ScottishPower Renewables

Hare Hill Windfarm

Repowering and Extension

Environmental Impact Assessment Report

Volume 1

Chapter 5: Development Description

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ScottishPower Renewables

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Abbreviations

Abbreviation	Description
BPA	Borrow Pit Assessment
c	Circa
CAA	Civil Aviation Authority
CDM	Construction Design Management
CMS	Construction Method Statement
COSHH	Control of Substances Hazardous to Health
DCEMP	Decommissioning and Construction Environmental Management Plan
ECoW	Ecological Clerk of Works
ECU	Energy Consents Unit
EIA	Environmental Impact Assessment
EIA Report	Environmental Impact Assessment Report
FCS	Forestry Commission Scotland
FLS	Forestry and Land Scotland
HH	Hare Hill
HHE	Hare Hill Extension
HHW	Hare Hill Windfarm
HMP	Habitat Management Plan
km	Kilometres
LPA	Local Planning Authority
m	metres
MoD	Ministry of Defence
MW	Megawatts
RAMS	Risk Assessments and Method Statements
SEPA	Scottish Environment Protection Agency
SNH	Scottish Natural Heritage
SuDS	Sustainable Drainage System

5. Proposed Development Description

5.1. Introduction

1. This Chapter provides a description of Hare Hill Windfarm Repowering and Extension (the 'proposed Development') and forms the basis of assessments presented in **Chapters 6** to **14**. It provides details of the general decommissioning of the existing Hare Hill (HH) and Hare Hill Extension (HHE) windfarms and the construction and operation of the proposed Development.

2. The construction methods detailed within this Chapter build on best practice methodologies developed at other windfarms to comply with Health and Safety requirements for construction and operations in addition to relevant environmental guidance including:

   - Scottish Environment Protection Agency's (SEPA) Pollution Prevention Guidelines;
   - Scottish Natural Heritage's (SNH) (now known as NatureScot however SNH branding still appears on some guidance documents) Good Practice During Wind Farm Construction; and
   - SNH/Forestry Commission Scotland's (FCS) (now known as Forestry and Land Scotland (FLS) however FCS branding still appears on some guidance documents) Floating Roads on Peat Guidance.

3. Embedded mitigation measures have been incorporated into the design of the proposed Development. These measures have been adopted to avoid and reduce the potential environmental impacts from the construction and operational activities.

4. This Chapter is supported by the following figures and appendices:

   - Figure 5.1 – Proposed Site Layout;
   - Figure 5.2 – Indicative Substation;
   - Figure 5.3 – Indicative Wind Turbine;
   - Figure 5.4 – Indicative Switchgear Unit;
   - Figure 5.5 - Indicative Wind Turbine Foundation;
   - Figure 5.6 - Indicative Crane Hardstanding;
   - Figure 5.7 - Indicative Control Building Elevations;
   - Figure 5.8 - Indicative Cable Trench Details;
   - Figure 5.9 - Indicative Track details;
   - Figure 5.10 - Proposed Site Access Visibility Splay;

- **Figure 5.11 - Proposed Site Access SPA;**
- **Figure 5.12 – Indicative Permanent Met Mast;**
- **Figure 5.13a – Indicative Construction Compound Layout**;
- **Figure 5.13b – Indicative Construction Compound Layout – Batching Plant,** and;
- **Appendix 5.1 – Outline Decommissioning and Construction Environmental Management Plan.**

5.2. Location & Site

5. The proposed Development is located approximately 1.5 kilometres (km) south east of the village of New Cumnock and 4.5 km west of Kirkconnel (**Figure 1.1**) The application boundary **(Figure 1.2)** and the area within (the Site) is across both the East Ayrshire and Dumfries and Galloway administrative areas.

6. Regarding the physical attributes, there are a number of burns and small watercourses across the Site. The Site is made up of undulating hills of upland heath and moorland with areas of commercial forestry. The Site lies north east of the Afton Reservoir and Blackcraig Hill, south east of New Cumnock and west of Kirkconnel.

7. The current operational site containing HH and HHE, known as 'Hare Hill Windfarm' (HHW) has a total of 55 turbines. HH has 20 turbines with an output of 13.2 MW. It has been operational since 1999 and is one of Scotland's oldest windfarms. HHE comprises 35 turbines with an output of 30 MW. HHE has been operational since 2017. The HH turbines are situated towards the northern area of the operational windfarm with HHE turbines extending towards the south east. The proposed Development will incorporate both of these areas and extend further to the south east.

8. The access to the proposed Development is from the A76 east of New Cumnock. The access track runs south away from block of commercial forestry which then leads east to the first of the HH turbines. The track continues to the east connecting the small track spurs to each of the HH turbine hardstandings. The access track then turns south east and continues in this direction connecting with the three spurs of the HHE turbines. **Note**: an existing track runs through the commercial forestry. This track will not be utilised for abnormal loads during construction. It will be used as required for standard vehicle access during construction, operational access between phases, Hare Hill Extension and in emergencies.

5.3. Proposed Development Overview

9. The proposed Development would comprise turbines, crane hardstandings, a substation, networks of connecting tracks and associated infrastructure. The centre of the Site is at NS 65411 08094. The access would be from the A76 public road. Additionally, the proposed Development would include two areas for habitat improvement with one located onsite and one offsite (location to be determined), full details of these can be found in **Technical Appendix 7.4: Draft Habitat Management Plan**. The proposed Development layout is provided in **Figure 5.1.**

10. The proposed Development would involve the construction of up to 23 wind turbines: 7 with a maximum tip height of 200 metres (m); 9 with a maximum tip height of 180 m; and 7 with a maximum tip height of 150 m, with associated ancillary infrastructure (Figure 5.1).

11. It is expected that each wind turbine would have a rated capacity of the following:

- 200 m to tip – circa (c.) 6.2 MW;
- 180 m to tip – c.6 MW; and
- 150 m to tip – c.4.5 MW.

12. This would give the proposed Development an anticipated capacity of c.130 MW.

5.3.1. Proposed Development Phasing

13. The proposed Development will be split across two distinct phases:

- Phase 1 would commence following the decommissioning of HH and involve the construction of 15 new turbines (T1 – T15); and
- Phase 2 would commence following the decommissioning of HHE and involve the construction of 8 new turbines (T16-T23).

Table 5.1 - Proposed Development Indicative Phasing Timeline

	2030	2031	2032	2033	2034	2035	2036	2037	2038 (Onwards)
Hare Hill Decommissioning									
Construction									
Operation									
Hare Hill Extension Decommissioning									
Construction									
Operation									

14. The primary reason leading to the proposed Development being separated across the two phases is to maximise potential of the separate life cycles for both current operational windfarm developments. This approach was discussed with the Energy Consents Unit (ECU) and other consultees such as SEPA and NatureScot, with methodologies for the impact assessments being produced and agreed prior to assessment. It was noted that the worst-case scenario in Environmental Impact Assessment (EIA) terms may differ between disciplines with which period of the proposed Development this scenario would take place. This is due to the interaction with the new larger turbines and the current smaller operational turbines present. The period in which this worst-case scenario takes place will be discussed in each chapter where relevant and would be the primary assessment point for each environmental topic.

15. The distribution of turbine sizes for each phase is as follows:

Table 5.2 - Distribution of Proposed Turbines Through Phases

Turbine Height	Phase 1 (T1-T15)	Phase 2 (T16-T23)
150 m	6	1
180 m	7	2
200 m	2	5
Total	15	8

5.4. Site Layout

16. The proposed layout following consideration of environmental, engineering and planning constraints (**Chapter 4: Site Selection and Design Evolution**), is illustrated in **Figure 5.1**.

17. The figure illustrates the proposed Development will comprise:

- The turbines and ancillary infrastructure:
- Turbine foundations and hardstandings;
- External transformer housing;
- Crane pads;
- Access tracks (c. 21 km new and 7 km upgraded);
- Underground electricity cables;
- Temporary borrow pits;
- Temporary construction and storage compounds with ancillary infrastructure;
- Site signage and snow poles;
- Onsite substation, storage building and control building; and
- Waste water and drainage attenuation measures (as required).

18. The lifespan of the proposed Development would be 50 years.

19. Micrositing of 50 m is proposed to facilitate minimisation of the impact of the proposed infrastructure on the local environment. The extent of the micrositing will be determined following detailed ground investigation and ground clearance with a record of the exact turbine and infrastructure locations being submitted to Local Planning Authority (LPA), via an appropriately worded planning condition. **Table 5.3** details the centre point coordinates for each of the proposed turbines.

Table 5.3 - Turbine Coordinates

Turbine	Easting	Northing
T1	267299	610340
T2	266898	610678

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T3	266400	610307
T4	266737	609943
T5	267351	609887
T6	264968	610589
T7	264500	609964
T8	264822	609655
T9	265107	608209
T10	266181	606783
T11	265656	605822
T12	266503	605539
T13	266806	606088
T14	267451	607244
T15	268025	607750
T16	265771	609567
T17	266368	609453
T18	265466	608824
T19	266613	608924
T20	266440	608388
T21	267212	608646
T22	266157	607818
T23	266952	608114

20. The total land take of the proposed Development, after completion of reinstatement measures including: foundations crane pads; site tracks; and new sections of access track, has been assessed to be approximately 13.6 ha excluding batter slopes.

21. Indicative drawings for current available technologies that suit site conditions are presented in Figures 5.2 – 5.9 and Figures 5.12-5.13.

22. Drawings include:

- Figure 5.2 – Indicative Substation
- Figure 5.3 – Indicative Wind Turbine

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- Figure 5.4 – Indicative Switchgear Unit
- Figure 5.5 - Indicative Wind Turbine Foundation
- Figure 5.6 - Indicative Crane Hardstanding
- Figure 5.7 - Indicative Control Building Elevations
- Figure 5.8 - Indicative Cable Trench Details
- Figure 5.9 - Indicative Track details
- Figure 5.10 - Proposed Site Access Visibility Splay
- Figure 5.11 - Proposed Site Access SPA
- Figure 5.12 – Indicative Permanent Met Mast
- Figure 5.13a – Indicative Construction Compound Layout
- Figure 5.13b – Indicative Construction Compound Layout – Batching Plant

5.5. Grid Connection

23. It is intended that the proposed Development would make use of capacity on the local transmission network. The connection to the 132/22KV transmission line would be to Glenmuckloch substation. Glenmuckloch substation is located approximately 4 km north of the Site.

24. The connection to Glenmuckloch substation would be fully assessed as part of a separate application submitted by the network operators.

5.6. Public Road Access

25. The proposed Development would utilise the current access junction for HHW that adjoins the public road (A76).

26. The preferred turbine delivery route would start at the port of entry at St George Docks Glasgow heading south to the M77. From the M77 the route would then connect to the A76 towards New Cumnock and connect to the Site at the current access junction.

27. Notwithstanding the above, the final turbine delivery route will not be known until the turbine supplier is appointed and they have in turn reached contractual agreements with the port, sea freight/shipping company and road haulier.

28. The condition of smaller, public roads along the access route would be surveyed and recorded prior to them being used for deliveries and decommissioning and construction traffic associated with the proposed Development. Where required, repair and maintenance work would be carried out on utilised roads during and following the decommissioning/construction period to rectify any identifiable damage which is directly attributable to the proposed Development.

5.7. Decommissioning of Hare Hill Windfarm

29. Prior to the proposed Development construction, work will commence for the phased decommissioning of the HHW. The current planning consents for the operational turbines contain conditions that provides for HHW to be decommissioned, and the site restored once it has come to the end of its operational lifetime.

30. Detailed decommissioning plans will be prepared for HH and HHE and agreed with both Dumfries and Galloway and East Ayrshire councils as the planning authorities in accordance with current planning conditions. The decommissioning and restoration of HHW will be undertaken in accordance with approved decommissioning plans in advance of the construction phases of the proposed Development. The programme and phasing of these works would be agreed along with the decommissioning plans via a planning condition attached to HHE consent; any overlap of the restoration proposals would be considered within these plans and agreed with the planning authorities prior to commencement of development.

31. For clarity, the EIA report herein focuses on the proposed Development, however, consideration has been given to potential overlap with both the HH and HHE decommissioning plans (for example, within the assessment of landscape and visual effects, noise and environmental management control measures). It is further noted, given the overlap in environmental management control measures, a combined Decommissioning and Construction Environmental Management Plan' (DCEMP) would be produced. (An outline DCEMP for the HHW Decommissioning and proposed Development is provided in **Technical Appendix 5.1**.)

5.8. Proposed Development Construction

5.8.1. Construction Schedule and Activities

32. The construction period for each phase (**Table 5.4** and **Table 5.5**) of the proposed Development is envisaged to last for:

- Phase 1 - 23 months; and
- Phase 2 - 15 months.

33. Construction during each phase would consist of the following activities which, although presented in a typical sequence, may overlap or occur concurrently:

- Winning of material from borrow pits (if required);
- Temporary construction compounds for storage and off-loading materials and components, and to accommodate site offices and mess facilities. Depending on where the site storage compound is, normally some tracks would be required;
- Upgrading and construction of tracks and excavation of cable trenches;
- Public highway improvements (if required);
- Construction of hardstanding and platforms;

- Construction of foundations and crane pads;
- Laying of on-site cabling;
- Installation of turbine transformers;
- Works to the on-site substation and control building;
- Delivery and erection of turbine towers, and installation of nacelles and blades;
- Testing and commissioning of the turbines and the windfarm electrical system; and
- Site reinstatement (on-going during works).

34. Pre-construction surveys, for each separate infrastructure item, would be carried out by an on-site Ecological Clerk of Works (ECoW) to ensure the proposed Development decommissioning and construction does not having an unacceptable impact on any species of concern.

35. Outline construction sequencing programmes for the proposed Development are presented in **Table 5.4** and **Table 5.5**.

Table 5.4 - Phase 1 - Outline Construction Sequence

Indicative Construction Activity	Months																							
Phase 1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Decommissioning of Hare Hill	■	■	■	■	■																			
Site Establishment			■																					
Access roads			■	■	■	■																		
Borrow pit establishment and operations				■	■	■	■	■	■	■	■													
Access track and hardstand construction					■	■	■	■	■	■	■	■	■	■										
Grid Works			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■						
Turbine foundations								■	■	■	■	■	■	■	■	■								
Substation construction Civil and Electrical					■	■	■	■	■	■	■	■	■	■	■	■	■	■						
Cable trenching, installation and backfill												■	■	■	■	■	■							
Crane delivery																■								
Turbine delivery																	■	■	■					
Turbine erection																		■	■	■				
Turbine commissioning																			■	■	■	■		
Reinstatement and Restoration																					■	■	■	

Table 5.5 - Phase 2 – Outline Construction Sequence

Indicative Construction Activity	Months																							
Phase 2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Decommissioning of Hare Hill Extension	■	■	■																					
Site Establishment			■																					
Access roads			■	■	■																			
Borrow pit establishment and operations				■	■	■	■																	
Access track and hardstand construction					■	■	■	■	■	■														
Grid Works				■	■	■	■	■	■	■	■	■												
Turbine foundations								■	■	■	■	■												
Substation construction Civil and Electrical					■	■	■	■	■	■	■	■												
Cable trenching, installation and backfill										■	■													
Crane delivery											■													
Turbine delivery												■	■											
Turbine erection													■	■										
Turbine commissioning														■	■									
Reinstatement and Restoration															■									

5.8.2. Typical Construction Equipment

36. The following is an indicative list of equipment that would be required to construct the proposed Development. The equipment would be in use on the Site or stored on-site within the construction compound. Where appropriate, vehicles such as cranes, trucks, excavators and bulldozers may be secured and left on the track at appropriate working areas overnight.

- 400/500 (or less) tonne capacity cranes and one 800/1000 tonne capacity crane. The 400/500 tonne cranes would be used for general construction duties such as the preparation of the reinforcement cages at the turbine bases and as tailing cranes for steerage during the turbine erection. The larger crane would be used for the turbine erection to lift the heavy components into place.
- 30/40 tonne 360-degree excavators. These would be used at the preferred or optional borrow pits for excavating stone and for excavation of turbine foundations. Ripper buckets or hydraulic breakers may be used for the excavators winning stone.
- Smaller excavators in the range of 10 to 20 tonnes. These would be used for road construction and profiling, and restoration of verges, foundations and for excavation of cable trenches.
- Tracked bulldozers would be used for a number of tasks such as stockpiling material from excavations, management of stockpiles within the borrow pits, road construction, crane pad preparation and re-grading of the track running surface.
- Dumper trucks would be used for moving material around the Site, e.g. for moving excavated peat or soils from cut site tracks to any stretches of floating track over deeper peat, and stone from the quarry or borrow pits for track construction.
- Heavy duty vibrating rollers would be used to compact new roads, foundation formations and are essential in compacting the crane pads and backfill to the appropriate densities.
- Mobile concrete pumps would be used on-site during the concrete works for the turbine foundations and the metering building. The pump would be lorry mounted and have a large boom to enable placement of the concrete within the turbine base excavations. The concrete wagons would reverse up to the rear of the pump and deliver the concrete into a hopper which would be connected to the pump. Using the pump allows a controlled and highly flexible method of pouring foundations.
- Cable laying vehicles. These would comprise a lorry or tractor with a revolving drum attachment for laying of cables in trenches alongside site tracks and a tracked excavator with drum attachment for the offsite cabling on stretches where it is not routed alongside a new or existing track.
- Small trucks or four-wheel drive vehicles with trailers. These would be used for transporting of small loads around the Site i.e. ducting pipes for cables in turbine foundations.

- Minibuses and four-wheel drive vehicles would be used for transporting construction workers and site managers around the Site. These would be likely to leave the Site on a regular basis transporting workers to and from their billets off-site.
- A number of other vehicles would bring loads to the Site but would not themselves be stored at the Site. These would include lorries with flatbed extendable trailers carrying all turbine components including transformers, lorries carrying cabling, steel rods for concrete reinforcement and concrete lorries with revolving drums.
- To prevent mud entering the public road system, if necessary, the wheels of all lorries leaving the Site would be washed either using a manual spray or a wheel washing drive through unit.
- Cabins/Welfare Facilities. Due to the requirement under Health & Safety Legislation and the Construction Design Management (CDM) Regulations for welfare facilities on-site and the exposed nature of the Site, a number of cabins would be needed in the construction compound(s).
- Fuel & Chemical Storage Equipment.
- Construction Materials. A variety of materials would be utilised during the construction of the proposed Development including, but not limited to; concrete, reinforcing steel, timber for joinery work and shuttering, stone and sand for road construction, general construction sundries and electricity cables. Wherever possible, the re-use of materials would be carried out, i.e. formwork to be re-used, excavated material from foundations to be reused in the preparation of crane pads and roads, topsoil for re-instatement and landscaping, etc. An indication of the materials used and the amount of resources (plant and labour) is generally included in a construction method statement (CMS). Handling of potentially hazardous materials would be carried out in accordance with SEPA Pollution Prevention Guidelines, but particularly; Pollution Prevention Guidelines 6: Working at Construction and Demolition-sites concerning the delivery, handling and storage of materials. For example, the preparation of contingency plans and briefing operatives on the procedure to follow if a spillage occurs would be covered by the appointed civil engineering contractor, displayed on-site and contained within the CMS document prior to construction commencing.

5.8.3. Construction Method Statement

37. Prior to the commencement of construction of the proposed Development a CMS would be produced. The CMS would be prepared in accordance with relevant planning conditions; regulatory requirements and guidelines; and details provided in this EIA Report. The aim of the CMS is to ensure that each construction activity is carried out safely, in accordance with best practice and the relevant guidelines, and to minimise environmental impact, in accordance with SEPA's pollution prevention guidance. Typically, the CMS would cover the following:

- Site health and safety plan;

- Risk Assessments and Method Statements (RAMS) to include for environmental considerations, e.g. sympathetic construction methodology with regard to weather and ground conditions;
- Location and description of proposed Development;
- Consent and regulation approvals, e.g. discharge of planning conditions;
- Pre-decommissioning survey work undertaken;
- Pre-construction survey work undertaken;
- Turbine description/specification;
- Construction schedule;
- Public highway works;
- Site tracks;
- Temporary construction compound;
- Crane pads;
- Cable trenches;
- Foundation works;
- On-site substation and control building;
- Preferred and optional borrow pits including restoration;
- Monitoring procedures - ecological, hydrological and geotechnical, and archaeological;
- Emergency procedures; and
- Pollution control and waste management procedures.

38. The CMS will include a DCEMP (outline DCEMP provided in **Technical Appendix 5.1**).

39. Preparation of the CMS would be an iterative process, involving consultation with stakeholders, such as NatureScot, SEPA, LPA and other relevant consultees to secure accurate and realistic method statements. During this process, additional data will be available for consultation in the form of detailed site investigations. Furthermore, the civil engineering and the turbine supply contractors will have been chosen by this stage, enabling more detailed preparation of individual method statements. This iterative process also ensures that once construction commences, there is a documented procedure and risk assessment. The documented procedure and risk assessment process makes monitoring of the construction activities, either by the appointed site representative or by the various bodies associated with the preparation of the document, more straightforward.

40. Each section of the CMS will provide a detailed description of the tasks to be completed along with risk assessments, where necessary, covering items such as waste management, pollution prevention, control of waters, nuisance and material use.

41. A section of the CMS regarding the handling and storage of peat would be prepared in accordance with recommendations of a suitably qualified geotechnical designer, ecologist and hydrologist following a detailed site investigation. In respect of matters regarding decommissioning and construction methodology and peat stability at the Site, the following general measures would be adhered to and would form part of the overall CMS documentation:

- Environmental awareness training to be provided to all staff entering on to the Site which will include a basic environmental site induction;
- Avoid placing excavated material and local concentrated loads on peat slopes;
- Avoid uncontrolled concentrated water discharge onto peat slopes identified as being unsuitable for such discharge;
- Avoid unstable excavations. All excavations would be suitably supported to prevent collapse and development of tension cracks;
- Avoid placing fill and excavations in the vicinity of steeper slopes;
- During construction install and regularly monitor geotechnical instrumentation as appropriate, in areas of possible poor ground such as deeper peat deposits;
- Implement site reporting procedures to ensure that working practices are suitable for the encountered ground conditions. Ground conditions are to be assessed by a suitably experienced geotechnical engineer;
- Form a contingency plan to detail the level of response to observe poor ground conditions;
- Routine inspections of the Site by maintenance personnel including an assessment of ground stability conditions;
- Carry out an annual inspection of the Site following completion of works by suitably experienced and qualified geotechnical personnel;
- Maintain stored peat in a suitable condition to minimise the peat drying out; and
- Minimise the need to handle stored peat so as to reduce any drying or changes to the peat.

42. It is intended that the CMS would be reviewed and updated as the decommissioning and construction progresses to capture for example, additional mitigation measures, updates to monitoring, or technology/construction method updates.

5.9. Specifications of Turbines

5.9.1. Description

43. The proposed Development includes the construction of up to 23 turbines with blade tips of up to 200 m. The final turbine models are still to be selected and will depend on the procurement processes, therefore the final hub heights and blade lengths will vary depending on market availability at the time of procurement. However, a Vestas V162 is being used as a candidate turbine with a hub height of 119 m and a blade length of 81 m

for EIA purposes. The Vestas V162 wind turbine is currently available and is offered as a potential candidate turbine that complies with the maximum tip height of 200 m, this model would further work for the turbines at a height of 180 m, however, where appropriate for a worst case scenario in assessments a Vestas V150 has also been used. The Vestas V136 is the selected model for proposed turbines at a height of 150 m to tip.

44. The selected turbines would be of a modern design with three blades mounted on a horizontal axis, attached to a nacelle, housing the generator, gearbox and other operating equipment. The nacelles would be mounted on a tubular tower which allows access to the nacelle. It is expected that the turbine cut in wind speed will be around 3 m/s and will rotate clockwise.

45. A proposed reduced lighting scheme has been submitted for approval to the Civil Aviation Authority (CAA) and specifies:

- Medium intensity steady red (2000 candela) lights on the nacelles of turbines (T1, T5, T6, T7, T9, T10, T11, T12, T13, T14, T15, T16, T17, T21, T22).
- A second 2000 candela light on the nacelles of the above turbines to act as alternates in the event of a failure of the main light; and
- Infra-red lights to Ministry of Defence (MoD) specification installed on the nacelles of the lit turbines.

46. Wind turbine towers will likely be constructed from steel and the blades from fibreglass. It is proposed that the turbine tower, nacelle and blades be finished in a semi-matte, off-white/pale grey colour.

47. Typical turbine specifications, of the type being considered for use on the Site, are presented in **Figure 5.3**. In order to comply with Health and Safety requirements for the Site ScottishPower Renewables (UK) Limited (the Applicant) would propose to apply identification numbers to the sides of the turbines. Numbers would be up to 1000 mm tall by 900 mm wide and would be positioned between 1.5 m and 3 m from ground level so to be visible from the approaching access track. Details of these would be agreed as part of the CMS.

48. Transformer housings are likely to be situated adjacent to each of the turbine towers. The requirement for such structures, along with their dimensions, will vary based on the final turbine choice (some turbine types require two stacked transformer housings).

5.9.2. Erection of Turbines

49. Two types of cranes would be required for the erection of the turbines; 800/1000-tonne capacity cranes and 400/500- tonne capacity tailing cranes. The cranes would use the crane hard standing area as indicated in **Figure 5.6**.

50. Where possible, the delivery of the turbine components would be scheduled, weather dependent, to allow for direct lift off the transport trailers. Otherwise, turbine components would be stored on, or adjacent to, the crane pad areas. Alternatively, components may be delivered to the construction compound for internal distribution by a separate tractor unit. The tower sections would be erected, followed by the nacelle and hub. Following erection of the tower sections and the nacelle, the blades would

either, be lifted and attached individually to the hub in position, or the hub and blades would be raised together, as a unit, and attached to the nacelle. The cranes would then move to the next turbine location.

5.9.3. Environmental Considerations

51. All turbine transformers would be sited on bunded foundations that are able to contain 110 % of the oil contained within each transformer. Any leaks from equipment within the nacelle would be contained within the turbine.

52. Infrastructure for the proposed Development will have a direct impact on some sensitive habitats, mainly blanket bog (degraded), dry heath, upland flushed fen and swamps and upland acid grassland resulting in some habitat loss. However, a Habitat Management Plan (HMP) will be implemented to reduce any impacts from the construction and to restore and enhance habitats during the operational phase of the proposed Development.

5.10. Turbine Foundations

5.10.1. Construction

53. Reinforced concrete gravity foundations are envisaged for use on the proposed turbines. This foundation type is typically an inverted T shape consisting of a large pad with a protruding upstand with approximately 200 mm proud of the finished ground level. The pad is backfilled with selected as-excavated material or stone material placed and compacted over the foundation. The base tower section of the turbine is subsequently connected to the foundation by using holding down bolts that are cast into the upstand section of the foundation. Stability of the turbine is provided through the weight of the foundation and the material replaced and compacted over it.

54. A typical turbine foundation specification is presented in **Figure 5.5**. Detailed design specifications for each foundation would depend on the site-specific factors such as ground conditions, the specific turbine used and various other engineering considerations. Typically, a circular concrete base of approximately 28 m diameter usually suffices for turbines with the dimensions identified in **Figures 5.3**. Combined with the protruding upstand, the overall depth of the foundation would be around 3 m – 3.5 m. Following construction of the foundations, a layer of peat, peat turfs and/or mineral soils that was excavated from the turbine foundation area would be reinstated. Transformers would be located within housings, as shown in **Figure 5.3**, adjacent to the turbines with power cables from the turbines passing through ducts cast into the foundation.

5.10.2. Environmental Considerations

55. Depending on the height of the water table at each foundation location, a drainage system may be installed around the foundation to prevent the build-up of water pressure under the foundation. Alternatively, in locations that were particularly sensitive to hydrological disturbance, a submerged foundation design could be employed which would not require a drainage system around the foundation.

56. Cement entering a watercourse can have a detrimental effect by drawing oxygen from the water and increasing its alkalinity. As an on-site batching plant is required it would be situated away from water courses, either within a borrow pit or at another secure location which would be agreed in advance with SEPA. It has currently been situated within a construction compound area, as shown in **Figure 5.1**. Particular care would be taken when pouring concrete at turbine foundations in the vicinity of watercourses and in areas of deeper peat. SEPA's Pollution Prevention Guidelines would be adhered to and SEPA would also be consulted during the preparation of the CMS to ensure that the appropriate measures are put in place. This may include construction of a settlement pit within the construction compound or elsewhere for treating rinse water from concrete lorries, and measures to prevent water from entering excavations in the vicinity of watercourses.

57. Depending on the height of the water table at each foundation location, a drainage system may be installed around the foundation to prevent the build-up of water pressure under the foundation. Alternatively, in locations that were particularly sensitive to hydrological disturbance, a submerged foundation design could be employed which would not require a drainage system around the foundation.

5.11. Permanent Crane Hardstandings

5.11.1. Description

58. Permanent crane hardstandings (pads) as well as temporary laydown areas would be constructed to facilitate the cranes required for the erection of turbine components. To provide stable, firm ground for safe operation of the cranes, areas of hardstanding would be laid down on one side of each turbine foundation. These would need to be suitable for the outriggers[1] of the respective cranes (as illustrated in **Figure 5.6**). Their locations would be finalised following further site investigation but would be selected to maximise use of the access tracks, where possible, to minimise the carbon footprint of the proposed Development.

5.11.2. Construction

59. Typically, construction of the hardstanding areas would be similar to construction of the site tracks (on shallow soils) with 100-150 mm of topsoil removed and stored adjacent to the hardstanding areas and remaining soil removed down to a suitable bearing stratum and stored at a pre-agreed location within the Site. Geotextile material would be laid down with crushed stone on top, to a depth of around 700 mm. The crushed stone would preferably be sourced from the borrow pit locations identified indicatively in **Figure 5.1**.

60. Additional temporary hardstandings may be required at various stages during turbine construction and erection. This may include temporary hardstanding to facilitate the erection of crane components, lattice boom or turbine components e.g. rotor assembly.

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[1] *Outriggers are essentially the 'legs' of a crane and act as supports that spread the weight of the crane over a larger area which in turn allows the crane to lift more without tipping over.*

5.12. Site Tracks and Borrow Pits

5.12.1. Description

61. The main access track connects onto the Site from the A76 coming from the east of New Cumnock. The access track track then ascends to the Site in a southerly direction alongside a block of commercial forestry before leading east to join the wind turbine array at T1. The track continues to the east connecting the small track spurs to each of the HH turbine hardstandings. The access track then turns south east and continues in this direction connecting with the three spurs of the HHE turbines. The proposed route can be viewed in **Figure 5.1**. The figure shows the proposed turbine layout and the proposed new access track. The tracks allow plant to dig new cable trenches and thereafter to access the Site for operational and eventual decommissioning purposes. **Note**: an existing track runs through the commercial forestry. This track will not be utilised for abnormal loads during construction. It will be used as required for standard vehicle access during construction, operational access between phases, Hare Hill Extension and in emergencies.

62. It is expected that the majority of new stone for access tracks will be sourced from borrow pits within the Site. However, a worst-case traffic volume for importing all required stone is assessed in **Chapter 11: Access, Traffic and Transport** in reaction to the scoping responses from consultees. In addition, a Borrow Pit Assessment (BPA) (**Technical Appendix 9.3**) has been carried out on the Site. As a result of this assessment, indicative borrow pits are shown in **Figure 5.1.** The final extent of any borrow pits (within the 50 m micrositing allowance) would be agreed as part of the CMS for the scheme and subject to detailed ground investigations to confirm suitability of material. Should further stone be required, any further borrow pit locations will be subject to the successful outcome of a relevant Mineral Extraction Licence application which would be made to the relevant authority. The final reinstatement of these borrow pits would be agreed with the local authority in consultation with NatureScot prior to reinstatement works commencing.

63. After construction is complete the tracks will be left in place for routine maintenance of turbines.

5.12.2. Water Course Crossings

64. There are 39 water crossings within the Site.

65. Approximately 21 km of new on-site tracks would link the proposed turbines and infrastructure to the road network. The design philosophy behind the track layout has taken into account a number of factors including topography, hydrology, watercourse crossing, ground conditions and construction parameters and has been based on best practice methodology developed at other renewable energy sites. The proposed track layout has been designed following an onsite review and minimised the number of water crossings necessary.

5.12.3. Environmental Considerations

66. The initial stripping of topsoil for the new tracks and placement of stone material for construction of new tracks has the biggest potential to release sediment into watercourses. Therefore, using methods consistent with industry best practice would be put in place ahead of the track construction activities. Sediment has the potential to be transported the furthest distance by existing surface water channels and manmade drainage systems, therefore proactive mitigation measures would require the existing surface water channels to be identified prior to the track construction. Within the channels and drains and any necessary settlement ponds, silt traps would be constructed prior to track construction. The silt traps would likely be constructed using straw/hay bales or specialised siltation fencing, pinned into place, allowing water to either percolate through the bale or flow over. Where machinery is required for any of these up-front activities, they would have low pressure bearing tracks. Sediment transport mitigation drainage systems would be subject to regular maintenance during the lifetime of the proposed Development.

67. Depending on Site specific conditions alternative methods would be utilised for different areas of the Site for construction of new sections of track. For each construction method, the track running width (excluding drainage channels and cable trenches) would be approximately five m wide, with the exact width depending on the local ground conditions. Track widths may be wider for short sections such as lengths with passing places, sharp bends and track junctions. Excavated road would be used for the majority of the access tracks, where overlying soil or peat material would be removed with a foundation formed on the underlying glacial till or the weathered rock horizon.

68. In addition, there would be a requirement for drainage channels along one or both sides of each section of track depending on the ground conditions along each track segment (Figure 5.9) to prevent the track itself acting as a watercourse. Tracks would be designed with a crossfall, towards the drainage ditches to prevent build-up of water on the running surface. It is important that the water flowing along the drainage ditch is not able to build up enough volume and velocity to act as a major sediment transport route. To prevent this happening, cross drainage pipes would be placed under the road at regular intervals. The cross track drainage pipes also help to minimise the effect the road construction on the hydrology in the adjacent area and prevent concentration of water flow higher in the catchments' area. The drainage ditch would also be blocked just above the cross drainage inlets, thus preventing water from simply flowing past the inlet. Using stone available onsite, a head wall would be constructed to prevent erosion around the inlet. A silt trap would also be constructed at the inlets to the cross drainage, to minimise sediment entering the pipes. The outlet of the cross drainage would allow the water to filter through the adjacent vegetation.

69. For safety reasons, marker posts may be placed in the ground by the edge of the track in order to guide on-site vehicles during times of poor visibility or at night.

5.13. On-site Cabling, Substation and Control Building

5.13.1. Description

70. The candidate wind turbines on the proposed Development will initially generate electricity at 690-1000 Volts. This voltage needs to be converted to 33,000 Volts (33 kV), via a transformer located immediately adjacent to the tower of each turbine, to allow the electricity to be exported to the wider grid. Any external transformer would be linked to the turbines through cable ducts in the turbine foundations. Each transformer will then be directly connected to the on-site substation via underground cables. The underground cable routes between turbines and the substation compound would generally follow track routes. These would be placed up to 2 m from the track verge and drainage ditches.

71. The on-site substation and control building compound will accommodate metering equipment, switchgear, transformers, the central computer system and electrical control panels. A spare part storeroom and domestic facilities will also be located in the control building. **Figure 5.7** shows a typical compound and layout. Although not permanently staffed, the buildings would be visited periodically by maintenance personnel. There is no requirement for any other permanent buildings on the Site.

5.13.2. Construction

72. The transformers would be linked to the on-site electrical substation and metering/control building via 33 kV underground cables placed in trenches. The cable route within the Site would generally run adjacent to on-site tracks where possible. The underground cables between the turbine infrastructure and the on-site substation and battery/energy storage will likely be routed adjacent to tracks. The route would be marked above ground with clearly identified posts, spaced at suitable intervals along the length. The details would be agreed as part of the CMS.

73. Cables would be laid from a drum attached to a suitable vehicle. Each 33 kV cable would arrive as three insulated cores. These would be gathered in the trench and bound together along the entire length of the trench in a trefoil arrangement. Communication cables and earth tapes would also be laid in the same trench. The cables would be protected from mechanical damage by a sand bed and surround. Two layers of marker tape and/or tiles would be laid above the cables to prevent accidental excavation, and concrete marker posts would be placed at regular intervals to enable the cables to be located in the future.

74. Silt, scour and run-off could pose a problem as the cable trench can act as a preferential drainage channel. Backfilling of the trench would be carried out as soon as is practicable and the road drainage installed should be set up with suitable silt traps as the construction proceeds. In steep sections, impermeable plugs would be used in the cable trench to prevent the channel becoming a preferential drainage run, ideally using locally sourced clay material.

5.13.3. Environmental Considerations

75. Where cabling is required, pre-commencement surveys would be undertaken to give a contemporary assessment of any ecological and other environmental sensitivities and

will inform the CMS. Cabling will be carried out in a staged process, with vegetation and topsoil temporarily removed to be back filled as soon as the cables are laid. This method ensures vegetation is replaced as soon as possible and any disturbance during the works is kept to an absolute minimum and is temporary in nature.

76. Following the pre-commencement and pre-construction surveys, (and due to the staged nature of the cabling process) the impact on habitats, the wider environment, and any species of concern would be reduced to a minimum and will result in transient disturbances where they do occur. In areas where the surrounding soils are very coarse gravel or peat, the cable trench footprint shall have a geotextile wrap placed within it to prohibit fines migrating from the backfill into the surrounding sub-soils. These areas shall be identified on-site during the commencement of the works. Where surplus mineral soil material is present, this shall be transported back to the borrow pit for use in the reinstatement and final profiling.

77. On-site cable trenches would be located to minimise the area of disturbance, up to 5 m beyond the edge of the Site track in case of multiple circuits. Trench excavation, cable laying and backfill would be carried out in a continuous operation (minimising the length of trench open at any one time) and may occur subsequent to the construction of on-site tracks or after the erection of turbines. Prior to excavation, the topsoil/turfs would be stripped and placed to the side in a temporary stockpile. A trench would then be dug with a small excavator or backhoe to approximately 1 m in depth and up to 1.5 m in width.

78. Where cables cross contours on steeper areas of ground, clay plugs would be placed at intervals within the trench to prevent the trench acting as a water conduit. Figure 5.8 gives an indicative outline of the cable trench.

79. Alternatively, cable ploughing may be adopted if ground conditions permit. The final choice of method will depend on the appointed contractor and the results of further site investigation.

80. Cables would be laid in sand for protection with warning tapes/boards placed above to mitigate the risk of unintentional excavation. Impermeable barriers (plugs) would be placed in the sand layer at regular intervals to prevent the trench acting as a water conduit with more frequent spacing between plugs on steeper gradients.

81. In all cases, the cables would be buried to a depth of approximately 1 m. Reinstatement would be carried out to relay the previously stripped top layer of peat turfs containing the seed bank, over the top of the cable trench. This reinstatement would be conducted following the backfilling of each cable trench section.

82. At track crossings and within concrete foundations, the cables would be laid within plastic ducts.

83. Existing watercourses would be monitored during the works, both to prevent water entering the excavation, and also for runoff and silt escaping and entering these. These may need temporary diversions/piping until the track is complete and the watercourses can be reinstated.

84. On decommissioning of the proposed Development, on-site cabling would be left in-situ, unless ducted. Most modern cables are aluminium and are relatively benign and inert. These can be electrically isolated and left in-situ, as is common practice.

5.14. Temporary Construction Compound and Facilities

5.14.1. Construction Compounds

85. The dimensions of the compound would be c.126 m x 75 m (**Figure 5.13a-b**) and would be surrounded by a security fence. According to the CDM regulations, cabins within the compound would be offices, canteens, drying-rooms, toilets and washing facilities. Smaller mobile, self-contained units are likely to be required as work progresses throughout the site. These would be placed at suitable locations to tie in with the work interfaces as required.

86. The compound would be used, where necessary, for temporary storage of the various components and materials which are required for construction.

87. A settling pit/concrete washout bay and wheel wash may be included near the construction compound. When concrete lorries have deposited their loads, there is a requirement to wash out the inside of the concrete drum. This requires a few gallons of water that would then be washed out from the drum into a settlement pit. The size of this pit would depend upon the flow of concrete lorries up to the Site (or within the Site if an on-site batching plant is employed) but would be lined with an impermeable sheet and granular fill to assist in the settling process.

88. The construction compound would be reinstated at the end of the proposed Development's construction period. The stored subsoil and the stored topsoil would be laid over the geomembrane separating it from the underlying stone surface and then reseeded using a seed mix selected or, where possible, turfs would be reinstated.

89. The settlement pit would be located away from watercourses with details included as part of the CMS following consultation with SEPA. Any drainage from these facilities would be collected and treated prior to discharge via the Sustainable Drainage System (SuDS). The washout bay would be maintained as necessary by replacing the granular fill with clean stone. At close of construction, all material within the washout bay would be removed from the Site and the area reinstated.

5.14.2. Concrete Batching Plant

90. A concrete batching plant allows for concrete to be mixed in-situ for use throughout the Site and relieves pressure on the road network by avoiding additional transportation of materials onto the Site during construction. This is proposed to be located within one of the proposed construction compounds.

5.14.3. Environmental Considerations

91. On-site access to fuel would be required for the vehicles, generators and other equipment. The fuel storage facilities would typically be comprised of a bunded concrete area containing a lockable, bunded fuel tank and a lockable housing for the storage of construction chemicals. In addition, there would typically be a wheeled,

double-skinned bowser for transport of fuel to tracked vehicles. All construction equipment would be inspected daily to check for spillages. Emergency spill kits would be kept on the Site adjacent to the fuel storage area and with the mobile bowser. Site operatives would be briefed on the emergency procedures to be undertaken in the event of a large spillage. The principal contractor would have a 24-hour emergency response company on standby in the event of a spillage incident. Maintenance and refuelling of machinery and vehicles would be undertaken off-site or within designated areas of temporary hardstanding. In these designated areas contingency plans would be implemented to ensure that the risk of spillages is minimised. Placing a drip tray beneath a plant and machinery during refuelling and maintenance would contain small spillages. All previous stated measures would be used when refuelling vehicles and the bowser operator would be suitably trained to deal with any spillage. The units would be self-contained, and no discharge of drainage would be made to the surrounding land unless otherwise agreed with SEPA and the local authority.

92. Cement entering a watercourse can have a detrimental effect by drawing oxygen from the water and increasing its alkalinity. As an on-site batching plant is required, it will be situated in a borrow pit or other suitable location away from watercourses and agreed with SEPA prior to construction. This is proposed to be located within the construction compound, as shown in Figure 5.13.

5.15. Signage

93. Due to the isolated location of the proposed Development and the industrial operations occurring during construction, signs are required on-site for safe day-to-day navigation for works traffic and personnel; access for emergency vehicles; and for the health and safety of the public. To further protect the health and safety of all those visiting the site a comprehensive risk assessment for visitors will be produced. Signage would consist of non-illuminated post and panel sign locations and non-illuminated turbine identification signs with a maximum of three signs per post facing at the proposed Development. Signs would also be placed on the turbines to help identify them.

94. The signage on-site would comprise of two elements; directional signs and roundels displaying the site speed limit. The directional and speed roundel sign measure 300 mm x 400 mm x 3 mm and 300 mm x 300 mm x 3 mm respectively, which will be mounted on a 2500 mm x 76 mm grey aluminium pole. The poles will be set within a 460 mm deep concrete foundation. This will ensure the stability of the signs, in line with current guidance for such installations.

95. The sign fixtures allow back-to-back mounting and are used on sign locations where more than two signs are specified. The signs will be hard-wearing using tamperproof fixtures, securing the signs in place. A high-quality typeface is used to maximise readability. The signage is uncluttered and designed to be legible from vehicle or from foot.

96. The exact number of signs required at any of the post locations will be decided post-consent, following a full review of the health and safety requirements and will be confirmed in the CMS.

5.16. Employment During Construction

97. 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 150 construction staff for each phase of construction.

5.17. Site Reinstatement

98. The DCEMP would include a plan for soil management and restoration of the proposed Development construction areas. This would include methods used for reinstatement of both disturbance from the construction activities as well as re-instatement of redundant infrastructure. This will form an integral part of the post-construction restoration programme to be carried out in accordance with the draft HMP and outline DCEMP. These methods will be agreed with the relevant councils and statutory bodies prior to the commencement of restoration works.

99. Site restoration would involve the restoration of track and hardstanding verges and the temporary decommissioning and construction compound area to provide a natural ground profile with non-geometric surfaces and tie-ins with existing undisturbed ground levels to prevent the collection of surface water where appropriate. Restoration would be undertaken at the earliest opportunity to minimise storage of turf and other materials and would involve:

- Track and hardstanding verges on the downhill side will be covered with a layer of turf and associated soil. They will then be left to naturally seed; this turf will be obtained from areas where shallow organic deposits or otherwise shallower peat deposits ('acrotelmic' peat) have been excavated. A mixture of habitats are expected to develop on track and hardstanding verges on the downhill and uphill sides, because of local variation in soil depth/type and the variety of drainage conditions that will be preset, including wet heath, marshy grassland, dry heath and acid grassland;
- The decommissioning and construction compounds will be restored with peat/other organic deposits as appropriate capped with a layer of associated turf. Due to the flat nature of the area where the compounds will be located, it is expected that a mixture of marshy grassland, wet heath along with dry heath/acid grassland would develop;
- Cable trenches would be similarly reinstated. Where practicable, vegetation over the width of the cable trenches would be lifted as turfs and replaced after trenching operations to reduce disturbance;
- The upgraded access tracks serving the new turbines will be left in place after completion of the construction phase as they will provide access for maintenance repairs and the eventual decommissioning phase;
- High standing and turning areas constructed at each turbine location will be retained for use in ongoing maintenance operations including component replacement as necessary on the decommissioning phase; and

- Redundant infrastructure would be removed or broken out from a depth of c.1 - 1.5 m and a number of the areas reinstated in accordance with the draft HMP and outline DCEMP.

100. Should future works be required to maintain the proposed Development the temporary construction compound areas would be reinstated such that they could be reused for potential maintenance purposes.

5.18. Operational Phase

101. Operation of the proposed Development would be mostly automated but managed by the operations team based at the existing Whitelee Windfarm control centre site offices. Each individual turbine would operate independently and would be managed by remote control and monitoring systems. The monitoring system controls the rotational speed of each individual turbine and ensure its continued safe operation. Should a malfunction occur or should wind speeds exceed safe limits, then the braking system of the wind turbine would automatically be applied.

102. If high winds are the cause of the shutdown, the turbine would automatically re-commence operation once average wind speeds reduce to below 25 m/s. Should a shutdown occur due to other causes, e.g. turbine malfunction, that turbine would remain shut down in a safe condition (e.g. with the rotor blades orientated 90 degrees to the wind direction). A manual restart by a member of the Operations and Maintenance team, would be carried out following satisfactory inspection and/or repair.

103. The lifetime of the proposed Development is 50 years from completion of commissioning to commencement of decommissioning. To ensure that turbines continue to operate with acceptable reliability (i.e. with each turbine capable of operating on average, between 95 % and 98 % of the time), individual turbines will be subject to regular pre-planned maintenance and servicing programmes.

104. In addition to the scheduled maintenance, unforeseen mechanical breakdowns will be subject to adhoc maintenance visits.

105. Tracks giving access to turbines would be utilised during the operational period of the windfarm to allow for routine maintenance operations and occasional replacement of larger components.

5.18.1. Maintenance Programme

106. Maintenance regimes commonly begin shortly after commissioning with a 'post-construction' check on the torque levels of all bolts within the structure. This is normally performed 10 days after commissioning and again, three months after commissioning.

107. Once operational the turbines would be subject to a major and minor service regime. The major and minor servicing would be six months apart and carried out throughout the lifespan of the turbine.

108. Routine oil sampling and testing of lubricant maintains awareness of the integrity and condition of these lubricants. Routine oil sampling and testing of transformer oils would

also be performed in order to maintain awareness of the integrity of the electrical properties of these oils.

109. Maintenance of the high-voltage switchgear would be conducted routinely, with routine annual checks.

110. In the case of major component maintenance being required, such as generator or blade replacement, large vehicles similar to those used during construction may need to return to the Site. These would be subject to similar conditions of planning as agreed for the initial construction period. From time to time, when such maintenance is being undertaken, it may be necessary to restrict access to areas close to the replacement turbine components in order to secure the health and safety of both the maintenance engineers working within the restriction zone and direct the general public away from the areas required to undertake maintenance activities. In such cases, the areas affected would be clearly marked and fenced and alternative routes would be provided for the general public seeking passage through the windfarm for the duration or the maintenance activities. Once complete the status quo in terms of site access would be re-instated.

111. All maintenance of any equipment item would be performed according to the original equipment manufacturer stated schedules, and health and safety procedures.

112. All maintenance would also occur according to the environmental procedures aforementioned in this Chapter.

5.18.2. Storage and Use of Polluting Substances

113. Storage of polluting substances at the site during the operational period of the proposed Development would only take place where agreed with the relevant authorities in accordance with Control of Substances Hazardous to Health (COSHH) regulations. Generally, substances of this nature are transported in minimum quantities on an 'as required' basis.

5.19. Decommissioning

114. At the expiry of the consent or the end of the proposed Development's useful life, it is proposed that the turbines and transformers would be removed. The upper sections of the turbine foundations, to a depth of at least 1 m, would be removed and backfilled with appropriate material. Peat or topsoil would be replaced, and the area reseeded. Tracks will be left and allowed to grass over or would be covered with soil and reseeded. Cabling would be left in-situ, unless ducted. At least six months prior to the decommissioning of the Site, a Decommissioning Method Statement would be prepared, for agreement with the local authorities and relevant consultees.

5.20. Waste Management

115. A Site Waste Management Plan would be developed for implementation during each construction phase, as discussed in the DCEMP (**Technical Appendix 5.1**). This outlines details of the materials requirements and waste generation during construction and how the Applicant intends to consider the management of these aspects.