Chapter 4

Development Description

SCOTTISHPOWER RENEWABLES

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Development Description

4.1 Introduction

1. This chapter provides a description of the proposed Development and its geographical context. It also outlines the anticipated construction and operation activities connected with the proposed Development. The final proposed Development layout is illustrated in **Figure 4.1**.

4.2 Proposed Development

4.2.1 Scheme outline

2. The proposed Development would comprise 18 three-bladed horizontal axis turbines up to 200 m tip height with a combined rated output in the region of 100 megawatts (MW). The proposed Development includes associated infrastructure comprising:

- turbine foundations;
- crane hardstandings;
- transformer/switchgear housings;
- access tracks (existing, upgraded or new as required);
- watercourse crossings (existing, upgraded or new as required);
- underground electrical cabling;
- permanent control compound area including substation, control buildings, LIDAR remote sensing unit, external equipment and ancillary grid service equipment/energy storage;
- permanent anemometer mast;
- up to two temporary Power Performance Masts;
- close circuit television mast(s);
- communication mast(s);
- site signage;
- up to eight borrow pit search areas; and
- two temporary construction compound areas.

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

4. The proposed Development would produce between approximately 320 GWh of electricity annually. This equates to the annual power consumed by approximately 84,000 average UK households (BEIS, 2018. Turbines with a maximum height of 200 m have been selected due to the increased yield that can be achieved from taller turbines and also the environmental benefits intrinsic to large 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.

5. With larger turbines the amount of concrete per MW produced is lower than a scheme with smaller turbines, and similarly the length of the 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 Scottish Government meet its climate goals and provide low-carbon power to 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. This is due to the lack of demand from mainland Europe, when the tendency is to install turbines at higher tip heights (e.g. 175 - 240 m to blade tip). Therefore, it is highly unlikely that a range of smaller turbines (e.g. 120 m) would be available by the time the proposed Development is ready to be constructed, if consented. Larger turbines must be considered if onshore wind development is to continue to contribute to both the UK and Scottish Government's renewable energy targets.

4.2.2 Access to the Site

7. Following the applicant's recent experience of constructing the nearby 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 King George V (KGV) Dock in Glasgow, but with the possibility of using the port of Cairnryan. Where the KGV Dock is used the wind turbine components would transit via the motorway (i.e. M8, M74) and then onto the A75 and finally the A714, before accessing the Site. Further details on transport and access is detailed in **Chapter 12: Access, Traffic & Transportation.**

4.2.3 Grid Connection

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

9. The precise route of the grid connection cabling has not been fully determined. It considered possible that the connection would be to the operational Mark Hill windfarm.

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.

4.2.4 Operational Life

11. There is no proposal to limit the lifetime of the proposed Development. Therefore, the assessment 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 address the requirement to remove turbines if they become non-operational for a defined period of time.

4.2.5 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 considered in the project design from the earliest stage, as described in **Chapter 3: Site Selection & Design.**

4.2.6 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 3: Site Selection & Design**.

14. Throughout the design embedded mitigation has been a feature of the process that has led to the final design of the proposed Development; and therefore, forms part of the proposed Development which is assessed.

15. During the construction of the project, effects can be further considered by the adoption of good practice, supported by robust project management and an Environmental Clerk of Works (ECoW), as set out in the outline Construction Environment Management Plan (CEMP) (**Technical Appendix 4.1**), 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 6 to 14**.

4.2.7 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.

4.2.8 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.

4.3 Construction Phase

19. The proposed Development would be constructed over a period of approximately 18 months, anticipated to commence in 2022/2023. Construction would include the principal activities listed within the indicative construction programme as provided in **Table 4.3.1**.

4.3.1 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 up to 150 construction staff.

4.3.2 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.

4.3.3 Construction Lighting

22. 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.

4.3.4 Materials Sourcing and Waste Management

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

24. A Site Waste Management Plan would be developed for implementation during construction, as discussed in the CEMP (**Technical Appendix 4.1**). This outlines details of the materials requirements and waste generation during construction and how SPR intends to consider the management of these aspects.

Table 4.3.1 Indicative construction programme

Activity	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Site establishment																		
Forestry felling																		
Access road upgrades																		
Construction of new access tracks and crane hardstandings																		
Turbine foundations																		
Substation building and electrical works																		
Energy storage compound and installation																		
Cable trenching and installation																		
Turbine delivery, erection and commissioning																		
Site reinstatement																		

4.4 Access Tracks

25. Approximately 13.2 km of new onsite access tracks and approximately 12.6 km of upgraded track will be required to provide access to the wind turbines, substation, control buildings, energy storage, anemometer mast and construction compounds. The infrastructure details are shown on **Figure 4.2**.

26. Tracks will have a typical 5 m running width, wider on bends and at junctions. Where not possible to avoid areas of deepest peat, floating tracks would be required to be constructed. It is anticipated that approximately 4.3 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.

27. The majority of the access route into the Site would be via the existing access from the A714 which currently facilitates access to the Clauchrie Forest. The access route is in good condition, but may be widened to a 5 m running width. A new section of track will be constructed, where the current track meets the tracks used by local residents at grid reference 233502, 586280. This new section of track is shown on **Figure 4.3** and will require 0.9 km of new track construction.

28. The Site entrance, off the A714, requires widening to allow turbine delivery vehicles to safely turn onto Site. Widening will involve constructing a wide-radius bend in crushed stone, with the section abutting the public road to be surfaced in tarmac.

4.4.1 Passing Places

29. Construction traffic passing places will be placed every 500 m in addition to passing opportunities at site junction and crane hardstandings. There will be 10 laybys required on the access route, spaced approximately 1000 m apart, to achieve the requirements of the turbine manufacturers. These will be 70 m x 5 m to accommodate the largest turbine component delivery vehicles.

30. There will be nine turning heads in addition to turning areas at site junction locations, to be located at turbines 1, 4, 7, 9, 10, 12, 13, 15 and 16. These will be 30 m x 5 m, located before the turbine on the access track and perpendicular to the track. This is shown on Figure 4.2.

4.4.2 Watercourse Crossings

31. Watercourse and ditch crossings have been avoided in the design of the access track layout as far as possible, however there would be 18 watercourse crossings within the Site (coordinates provided in **Table 4.4.1**). Nine of these watercourse crossings are new and nine are upgrades of existing watercourse crossings. The specification for which, will be agreed with FLS. These are discussed in more detail in **Chapter 7: Hydrology, Hydrogeology, Geology and Soils** and **Technical Appendix 7.3: Water Crossing Schedule**.

Table 4.4.1 Watercourse crossings

Watercourse Crossing	OS Easting	OS Northing
WX01	231657	581780
WX02	231593	582310
WX03	232093	583959
WX04	233448	586154
WX05	233012	587358
WX06	232516	587868
WX07 *	232590	588213
WX08 *	232713	589367
WX09	232869	589634
WX10	232371	589764
WX11	231544	589805
WX12 *	231362	589769
WX13 *	231402	589692
WX14 *	231132	589492
WX15 *	229887	588877
WX16 *	229895	588493
WX17 *	229194	589525
WX18 *	228922	587513

* new watercourse crossing

4.5 Permanent Control Compound

32. A permanent control compound is proposed measuring approximately 5,000 m^2 to host a range of electrical grid equipment, such as, but not limited to:

- Control buildings;
- Ancillary grid service equipment;
- Energy storage container units;
- Transformers;
- Other electrical equipment;
- HVAC Coolers; and
- Electrical cabling.

33. The proposed Development would be connected to the electricity network via an onsite control building located at grid reference 227485, 587617 (**refer to Figure 4.4**). An indicative control building compound is shown on **Figure 4.5.**

34. 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. An indicative control building layout and elevations are shown on **Figure 4.6**. 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.

35. 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. 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 4.7** The approximate length of cable trenching required on Site would be 17.5 km.

36. 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.

37. A security fence of around 3 m in height would be installed around the compound perimeter.

4.6 Temporary Construction Compounds

38. Two temporary construction compounds would be required for the duration of the construction phase as shown on **Figure 4.4**. These would be located at: the site entrance, (off the A714); and at the end of the access track, before the turbines (CC2).

39. **Figure 4.8** illustrates a typical construction compound although the layout may differ depending on Site topography and contractor requirements. A temporary laydown area has been included between turbine 6 and turbine 18. The crane hardstanding areas, along with the construction compound, would also be used for laydown, as required during construction.

40. For the purposes of the transport assessment and to ensure a conservative approach is taken, it has been assumed the read-mix concrete will be supplied to the Site. In reality, given the distance to the nearest concrete supplier, onsite concrete batching may be necessary. The potential impact from concrete batching will be evaluated in **Chapter 7: Hydrology, Hydrogeology, Geology and Soils.**

41. The concrete batching, if required, will take place at the construction compound at the end of the access track (CC2). Water will be required for onsite batching. An abstraction licence, if required, will be carried out under authorisation from the Scottish Environmental Protection 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 (e.g. GPP 4: Treatment and disposal of wastewater where there is no connection to the public foul sewer).

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

43. The applicant proposes to convert part of the temporary construction compound, near to the main access from the A714, to a permanent car park for recreational users upon completion of construction works. The details of the car park would be agreed with FLS and should consent by received, the applicant will develop an access plan in consultation with SAC's and D&GC. This approach will help ensure access and recreation opportunities are maximised as a result of the proposed Development.

4.7 Turbines

4.7.1 Wind Turbine Layout

44. The proposal is to erect 18 three-bladed horizontal axis wind turbines at the Site. The proposed turbine locations are shown on **Figure 4.1** and the coordinates for each are provided in **Table 4.6.1**.

Table 4.7.1 Turbine coordinates

Turbine No.	OS Easting	OS Northing
1	227188	588494
2	227238	587703
3	228210	587355
4	228067	589043
5	227899	588159
6	229456	588245
7	228843	589605
8	228887	588759
9	229750	588992
10	229597	589797
11	230627	589167
12	231162	588518
13	230830	589926
14	231980	589747
15	233008	589647
16	232816	588854
17	231409	589199
18	228753	587528

4.7.2 Wind Turbines and Transformers

45. 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 steel tower and three blades attached to a nacelle that would house a turbine generator and other operating equipment. The turbines would be semi-matt pale grey, or a finish agreed with South Ayrshire Council (SAC).

46. 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 4.9**

47. 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. The transformer unit would be mounted on a concrete plinth. An indicative external transformer is shown on **Figure 4.10**.

4.7.3 Foundations and Crane Hardstandings

48. 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 4.11**.

49. The turbines would have gravity foundations approximately 30 m in diameter and would be constructed using a reinforced concrete. The depth of the excavation would depend on the ground conditions. but will be approximately 3.5 m in depth. The sides of the excavation would be graded back, from the foundation to approximately a 37 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.

50. A crane hardstanding would be built adjacent to each wind turbine and is likely to have a footprint of 80 m x 30 m, with the depth dependant on the underlying bearing strata. The depth of crane hardstandings is expected to be approximately 500 mm. Adjacent to each crane hardstanding a blade laydown area of 80 m by 25m is to be formed. This area will simply be a flat and level area suitable for the storage of wind turbine blades. It is proposed that these are retained for the life of the project in the event major component replacement is required during the operational phase. An illustration of a typical crane hardstanding is provided on **Figure 4.12**.

4.8 Other Associated Infrastructure

4.8.1 Permanent Anemometer Mast and Temporary Power Performance Masts

51. A 125 m anemometer mast may be installed onsite at grid reference 227965, 588259. The mast would be lattice in structure. The purpose of this is to provide operations and performance monitoring data and the mast height would be dependent on the final turbine selection.

52. The mast would be delivered to Site in sections and would be bolted to a concrete pedestal typically measuring 5 m x 5 m and 0.5 m high, founded on a suitable bearing stratum. For mast erection, a crane hardstanding measuring approximately 25 m x 25 m is required adjacent to the mast. A 3 m high anti-climb fence would also be installed around the base of the mast to restrict access.

53. Up to two, 125 m temporary power performance masts, 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. It is proposed that the temporary masts would be in place for a period of up to two years following turbine commissioning.

54. Furthermore, a LIDAR remote sensing unit will be located adjacent to the substation and control buildings, which will comprise a 3 m x 3 m fenced compound with a LIDAR remote sensing unit on a raised 2 m platform.

4.8.2 Ancillary Grid Service Equipment and Energy Storage

55. An ancillary services facility is proposed within the permanent control compound. The facility would be able to undertake a range of ancillary services as welcomed by National Grid, such as 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').

56. It is proposed that energy storage container units, with up to 25 MW of energy storage equipment, would be located within the permanent control compound. The proposed energy storage would store excess power generated by the proposed Development and release power on to the grid when the output from the proposed Development falls due to decreased wind speed. The inclusion of the energy storage as part of the proposed Development would increase the sustainability of the power generated.

57. Ten energy storage container units are proposed to occupy an area of up to approximately 20m x 30m in size. The containers would be of steel construction, very similar to shipping containers in appearance.

4.9 Borrow Pits

58. Eight borrow pit search areas have been identified onsite, to provide a total of approximately 130,000 m^3 of material to construct the proposed Development (coordinates provided in **Table 4.8.1**). In addition, a number of active borrow pits have been identified and the opportunity to win stone from these will be discussed with FLS. 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 availability and quality of the rock at these locations. It is possible that only some of the eight borrow pits would be required. For the purposes of the assessment all eight borrow pits are assessed. Further details are provided in **Technical Appendix 4.2**.

Table 4.9.1 Borrow pit search area

Borrow Pit No.	NGR Reference	Approximate Dimensions (m)	Volume (m^3)
BP-A	231610, 582191	40 x 90 x 5	8100
BP-B	231632, 583173	50 x 50 x 8	9000
BP-C	233146, 585491	70 x 60 x 12	22680
BP-D	232893, 587465	90 x 60 x 5	12150
BP-E	232783, 589209	60 x 60 x 15	24300
BP-F	230958, 589386	60 x 90 x 7	17010
BP-G	229086, 588354	80 x 80 x 10	28800
BP-H	227437, 587524	60 x 60 x 5	8100

4.10 Temporary Peat Storage

59. 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 4.1**) and the outline Peat Management Plan (**Technical Appendix 7.1**). 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.

60. The catotelm layer will not be used for the dressing off roads and hardstandings, unless back-bladed to prevent erosion. 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.

61. 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. This will be reflected in updates to the Peat Management Plan.

62. Further detail is provided in the Peat Management Plan in **Technical Appendix 7.1**.

4.11 Site Restoration

63. 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.

64. Further detail on Site restoration will be provided within the CEMP, an outline of which is provided in **Technical Appendix 4.1**.

4.12 Environmental Management

65. 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.

66. 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:

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

4.13 Operations and Maintenance Phases

4.13.1 Duration

67. 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 address the requirement to remove turbines if they become non-operational for a defined period of time.

4.13.2 Lighting

68. Turbines will be up to 200 m to blade tip and therefore would need to be lit. It is recognised that the proposed Development sits within the buffer of the Galloway Forest Dark Sky Park and that turbine lighting may have an impact. The possibility of using 'smart' aviation lighting (aviation obstruction lighting detection system) is being considered, 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 2020.. 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. In this instance the aviation lighting would not be activated when commercial airlines pass over the Site, as such aircraft ordinarily operate in Controlled Airspace (CAS), at much higher altitudes.

69. An aviation assessment has been undertaken and is documented in **Technical Appendix 14.2**. Their assessment indicates that the airspace above the Site is relatively quiet, in terms of frequency of flights. Given the lights are only required for general aviators flying at night in the vicinity of the Site, it is anticipated that the lights will be rarely on.

70. To mitigate potential effects of the Development on the Glasgow Prestwick Radar (GPR), a surveillance system may be required to be deployed within the Development Area. The requirement for this will be determined following consultation with GPA and the CAA.

4.13.3 Electricity Generation

71. 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.

4.13.4 Maintenance

72. 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 civil maintenance of tracks, drainage and buildings.

73. Turbine maintenance includes the following:

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

4.14 Felling

74. The proposed Development would require an advanced fell of 298.7 ha of woodland to be felled in order to facilitate wind turbines and associated infrastructure. The requirements of which would be undertaken in close consultation with FLS and documented in the Forestry Plan.

75. Forestry felling will be required, generally, and on average, to consist of a 90 m keyholed radius from each turbine location within woodland to allow for construction, operation and environmental mitigation. Further details are provided in **Technical Appendix 14.4.**

4.14.1 Compensatory Planting

76. 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 121.6 ha. Further details are provided in **Technical Appendix 14.4.**

77. 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, considering any revision to the felling and restocking plans prior to the commencement of operation of the windfarm.

4.15 References

BEIS: Sub-National Electricity and Gas Consumption Statistics, January 2018 (based on average household consumption of 3781 KWh)

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