# Chapter 3: Development Description

# Chapter 3
# Development Description

## Introduction

**3.1** This chapter describes the components of the Proposed Development for which consent under Section 36 of the Electricity Act 1989 is being sought alongside deemed planning permission, and which has been assessed through the Environmental Impact Assessment (EIA) process. It also includes details about the construction and operation of the Proposed Development.

**3.2** This chapter is supported by the following figures and appendices which are referenced throughout the text:

- EIA Report Volume 3a: Figures
  - **Figure 3.1: Site Layout**;
  - **Figure 3.2: Indicative Turbine Elevation 220 m Tip Height**;
  - **Figure 3.3: Typical Turbine Foundation**;
  - **Figure 3.4: Typical Crane Hardstanding**;
  - **Figure 3.5: Typical Cable Trench**;
  - **Figure 3.6: Proposed Substation Expansion**;
  - **Figure 3.7: Indicative Battery Storage Facility**;
  - **Figure 3.8a: Widening at Junction with B6456**;
  - **Figure 3.8b: Outline Access Junction Design**;
  - **Figure 3.9: Typical Access Track Details**;
  - **Figure 3.10: Typical Watercourse Crossing Details**;
  - **Figure 3.11a - d: Proposed Construction Compounds 1 – 4**;
  - **Figure 3.12: Substation Plan and Elevation**; and
  - **Figure 3.13: Recreational Access Routes**
- EIA Report Volume 4: Appendices
  - **Appendix 3.1: Outline Construction Environmental Management Plan (CEMP)**;
  - **Appendix 3.2: Borrow Pit Assessment**;
  - **Appendix 3.3: Outline Outdoor Access Management Plan**; and
  - **Appendix 3.4: Explosive Ordnance Threat Assessment (EOTA).**

## Location

**3.3** As described in **Chapter 1: Introduction**, the Site is located within the Lammermuir Hills in the Scottish Borders Council (SBC) local authority area. The topography of the Site consists of a plateau of rolling hills ranging between 300 metres (m) and 500 m Above Ordnance Datum (AOD), separated by the steep sided valley of the Dye Water which runs west-east through the Site. The Dye is a tributary of the River Tweed. Notable hills within the Site include: Meikle Law (468 m AOD) in the north-west; Byrecleugh Ridge (440 m AOD) in the north, Dunside Hill (437 m AOD) in the south-east, and Wedder Lairs (486 m AOD) in the

west. Multiple smaller watercourses join the Dye Water and further dissect the Site – these small watercourses are generally orientated north-south, and include Green Cleugh, Wood Cleugh, Kersons Cleugh, and Foul Cleugh.

**3.4** The landcover on the Site consists mainly of heather moor and acid grassland. Tree cover is sparse, especially so on the upper plateau where heather moorland vegetation dominates. Large areas of the Site have been managed for shooting, and the patchy growth pattern of the vegetation reflects the distribution of muirburn. There are no Core Paths within the Site, however the Southern Upland Way runs approximately 0.8 kilometres (km) to the south of the nearest proposed turbine and shares a section of the proposed access track (the existing Fallago Rig access track) for approximately 700 m to the east of Twin Law.

**3.5** The closest settlements to the Site are Westruther, which is on the B6456 to the south, and Longformacus, which is on the minor road which crosses the Lammermuir Hills to the east. The B6355 runs broadly parallel to this minor road, and the two join at Wanside Rig to the north of the Site. There is a cluster of dwellings at Byrecleugh in the east of the Site, accessed via a private track. Other residential properties within 2-3 km of the Site include Trottingshaw and Dye Cottage to the east and Killpallet to the north.

**3.6** The operational Fallago Rig Wind Farm which comprises 41 turbines at 125 m height to tip, and seven turbines at 110 m to tip is immediately to the north-west of the site boundary. The access track to Fallago Rig runs through the Site, along the valley of the Dye Water and through Byrecleugh.

## Fallago Rig Wind Farm

**3.7** Fallago Rig Wind Farm, which is operated by EDF Renewables, is located in the Scottish Borders adjacent to the Proposed Development. The existing wind farm comprises 48 turbines with an installed capacity of 144 megawatts (MW). The wind farm became operational in July 2013. The Proposed Development will connect to the electricity grid at the Fallago Rig substation.

## Overview of the Proposed Development

**3.8** The main components of the Proposed Development are listed below and described in more detail in the remainder of this chapter:

- Up to 15 wind turbines, each with a maximum blade tip height of 220 m (with an external transformer kiosk);
- Crane Hardstandings adjacent to each turbine position;
- Four new watercourse crossings and associated infrastructure;
- Approximately 15 km of proposed wind farm tracks and approximately 1.1 km of proposed light vehicle track;
- Approximately 17.5 km of existing access tracks (including areas of widening/upgrading);
- Onsite underground electrical cables and cable trenches;
- Control building and extension to Fallago Rig existing substation; and
- A 20 MW battery storage area.

**3.9** In addition to the above components associated with the operation of the Proposed Development, construction of the Proposed Development will also require the following components:

- Four construction compounds (two existing compounds which will remain in situ following completion of the Proposed Development, and two proposed which will be restored following construction), including laydown area(s) and car parking; and
- Up to three borrow pits which will be closed and reinstated following completion of construction.

**3.10 Figure 3.1** shows the proposed layout of the Proposed Development including the key components noted above. **Table 3.1** details the grid coordinates and maximum blade tip height of the proposed wind turbine locations.

**Table 3.1: Wind Turbine Details**

| Turbine No | Easting (X) | Northing (Y) | Maximum Blade Tip Height (m) |
|---|---|---|---|
| 1 | 360176 | 660152 | 220 |
| 2 | 361195 | 660182 | 220 |
| 3 | 361875 | 659981 | 220 |
| 4 | 360226 | 659587 | 220 |
| 5 | 361171 | 659607 | 220 |
| 6 | 360413 | 659036 | 220 |
| 7 | 359947 | 658162 | 220 |
| 8 | 361038 | 658162 | 220 |
| 9 | 359530 | 657593 | 220 |
| 10 | 360186 | 657242 | 220 |
| 11 | 361000 | 657558 | 220 |
| 12 | 360598 | 656792 | 220 |
| 13 | 361483 | 657214 | 220 |
| 14 | 361107 | 656413 | 220 |
| 15 | 362045 | 656697 | 220 |

## Components of the Proposed Development

### Wind Turbines

**3.11** Consent is being sought for the installation and operation of up to 15 three-bladed, horizontal axis turbines with maximum blade tip heights of 220 m[1]. For assessment purposes, a representative candidate turbine has been used based on specifications available in the marketplace (currently of 7.2 MW nominal capacity), the candidate turbine used in the assessment work is the Vestas V172 unless otherwise stated. Where relevant, the technical chapter of the EIA Report identifies which candidate turbine/turbine parameters have been used to assess a maximum/worst case scenario using currently available data. The civils work (foundation and hardstanding design) has used the Siemens Gamesa SG170 as the relevant data is not available for the V172. For the Landscape and Visual Impact Assessment (LVIA) (**Chapter 4**), this assesses two 'reasonable worst case' scenarios[2] which are as follows:

- Day-time scenario (largest rotor) – maximum blade tip height 220 m, hub height 130 m, rotor diameter 180 m; and
- Night-time scenario (tallest hub) – maximum blade tip height 220 m, hub height 139 m, rotor diameter 162 m.

**3.12** It should be noted that the final chosen turbine model is likely to be different to currently available turbines and this may affect the rotor lengths and hub height. However, all assessments are based on a maximum case and judgements of

[1] For the purposes of this application, consent is being sought for 15 turbines, each with a capacity of 7.2 MW. It should be noted that a turbine with a different capacity could be used depending on availability at the time the Proposed Development is constructed.
[2] Two scenarios are provided to assess the different effects which may occur during day time and night time.

significance will not change. The Applicant (EDF Energy Renewables Ltd) will use the best turbine option available at the time of construction within the constraints of the maximum blade tip height of 220m. Likewise, the overall capacity rating of suitable turbines may vary from the time of application with replacement models regularly being developed by turbine manufacturers.

**3.13** A diagram of a typical 220 m maximum blade tip height turbine is shown on **Figure 3.2**. For the purposes of the visualisations and landscape and visual impact assessment (see **Chapter 4: Landscape and Visual Impact Assessment**), it is assumed the turbine blades will be made from glass fibre/carbon spar with glass fibre airfoil shells. The turbine towers will be of tapering tubular steel construction, likely to be finished in a light grey semi-matt colour.

**3.14** The colour and finish of the wind turbine blades, nacelles and towers are expected to be the subject of a deemed planning permission condition.

**3.15** A small external kiosk will be located adjacent to the turbine tower and will house switchgear equipment and in some cases, the turbine transformer as shown on **Figure 3.2**. The size of the kiosk will depend on the turbine model but is typically 3 m by 2.5 m in plan and 2.5 m in height above surrounding ground level. External switchgear and transformers provide the safest working areas for operational turbine maintenance personnel.

### Aviation Warning Lighting

**3.16** In line with the published guidance from the Ministry of Defence (MOD) and approval from the Civil Aviation Authority (CAA), seven turbines will be fitted with Air Navigation Order (ANO) visible red lights (T1, T3, T6, T8, T9, T14 and T15) and all 15 turbines will be fitted with infra-red hub mounted obstruction lighting. Infrared lighting allows military aircraft fitted with a range of Night Vision Devices (NVDs) to detect and avoid the Proposed Development. Infrared lighting cannot be seen by the naked eye. Further information can be found in **Appendix 11.1**: **Wind Farm Aviation Lighting and Mitigation Report**.

### Turbine Foundations, Crane Hardstandings and Temporary Laydown Areas

**3.17** The turbines will be installed on foundations comprising both stone and steel-reinforced concrete. These typically measure approximately 25 m diameter with a concrete depth of approximately 3.5 m as shown on **Figure 3.3**. Each turbine foundation will require approximately 1000 $m^3$ of concrete. The detailed design, sizing and specification for each foundation will depend on the final turbine selected and the ground conditions encountered at each turbine location, which will be confirmed by detailed site investigation post-consent, in the pre-construction period.

**3.18** Adjacent to each turbine, a permanent area of hardstanding approximately 50 m x 20 m will be constructed for use as a crane pad. The exact geometry and position of the crane pads will depend on the turbine supplier's specifications, the crane selected for erection and the findings of detailed ground investigations prior to construction. Additional temporary hardstanding areas will be constructed for the secondary crane, and these will measure approximately 19 m x 11 m.

**3.19** Temporary laydown areas will also be required for the crane boom erection and storage of turbine components. These temporary areas will be reinstated following erection of the turbine. The hardstanding areas will be levelled using cut and fill operations and surfaced in crushed stone to provide a durable surface. These hardstanding areas are used during the turbine erection process as a platform for the cranes to lift the turbine components into position. The hardstanding provides safe access for maintenance and repairs and will therefore remain in place for the operation of the Proposed Development. An indicative crane hardstanding arrangement with temporary laydown areas is shown in **Figure 3.4**.

**3.20** Construction of turbine foundations, hardstandings and laydown/ storage areas will require the excavation of surface organic and soft surface material. Turbine foundations will generally require excavation to a depth of approximately 4 m, with hardstandings and laydown areas generally requiring excavation to a depth of up to 1 m. The excavated material would be used to partially backfill the excavation and provide material for landscaping and surfacing reinstatement. As such, this material will be stored near to the excavation until required. The underlying rock will be levelled to provide a workable platform for the assembly of reinforcing bars and formwork used to contain the poured concrete for turbine foundations. As discussed in **Chapter 2: Site Selection and Design Strategy**, the design of the Proposed Development has sought to avoid areas of deeper peat.

**3.21** During construction, dewatering could be required to keep the construction areas dry (for example, if rainwater gets into construction areas). Suitable filtration systems will be employed to ensure that silt laden water will not contaminate surface watercourses and that extracted water will be remediated close to the extraction location to minimise potential effects on local

hydrology. Further details on pollution prevention are set out in the outline Construction Environmental Management Plan (CEMP) (see **Appendix 3.1**).

### Turbine Transformers and Underground Cables

**3.22** An electrical transformer will be required for each turbine and will be located within the wind turbine or an external turbine kiosk. The transformers will be either oil-filled with a bunded footing to remove any risks of spillage or a solid cast resin type which is effectively non-polluting. All cables within the wind farm and connecting to the Fallago Rig substation will be buried underground or within the structure of watercourse crossings.

**3.23** Power, earthing, communication and control circuits will be required to link each wind turbine to the switchgear station housed within the wind farm substation. These cables will be buried in trenches and located adjacent to the proposed/existing access tracks, where practicable. Typical cable trench details are shown in **Figure 3.5**.

**3.24** The cabling connecting each wind turbine to the switchgear station will be single core and consequently each circuit will comprise three individual power cables laid in a trefoil arrangement and surrounded by sand backfill. Detailed construction and trenching specifications will depend on ground conditions encountered. Typically, cables will be laid in a trench 1 m deep and 1.5 m wide. To minimise ground disturbance cables will be routed alongside the access tracks. Cables will be laid within a sand or granular bedding to prevent damage to the cables from sharp stones. Trenches will be backfilled with excavated material and the surface redressed with set-aside turves or to allow natural revegetation.

**3.25** Cable routes will run parallel to proposed access tracks from each turbine to the proposed substation. Cabling from turbine numbers T2, T3 and T5 will route via the proposed light vehicle track to the west.

### Grid Connection, Control Building and Substation

**3.26** The Proposed Development will be connected to the national electricity network (the 'grid') at the existing Fallago Rig substation (**Figures 3.1 and 3.6)**.

**3.27** The existing 400kV Fallago Rig substation is split into two parts: Scottish Power Transmission (SPT) operates a switchgear building and 400kV compound; and Fallago Rig Wind Farm operates a separate switchgear building and maintenance area. The Proposed Development includes an extension of the existing substation as shown on **Figure 3.1**. The substation extension will be constructed in line with SPT's requirements and will house the equipment required for connecting the Proposed Development to the existing 400kV SPT compound. This includes a new transformer and busbar extensions to the existing 400kV infrastructure. The indicative arrangements for the substation are presented on **Figure 3.6**.

**3.28** A new switchgear building for Dunside Wind Farm will also be constructed in the extended substation compound, and this will accommodate switchgear, metering equipment, electrical control panels, communications equipment, welfare, central computer systems and spare parts/maintenance consumables associated with the operation and maintenance of the wind turbines. External to this building there may also be an auxiliary transformer and auto-start standby diesel generator with close coupled fuel storage tank. The generator fuel will be stored in accordance with Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended). The indicative arrangements for the control building are presented on **Figure 3.12**. Depending on final turbine characteristics, the Dunside Wind Farm substation area may also require a statcom area to manage reactive power for the grid connection. Whilst the need for a statcom is considered to be unlikely, it has been included in the current proposal (within the proposed substation extension area) for completeness and would be confirmed through discharge of a deemed planning permission condition relating to the final substation arrangement and building finishes (**Figure 3.6**).

### Battery Storage

**3.29** It is proposed that an energy storage facility will be constructed to enable co-location of battery storage with the proposed wind turbines. It is anticipated that the preferred choice for battery storage will consist of Lithium-ion batteries, contained and bunded within secure steel shipping typed containers. The batteries and their ancillary equipment will be surrounded with approximately 2 m security fencing to form a stand-alone compound to the south of the substation (**Figure 3.1**). It is proposed to be located within the base of the borrow pit created during the construction of Fallago Rig wind farm in an area of existing levelled ground. The compound for the energy storage area will measure approximately 50 m x 40 m in plan dimensions. The arrangement of the indicative energy storage facility is shown on **Figure 3.7**.

**3.30** The facility will be able to both import and export power to the network as required, providing a 'security buffer' to cope with supply and demand events. The battery storage facility would provide back-up power to National Grid for the benefit of providing stability to the electricity supply network and the integration of more renewable energy generation. The capacity of the proposed battery storage facility is 20 MW.

### Access to Site

**3.31** Access to the Site will utilise the existing access created and maintained for Fallago Rig Wind Farm (with upgrades/widening proposed where required), with access taken from the B6456 to the east of Westruther (**Figure 3.8a-b**) then by means of a short section of minor road to Wedderlie and then following the wind farm track north for approximately 6 km to the Dye Water valley. This will be used primarily for the delivery of wind turbine components, general construction traffic and as the Site access for construction workers. Delivery of turbines from the port of entry (currently assumed to be Rosyth) will be undertaken via the M90, A720, A68 and A697 joining the B6456 near Hyndsidehill. Further details are provided in **Chapter 10: Access, Traffic and Transport**.

**3.32** A Construction Traffic Management Plan (CTMP) will be implemented to minimise disturbance on the local road network. The CTMP will also contain details of the temporary measures (such as signage) to be put in place on the approach to the Site to ensure the safe access and egress of construction vehicles from and onto the major road network. Further details are provided in **Appendix 10.1: Transport Assessment.**

### Onsite Wind Farm Tracks

**3.33** There are a number of existing wind farm tracks currently used onsite, which are used for the operation and maintenance of the Fallago Rig Wind Farm. Whilst the position of the wind turbines inherently influences the routes of the proposed new wind farm tracks, the following objectives were adopted during the track design, where possible:

- To facilitate safe access to each wind turbine, avoiding steep slopes, ground with potential instability and deeper areas of peat (floating tracks proposed where required);
- To build health and safety aspects into track design from an early stage, including avoiding slopes which will be too steep for access and creating clear definitions between turbine working areas and access tracks;
- To minimise the need for new watercourse crossings and maintaining a 50 m buffer from existing watercourses where possible;
- To keep overall new track length to a minimum, reducing stone requirements and associated potential environmental effects;
- To use existing access tracks as far as possible, minimising the necessity for new excavation;
- To follow the existing ground topography as much as possible, minimising the necessity for cut and fill engineering works and associated visual effects;
- To avoid known environmental constraints wherever possible; and
- To avoid disturbance to public access.

**3.34** Approximately 17.5 km of existing track will be utilised, and approximately 15 km of new track (including floating tracks) and 1.1 km of light vehicle tracks will be built as part of the Proposed Development. The indicative typical cross sections of wind farm tracks are presented on **Figures 3.9.**

### Light Vehicle Tracks

**3.35** The light vehicle track will be constructed using crushed stone to a depth of generally 0.5 m to 1.0 m depending on existing ground conditions, with a typical crossfall or centrefall of approximately 2% to aid surface water runoff.

**3.36** A 1.1 km section of 3m wide light-vehicle track is proposed in the north of the wind farm between turbine 1 and turbine 2. The topography in this area is too steep to use this route to deliver turbine components but the track is proposed for use by maintenance vehicles during the operation of the wind farm, enabling shorter journeys and quicker emergency response within the wind farm. Underground cables from T2, T3 and T5 will run alongside the track and cross over the minor watercourse in

Kersons Cleugh within the structure of an arch-section culvert, avoiding the need for a section of overhead line for the watercourse crossing.

### Watercourse Crossings

**3.37** The Proposed Development utilises existing access and wind farm tracks, and watercourse crossings created for Fallago Rig wherever possible. The number of watercourse crossings has been minimised and 23 are proposed, 19 of which are existing with the exception of the crossing for the light vehicle track described above, a minor crossing at the start of the proposed track to the southern area, and a new crossing at the informal track crossing of the Burn betwixt the Laws, which will need to be replaced to facilitate construction An inspection of the existing culverts and bridges has been undertaken. It is anticipated that none of the existing watercourse crossings will need to be replaced or improved to facilitate construction or operation of the Proposed Development. Redressing, and/or minor repair to the track surfaces of the existing crossings will likely be required to provide a suitable running surface for component delivery and routine Site maintenance. Typical watercourse/ditch crossings are shown in **Figure 3.10.**

### Micrositing

**3.38** It is proposed that the turbines and other infrastructure will be subject to a 100 m micrositing allowance which will be applied should adverse ground conditions or new environmental sensitivities be encountered during pre-construction ground investigations and surveys, or if more optimal ground conditions are identified nearby. Movement of infrastructure will also take into consideration other onsite constraints, such as environmental constraints, and be subject to advice from an Environmental Clerk of Works (ECoW). This allowance will ensure that the final position of the turbines and associated infrastructure are not varied to such a degree as to cause a notable change in the predicted environmental effects outlined in the EIA Report It is anticipated that, relocation of turbines beyond 50 m will require written approval from SBC in consultation with relevant statutory consultees. Tailored restrictions to the standard micrositing allowance are proposed to ensure that the final position of the turbines and associated infrastructure are not varied to such a degree as to cause a notable change in the predicted environmental effects outlined in the EIA Report. These restrictions are detailed in **Table 3.2**.

### Temporary Construction Compounds

**3.39** Four temporary construction compounds are proposed: two existing (CC1 and CC4) and two proposed new compounds (CC2 and CC3) as per **Figure 3.1**. The existing compounds CC1 and CC4 will remain in situ post construction for use by the landowner and Fallago Rig Wind Farm.

**3.40** The two new construction compounds will be formed by stripping organic and soft surface material and laying geotextile and crushed rock to create a firm regular surface. The proposed compounds are large enough for both the Balance of Plant Contractor (BoP) and turbine supplier to store materials and to provide appropriate welfare facilities. It is envisaged that the temporary construction compounds will be approximately 100 m x 50 m (CC2) and 150 m x 100 m (CC3). CC4 makes use of an existing hardstanding area created for Fallago Rig wind farm and will be used by Scottish Power Transmission for the development of the substation extension. Any oil storage areas will be appropriately bunded to ensure secondary containment was provided in line with the requirements of the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended). Perimeter drainage will intercept rainfall and then channel water to temporary filtration and dispersion structures, utilising where possible the natural contours of the landscape. The stripped surface material will be stockpiled nearby for reinstatement.

### Land Take

**3.41 Table 3.2** provides a summary of temporary and 'permanent' land take for the components of the Proposed Development. **Figure 3.11 a - d** illustrates the temporary working area for the Proposed Development.

**Table 3.2: Proposed Development Areas of Temporary and Permanent Land Take**

| Project Elements | Temporary Land Take ($m^2$) | Permanent Land Take ($m^2$) |
|---|---|---|
| Turbine, Crane Pads and Laydown areas | 132200 | 33000 |

| Project Elements | Temporary Land Take ($m^2$) | Permanent Land Take ($m^2$) |
|---|---|---|
| Substation Compound/extension | 0 | 19700 |
| Battery Storage (note: existing levelled area) | 0 | 2900 |
| Construction Compound 1 and 4 (including parking and staff welfare facilities) - existing levelled compound areas | 8450 | 0 |
| Construction Compound 2 and 3 (including concrete batching plant, parking and staff welfare facilities) - proposed areas | 22850 | 0 |
| Borrow Pits | 22090 | 0 |
| Onsite Access Tracks (New) | | |
| Floating | 0 | 4100 |
| Cut & Fill | 0 | 116700 |
| Onsite Access Tracks (Existing - area provided is only area of required widening) | 0 | 11540 |

### Borrow Pits

**3.42** To minimise the volume of stone brought onto the Site for construction of the Proposed Development, and any associated environmental effects, it is proposed that stone will be sourced from onsite borrow pits to provide the material necessary for new or upgraded tracks and hardstanding construction. Following detailed pre-construction site investigation including trial pits and stone sampling of borrow pit search areas, the volume and suitability of stone can be accurately evaluated whereupon borrow pit design and restoration profiles will be updated. Three borrow pit search areas and indicative designs have been identified and assessed to ensure that a 'worst case' has been considered in the EIA. Details of the three borrow pit search areas and indicative designs are provided in **Table 3.4 and Appendix 3.2: Borrow Pit Assessment**.

**3.43** It is estimated that approximately 127,000 $m^3$ of stone aggregate will be required for construction of the Proposed Development (including permanent access tracks, structural fill beneath turbine foundations and crane hardstandings and fill material for temporary construction works areas such as compounds), with the borrow pit search area having the estimated capacity to provide all of this requirement. However, for the purposes of a robust assessment for effects on traffic and transport, it has been assumed that 50% of the stone will be obtained from the borrow pits, with 50% being required to be imported. Further details are provided in **Chapter 10**.

**3.44** Typically, aggregate extraction from borrow pits will involve the following activities:

- Installation of perimeter drains to prevent surface water flows entering the excavated area;
- Creation of sumps and silt traps to capture subsurface flows and rainwater from the excavated area prior to discharge into the perimeter drains. These would allow suspended materials in the water to drop out before entering the drainage system;
- Upper layer of heather or grass (top 300 mm minimum) would be turfed, rolled and located suitably near point of removal. Turves are then watered and maintained until reinstatement; and
- Extracted material would be separated and machined/crushed within the borrow pit (or adjacent to it) and separated into stockpiles for use as general fill, structural fill or topping material.

**3.45** Following completion of construction, borrow pits would be restored to ensure that the ground is stable and to improve their visual appearance. A detailed reinstatement programme will be developed, drawing upon the advice of a landscape architect and an ecologist and implemented in agreement with SBC to ensure that proposed reinstatement materials and techniques are

suitable. It is anticipated that steep faces would be graded out to fit with the surrounding topography and disturbed surfaces covered with soil and re-seeded or re-turfed.

**Table 3.3: Borrow Pit Search Area Locations**

| Borrow Pit Search Area | Approx. Size ($m^2$) | Location |
|---|---|---|
| Borrow Pit 1 (east) | 8,880 | 363770, 658000 |
| Borrow Pit 2 (central) | 7,350 | 362240, 658550 |
| Borrow Pit 3 (west) | 5,940 | 359700, 658770 |

## Construction Activities

**3.46** It is estimated that it will take approximately 19 months to construct the Proposed Development. Construction works will include the following main activities.

- Upgrades to the existing Fallago Rig access track;
- Establishment of borrow pit(s);
- Construction of the temporary construction compounds (CC1, CC2 and CC3);
- Formation of temporary construction compound for grid operator (CC4);
- Construction of wind farm tracks and watercourse crossings;
- Construction of culverts under tracks to facilitate drainage and maintain existing hydrology;
- Construction of turbine foundations;
- Excavation of trenches and cable laying adjacent to site tracks and connecting to Fallago Rig substation;
- Construction of substation compound extension at Fallago Rig;
- Construction of substation control building (switchgear building);
- Movement onto Site and delivery and placement of battery storage facility steel enclosures;
- Movement onto Site and delivery and erection of wind turbines;
- Commissioning of the wind turbines, switching station, battery storage and control building;
- Restoration of areas disturbed during construction including re/planting; and
- Habitat management works (see **Appendix 6.6**).

**3.47** Where possible, construction activities will be carried out concurrently to reduce the overall length of the construction programme. Phasing of the construction process may result in civil engineering works progressing in some areas of the Site whilst turbines are being erected elsewhere. To minimise disruption to land use, Site restoration will be undertaken as early as possible.

### Construction Programme

**3.48** Construction of the Proposed Development is estimated to take 19 months. An indicative programme for the construction activities of the Proposed Development is shown in **Table 3.4** below.

**Table 3.4: Construction Programme**

| Construction Programme | Construction Month | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| Ground Clearance and preparation | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | | | | |
| Access to Site | ■ | | | | | | | | | | | | | | | | | | |
| Mobilisation and Enabling Works | ■ | ■ | ■ | | | | | | | | | | | | | | | | |
| Site Compounds | ■ | ■ | | | | | | | | | | | | | | | | | |
| Access Tracks | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | |
| Wind Turbine Foundations | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | |
| Crane Hardstanding | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | |
| Substation and Control Building | | | | | ■ | ■ | | ■ | ■ | ■ | | | | | | | | | |
| Cabling and Electrical Works | | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | |
| Wind Turbine Deliveries | | | | | | | | | | | | ■ | ■ | ■ | ■ | | | | |
| Wind Turbine Erection | | | | | | | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | |
| Commissioning and Restoration | | | | | | | | | | | | | | | | ■ | ■ | ■ | ■ |

**3.49** As noted above, many of the construction activities will be carried out concurrently, although predominantly in the order identified, reducing the overall length of the construction programme, where possible. Site restoration will be programmed and carried out to allow the restoration of disturbed areas as early as possible and in a progressive manner. An Environmental Clerk of Works (ECoW)[3] will be onsite throughout construction and will ensure that activities are carried out in accordance with the agreed Construction Environmental Management Plan (CEMP) (Outline CEMP provided in **Appendix 3.1**).

### Working Hours

**3.50** In general, working hours for construction will be from 07.00 to 19.00 Monday to Friday and 07.00 to 12.00 on Saturday. No working is proposed on Sundays and public holidays. In the event that work outside of these hours is required, this will be agreed in advance with SBC.

**3.51** Exceptions to the proposed working hours will be made for foundation pours and turbine erection. Concrete pouring for an individual turbine foundation must take place continuously and so activity will only cease when the pour has been completed. Turbine erection can only occur during periods of low wind speeds and to minimise the construction programme, lifting operations may need to be scheduled outwith the above hours. In addition, it could be necessary to complete a particular lifting operation to ensure the structure is left in a safe condition. Exceptions may also be required for emergency works, dust suppression and testing of plant and equipment where necessary.

### Construction Traffic

**3.52** The construction vehicle traffic profile will include a mix of cars, Light Good Vehicles (LGVs), Heavy Goods Vehicles (HGVs) and Abnormal Indivisible Load (AIL) vehicles. **Chapter 10** sets out the expected number of vehicle movements to and from the Site each month, taking into account forecast vehicle numbers from construction activities and based on the assumed

[3] The ECoW will be supported by other technical clerks of works as required (e.g an Ecological Clerk of Works (EcCoW).

construction programme presented in **Table 3.5**. In consultation with SBC, a detailed CTMP will be prepared prior to the construction of the Proposed Development, should consent be granted. Further details are provided in **Chapter 10 and Appendix 10.1**.

### Concrete Batching

**3.53** To minimise traffic movements associated with concrete delivery, concrete batching is proposed to be undertaken onsite. A concrete batching plant will be located within the construction compound number 3. Suitable pollution prevention measures will be put in place, which will be developed in conjunction with the ECoW and incorporated into the CEMP. If water abstraction is required for batching, this would be subject to an abstraction licence from Scottish Environment Protection Agency (SEPA).

**3.54** All turbine and substation foundation concrete will be mixed onsite, with deliveries of cement powder, water and sand being delivered by HGV tankers. It is assumed that the cement powder and water will be delivered from concrete suppliers to the south-west, from local suppliers. Sand and aggregate not sourced from onsite borrow pits will be delivered by tipper HGV and is expected to come from local quarries, located to the south. There are a number of potential suppliers including the following:

- Tarmac Craighouse Quarry at Earlston; and
- Blinkbonny Quarry, south of Gordon.

### Working of Borrow Pits

**3.55** Excavation of material from the borrow pits will be carried out using standard quarrying techniques, which may include blasting and mechanical excavation. If required, blasting work will be undertaken by a specialist contractor who will assume responsibility for blast design and implementation. The extent of any blasting requirement cannot be determined until intrusive site investigation tests are completed which will be undertaken for all infrastructure locations as a pre-construction activity.

## Embedded Mitigation and Working during Construction

**3.56** Construction Method Statements and a CEMP will be prepared prior to the start of construction, detailing measures to avoid or further mitigate potential effects associated with construction activities. These will reflect and expand upon measures identified in this EIA Report, and will be agreed with SBC, SEPA, NatureScot and other stakeholders, where appropriate. An Outline CEMP is provided as **Appendix 3.1** and provides a framework from which a final CEMP will be developed by the Principal Contractor.

**3.57** The purpose of the CEMP is to:

- Provide a mechanism to ensure that construction methods avoid, minimise and control potentially adverse significant environmental effects, as identified in the EIA Report;
- Ensure that good construction practices are adopted and maintained throughout the construction of the Proposed Development;
- Provide a framework for mitigating unexpected effects during construction;
- Provide assurance to third parties that agreed environmental performance criteria will be met;
- Establish procedures for ensuring compliance with environmental legislation and statutory consents; and
- Detail the process for monitoring and auditing environmental performance.

**3.58** The CEMP will be updated when necessary to account for changes or updates to legislation and good practice methods throughout the construction phase. The CEMP will also be amended to incorporate information obtained during any further detailed geotechnical investigations which will be undertaken prior to construction activities to inform the detailed design (e.g. foundation design, micrositing requirements, detailed borrow pit design). Compliance with the CEMP (including procedures, record keeping, monitoring and auditing) will be overseen by a suitably qualified and experienced ECoW.

**3.59** The CEMP will contain the following documents, which the Principal Contractor and their sub-contractors will be required to adhere to throughout the construction process:

- A Pollution Prevention Plan (PPP);

- Construction Method Statements (CMS);
- Soil and Peat Management Plan (SPMP) (following the principles set out in the draft Peat Management Plan (PMP) presented in **Appendix 8.3**;
- Site Waste Management Plan (SWMP);
- Construction Traffic Management Plan (CTMP) (following the principles set out in the draft CTMP presented in **Appendix 10.1**);
- Outdoor Access Management Plan (OAMP) (following the principles set out in the Outline OAMP presented in **Appendix 3.3**); and
- Site Restoration Plan.

**3.60** The CEMP will also contain the following information:

- The name, qualifications and CV of the nominated person(s) with the responsibility for all environmental matters, for approval;
- A completed register of contacts confirming the contact details for all key personnel for managing environmental issues, including the Applicant's representatives, the ECoW, Principal Contractor contacts and appropriate regulator contact;
- The construction programme and detailed working method statements;
- A site-specific action plan, providing a register of environmental risks and outlining the requirement for accompanying site-specific mitigation, monitoring and reporting procedures; and
- Audit and inspection procedures.

**3.61** The Principal Contractor will be responsible for the continual development of the CEMP to take account of monitoring and audit results during the construction phase and changing environmental conditions and regulations.

**3.62** The services of other specialist advisers will be retained as appropriate, to be called on as required to advise on specific environmental issues.

**3.63** Performance against these documents will be monitored by the Applicant's Construction Project Manager and the ECoW throughout the construction period. They will ensure that the works carried out will be in accordance with the relevant legislation and best practice guidance documents.

### Watercourse Crossings

**3.64 Appendix 8.1: Watercourse Crossings** contains details of the existing watercourse crossings. The Proposed Development has made use of existing tracks wherever practical, and 19 watercourse crossing locations utilise existing crossing points. Four new watercourse crossings are proposed, two of which are the replacement of existing track crossings on two closely located tributaries of the Burn Betwixt the Laws.

**3.65** Typical watercourse crossings are presented on **Figure 3.10** and the final crossing design will be identified as part of the detailed design of the Proposed Development prior to construction and in line with current best practice as outlined in the **Appendix 3.1**.

### Public and Private Water Supplies

**3.66** Consultation with Scottish Water confirmed that no public water supplies exist onsite, however the Site is located in a surface water Drinking Water Protection Area (DWPA). Dye water supplies the Rawburn Water Treatment Works which is approximately 3.7 km downstream of the Site and downstream of the Watch Water reservoir. Effects and mitigation on the DWPA are considered further in **Chapter 8: Hydrology, Hydrogeology and Peat**.

**3.67** A review of Private Water Supplies (PWS) data obtained from SBC has been undertaken for the Site, as detailed in **Chapter 8**. One PWS is located within the Site and 11 within 1 km of the Site boundary; however, there are no PWS within the Proposed Development's infrastructure buffer (250 m buffer zone for excavations deeper than 1 m and a 100 m buffer for

excavations less than 1 m), which is based on SEPA guidance[4] . Accordingly, a PWS risk assessment in accordance with SEPA's guidance is not required. An initial assessment of PWS is provided in **Chapter 8**.

### Peat Slide Risk

**3.68** The Site has been assessed for potential hazards associated with peat instability. The overall conclusion regarding peat stability is that there is a low risk of peat instability over most of the Site although some areas of moderate risk have been identified. For these moderate Risk areas, a hazard impact assessment was completed which concluded that, subject to the employment of appropriate mitigation measures, all these areas can be considered as an insignificant risk. Based on the calculated risks site-wide good practice measures should be sufficient to manage and mitigate any construction induced instability. Further details are provided in **Appendix 8.4: Peat Landslide and Hazard Risk Assessment**.

### Peat Management

**3.69** An Outline PMP (**Appendix 8.3)** has been produced and provides indicative volumes for peat extraction and outlines recommendations for the handling, re-use, and storage of peat during construction of the Proposed Development.

**3.70** The total peat volumes are based on a series of assumptions for the Proposed Development layout and peat depth data is averaged across discrete areas of the Site. Such parameters can still vary over small scale changes and therefore topographic changes in the bedrock profile may impact the total accuracy of the volume calculations.

**3.71** The Outline PMP **(Appendix 8.3)** indicates that the volumes of peat excavated onsite will be re-used without creating surplus materials. Post consent, the Outline PMP and the CEMP (**Appendices 8.3** and **3.1**) respectively will be updated with information obtained during detailed ground investigations and detailed design stage.

**3.72** These plans will be developed to update the CEMP with detailed post construction restoration plans. This will be reviewed and monitored along with the updated Outline PMP and CEMP to ensure compliance with method statements and to keep track of volumes.

### Recreational Access Management

**3.73** The following recreational access routes are located close to or on the Site as illustrated in **Figure 3.13**:

- Southern Upland Way (SUW) BB/BB196/1 also BB/HP01/5;
- Scottish Hill Track no. BB/HT712/1;
- Scottish Hill Track no. BB/HT720/8;
- Scottish Hill Track no. BB/HT525/19;
- Scottish Hill Track no. BB/HT525/17;
- Public Right of Way No. BB/BB109/1;
- Public Right of Way No. BB/BB110/2;
- Public Right of Way No. BB/BB113/1;
- Public Right of Way No. BB/BB143/1;
- Public Right of Way No. BB/BB112/1;
- Public Right of Way No. BB/BB103/1;
- Public Right of Way No. BB/BB106/1;
- Public Right of Way No. BB/BB108/1;
- Public Right of Way No. BB/BB118/1;

[4] SEPA: Land Use Planning System, SEPA Guidance Note 31 (LUPS-31): Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems, 2017

- Public Right of Way No. BB/BB104/1; and
- Heritage Path No. BB/HP01/14 (Herring Road).

**3.74** The SUW follows the existing Fallago Rig access track for a length of approximately 700 m then continues outside of the Site boundary. The nearest proposed turbine lies approximately 860 m north of the SUW.

**3.75** The three Scottish Hill Tracks run along the main existing Fallago Rig access track into the Site from the B6456 towards Dunside Cottage and across the River Dye.

**3.76** The Public Rights of Way (PRoW) follow the existing Fallago Rig access track the B6456 and through the Site to Fallago Rig, stopping short of the existing substation. BB/BB106/1 runs north to south to the east of the Mutiny Stones (Scheduled Monument). BB/BB108/1 and BB/BB109/1 both run south from the existing access track which runs east to west through the Site towards the SUW.

**3.77** The proposed new access track to T15 and the temporary hard standing cut across the BB/BB108/1 PRoW, and the proposed access track leading to T2, T3 and T5 in the northern portion of the Site also interacts with the BB/BB106/1 PRoW in addition to the recreational access routes which also follow the main access route into the Site.

**3.78** Access will be maintained for the SUW and Herring Road throughout the construction of the Proposed Development, with the temporary reinstatement of a footpath running alongside the shared section of access track that was created during the construction of Fallago Rig Wind Farm. Predicted effects on recreational routes are also considered in **Chapter 4** and **Chapter 10**.

#### During Construction

**1.1** All construction activities will be managed within the requirements of the Construction (Design and Management) (CDM) Regulations 2015 and will not conflict with the Health and Safety at Work Act 1974. The design of the Proposed Development will continue to take full account of these regulations. To further reduce possible health and safety risks to users of the paths, a Health and Safety Plan for the project will also be drawn up. All construction staff and contractors will be required to comply with the safety procedures and work instructions outlined in the Plan at all times.

**3.79** To ensure that hazards to recreational users are appropriately managed, risk assessments will be undertaken for all major construction activities, with measures put in place to manage any hazards identified.

**3.80** Access for path users will be maintained throughout the construction period, with temporary diversions put in place where required. Where it is required to have recreational users segregated for example during high traffic volume and abnormal loads deliveries, the creation of a temporary footpath alongside the existing access track would be provided and short diversions using existing tracks could be established.

**3.81** Appropriate signage will be put in place to advise recreational users of construction works and any access restrictions which may be in place and the timings of such.

#### During Operation

**3.82** Public access rights will not be affected by the Proposed Development following the completion of the construction activities and during operation.

#### Outdoor Access Management Plan

**3.83** An OAMP is expected to be subject of a condition on the deemed planning permission consent. This will set out the proposals for managing public access to the Site during the construction phase of the Proposed Development and will be agreed in writing with the local authority access officer. An Outline OAMP is provided at **Appendix 3.3**.

### Unexploded Ordnance (UXO)

**3.84** A study was commissioned early in the design process to establish the risk of presence of UXO in the Proposed Development Area. This study is provided in **Appendix 3.4** which identified a potential risk for UXO particularly in the southern end of the Proposed Development Area due to the presence of a WW2 firing range in the Lamermuir Hills. A UXO surveyor was commissioned by the Applicant to provide a health and safety presentation and accompany site personnel undertaking works

which involved ground breaking (such as peat probing). UXO was encountered during the construction of Fallago Rig Wind Farm and two further items identified, and professionally disposed of, during the design development of the Proposed Development. This will be a key safety consideration for the construction of the Proposed Development should it gain consent. UXO specialists will survey construction areas in advance of construction and carry out appropriate disposal of any items that pose potential risks.

## Operation Management

**3.85** The Proposed Development has been designed to have an operational life of up to 35 years. Once operational, the Site will be staffed from the substation area at Fallago Rig. Fallago Rig currently has 11 EDF Renewables staff working onsite and new technicians would be trained for the maintenance of the turbines at the Proposed Development. It is envisaged that the amount of traffic associated with the Proposed Development will broadly be limited to personnel vehicles, occasional component deliveries, habitat management works and High Voltage maintenance by SPT for its grid connection infrastructure (as discussed in **Chapter 10**). Wind turbine operations will be overseen by suitably qualified technicians.

**3.86** Routine maintenance and servicing for each turbine will take place twice per year. Servicing will include the performance of tasks such as adjustment of blades, inspection of blade brakes and, inspection of welds in the tower. Other works at the operational wind farm will take place more frequently to ensure that the turbines, and battery storage are operating at their maximum efficiency. In the event of any unexpected faults onsite, appropriate repair works will be carried out as soon as they can safely be undertaken to minimise outages.

**3.87** The vehicles used for most onsite works are four-wheel drive vehicles and small vans, although there could be an occasional need for an HGV or crane to access the Site for heavier maintenance and repairs. Ongoing track maintenance will generally be undertaken in the summer months when tracks will be dry. Safe access will be maintained all year round.

**3.88** Site access tracks and wind farm tracks are required throughout the operational life of the Proposed Development to permit access for maintenance and repair operations. They will also be necessary to allow access during the decommissioning stage.

## Decommissioning

**3.89** The operational life of the Proposed Development and associated infrastructure will be 35 years. Following this, an application could be submitted to retain or replace the turbines, or they could be decommissioned. Decommissioning is anticipated to involve the following activities:

- dismantling and removal of wind turbines and electrical equipment;
- restoration of the turbine areas, hardstandings and tracks; and
- demolition and removal of the substation and battery storage compounds.

**3.90** Turbine components and electrical equipment will be dismantled and removed in a similar fashion to their delivery and erection. The turbines will be split into sections which will then be transported from the Site by HGVs unless the components are sold on, in which case, they will be removed as abnormal loads. Turbine components will be cut up offsite in controlled environments ready for reuse, recycling or appropriate disposal.

**3.91** Some of the access tracks could be left onsite to ensure the continued benefit of improved site access for the landowner, or they could be reinstated. It is not currently usual to remove concrete foundations from the Site as this will cause more damage to the environment. The exposed concrete plinth from turbine foundations will typically be removed to a depth of 1 m below the surface and the entire foundation will be graded over with soil and replanted / restored as appropriate.

**3.92** The removal of the top of the turbine base will be undertaken requiring an excavated trench around the upstand to provide a working area. Breakout of the top part of the plinth will be undertaken using an excavator mounted jack hammer. The cables will be cut level with the remaining concrete. Once the broken-out concrete has been removed, the area will be reinstated by backfilling with soil/peat to an agreed method statement, as outlined above.

**3.93** The CEMP will be updated as required to ensure best practice is adopted during decommissioning of the Proposed Development and that activities are carried out in line with the legislation and guidance that is current at time of decommissioning.

**3.94** A detailed assessment of the decommissioning of the Proposed Development has not been undertaken through the EIA, however each of the technical EIA Report chapters briefly discusses decommissioning in relation to their specific topic. It is expected that effects are unlikely to be greater than those which will occur during construction, and that decommissioning methods will improve in the years that follow.