, A751, A75 and then the unclassified road past Newton Stewart and then north along the A714 to the Site entrance at Wheeb Bridge. HGV construction vehicles would mainly use the access from Wheeb Bridge, however it is anticipated that the Site entrance at Bents Farm may be used for some construction traffic and also used for Light Goods Vehicle (LGV) during operation. It is also proposed that the unclassified Barrhill to New Luce road may be used for some LGV traffic during construction and operation. New access tracks would be required within the Site and existing access tracks may require upgrading.

3.2.3 Grid connection

8. The grid connection point for the proposed Development is subject to confirmation by the network operator/owner.

9. The precise route of the grid connection cabling has not yet been determined and the assessment of its effects are not identifiable because it has yet to be designed and applied for.

10. The grid connection is likely to require consent under Section 37 of the Electricity Act 1989 which is the subject of a separate consenting process to this Section 36 application. The grid connection application will be made by ScottishPower Energy Networks (SPEN) who are the network owner in the area of the proposed Development and who will own assets beyond the Site substation (**Figure 3.2**).

3.2.4 Operational life

11. There is no proposal to limit the lifetime of the proposed Development. Therefore, the assessment of all technical areas considers the effects of the operational phase of the proposed Development, without time limitations. Should decommissioning of any of the proposed Development be required e.g. failure of a wind turbine beyond economic repair, it is considered that any effects would be less than those resulting from construction of the proposed Development, and as such this potential for decommissioning has been scoped out of further assessment. Should consent be granted, it is anticipated that there would be a condition which would deal with the requirement to remove turbines if they become non-operational for a defined period of time.

3.2.5 Embedded mitigation

12. A key benefit of the EIA process is the opportunity it gives to integrate environmental considerations into the careful, iterative design of a project. This allows potential environmental effects to be considered and minimised so that the environment is taken into account in the project design from the earliest stage, as described in **Chapter 2: Site Description and Design Evolution**.

3.2.6 Design principles

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

14. Throughout the design 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 is assessed.

15. During the construction of the project, effects can be further taken into account by the adoption of good practice, supported by robust project management and Environmental Clerk of Works (ECoW), as set out in the outline CEMP (**Technical Appendix 3.1**), and by the application of the Pollution Prevention Guidelines (PPGs) and replacement Guidance for Pollution Prevention (GPPs).

16. 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 16. Such environmental measures are also included in the outline CEMP (**Technical Appendix 3.1**).

3.2.7 Micrositing

17. 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 50m micrositing tolerance of turbines and all other infrastructure would be applied to the proposed Development. Within this distance any changes from the consented locations would be subject to approval of the 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.

3.2.8 Consents Prior to the Commencement of Development

18. 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 covered in the technical Chapters of this EIA Report.

3.2.9 Construction phase

3.2.9.1 Construction timetable

19. The proposed Development would be constructed over a period of approximately 18 months, anticipated to commence in 2022. Construction would include the principal activities listed within the indicative construction programme as provided in **Table 3.1**.

3.2.9.2 Construction employment

20. The number of people employed during the construction period would vary depending on the stage of construction and the activities ongoing onsite. It is anticipated that the peak workforce requirement would be around 120 construction staff.

3.2.9.3 Construction hours

21. The construction working hours for the proposed Development would be 7am to 7pm Monday to Friday and 7am to 4pm on weekends. It should be noted that out of necessity due to weather conditions and health and safety requirements, some generally quiet activities, for example abnormal load deliveries (which are controlled by Police Scotland) and also the lifting of the turbine components, may occur outside the specified hours stated.

Construction Activity	Months																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Access road improvements and reinstatement																		
Site establishment and restoration																		
Forestry felling and export																		
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 laying and sand for cable bedding																		
Crane delivery																		
Turbine delivery, erection and commissioning																		

Table 3.1: Indicative construction programme

3.2.9.4 Access tracks

22. Approximately 5.1 km of new onsite access tracks and approximately 14.3 km of upgraded track will be required to provide access to the wind turbines, control building compound, anemometer mast and construction compound (**Figure 3.4**). Indicative track details are shown on **Figure 3.3**.

23. Tracks with have a typical 5 m running width, wider on bends and at junctions. Where not possible to avoid areas of deepest peat, floating tracks would be required to be constructed. It is anticipated that between approximately 1.4 km and 4.2 km of floating track would be required where consistent peat depths of 1-1.5 m or greater are identified along with shallow topography in the area (below 5 %).

24. The majority of the access route would be the same as that utilised for the existing Arecleoch Windfarm and Kilgallioch Windfarm, the access route to site (general access road – from the A714 to the Arecleoch site) is in good condition, was widened for Kilgallioch Windfarm and other works and is generally suitable for very large turbine component deliveries. It is not expected to have to carry out any significant engineering works along this route to the Arecleoch railway bridge, however there may be a couple of sections which require very minor upgrades or limited repair works within the existing road corridor.

25. The Site entrance may require some levelling to remove a small screening bank and individual trees to ensure that the entrance meets the required width for turbine delivery.

3.2.9.5 Passing places

26. Construction traffic passing places will be placed every 500 m in addition to passing opportunities at site junction and crane hardstanding.

27. There will be six turning heads in addition to turning areas at site junction locations, to be located at turbines 3,4, 5, 9, 12 and 13. These will be 60 m x 5 m, located before the turbine on the access track and perpendicular to the track.

3.2.9.6 Watercourse crossings

28. Watercourse and ditch crossings have been avoided in the design of the access track layout as far as possible, however there would be 25 watercourse crossings within the Site (coordinates provided in **Table 3.2**). Two of these watercourse crossings are to be new and six are to be upgrades of existing watercourse crossings.

Watercourse crossing	Northing	Easting
WX01	220806	580260
WX02	220534	580138
WX03	**220079**	**580066**
WX04	219306	578943
WX05	218701	581061
WX06	**219737**	**580821**
WX07	218490	580640
WX08	218385	580592
WX09	218531	581415
WX10	222160	578301
WX11	222303	577529
WX12	223128	576760
WX13	223203	576635
WX14	223581	576470
WX15	225177	577308
WX16	225988	577561
WX17	227156	578132
WX18	227465	578353
WX19	229226	579219
WX20	230208	580492
WX21	219982	581988
WX22	220806	583410
WX23	218096	580515
WX24	218209	579930
WX25	218788	578769

Table 3.2: Watercourse crossings
* **Bold** are new; Green existing crossing for improvement; Normal no change.

3.2.9.7 Temporary construction compound

29. A single temporary construction compound would be required for the duration of the construction phase as shown on **Figure 3.5**:

- compound 1 located at NGR NX 19624 81520

30. The temporary construction compound platform largely exists onsite as it was the location for the Arecleoch Windfarm construction compound and large sections of the foundations for this were left following site restoration. The compound would have a footprint of around 150 m x 50 m (7,500 m^2) and would be likely to contain the following:

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

31. **Figure 3.4** illustrates a typical construction compound although the layout may differ depending on Site topography and contractor requirements. Crane hardstanding areas, along with the construction compound, would be used for laydown during construction.

32. Onsite concrete batching will take place at the construction compound. Water will be required for onsite batching. An abstraction licence, if required, will be carried out under authorisation from the Scottish Environmental Protect Agency (SEPA) with relevant regulation/permits to be obtained by SPR. Fuel and oil storage and foul effluent would be treated in line with the relevant SEPA Guidance for Pollution Prevention (eg GPP 4: Treatment and disposal of wastewater where there is no connection to the public foul sewer).

33. Water would also be required for welfare facilities and to dampen track during dry weather. This however would be minimal and would likely be collected via rain water harvesting.

34. Adjacent to the temporary compound, other existing laydown and storage areas may be utilised as shown on **Figure 3.1.**

35. Given the land at the proposed compound location is largely an existing former compound platform and is open ground, SPR will discuss the long term use of the platform with the landowner and agree on the reinstatement requirements at the end of the construction period.

3.2.9.8 Lighting

36. 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 down and towards works activity and away from Site boundary), to minimise impact on local properties and any other environmental considerations.

3.2.10 Wind turbine layout

37. The proposal is to erect and operate 13 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 3.3.**

Turbine No.	OS Easting	OS Northing
1	219774	581117
2	219330	581708
3	218758	581958
4	217970	582203
5	218078	581522
6	218668	581153
7	218695	580330
8	219333	580621
9	219990	580399
10	219536	579827
11	219038	579261
12	219498	578843
13	220132	579054

Table 3.3: Turbine coordinates

3.2.11 Wind turbines and transformers

38. The turbines would have a rating of approximately 5.6 MW based on the most advanced technology available and each turbine would have a maximum height of 200 m to blade tip in an upright position. The turbines would each incorporate a tapered tubular tower and three blades attached to a nacelle that would house a turbine generator and other operating equipment e.g. a gear box. The turbines would be semi-matt pale grey or a finish agreed with South Ayrshire Council (SAC).

39. The exact model of wind turbine to be installed at the proposed Development would be selected through a competitive procurement process. In each assessment in the EIA a worst case scenario of the turbine dimensions/characteristics has been used. An indicative turbine for the windfarm is shown on **Figure 3.5**.

40. 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 3.6**.

3.2.12 Foundations and crane hardstandings

41. 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 turbine foundation is provided **Figure 3.7**.

42. Crane hardstandings and construction compound will be used for temporary laydown. The existing borrow pit/laydown area along the general access road near Kilgallioch Windfarm substation may also be used as a laydown area.

43. The turbines would have gravity foundations over an area of 28 m diameter and would be laid using a reinforced concrete. The depth of the excavation would depend on the ground conditions. As a minimum, foundations would be 3 m deep (approximately 1.5m foundation depth + 1.5m of minimum fill) and up to 28 m deep. The sides of the excavation would be graded back, from the foundation to approximately a 33 m diameter and battered to ensure that they remain stable during construction. The turbines would be erected using mobile cranes brought on to the Site for the construction phase.

44. A crane hardstanding would be built adjacent to each wind turbine and is likely to have a footprint of 28 m x 70 m, with the depth dependant on the underlying bearing strata. The depth of crane hardstandings is expected to range from 1 m to 2 m

depending on peat depth. The actual crane pad design and layout would be determined by the turbine supplier according to their preferred erection method. An indicative design has been considered for the purposes of this assessment and is provided on **Figure 3.8**. The crane hardstanding would include laydown areas for the blade fingers which results in a non-regular foundation footprint with a disturbance area of 80 m by 70 m, plus up to 3 smaller crane pads along the access track typically 15 m by 15 m. These areas would remain *in situ* for the duration of the operational phase of the proposed Development.

45. 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 would be developed through the CEMP.

3.2.13 Permanent anemometer mast and temporary power performance masts (PPM)

46. A 125 m anemometer mast may be installed onsite at grid reference NX 17679 81878. The mast would be lattice in structure as shown on **Figure 3.9**. The purpose of this is to provide operations and performance monitoring data and the mast height would be dependent on the final turbine selection.

47. The mast would be delivered to Site in sections and would be supported using a reinforced concrete pad and hardstanding measuring approximately 25 m x 25 m and the depth dependant on a suitable bearing strata, typically a few meters deep. The mast would be bolted to a concrete pedestal typically measuring 5 m x 5 m and 0.5 m high, centred on this concrete pad. A 3 m high anti-climb fence would also be installed around the base of the mast to restrict access.

48. Up to four, 125 m temporary Power Performance Masts (PPM), may be erected dependant on the final turbine selected. If required, the temporary masts would be erected early in the construction programme and would record data for several months before turbine erection. Prior to the turbines being constructed, two of the temporary masts would be decommissioned and removed, with the other two of them remaining in place for a period of up to two years following turbine commissioning.

3.2.14 Ancillary services compound and onsite cabling

49. An ancillary services facility is proposed close to the control compound / sub-station location of approximately 30m x 50m in size. The facility would be able to undertake a range of ancillary services as welcomed by National Grid, such as storing electricity, both importing and exporting power to the National Grid network as required and allowing the grid to manage both supply and demand (balancing services). The facility may also offer other services to National Grid such as frequency control, reactive power compensation and re-starting the electrical grid in the event of failure ('black start').

50. Amongst a range of services, the storage facility would provide back-up power to National Grid for the benefit of providing stability to the electricity supply network and the integration of more renewable energy generation.

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

- Control building;
- Energy storage, e.g. battery containers, with up to 20MW of battery equipment;
- Transformers;
- Other electrical equipment;
- HVAC Coolers; and
- Electrical cabling.

52. The control building would be single storey, built on a pre-cast concrete base and would measure approximately 14 m x 23 m and 7 m high. 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 rain water harvesting for flushing of toilets etc.

53. The control building would be located within a compound which would measure approximately 7,500 m^2 in total. The compound would include an area for car parking and High Voltage (HV) equipment, such as transformers and circuit breakers.

54. It is proposed that battery storage and other electrical equipment would be located within the control building compound. The batteries would store excess power generated by the proposed Development and provide grid support services. The battery containers would be of steel construction, very similar to shipping containers in appearance.

55. Energy storage such as batteries would comprise a number of units typically measuring 17 m (l) x 8 m (w) x 4 m (h) with ancillary equipment such as inverters. The batteries would store excess power generated by the proposed Development and release the power on to the grid when the output from the proposed Development falls due to decreased wind speed. The inclusion of the batteries as part of the proposed Development would increase the sustainability of the power generated.

56. The proposed Development would be connected to the electricity network via an onsite control building located at grid reference NX 20706 80590. An indicative control building compound and elevations are shown on **Figure 3.10**.

57. The majority of the underground power cables would run along the side of the access tracks in trenches from each of the turbines to the proposed control building compound with the exception of cabling from T12 to T13 which will be laid along existing tracks and under the railway line through an existing bridge/culvert. The trenches would be typically 0.45 m wide and cabling will be considered with the landowner and ongoing forest management operations. Indicative cable trench arrangements are provided on **Figure 3.11**. The approximate length of cabling required on Site would be 11.7 km.

58. It is likely that a separate switchgear container for the necessary electrical plant to operate will be required, and this too would be accommodated within the compound.

59. A security fence of around 3 m in height would be installed around the perimeter of the ancillary services compound and the site would be served via a locked access gate.

3.2.15 Materials sourcing and waste management

60. For construction, the proposed Development would require a range of materials (e.g. stone for access tracks, the temporary Site compound and the control building compound). Excavated material from the turbine bases and access tracks would be used onsite for restoration/reinstatement.

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

3.2.16 Borrow pits

62. Six borrow pits have been identified onsite, to provide a total of approximately 183,800 m^3 of material to construct the proposed Development (coordinates provided in **Table 3.4**). Quarrying all of these borrow pits would provide a greater volume of rock than would be needed for the construction of the proposed Development, but allows for the current uncertainty of the quality of the rock at these locations. It is likely that only some of the six borrow pits would be required. For the purposes of the assessment all six borrow pits are assessed.

Borrow Pit No.	NGR Reference	Approximate Dimensions (m)	Volume (m^3)
BP01	NH 218670, 580913	80 x 100 x 15	48,000
BP02	NH 226559, 577653	140 x 90 x 5	24,000
BP03	NH 224618, 577001	80 x 100 x 10	32,000
BP04	NH 220787, 580811	150 x 110 x 6	29,400
BP05	NH 219901, 580861	120 x 40 x 3	14,400
BP06	NH 220787, 580811	180 x 20 x 10	36,000

Table 3.4: Borrow Pit Information

63. It is assumed that Type 1 crushed rock track and hardstanding surface layer will be won on site from the onsite borrow pits.

3.2.17 Temporary peat storage

64. The construction process will both generate peat and use peat. Where possible, "restore-as-you-go" techniques will be used to place excavated peat material in its final destination rather than in temporary stockpiles. However there may, in some circumstances, 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. Procedures to control the hydrology of stored peat would be covered by the CEMP (the outline CEMP is provided in **Technical Appendix 3.1**) and the Peat Management Plan (**Technical Appendix 10.2**). These would include:

- prior to the excavation of relevant infrastructure, vegetation, peat and superficial geology will be removed and stored in overburden stockpiles (or used directly in restoration of other areas; see below);
- 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;
- run-off from overburden stockpiles will be directed through the infrastructure SUDS measures including silt fences and mats, drainage measures and settlement lagoons, as appropriate; and
- peat will not be allowed to dry out in the overburden stockpiles.

65. The catotelm layer will not be used for the dressing off roads and hardstandings, unless back-bladed to prevent erosion and seeded with suitable seed mix. A minimum thickness of 300 mm will be adopted to prevent erosion. It will only be used for the dressing of slopes and batters on slopes no greater than 45 degrees.

66. The detail for peat storage areas and dimensions will be determined when site work has commenced and the peat condition and requirements are better known.

67. Further detail is provided in the Peat Management Plan in **Technical Appendix 10.2.**

3.2.18 Site restoration

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

69. Further detail on Site restoration will be provided within the CEMP, an outline of which is provided in (**Technical Appendix 3.1**).

3.2.19 Environmental management

70. SPR will engage an ECoW onsite during the construction phase. The services of other specialist advisors will 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) will ensure construction activities are carried out in accordance with the mitigation measures outlined in this EIA Report and any planning conditions, and this will be monitored by SPR and the ECoW.

71. To ensure all mitigation measures outlined within this EIA Report are carried out onsite, contractors will be required to develop a CEMP which will 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).

3.2.20 Operations and maintenance phases

3.2.20.1 Duration

72. There is no proposal to limit the lifetime of the proposed Development. Should consent be granted it is anticipated that there would be a condition which would deal with the requirement to remove turbines if they become non-operational for a defined period of time.

3.2.20.2 Lighting

73. Turbines would be in excess of 150m to blade tip and would need to be lit with medium intensity (2000 candela) steady red aviation warning lights (with dimming option) as per Article 222 of the UK Air Navigation Order (ANO) 2016. It is therefore proposed that visibility sensors be installed at the proposed Development and if visibility is restricted to 5 km or less the lights would operate at 2000 candela. The 2017 CAA Policy Statement (CAA, 2017) further modifies Article 222 to permit only one level of intermediate lights, halfway up the tower, and at reduce intensity (32 candela rather than 2000 candela). At least three (to provide 360 degree coverage) low-intensity (32 candela) red lights should be provided at an intermediate level of half the nacelle height on the tower.

74. In addition, it is proposed to explore the possibility of using 'smart' aviation lighting (aviation obstruction lighting detection system) whereby the lights would only be switched on when low altitude aircraft approach them. The CAA is in the process of consulting on a new policy statement on En-Route Aviation Detection Systems for Wind Turbine Obstruction Lighting Operation. SPR has had an opportunity to review the CAA's proposal as part of an industry working group considering this guidance. It is expected that this guidance will be finalised and released during 2019. The draft guidance would allow the aviation lights only to be illuminated when an aircraft is detected by a radar entering a volume bounded by 4 km (horizontal distance) from the perimeter group of turbines and 300 m above the highest turbine tip of the Site. Our calculations estimate that the upper boundary of this volume would be around 2500 ft above ground level (see **Chapter 15: Other Issues**). The aviation lighting would not be activated when commercial airlines pass over the Site as such aircraft ordinarily operate in Controlled Airspace (CAS), the base of which CAS over the Site being 5,000 ft and above.

75. Given the lights are only required for general aviators flying at night in the vicinity of the Site at altitudes of up to 2500 ft, it is anticipated that the lights will be rarely on in this quiet airspace. The widest transit across proposed Development is circa 4 km (approximately north to south between turbine 4 and turbine 13), then the horizontal coverage volume would be 12 km (4+4+4). At 250 knots the lights would be on for approximately 2 minutes, provided the radar can track the aircraft across the windfarm.

76. If radar activated lighting is required, this would require a separate planning application, radar licencing and relevant CAA approvals. Optimally, any such radar deployment could benefit multiple windfarms in the South Ayrshire or Dumfries and Galloway regions.

77. Periphery lights would also be lit with infra-red lighting to meet the MoD's low flying requirements (to be agreed with the MoD prior to turbine instalment).

3.2.20.3 Electricity generation

78. The turbines would start to generate electricity at wind speeds of around 3 m/s. Electricity output would increase as the wind speeds increase up to a maximum of around 15 m/s, when the wind turbines would reach their maximum capacity. The turbines would continue to operate at maximum capacity up to wind speeds of around 25 m/s when they would cut-out and automatically stop as a safety precaution.

3.2.20.4 Maintenance

79. The proposed windfarm would be maintained throughout its operational life by a service team comprising up to five full time equivalents made up of operation management, operations technicians and support functions. During periods of scheduled maintenance up to four technicians who may be based in the local area would be required for up to seven weeks per year, whilst additionally the technicians would be required to undertake unscheduled maintenance throughout the year. This team would either be employed directly by the developer or by the turbine manufacturer. Management of the windfarm would typically include turbine maintenance, health and safety inspections and annual civil maintenance of tracks, drainage and buildings.

80. Turbine maintenance includes the following:

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

3.2.21 Felling

81. The proposed Development would require 135 ha of woodland to be felled in order to facilitate wind turbines and associated infrastructure (of which 44.3 ha will be re-stocked). Forestry felling will be required in a 90m keyholed radius from each turbine

location within woodland for to allow for construction, operation and environmental mitigation, including bat habitat standoff distances. Further details are provided in **Technical Appendix 3.2**.

3.2.22 Compensatory planting

82. As a result of the construction of the proposed Development, there would be a net loss of woodland area. The area of stocked woodland in the study area would decrease by 60.1 ha. Further details are provided in **Technical Appendix 3.2**.

83. In order to comply with the criteria of the Scottish Government's Control of Woodland Removal Policy, off-site compensation planting would be required. The Applicant is committed to providing appropriate compensatory planting. The extent, location and composition of such planting 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 windfarm.

3.2.23 Community benefit and investment

84. SPR is committed to offering a package of community benefits to local communities that could include the opportunity for community benefit and to invest in the operational windfarm. SPR has already shared initial information with the community about an opportunity to invest and has provided an introductory leaflet which outlines a potential investment structure. See **Technical Appendix 14.3** for further details.

85. SPR will discuss with local stakeholders and Forestry and Land Scotland which communities would be the appropriate 'Community Organisations' to participate. The criteria to define the appropriate Community Organisation come from the community right to buy under Land Reform legislation.

86. Interested Community Organisations would combine to form a single Community Vehicle that would administer the community benefit fund and under the proposed investment structure would also have the opportunity to invest in the operational windfarm, on behalf of all the interested Community Organisations.

87. SPR is committed to keeping local communities informed as the project progresses and, in line with Scottish Government guidance, will provide information in a timely manner so the communities are able to fully assess the opportunity.

88. It is expected that any proposed income streams would provide a long term, flexible revenue which could be used to support community projects within South Ayrshire and Dumfries and Galloway. A range of options would be available to local communities who would have the flexibility to be able to choose how the money is spent and prioritise it on the things which matter most to them. The Barrhill Community Action Plan 2017-2022[1] gives an indication as to the type of initiatives that might be considered important within the Barrhill Community Council area, including the following:

- energy efficiency measures for residential properties;
- improve broadband and mobile phone services;
- IT, social media and communications training;
- more health education and activities; and
- improved visitor information and services.

89. To date, SPR has voluntarily awarded over £5.7 million in community benefit funding to South Ayrshire communities. A wide range of local projects and community initiatives have been supported by the funds including:

- 224 community facilities and services projects totalling £602,237;
- 74 community or local event projects totalling £218,490;
- 27 environmental projects totalling £219, 861;
- 15 heritage projects totalling £87,441;
- 25 skills and employment projects totalling £183,067;
- 143 sport and recreation projects totalling £561,503 and
- 158 youth and education projects totalling £602,237.

90. A further community benefit allocation of more than £600,000 is expected to have been paid by the end of the calendar year in 2019** bringing the total figure paid out to South Ayrshire communities to over £6 million.

***not including indexation or top ups. Anticipated amount of remaining funds awarded to South Ayrshire by the end of the calendar year 2019 is c. £627,000.*

3.3 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 07/05/19]

The Electricity Act 1989

The Air Navigation Order 2016.

[1] Barrhill Community Council: Barrhill Community Action Plan 2017-2022