CLOICH FOREST WIND FARM

EIA Report – Volume 1 – EIA Report Text

Chapter 3

Project Description

3 PROJECT DESCRIPTION

3.1 INTRODUCTION

1. This Chapter of the Environmental Impact Assessment Report (EIA Report) provides a description of the proposed Cloich Forest Wind Farm ('the Development') which forms the basis of the assessments presented within Chapters 5 to 17. It provides details of the construction phase, the 30-year operational phase and decommissioning phase of the Development.

2. The Development is located within Cloich Forest approximately 5.5 kilometres (km) north-west of Peebles ('the Site').

3. This Chapter includes an overview of the Development followed by a detailed description of the main components and their method of construction. Measures that have been built into the design of the Development to reduce effects, also known as 'embedded' mitigation measures, are set out in the previous chapter (**Chapter 2: Site Selection and Design**), and in this Chapter. In addition to these embedded mitigation measures, Chapters 5 to 18 present mitigation and enhancement measures where specifically relevant to their assessment topic.

4. This Chapter of the EIA Report is supported by the following figures provided in Volume 2a Figures excluding LVIA:

- Figure 3.1a-d: Detailed Development Site Layout;
- Figure 3.2: Indicative Turbine Elevation;
- Figure 3.3: Indicative Foundation Design;
- Figure 3.4: Indicative Crane Hardstanding;
- Figure 3.5: Indicative Cable Trench Detail;
- Figure 3.6: Indicative Substation & BESS Compound;
- Figure 3.7: Indicative Control Building & BESS Elevation;
- Figure 3.8: Indicative Construction Compound;
- Figure 3.9: Indicative Access Track;
- Figure 3.10: Indicative Culvert Details;
- Figure 3.11: Indicative Bridge Detail;
- Figure 3.12: Proposed Temporary Junction Arrangement at Existing A703 / D17 Junction;
- Figure 3.13: Outline Design of Borrow Pit 1; and
- Figure 3.14: Outline Design of Borrow Pit 2.

5. This Chapter of the EIA Report is supported by the following Technical Appendix document provided in Volume 3 Technical Appendices:

- A3.1: Borrow Pit Assessment.

3.2 DESCRIPTION OF THE DEVELOPMENT

3.2.1 Development Overview

6. The Development comprises a wind powered electricity generating station known as Cloich Forest Wind Farm with a generation capacity exceeding 50 MW. It will involve the construction and operation of a wind farm and associated infrastructure, and include widening works along the main public road access, as described in Table 3.1 below.

7. The Development will comprise:

- Up to 12 wind turbines including external transformers and associated infrastructure including:
  - Widening works along public road;
  - A substation compound & building;
  - An approximate 20 MW battery energy storage system (BESS); and
  - Forestry felling and compensatory planting.

8. The Development is located within Cloich Forest approximately 5.5 kilometres (km) north-west of Peebles ('the Site'). As the Site is currently used as a commercial forestry plantation with existing good quality forestry tracks, efforts have been made to utilise these existing tracks where possible. The components of the Development are summarised in Table 3.1 and shown on Figure 3.1.

Table 3.1 Key Parameters of the Development

Element	Details
Turbines	Up to 12 turbines with a maximum tip height of 149.9 m. Depending on the final turbine choice, a small transformer may be located at the base of each turbine. Each turbine will have a foundation with a diameter of approximately 24 m, with a depth of up to 3 m (Figure 3.3).
Public Road Access (D17 Whim – Shiplaw & D18 Cloich)	From the junction with the A703, the route to the main body of the Site will be afforded via the 'D17 Whim – Shiplaw' & 'D18 Cloich' public roads. The Public Road Access consists of approximately 2.4 km of public road and will be subject to road widening works. The existing surfaced road's width varies between approximately 3 m and 5 m. The road upgrade works will create a width of at least 4.5 m along its length, suitable for the delivery of turbine components, and cranes. For much of the route, widening works can be carried out in the road verge, with some re-alignment of field boundaries where appropriate. The widening works are illustrated in Figure 3.1.
Site Entrance	The Site encompasses both the 'D17 Whim – Shiplaw' & 'D18 Cloich' public roads which lead to the Site Entrance located on existing forestry track, which will form part of the Onsite Access Tracks, at the western extent of the Site; additionally, there will be a Secondary Entrance in the eastern portion of the Site, which will be used by vehicles etc. already inducted via the Site Entrance at an earlier date. Figure 3.1 illustrates both the Site Entrance and the Secondary Entrance.

Element	Details
Onsite Access Tracks	Onsite Access Tracks occur from the point at which public road (the D18 Cloich) ceases, as shown on Figure 3.1 & Figure 1.3 of **Chapter 1: Introduction**. The Onsite Access Tracks are served by two main access points, as described above. Onsite Access tracks within the wind farm will have a width of approximately 5 m, with the exception of the proposed new connecting track that is for light vehicle use only and connects the northern and southern areas of the Site (see Figure 3.1 & Figure 3.9). This, approximately, 1.4 km long section of track will be constructed to Forestry and Land Scotland (FLS) Civils Specifications and will not be used for transporting oversized turbine components or cranes. It is anticipated to be 3 m wide. Access tracks will consist of approximately 7.6 km of existing forestry tracks (with some minor upgrading in locations), and approximately 8.2 km of newly constructed track.
Electrical Infrastructure	Onsite cabling will be laid underground alongside the access tracks where possible, linking the turbine transformers to the wind farm control building and substation (Figure 3.5). Transformer units for wind turbines will be located in kiosks (3m x 2.5m x 2.5m) adjacent to turbines. A substation compound will be located at approximately NGR 320611, 649305 (Figure 3.1). The compound measuring approximately 100 m x 50 m will include a single storey control building, external electrical infrastructure, BESS components, recycling and storage, and vehicle parking etc. (Figure 3.6).
Battery Energy Storage System (BESS)	An approximate 20 Megawatt (MW) BESS facility will be located within the substation compound, as shown on Figure 3.1 & Figure 3.6. It is proposed that the BESS will comprise of four 'energy storage units' (ESU), where one ESU contains: • 2 x battery containers; • 1 x transformer; • 1 x HVAC Cooler; • A perimeter fence; and • Electrical cabling connecting to the nearby substation.
Crane Hardstanding	Crane hardstandings will be required adjacent to each turbine, this will consist of an area of approximately 1250 m^2 at each turbine (Figure 3.4). In addition to the main hardstanding area, there will be an auxiliary crane area which will consist of a temporary flattened area for crane assembly and turbine blade storage which will not be formed of hardstanding.
Temporary Construction Compound	A temporary construction compound will be required during the construction of the Development, forming an area of hardstanding providing space for temporary construction cabins, parking and lay down areas; this will measure approximately 100 m x 50 m and be located in the western area of the Site, at approximately NGR 320548, 649205 (Figure 3.1 & Figure 3.8).
Borrow Pits	Up to two onsite borrow pits are proposed. One is located approximately 130 m north-east of T12, along one of the main access tracks into the Site and will extend an existing quarry; the second borrow pit is to be located in the west of the Site, approximately 170 m north of T5, and will extend an disused quarry. Given that the track layout reuses 7.6 km of existing access track, less aggregate will be required when compared to a typical wind farm of this size, and the use of both borrow pits may not be required.

9. It is estimated that the permanent footprint of the Development, including infrastructure and following restoration, will be approximately 17 hectares (ha). This includes upgrades to existing forestry track and public road. During the construction period it is estimated

that a further approximate 16 ha will be temporarily required, which includes the borrow pits, laydown areas, and the construction compound which will be reinstated following the construction works.

10. As the Development is largely located within commercial forestry plantation, felling is required to accommodate infrastructure, including: access tracks, turbine infrastructure, borrow pits, the substation compound, and the construction compound. Further details are outlined in Section 3.2.12 of this Chapter.

3.2.2 Wind Turbines and Associated Infrastructure

3.2.2.1 Wind Turbines

11. Consent is being sought for the erection of up to 12 three-bladed horizontal axis wind turbines with a maximum height from base to tip that will not exceed 149.9 m (with the blade in the vertical position). Figure 3.2 illustrates a typical turbine of this type. The blades will be made of fiberglass reinforced epoxy and mounted on a tapered tubular steel tower. The turbines will be light grey in colour and the finish of the tower and blades will be semi-gloss and semi-matt respectively.

12. The specific turbine is dependent on the final choice of turbine models available at the time of procurement and will be chosen with the aim of optimising renewable energy generation at the Site. However, the chosen turbines will have a maximum blade tip height of no more than 149.9 m, which is the upper limit of the environmental and planning parameters considered in this EIA.

13. Turbines are typically of a variable speed type, so that turbine rotor speed will vary according to wind speed. Turbines of the dimensions proposed typically have rotational speeds of between 6 and 14 revolutions per minute (rpm), depending on variations in wind speed, generating power for all wind speeds between approximately 3 and 25 metres per second (m/s). At speeds greater than 25 m/s, turbines typically reduce power output by pitching the blades out of the wind to protect the turbine from damage caused by high wind speeds. These very high wind conditions usually prevail for less than 1% of the year.

14. The turbines are computer controlled to ensure that at all times, the turbine faces directly into the wind to ensure optimum efficiency. The rotors of all 12 turbines will rotate in the same direction.

15. When operating, the rotational movement of the blades is transferred through the gearbox, to drive the generator. This produces a three-phase power output typically at 690 Volts (V), which is transferred from the generator to the turbine transformer. The turbines will be controlled and monitored from within the proposed control building and will also be remotely monitored where performance details and statistical information for each turbine will be recorded.

16. During the construction phase, two cranes are typically required to install the turbines, consisting of a larger 800 – 1000 tonne main crane and a secondary 400 – 500 tonne crane. The cranes would use the crane hardstandings as described in Section 3.2.3. The construction contractors would determine the actual cranes used following the turbine procurement process, together with the exact programme and number of teams on site.

17. The method for erecting each turbine would depend on the turbine supplier and Site conditions. Turbine components would either be lifted directly off transportation units for erection or more typically stored adjacent to the crane hardstanding area. The tower sections are initially erected, followed by the nacelle and then the hub depending on the blade installation. The turbine blades would then be lifted individually and attached to the hub or if sufficient space is available would be attached to the hub at ground level

then raised together and attached to the nacelle. The overall assembly process for each turbine takes approximately two to four days, depending on weather conditions.

18. The layout of the Development is shown in Figure 3.1 and coordinates of the proposed turbine locations are provided in Table 3.2. The turbines will be subject to a micro-siting allowance (detailed in Section 3.2.11) to allow flexibility for encountering unknown ground constraints during pre-construction and construction.

Table 3.2 Wind Turbine Co-ordinates

Turbine No.	Easting	Northing
1	319967	646980
2	320015	645991
3	320558	646130
4	320947	646570
5	321167	647062
6	320149	647527
7	320425	646942
8	320616	647950
9	320830	647414
10	320594	648446
11	320190	648389
12	320212	648875

3.2.2.2 Turbine Foundations

19. It is anticipated that the turbine foundations would comprise a standard concrete gravity foundation constructed on poured concrete with steel reinforcement. Concrete batching may occur onsite; however, to present a worst case scenario the traffic and transport assessment within **Chapter 12: Access, Traffic and Transportation** will assume onsite concrete batching does not occur.

20. As shown on Figure 3.3, concrete foundations will be up to 24 m in diameter with a varying thickness increasing from around 0.5 m at the foundation edge to 2 m at turbine bases. Atop the concrete foundation, a layer of foundation backfill will be compacted, typically around 1 m deep. Designs vary depending on ground conditions but typically, concrete volumes for turbines of this size range from 460 m^3 to 570 m^3, and would include up to 90 tonnes of steel reinforcement.

21. The detailed design specification for the foundation would depend on the geotechnical site investigations undertaken during the enabling works to establish the nature of the subsoil condition at each turbine location. Each foundation would be designed separately according to the ground conditions, chosen turbine type, and manufacturer specification. Where suitable ground conditions exist, rock-anchored foundation solutions will be considered. These foundations can dramatically reduce the scale of the foundation required to restrain the wind turbine structure in terms of: ground area disturbance, excavation size needed, materials handled, reinforcement tonnage used, and concrete volume placed and finished.

22. The ground excavation methods would vary depending on the local ground conditions and the nature of the surface vegetation. The general processes would be as follows:

- Topsoil/turf will be stripped and stored local to the point of excavation in order to be reused in restoration of the turbine construction area. Excess materials will be moved to other locations on the site requiring reinstatement materials;
- Subsoil (if present) will be stripped and stored local to the point of excavation, keeping this material separate from the topsoil/turf. Excess materials will be moved to other locations on the site requiring reinstatement materials;
- Excavation of turbine foundations will then take place typically followed by: formation preparation, placement of 6N graded stone, installation of cable ducts, concrete blinding, installation of the WTG anchor cage structure, the reinforcement cage structure c/w all earthing cables, formwork/shuttering, and then the structural concrete; and
- After the foundation has been poured the area would be backfilled as soon as practicable with excavated materials, pending turbine installation.

23. Once the turbines have been installed, the immediate construction area around the turbine bases would be restored using the retained topsoil or turf to within approximately 1 m of the tower bases. A 4 m wide area of hardstanding would then be laid around the tower base. Material won from foundation and track excavations would, if suitable, be used in the landscaping of access tracks and restoration of site infrastructure including borrow pits and construction areas.

3.2.2.3 Transformers and Cabling

24. Depending on the final choice of turbine, transformers will either be located within the turbine tower (with internal switchgear) or externally, close to the base of the tower. For the purposes of this assessment it has been assumed that the transformers will be located adjacent to each turbine. An external transformer will normally be placed within a glass reinforced plastic (GRP) housing, the size of housing will depend on the type of transformer selected but in general it will be approximately 3 m by 2.5 m in plan and 2.5 m in height above surrounding ground level, located adjacent to the turbine within the hardstanding area.

25. The transformers will be either oil-filled with a bunded footing to remove any risk of spillage or a solid cast resin type which is effectively non-polluting. The transformers will increase the electrical voltage from 690 V to 33 kilovolts (kV).

26. Turbines will be connected by 33 kV single phase power cables which will be laid in trenches alongside the access tracks, with a depth of 0.8-1 m. The excavated trenches will also include SCADA cables or fibre optic cables. This will allow interrogation and control of individual turbines as well as remote monitoring. A copper cable will also be located in the trench and will be connected to the substation and each turbine to provide an earthing system to provide protection from lightning strikes and electrical faults. The cables will be laid on a sand bed, then surrounded by further sand and backfilled using suitably graded material. Clay, or equivalent low permeability barriers, will be inserted into the cable trenches at regular intervals to avoid the trenches becoming preferential drainage pathways. Details of typical trenches are shown in Figure 3.5.

3.2.3 Crane Hardstandings

27. Each turbine requires an area of hardstanding adjacent to the turbine foundation to provide a stable base on which to site the turbine components and cranes for the erection of the turbine.

28. The main working area at each hardstanding area composed of crushed stone will be approximately 50 m x 25 m, the footprint of the main hardstanding will be approximately 1250 m^2. There will be smaller temporary auxiliary crane areas which are required for

the assembly of the main crane jib and 'blade fingers' which are required for the storage of the turbine blades.

29. A typical arrangement is shown in Figure 3.4; however, the final arrangement of the hardstanding will depend on the method of erection and exact specification of the cranes chosen by the turbine erection contractor. The hardstandings will be sufficiently level and with a suitable load-bearing capacity for storage of turbine components and operation of the cranes.

30. Surface water and groundwater levels will be managed to ensure that natural drainage patterns are maintained and that water levels within excavations do not rise beyond appropriate and safe limits. Various cable ducts and other ancillaries will be installed within the foundations and under the access track crossing points.

31. Construction of the crane hardstanding would be similar to the construction of the Site access tracks as described in Section 3.2.4. Surplus excavated material would be reused elsewhere within the Site such as for track maintenance during construction or during borrow pit reinstatement. Similarly, any surplus topsoil would be used to restore track edges or the borrow pits after construction.

32. The crane hardstanding would be left in place following construction in order to allow for the use of similar machinery should major components need replacing during the operation of the Development. These would also be utilised during decommissioning at the end of the Development's life, at which point the crane hardstanding areas would be restored.

3.2.4 Access

3.2.4.1 Site Entrance

33. The main Site Entrance will be located within the Site Boundary, on the western access track, as illustrated on Figure 3.1. A Secondary Entrance is located on the eastern access track, as illustrated on Figure 3.1. During construction, security huts will be located at both the Site Entrance and the Secondary Entrance for health and safety purposes.

34. **Chapter 12: Access, Traffic and Transport**, has identified the following abnormal loads delivery route from the anticipated Port of Delivery, Grangemouth Port:

- Loads will exit the port and proceed towards Earl's Gate Roundabout via the A904 Earl's Road;
- At the roundabout, turn left onto the A905 and travel southbound towards Cadger Brae Roundabout and merge onto the M9 via the M9 Junction 5 Slip Road;
- Continue along the M9 southeast bound and merge onto the M8 via the M8 Junction 2 Slip Road;
- Continue along the M8 westbound towards Hermiston Gait Roundabout and at the roundabout, take the 3rd exit onto the A720 City of Edinburgh Bypass and travel toward Sheriffhall Roundabout;
- At the roundabout take the 5th exit onto the A7 and travel southbound toward Hardengreen Roundabout;
- At the roundabout, take the 3rd exit onto the B6392 and travel southbound towards Rosewell;
- At the B6392 / A6094 Roundabout, take the 1st exit onto the A6094;
- Continue on the A6094 southbound and turn right onto the B6372 northbound at its junction with the B6372;
- Continue on the B6372 northbound and turn left onto the B7026 southbound at its junction with the B7026;
- Continue on the B7026 southbound towards the B7026 / A6094 roundabout and take the 2nd exit, remaining on the A6094;

- Continue on the A6094 southbound towards the A6094 / A703 / A701 junction and turn left onto the A703;
- Continue on the A703 southbound for approximately 4.5 miles and turn right onto the D17 Road towards Cloich Farm (Figure 3.12);
- Continue on the D17 Road for approximately 1 mile and merge onto the D18 Cloich Road;
- Continue on the D18 Cloich Road for approximately 1 mile and turn left onto Cloich Farm Road to reach the Secondary Entrance; and
- The Site Entrance is reached by continuing along the D18 onto Cloich Forest forestry track and taking the next available left turn.

3.24.2 Access Tracks

35. The access tracks have been designed to minimise environmental disturbance and land take wherever possible by re-using as much existing forestry track as possible, avoiding areas of deep peat, environmental constraints identified during the EIA and minimising the number of watercourse crossings.

36. The length of onsite access tracks will total approximately 15.8 km which consists of localised upgrades to 7.6 km of existing forestry track and 8.2 km of new track.

37. New tracks will be constructed to connect the existing forestry tracks to the turbine locations to enable the turbine components, construction materials and construction staff to be transported to their locations, and to enable access for subsequent maintenance visits. The proposed track layout is illustrated in Figure 3.1.

38. Access tracks will be approximately 5 m (as described in Table 3.1) in width, with an additional 0.5 m verge on either side subject to local ground conditions. The proposed access track south of T1 and T7, shown in Figure 3.1 as 'New Access Track (Construction Traffic Only)', will be approximately 3 m wide and only used by construction traffic vehicles, excluding abnormal load vehicles. The tracks have been designed to have sufficient radii for turning of the construction vehicles, abnormal loads and plant. Turning heads have been included within the design as necessary to allow abnormal load vehicles and cranes to undertake turns during the turbine delivery and assembly process. These are incorporated into the crane hardstanding areas in order to minimise land take.

39. Figure 3.9 illustrates typical track designs which are likely to be employed for the Development's tracks. It is anticipated that access tracks would be constructed using a 'cut track' design. Topsoil is stripped to expose a suitable rock or sub-soil horizon on which to build the track. The track is built up on a geotextile layer by laying and compacting crushed rock to a depth dependent on ground conditions and topography. Generally, the surface of the track will be flush with or raised slightly above the surrounding ground level.

40. Excavated soils would be stored at no greater than 3 m in height, directly adjacent to, or near the tracks on ground appropriate for storage of materials i.e. relatively dry and flat ground, a minimum of 50 m away from any watercourses. Where possible, reinstatement will be carried out as track construction progresses.

41. The access tracks will be left in place after construction of the Development and can be utilised for forestry or recreational access as well as access to the turbines for maintenance and repair works.

42. Prior to the commencement of site construction, a detailed engineering specification for the access track design will be submitted to the planning authority as part of a Planning Conditions Compliance Statement which will include Construction Method Statements (CMS) for all aspects of construction.

43. A Drainage Management Plan (DMP), which will detail proposed surface drainage measures to treat and deal with all the surface runoff from the Site, will be designed in

accordance with Sustainable Drainage Systems (SuDS) principles. This plan will form part of a Construction Environmental Management Plan (CEMP) for the Development. The Development's CEMP will be drafted and agreed in consultation with the Council prior to construction of the Development.

44. All access tracks will incorporate robust drainage, including drainage channels running adjacent to the tracks, on one or both sides. The track would be designed to be cambered at gradients up to 4% towards the drainage channels to prevent a build-up of surface water and allowing the track to act as a watercourse. Use of rock check dams and other forms of catchment within access track drainage channels will also help to control surface water run-off speeds and reduce sedimentation, particularly during periods of very wet/thawing weather. The make-up of the tracks will also be as permeable as possible to prevent any instances of surface water build up.

45. Cross drainage pipes will be installed at regular intervals to prevent flooding or surcharging of the drainage channels and to maintain natural drainage catchments. Headwalls and sumps will also be included to protect pipe ends.

46. The implementation of the drainage design will be developed in response to a risk appraisal undertaken by the contractor and will be proactive, rather than being reactive to any events arising once works commence. The design will reduce the risk of sedimentation (from loose material) and pollution (from accidental spillage) of all downstream watercourses.

All construction works will be carried out in accordance with best practice guidance as per NatureScot's *'Good Practice during Wind Farm Construction'*[1].

3.2.5 Watercourse Crossings

47. As noted above, the track layout design has sought to limit the number of watercourse crossings; however, given the nature of the Site a number of crossing points are necessary. There is a requirement for 13 crossings for watercourses. Of these, 11 are existing crossing points as part of the existing forestry track network and public road, both of which may require upgrading; two watercourses would be subject to a new crossing. The locations of watercourse crossings are detailed in full in **Chapter 10: Hydrology and Hydrogeology**.

48. The type and design of each watercourse crossing will be dependent on the stream morphology, peak flows, local topography and ecological requirements, and will be chosen so as to avoid or minimise potential environmental effects. A typical watercourse crossing design is shown in Figure 3.10.

49. The watercourse crossing which crosses Courhope Burn will be constructed as a bridge, rather than a typical culvert crossing due to the nature and size of Courhope Burn. Figure 3.11 illustrates a typical bridge which is likely to be used.

50. Any crossing would be designed in accordance with Construction Industry Research and Information Association (CIRIA) Culvert design and operation guide (C689)[2] and incorporating the most recent climate change allowances, to ensure sufficient capacities for spate or flooding events.

[1] NatureScot (2019) Good practice during Wind Farm Construction [Online] Available at: https://www.nature.scot/guidance-good-practice-during-wind-farm-construction (Accessed 22/06/2021)
[2] Benn, J, Kitchen, A, Kirby, A, Fosbeary, C, Faulkner D, Latham, D, Hemsworth, M (Dec 2019) Culvert, screen and outfall manual (C786F) https://www.ciria.org/ItemDetail?iProductCode=C786F&Category=FREEPUBS (Accessed 22/06/2021)

51. Any watercourse crossings would be subject to the requirements of The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended)[3] (CAR) and Water Environment (Miscellaneous) (Scotland) Regulations 2017[4].

3.2.6 Substation Compound

52. The substation compound would be located on an area of crushed stone hardstanding measuring approximately 100 m x 50 m. The compound is centred at approximately NGR 320609, 649301, as shown on Figure 3.1.

53. The substation compound will be partitioned into two broad sections, accommodating the control building and associated external electrical switchgear, and the BESS which is detailed in Section 3.2.7 below. It will also include an area for vehicle parking and storage during the construction period. A typical arrangement is shown in Figure 3.6.

54. The principal element of the substation compound is the control building which contains the electrical infrastructure and control elements of the Development. This will likely comprise a single storey unit measuring approximately 10 m x 25 m with a pitched roof as shown in Figure 3.7. The control building will include control components, including metering equipment, switchgear, the central computer system and electrical control panels as well as welfare facilities, associated air conditioning systems, and a maintenance room. The substation compound will also include a septic tank and buried rainwater tank associated with the control building.

55. In addition to the electrical infrastructure housed within the control building, there will be external electrical switchgear located within the substation compound, which will be adjacent to the substation. External switchgear would be located within a security fence of up to 3 m height and served via a locked access gate.

56. The wind farm substation building will have its own foul drainage system, as noted above regarding a rainwater collection tank and septic tank. Surface water will drain via soakaway or other preferred SuDS method to be agreed with the Council.

57. The final designs for the buildings and compound will incorporate sustainable design features and will be agreed with the Council.

58. The underground cables from the wind turbines would be brought into the substation building in ducts. The ducts would guide the cables to the appropriate switchgear inside the building. Communications cables would enter in a similar manner.

59. Lighting will be kept to a minimum and will be limited to working areas only and will comply with health and safety requirements. Lighting will be down lit and linked to timers and movement sensors so that light pollution is kept to a minimum.

3.2.7 Battery Energy Storage System (BESS)

60. Also located within the Substation Compound is a BESS, as illustrated in both Figures 3.6 and 3.7. The BESS will be an approximate 20 Megawatt (MW) facility and will be able to import power from the national grid or wind turbines and export to the national grid as required providing a 'security buffer' to cope with supply and demand events. Battery storage components would be contained in sealed units within the Substation Compound, as shown on Figure 3.1.

[3] The Water Environment (Controlled Activities) (Scotland) Regulations 2011 http://www.legislation.gov.uk/ssi/2011/209/contents/made (Accessed 22/06/2021)
[4] Water Environment (Miscellaneous) (Scotland) Regulations 2017. http://www.legislation.gov.uk/ssi/2017/389/contents/made (Accessed 22/06/2021)

61. It is proposed that the BESS will comprise of four 'energy storage units' (ESU), where one ESU contains:

- 2 x battery containers;
- 1 x Transformer;
- 1 x HVAC Cooler;
- A perimeter fence; and
- Electrical cabling connecting to the nearby electrical substation.

62. The battery containers would be of steel construction and appear very similar to shipping containers, each approximately 12 m in length. These would be arranged in tandem i.e. two containers on a combined plinth with a shared transformer unit and coolers. A separating wall between the pair of containers is the highest elevated point at 3.8 m. This overall structure is called an ESU, of which the proposal comprises four in total. Each ESU will measure approximately 17.1 m by 7.6 m and would be 3.8 m at its maximum height.

63. A separate switchgear container for the necessary electrical plant to operate and monitor the units is also proposed. The container would measure up to 15 m by 4 m and 3.2 m in height. A security fence of up to 3 m height would be installed around the perimeter and the site would be served via a locked access gate. The fence specification and final battery configuration would be agreed at a later stage through an appropriately worded condition.

3.2.8 Grid Connection

64. The grid connection does not form part of the Section 36 consent application for the Development. The consent for the grid connection will be sought by the relevant owner/operator of the local transmission network, Scottish Power Transmission (SPT). The Network Operator will be responsible for the consenting (via a separate "Section 37" application), construction, operation, and maintenance of the grid connection.

65. A grid connection offer has been accepted by the Applicant and it is proposed that the Development will connect into the grid at Currie substation, located approximately 23 km to the north-west of the Site. The precise grid route has not yet been confirmed by SPT, but the route will be designed to minimise effects on environmental receptors.

3.2.9 Temporary Infrastructure

3.2.9.1 Temporary Construction Compound

66. A temporary construction compound will be created for the duration of the build centred at approximately NGR 320548, 649205 as shown on Figure 3.1. This area has been chosen within a relatively level area of the Site, close to the Site entrance and with suitable separation distance from any environmental constraints identified during the EIA process. The area of the compound will measure approximately 100 m x 50 m and will include space for:

- Temporary construction cabins for site office and staff welfare facilities with provision for sealed waste storage and removal;
- Areas for storing materials;
- Parking for project related vehicles; and
- Containerised storage for tools and spares.

67. A typical construction compound arrangement is shown on Figure 3.8. Welfare facilities for site personnel will be required during construction which would be located within the construction compound. Foul water and effluent would be treated either via septic tank with soakaway designed to SEPA guidelines (including GPP4) or by the use of chemical

facilities with periodic material for off-site disposal. Any facilities would be subject to agreement with SEPA.

68. The area to be used for the construction compound would be stripped of topsoil to expose a suitable formation which will be stored for future re-instatement. A geosynthetic material base or similar will then be laid followed by a layer of suitable material then a further geosynthetic material laid prior to the top surface of blended fines.

69. Appropriate bunding arrangements will be employed in all areas where fuel and oil storage tanks will be situated, in order to prevent contamination of the surrounding soils, vegetation, surface water and ground water. The fuel storage area will be above ground with secondary containment in accordance with SEPA's GPP2 (Above Ground Oil Storage Tanks), PPG7 (Refuelling facilities) and GPP8 (Safe storage and disposal of fuel oils), and will be situated a minimum of 50 m from watercourses to reduce the risk of pollution of watercourses. Any contaminated run-off within the sealed bund will be removed to a licensed waste management facility.

70. Following completion of the construction phase the components of the compounds will be removed and the area fully restored.

3.2.9.2 Borrow Pits

71. It is the intention to source aggregate for the construction of access tracks, structural fill beneath turbine foundations, construction compounds and turbine hardstandings from on-site borrow pits as far as possible. Sourcing aggregate from within the Site, rather than an off-site quarry, has the advantage of reducing the number of heavy goods vehicles (HGV) on public roads.

72. Taking account of the anticipated materials balance from the preliminary outline design and the assumption that the rock cut during construction would be reused, it is anticipated that approximately 120,000 m^3 would be required from borrow pits to complete the works.

73. Two potential borrow pits have been identified with an estimated 318,471 m^3 of available aggregate. This is additional capacity to that required for construction materials which allows some flexibility in the use of borrow pits, and it is therefore likely that the final borrow pit dimensions will be smaller than those presented; however, for the purpose of the EIA Report it is assumed that both borrow pits are used to their full extents as a worst case.

74. The locations of the borrow pits are shown on Figure 3.1; one is located north-east of the T12 in the north of the Site, and the second is located north of T5, in the east of the Site. The plans and profiles of the borrow pits are shown in Figures 3.13 and 3.14. A Borrow Pit Assessment is also presented in Appendix A3.1.

75. The locations of the two borrow pits have been influenced by environmental considerations to minimise the impacts on ecology, peatlands, cultural heritage, hydrology, private water supplies (PWS), and landscape as described within the relevant technical chapters of this EIA Report. The final location, number and estimate of material from each potential site would be determined once full ground investigation works and testing have been completed. The borrow pits will require the use of plant to both extract and crush the resulting rock to the required grading. It is anticipated that most rock will be extracted by breakers however some blasting may be required. Precise details will be confirmed at the construction stage.

3.2.10 Site Signage

76. During construction, the Site will have suitable signage to protect the health and safety of workers, contractors and the general public. There will be a sign giving the operator's name, the name of the Development and an emergency contact telephone number. On the turbines and substation building, there will be further signs giving information about the component, potential hazards, the operator's name, the location grid reference, and the emergency telephone number. The signage will occur largely on footpaths and along tracks; however, the exact final locations and design of the signage will be defined prior to the Development becoming operational.

3.2.11 Micro-Siting

77. Current knowledge of the ground conditions at the Site is based on desk top studies and preliminary site investigations, including walkover surveys and peat probing. These would be developed prior to construction by intrusive ground investigations which may result in minor adjustments to turbine and ancillary infrastructure locations to account for ground conditions and foundation design.

78. A 50 m micro-siting allowance has been proposed for turbines and ancillary infrastructure and considered in the EIA. Turbines and associated infrastructure would not be micro-sited into deeper peat or closer to watercourses except with prior agreement from the SEPA.

79. The micro-siting allowances are considered and assessed throughout the technical and environmental chapters (Chapters 5 - 17) completed as part of the EIA for the Development.

80. It should be noted that section of track proposed at the junction of the D18 Cloich & Cloich Farm Road will be aligned to avoid damage to the mature beech tree located at approximate NGR 322257, 649890. Further details for safeguarding this tree are included within **Chapter 7: Ecology** of this EIA Report.

3.2.12 Forestry Removal

81. As Development is largely located within commercial forestry plantation, felling is required to accommodate infrastructure, including tracks, turbine infrastructure, borrow pits, substation and construction compound. This includes a 110 m radius around each turbine position and 7.5 m either side of access tracks.

82. In total 70.62 ha of forestry would be removed for infrastructure construction. The area of forestry removed will be compensated for by an appropriately designed new compensatory forestry planting scheme to satisfy the requirements of the Control of Woodland Removal Policy[5].

83. Some crops adjoining the areas to be felled for infrastructure construction will require further tree clearance due to the predicted instability of these adjoining stands of trees. The area of proposed management felling for windblow mitigation is 129.63 ha representing approximately 12% of the stocked forest area within the Site. Areas felled for windblow mitigation within the forests would be replanted with a replacement crop in the same location with species determined by the approved restocking plan within the existing LMP.

[5] Forestry Commission Scotland (2009). The Scottish Government's Policy on the Control of Woodland Removal. Edinburgh. Available at: https://forestry.gov.scot/publications/349-scottish-government-s-policy-on-control-of-woodland-removal-implementation-guidance (Accessed 22/06/2021)
Note that in April 2019 Forestry Commission Scotland became "Scottish Forestry".

84. The forest removal will be undertaken using conventional harvesting and/or mulching for younger crops and brash. Activities will be carried out using standard forest harvesting equipment with commercial timber removed from the Site.

85. Further details on the Forest Design for the Site are explored in **Chapter 13: Forestry**.

3.2.13 Restoration

86. Site restoration will involve the restoration of track and hardstanding verges, borrow pits and the temporary construction compound to provide a natural ground profile with non-geometric surfaces and tie-ins with existing undisturbed ground levels. Restoration will be undertaken at the earliest opportunity to minimise storage of turf and other materials and to allow restoration of disturbed areas as early as possible and in a progressive manner.

87. A restoration plan for the site will be secured by condition and agreed with the Council and relevant statutory consultees.

3.3 CONSTRUCTION AND DEVLEOPMENT PHASING

88. The on-site construction period is estimated at approximately 18 months in duration and would comprise the following principal operations:

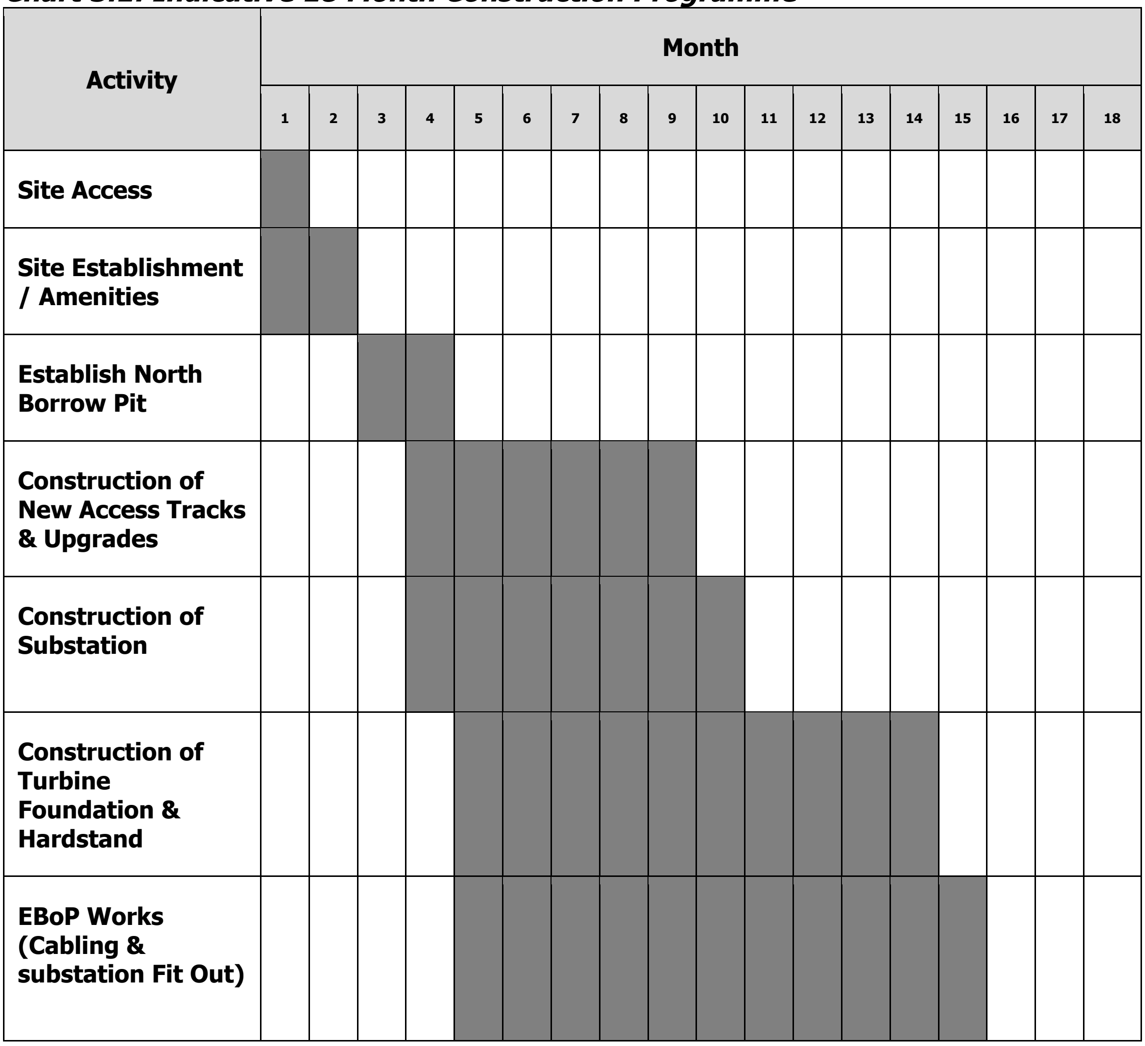
- Upgrade of the D17 and D18 public roads within the Site;
- Construction of access junction off the A703;
- Phased forestry felling to facilitate construction;
- Installation of temporary and permanent drainage;
- Extraction of stone from the onsite borrow pits;
- Construction of the temporary construction compound;
- Upgrade of existing forestry tracks and construction of new access tracks, including watercourse crossing points;
- Construction of the substation compound area;
- Construction of the substation building, including a control building and BESS;
- Excavation of shallow cable trenches approximately 1 m off the edge of the track and cable laying adjacent to the access tracks and crane hardstandings for drainage;
- Construction of turbine foundations;
- Construction of crane hardstanding areas;
- Delivery, erection and commissioning of wind turbines;
- Connection of onsite electrical distribution cables;
- Commissioning of the site equipment; and
- Restoration of the borrow pits and the temporary construction compound.

3.3.1 Construction Period

89. It is expected that many of the above operations will be carried out concurrently, although predominantly in the order identified in Chart 3.1 below, which will minimise the overall length of the construction programme. An indicative Construction Programme is illustrated in Chart 3.1. It should be noted that felling, as described in **Chapter 13: Forestry**, to facilitate the construction of the Development, as outlined in Chart 3.1 below, is likely to commence approximately six months prior to the construction commencement date, and continue for six months in parallel with construction activities. The current forestry Land Management Plan (LMP) has a significant amount of timber within the Site due for felling during the period of 2025-2030; therefore, a significant volume of timber may have already been felled and extracted prior to the construction of the Development in line with the current LMP. For the purpose of the traffic assessment presented in **Chapter 12: Access, Traffic and Transportation** all of this felling has been attributed to the Development and it is assumed that all permanent and management felling will be completed within the twelve-month period described above to present a worst-case scenario.

90. The starting date for construction activities will largely be dependent upon the date that consent may be granted and grid availability; subsequently, the programme would be influenced by constraints on the timing and duration of any mitigation measures confirmed in the individual technical chapters or by the consent decision, as well factors such as weather and ground conditions experienced on the Site.

Chart 3.1: Indicative 18 Month Construction Programme



Activity	Month																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Turbine Delivery & Installation																		
Grid Connection																		
Testing and Commissioning (EBoP & WTG)																		

91. It is proposed that construction activities be limited to the working hours of 07:00 to 19:00 Monday to Friday and 07:00 to 13:00 on Saturdays, with the exception of any emergency working or turbine deliveries. During the installation phase, there may be the requirement for extended working as some critical elements of installation cannot be stopped once started, such as concrete pouring. This would be agreed in advance with the Council.

3.3.2 Construction Methods and Environmental Management

92. The construction phase will be controlled via a series of detailed method statements, which will be prepared by a civil engineering contractor appointed by the Applicant, who will have overall responsibility for environmental management on the construction site. While these method statements can only be formulated following detailed site investigation and detailed engineering design it is possible to indicate the outline of the methods that will be used, particularly in relation to environmental management.

93. The services of specialist advisors will be retained as appropriate, such as an archaeologist and ecologist, to be called on as required to advise on specific environmental issues. The appointed civil engineering contractor working with specialist advisors (E.g. Ecological / Environmental Clerk of Works) will ensure construction activities are carried out in accordance with the mitigation measures outlined in this EIA Report.

94. Prior to construction, a detailed Construction Environmental Management Plan (CEMP) would be prepared that collates all measures required during construction to avoid and minimise environmental harm including guidance and best practice. The CEMP would include, but not be limited to:

- Site induction and training;
- Working hours;
- Enabling works;
- Surface water and drainage management;
- Waste management;
- Wastewater and water supply monitoring and control;
- Oil and chemical delivery and storage;
- Water quality monitoring;
- Ecological protection measures;
- Private Water Supply protection measures;
- Construction noise management;
- Cultural heritage protection measures;
- Handling of excavated materials;
- Forest and woodland management;

- Reinstatement and restoration;
- Traffic management;
- Environment incident response and reporting;
- Use and extent of borrow pits;
- Method statements and risk assessments;
- Final drawings and details of access tracks; and
- Final drawings and details of turbine foundations.

95. To ensure that the mitigation and management measures detailed within this EIA Report are carried out, construction personnel and contractors will be required to adhere to the CEMP which will form an overarching document for all construction site management requirements.

96. Contractors will also be required to adhere to the following to minimise environmental effects of the construction process:

- Conditions required under the Consent and deemed planning permission;
- Requirements of statutory consultees including SEPA and NatureScot (formerly Scottish Natural Heritage (SNH)); and
- All relevant statutory requirements and published guidelines that reflect 'best practice'.

97. The Applicant will require that all contractors follow the principles of ISO14001 - 'Environmental Management Systems - Specification and Guidance for Use'[6], and will provide the following:

- Details of main contractor's corporate environmental policy;
- Assessment of environmental impacts during construction;
- Procedures and controls for environmental management;
- Environmental monitoring details and reporting systems;
- Schedule of contractual and legislative requirements; and
- Schedule of relevant consents, licences and authorisations.

98. The CEMP will be agreed with the relevant statutory bodies including SEPA, NatureScot, and the Council prior to commencement of construction, and performance against the CEMP will be monitored by the Applicant's Construction Project Manager throughout the construction period.

99. Particular environmental impacts and associated mitigation measures required to be addressed within the CEMP are discussed in relevant sections of this EIA Report.

100. In addition, the CEMP will typically be supported by the following documents which apply to the construction process:

- Water Construction Environmental Management Plan;
- Peat Management Plan;
- Pollution Prevention Plan;
- Traffic Management Plan;
- Site Waste Management Plan; and
- Restoration Plan.

[6] ISO (2015) ISO 14001:2015 Environmental management systems – Requirements with guidance for use [Online]. Available at: https://www.iso.org/standard/60857.html (Accessed 15/06/2021).

3.3.3 Construction Materials

101. The key materials which would be required for the construction of the track, turbine foundations, hardstanding areas and cable trenches are:

- Crushed stone;
- Geotextile;
- Cement;
- Sand;
- Concrete quality aggregate: high strength structural grade, which is not prone to substantial leaching of alkalis;
- Steel reinforcement; and
- Electrical cable.

102. All materials will be sourced and transported to the site from local suppliers, where possible, with the exception of materials sourced from onsite borrow pits.

3.3.4 Construction Movements

103. Various vehicle types are required during the construction stage of the Development; of these, the majority would be standard road vehicles of similar type to those using local roads on a daily basis. However, the delivery of the main wind turbine components would require vehicles and transport configurations that are longer and/or wider and/or heavier than standard road vehicles, this is discussed in **Chapter 12: Access, Traffic and Transportation**.

3.3.5 Waste Management

104. All waste will be removed off-site for safe disposal at a suitably licensed waste management facility in accordance with current waste management regulations. Wherever possible, excavated stone or soils will be re-used on site, primarily for the restoration of disturbed ground. All details of this will be included within the CEMP, as agreed with the Council and SEPA.

105. The main items of construction waste and their sources are:

- Hardcore, stone, gravel from temporary surfaces to facilitate construction waste, and concrete;
- Subsoil from excavations for foundations and roads;
- Timber from temporary supports, shuttering and product deliveries;
- Miscellaneous building materials left over from construction of the control building;
- Sanitary waste from chemical toilets (if used);
- Plastics packaging of material; and
- Lubricating oils, diesel - unused quantities at end of construction period.

106. Subsoil will be used for reinstatement of construction areas and landscaping. Oils and diesel will be removed from the Site and be used or disposed of by an approved waste contractor in accordance with provisions of the Special Waste Regulations 1996[7] if it is unsuitable to use elsewhere

107. In the event of the complete decommissioning of the wind turbines, all mechanical/electrical equipment will be removed from the Site, the control building will be removed, turbine foundations will be covered over with soil and any disturbed ground will be reinstated and reseeded. All cables would be cut off below ground level, de-energised, and left in-situ. It is anticipated that tracks would remain *in-situ* and continue to be used for forestry management.

[7] The UK Government (1996) The Special Waste Regulations 1996 [Online] Available at: https://www.legislation.gov.uk/uksi/1996/972/contents/made (Accessed 22/06/2021)

108. The decommissioned turbine components will have sufficient salvage value to ensure their proper recycling, however it is customary that a financial bond is put in place with the local authority to ensure that provision is secured for decommissioning works in the event that the operator is unable to fulfil its requirements. An important environmental issue in the decommissioning of the wind turbines will be the proper handling and disposal of any contaminating material (e.g. lubricating/cooling oils etc.). The Applicant undertakes to ensure that all such contaminating material will be removed from the Site in accordance with best practice.

109. The civil engineering contractor will be required to prepare a Site Waste Management Plan (SWMP) to ensure that best practice principles are applied with regard to reducing, re-using and recycling of all materials.

3.3.6 Health and Safety Related Issues

110. Health and safety issues during construction and decommissioning fall under the Construction (Design and Management) (CDM) Regulations 2015[8]. Health and safety will be initially addressed as part of the Pre-Construction Information Pack prepared by the Applicant. The Construction Project Manager will be required to prepare a Construction Phase Plan (Health and Safety Plan) and to forward information to the Applicant during the works to enable the Health and Safety File to be completed.

111. Turbines are designed to be safe and are built to withstand extreme wind conditions. The turbines selected for the Development will have a proven record in terms of safety and reliability.

112. Day-to-day operational and maintenance activities will be co-ordinated with the private landowner's operational requirements.

113. Public access to the Site will be restricted throughout the construction working area during construction for health and safety reasons and will be reinstated following cessation of construction activities.

114. An Operations and Maintenance Manual for the design life of the Development will be prepared by the Contractor and will cover all operational and decommissioning procedures.

3.4 OPERATIONAL PHASE

115. The Development will have an operational lifespan of up to 30 years from full commissioning of the proposed turbines.

3.4.1 Turbine and Infrastructure Maintenance

116. Turbine maintenance will be carried out in accordance with the manufacturer's specification. The following routine turbine maintenance will be undertaken:

- Initial service;
- Routine maintenance and servicing;
- Gearbox oil changes;
- Blade, gearbox and generator inspections; and
- Replacement of blades and components as required.

117. Operational site inspections will be undertaken on a weekly basis and the servicing of turbines will be undertaken as per the turbine manufacturer requirements, usually once per year, but with monthly visits by the manufacturer's servicing team.

[8] Health and Safety Executive (2015) Construction Design and Management Regulations 2015 [Online] Available at: http://www.hse.gov.uk/construction/cdm/2015/index.htm (Accessed 22/06/2021).

118. Ongoing track maintenance will be undertaken to ensure safe access is maintained to all parts of the Development all year round.

119. All wastes arising as a result of servicing and maintenance (e.g. lubricating oils, cooling oils, packaging from spare parts or equipment, unused paint etc.) will be removed from the Site and reused, recycled or disposed of in accordance with best practice.

3.4.2 Snow Clearance

120. Safe access to the Development is required year round. There is potential for the Development to experience snowfall and therefore clearance of snowdrifts may be necessary via grading of the track using suitable ploughing plant.

3.5 DECOMMISSIONING

121. As noted previously, the operational lifespan of the Development and associated infrastructure will be up to 30 years. Following this, an application may be submitted to retain or replace the turbines, or alternatively they will be decommissioned.

122. Decommissioning would involve the following:

- Dismantling and removal of the wind turbines and electrical equipment;
- Reinstatement of the turbine areas and associated hardstanding; and
- Demolition and removal of control building and compound.

123. Turbine components and electrical equipment would be dismantled and removed in a similar manner to their delivery and erection. Turbine towers, nacelles and blades would be transported from the Site as abnormal loads. A route assessment will be undertaken prior to decommissioning to identify the best route to remove the components offsite. Turbine components would be broken up offsite in controlled environments ready for reuse, recycling or appropriate disposal.

124. The removal of the top 1 m of the turbine base and plinth would be undertaken, requiring an excavated trench around the upstand to provide a working area. Breakout of the top part of the plinth would be undertaken using an excavator-mounted jack hammer. The cables would be cut level with the remaining concrete. Metal from the bolt ring will also be disposed of through the removal of the top 1 m of the turbine base and plinth. Once the broken out concrete has been removed, the area would be reinstated by backfilling with soil/peat to an agreed method statement.

125. A similar process would be undertaken for the substation building, with the equipment removed offsite for breaking up and appropriate disposal and the building demolished. The top one metre of the concrete foundation slab would be broken up and removed, and the ground reinstated with topsoil. However cut faces are likely to be retained, as there would be insufficient material to fully backfill the substation area.

126. The access tracks will be retained *in situ* at decommissioning for use by FLS. The cables will also be left in situ.

127. Overall, it is estimated that the decommissioning period for the Development would be approximately eight to twelve months.