Harryburn Wind Farm

Technical Appendix 3.1

DRAFT Construction and Environmental Management Plan

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1.0 INTRODUCTION

1.1 Background

This document presents a draft Construction and Environmental Management Plan (CEMP) for the proposed wind farm development at Harryburn (from here on referred to as ‘the wind farm’). The CEMP would form part of the site induction which is mandatory for all employees, contractors and visitors attending Site. All employees and contractors shall familiarise themselves with the contents of the CEMP.

The CEMP has been prepared to take account of ‘Good Practice During Windfarm Construction’\(^1\), ‘Guidelines for Onshore and Offshore Windfarms’\(^2\) and ‘Research and guidance on restoration and decommissioning of onshore windfarms’\(^3\) and provides the construction activities methodology pertinent to the Environmental Impact Assessment (EIA).

The document should be read in conjunction with the site Environmental Statement\(^4\) (ES) which presents a comprehensive review of the Site setting, the proposed development and required mitigation measures.

This is a fluid document that would evolve during the different phases of the project. As such it would be subject to constant review to address:

- any conditions required in the consent;
- to ensure it reflects best practice at the time of construction;
- to ensure it incorporates the findings of pre-construction site investigations;
- changes resulting from the construction methods used by the contractor(s);
- unforeseen conditions encountered during construction; and
- changes in best practice.

This document has been developed as a draft ‘Construction and Environmental Management Plan’ to ensure it accurately identifies the environmental management, mitigation and monitoring requirements during the EIA process. This would ensure that the principal contractor would implement mitigation measures during the construction phase.

This is a standalone document that would be maintained and updated on Site, and would be augmented by associated design specifications and Construction (Design and Management) (CDM) 2015 Regulations documentation such as the Principal Contractor’s Construction Phase Plan.

1.2 Site Setting and Development Constraints

The proposed Site is located approximately 2km north west of Elvanfoot, 2.5km and 5km north east of Leadhills village and Wanlockhead respectively and 5.5km southwest of Crawfordjohn, in South Lanarkshire, Scotland. The Site and main turbine area is centred on grid reference 291570, 618905. The proposed Site would be accessed via a dedicated access constructed on the A702 to the north of Elvanfoot.

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\(^1\) Good Practice During Windfarm Construction, Version 3, September 2015.
\(^3\) Research and guidance on restoration and decommissioning of onshore windfarms, Scottish National Heritage Report No. 591, 2013.
\(^4\) Harryburn Windfarm Environmental Statement, SLR Consulting Ltd.
The Site is bisected by the B7040 and the river ‘Elvan Water’ in an east to west direction. The river ‘Elvan Water’ runs parallel to the B7040. However, all wind turbines are proposed to be located to the north of the B7040 and river; with the southern area of the Site to be used for habitat management.

The A74 (M) motorway, River Clyde and West Coast railway line run parallel to the eastern flank of the Site boundary in a north to south direction. At its closest point, there is less than 100 meters between the Site and this transport infrastructure. The A702 runs between the Site and the A74 (M) motorway in a north to south direction, passing through the habitat management area of Site. A 400kV high-voltage overhead line (OHL) with accompanying pylons traverses the north eastern part of the Site. The B797 runs along the western fringe of the Site, connecting Leadhills village to Abington.

The Site is approximately 994ha in area and comprises low level slopes and elevated terrain; Wellgrain Dod is the peak summit at 555m AOD in the proposed turbine area to low level of approximately 265m AOD in the River Valley of the Clyde. The land comprises mainly of upland heather moorland, managed for grouse shooting, interspersed with areas of purple moor grass. The lower slopes are comprised of acid grassland and bracken and are grazed for sheep.

The Scottish Power Elvanfoot 275/33kV Substation, a gas substation and Scottish Water pumping station are located directly north and south of the B7040, close to the settlement of Elvanfoot. This infrastructure is omitted from the Site boundary.

ES Figure 3.1 provides an overview of the proposed development.

The following provides details of the Site setting and access locations:

- Site is bounded to the north by Mid Hill and Ellershie Hill;
- Site is bounded to the west by Wool Law and the B797, connecting Leadhills village to Abington;
- The turbine area is bounded to the south by the river ‘Elvan Water’ and a dismantled railway;
- The peak of Dun Law lies to the south of the Site, and in line with the southernmost tip of the eastern flank;
- Site is bounded to the east by the A74 (M) motorway, West Coast Railway, the River Clyde;
- The Well Grain Burn runs down the western side of Wellgrain Dod, at the northwest corner of the Site;
- The Long Cleuch Burn runs down the eastern side of Wellgrain Dod, at the northwest corner of the Site, and feeds into the river ‘Elvan Water’;
- The Scottish Power Elvanfoot 275/33kV Substation, a gas substation and Scottish Water pumping station are located directly north and south of the B7040, close to the settlement of Elvanfoot;
- The Site includes a number of existing services within the boundary, comprising of a water main, overhead and underground electric lines, high power gas line and ethylene pipeline;
- A 400kV high-voltage overhead line (OHL) with accompanying pylons traverses the eastern periphery of the Site; and
Access to the Site would be via the A702 to the east of Site (see ES Figure 3.1). The A702 would be accessed directly by Junction 14 (northbound) of the A74 (M) motorway. A new junction from the A702 into the Site would be required.

1.3 Project Description

It is anticipated that the proposed development would consist of the following:

- 17 turbines with a height to blade tip of up to 149.9m. Each turbine would have an installed capacity of between 3.1 and 4.2 MW;
- 17 turbine foundations, measuring 18.5m diameter;
- external transformers at each turbine location measuring approximately 6.25m x 4m on a concrete plinth and 3.6m high. These would be located adjacent to the turbine bases;
- underground power cables linking the turbines laid in trenches along access tracks;
- substation compound incorporating a control building, tele-communications, 4 x 3MW battery storage units and parking;
- onsite access tracks (approximately 16km of new access tracks with a typical 5m running width) including associated drainage of which 300m would be floating tracks;
- access to the Site from the A702 for construction traffic;
- crane hardstandings adjacent to each turbine, with typical dimensions 45m x 28m which can also be used as laydown areas;
- temporary site construction compound and associated infrastructure including refuelling area, welfare facilities, wheel wash and vehicle parking;
- a single permanent anemometer mast, 95m high, constructed on a reinforced concrete base measuring 8.5m x 8.5m and 2.5m thick, and requiring a crane hardstanding measuring 20m x 20m;
- two temporary power performance masts; and
- three water crossing points; crossing point WC1 is over a tributary of the Elvan Water near Turbine 9, crossing point WC2 is over a tributary of the Glengonnar Water near Turbine 13 and WC3 is over a small tributary of the River Clyde near the site entrance.

1.4 Structure

The structure of this CEMP is as follows:

- Section 1 – Introduction;
- Section 2 – Responsibilities;
- Section 3 – Phasing;
- Section 4 – Construction Phase;
- Section 5 – General Construction Good Practice;
- Section 6 – Pre-Construction Surveys, Protected Species and Monitoring;
- Section 7 – Reinstatement;
- Section 8 – Reference Documents;
• Section 9 – Closure.
2.0 RESPONSIBILITIES

2.1 Health & Safety

The construction works shall be undertaken in accordance with primary health and safety legislation, namely:

- Health and Safety at Work Act 1974; and
- Construction (Design and Management) (CDM) Regulations 2015.

The construction works for the proposed development would fall under the CDM Regulations 2015. As such, the Principal Contractor would provide a Construction Phase (Health & Safety) Plan in accordance with the CDM regulations. This plan shall include (but not be limited to) a construction programme, emergency procedures, site layouts and fire plans, method statements and details of the proposed induction programme. This induction programme would include both the Principal Contractor’s site specific rules as well as the Client’s requirements, and would include instructions to all staff regarding the Emergency Pollution Prevention Plan (EPPP) and relevant procedures.

An induction would be required for all workers (permanent / temporary / contractor / subcontractor), site visitors, client representatives or other 3rd parties. Inductions shall be documented.

Plant operators and construction staff would be trained by the Principal Contractor with regard to spill prevention/mitigation measures and procedures and in the use of relevant mitigation material (e.g. spill kits).

Staff and Sub-Contractors employed by the Principal Contractor shall be trained and have to prove certification for any plant, vehicle or use of specialist equipment such as electrical and hot works.

2.2 Environmental Monitoring

An Ecological/Environmental Clerk of Works (ECoW) would be appointed during the period of wind farm construction and post–construction restoration. The appointment of the ECoW would be approved by South Lanarkshire Council (SLC).

The purpose of the ECoW is to provide environmental advice and monitor compliance – not implement measures. The ECoW shall ensure that biodiversity is secured and impacts either avoided or minimised.

The ECoW would have sufficient powers to:

- Oversee construction work and identify where mitigation measures are required;
- Authorise temporary stoppage of works if required; and
- To ensure that satisfactory construction arrangements and mitigation measures are in place.

The ECoW shall undertake the following activities:

- Monitoring the effects of construction activities before, during and after construction;
- Monitoring pollution prevention;
• Notifying the Contractor of ornithological sensitivities within the Site prior to starting construction and at the beginning of breeding bird season;
• Undertaking surveys for nesting birds throughout the construction period;
• Protection of breeding birds by setting up and monitoring appropriate exclusion areas whilst nests of relevant species are in use;
• Undertaking pre-construction surveys for otter, supervising mitigation for common lizard, marking out sensitive habitats to be retained and advising on other ecological issues where required;
• Maintaining an environmental register;
• Reporting to the local authority regarding any suspended works or breeches of wildlife laws;
• Undertaking environmental inductions to contractor(s)’s staff and all other visitors to the Site; and
• Undertake water monitoring as required of surface water streams and private water supplies

It is proposed that the ECoW would also carry out or supervise the construction monitoring programmes described throughout the sections of this report.

All works would be undertaken in accordance with the SEPA guidance documents [Ref: 12-23] and Prevention of Pollution from Civil Engineering Contracts [Ref: 9]. In addition, the appointed contractor would be familiar with and take due regard to the other related guidance documents as listed in Section 7.
3.0 PHASING

3.1 Construction

The construction works are expected to be completed over a period of 24 months (including a contingency for 4 months ‘down time’ during the winter period).

The following phases would be taken into consideration for the construction works:

- **Phase 1 - Site set-up:**
  - Construction of site entrance, including works to junctions with the public road;
  - Site compound set-up, including installation of welfare services;

- **Phase 2 - Construction:**
  - Construction of access tracks, including water crossing point(s);
  - Construction of crane hardstandings and turbine foundations;
  - Construction of sub-station building, including internal fitting, and external equipment;
  - Installation of wind farm cabling;

- **Phase 3 - Turbine Erection and commissioning:**
  - Erect wind turbine generators (WTG’s);
  - Commission wind turbine generators (WTG’s);
  - Wind turbine generator and wind farm reliability run;

- **Phase 4 - Demobilisation:**
  - Take over;
  - Snagging;
  - Decommissioning of the temporary construction compound and restoration of the Site.

Additionally a detailed construction programme would be provided by the Principal Contractor as part of the final CEMP and the Construction Phase (Health & Safety) Plan.

3.2 Reinstatement

Good practice techniques for vegetation and habitat reinstatement would be adopted and implemented on areas subject to disturbance during construction as soon as practicable.

The following reinstatement works would be considered:

- Re-use of turves;
- Re-use of topsoil/peat where appropriate; and
- Reseeding with appropriate species.

For clarity, the following are definitions for the different soil make-up of the natural ground between the surface and rockhead (from top down):

(a) **Vegetation.**

This is typically plant matter that can be removed/stripped above the ground level (i.e. does not include roots/topsoil). This can vary depending on the nature of the vegetation encountered on site.

(b) **Turf/Turves.**
This is typically a layer of matted earth formed by grass and plant roots. The matted earth layer would normally be 30-50mm thick.

(c) Topsoil.

The upper layer of soil usually containing significantly more organic matter than is found in lower layers. This can vary in depth but is typically 200mm thick. This can be excavated with the turf and depends on whether the turf is required elsewhere, or the topsoil needs to exclude the turf.

(d) Superficial Soils.

This is a generic term used for all material between topsoil and rockhead. This can vary in depth and content throughout the depth profile at any location.

(e) Weathered Rock.

This is a layer that may exist above rockhead that is neither rock or superficial material but a mixture of both. It can be mostly fractured rockhead as a result of physical and chemical weathering processes. When excavated it may have elements of fractured rock and superficial material as the boundary can be difficult to distinguish.

In some cases this can provide suitable engineering material for construction of foundations, embankments, tracks etc.

(f) Rockhead.

This is a naturally occurring solid aggregate of minerals which lies beneath the superficial soils.
4.0 CONSTRUCTION PHASE

4.1 Introduction

This chapter describes in more detail the key components of construction and the impact they are likely to have on the environment.

The overall site design has been developed in accordance with recommendations adopted from the ES and to reflect the requirements and specifications for transporting wind turbine components to the proposed turbine locations.

4.2 Temporary Compound

The construction area would consist of a Temporary Construction Compound (TCC).

This temporary area would be located in the east area of the Site, near to the Site access at the A702. The Temporary Construction Compound would be located as shown on ES Figure 3.1.

The temporary construction compound would measure 100m x 40m (4000m²) and is likely to contain the following:

- Temporary portacabin type structures to be used for site offices, the monitoring of incoming vehicles and welfare facilities including toilets with provision for sealed waste storage and removal;
- Parking for construction staff, visitors and construction vehicles;
- Secure storage for tools and small parts;
- Fuelling point, or mobile fuel bowser to comply with SEPA PPG 7 (The safe operation of refuelling facilities, July 2011), and PPG 2 (Above ground oil storage tanks, August 2011);
- A tool store and workshop (lockable containers) for workers/subcontractors, situated at a location to be agreed with the Principal Contractor. These tool stores would provide a safe and sheltered working area for maintenance and repair work. A welder, hydraulic pipe fitting crimper and all ancillary equipment would be available in the tool stores; and
- Wheel wash facilities.

Welfare facilities would be provided for the duration of the construction period in accordance with the Construction (Design and Management) Regulations 2015. Facilities for waste management, refuelling, power, water supply and chemical/material storage would be provided.

Where and when compound lighting is required it would be designed to minimise light pollution to the surrounding area. All lights would face inwards.

This compound would also be used as a storage compound for various components, fuels and materials required for construction.

This compound/area would be sited to use flatter ground. It should be noted that the 400kV high-voltage overhead line (OHL) with accompanying pylons which runs along the eastern periphery of the Site is approximately 250m from the proposed compound area. The Principal Contractor should ensure that they take this OHL into consideration in the event of any change to the location of the temporary infrastructure.
This compound would be built by stripping topsoil and regrading, then laying geotextile and an imported stone layer. The stripped topsoil would be stored adjacent to the compound in a linear bund typically no greater than 2m in elevation. Subsoil would be stripped and stored separately from the topsoil. This would be stored in a similar manner to the topsoil, but would depend on the volume which is required to be excavated.

It is proposed that un-contaminated surface run-off from the compound is accommodated in a shallow swale or soakaway which would be constructed as a perimeter ditch to avoid contamination of watercourses should there be a spillage and from fines washout. All other run-off from the Site would follow natural drainage patterns and newly installed drainage routes.

This compound area would be reinstated at the end of the construction period. Reinstatement would involve removal of the imported material and underlying geotextile. The exposed substrate would be gently ripped and the stored subsoil and topsoil replaced. The surface would be re-seeded as required using the same seed mix as that used for the reinstatement of track verges and batter (in consultation with SNH).

Alternatively, if the ground conditions permit, all inert materials such as the imported stone can be retained, and the stored subsoil and topsoil replaced. This area would be kept on record and can be used as the temporary construction compound during the decommissioning phase.

### 4.3 Welfare Facilities and Services

Welfare facilities would be provided in accordance with the Construction (Design and Management) Regulations 2015 during the construction period and would include mobile toilets with provision for sealed waste storage and removal. Sewage waste would be tankered off site by a licensed approved waste contractor. Alternatively, a septic tank could be installed and maintained for the duration of the works in accordance with SEPA’s PPG 4 (see Section 11), including regular emptying by an approved contractor.

Potable water would be imported as bottled water. The water would be used for messing purposes during the construction phase.

If additional water is required to be abstracted from a natural inland water body for site based activities (i.e. dust suppression, etc.), the CAR Regulations apply. Alternatively additional water can be provided from a rain water harvesting measures on Site.

Electricity would be provided by on site generators. All electrical equipment and its installation and maintenance would be undertaken by a qualified and competent person.

### 4.4 Transport Routes

The Site access is direct from the A702. The A702 connects to the A74 (M) motorway at junction 14 and delivery vehicles would only travel a distance of approximately 1.1km on the A702. A Traffic Management Plan (TMP) would be developed following appointment of the Principle Contractor and identification of the material supply points and included in the final CEMP.

Chapter 14 of the ES describes the transport routes in full.

Once consent has been received and prior to construction, the route shall be further inspected by suitable engineers, in conjunction with the police and the relevant highway
authorities, with a view to finalising the Traffic Management Plan and to obtaining a suitable licence for the movement of abnormal loads.

The Traffic Management Plan would include:

- Delivery schedule to ensure impacts on the road network are minimised;
- Liaison with the port over sea delivery schedules and provision of lay down areas as required;
- Detailed design of temporary road improvements; and
- Assessment of existing street furniture and bridge classifications and preparation of a schedule of temporary works along the access route.

4.5 Access Tracks

General

The extent of construction disturbance would be limited to around the perimeter of, and adjacent to, access track alignments, including associated earthworks, and shall be monitored by the ECoW as required.

In general, as part of the design mitigation wherever practicable all proposed infrastructure has been sited at least 50m from any watercourse and the number of required watercourse crossings have been minimised.

It is noted that a number of services exist within the Site Boundary. Access tracks have been routed in such a manner to minimise service crossings where possible. The proposed access track would cross both overhead and underground services, with the bulk of the services being located near to the Site entrance.

Overhead services:

- 11kV electric line; and
- 400kV electric line.

Underground services:

- trunk main – Scottish Water;
- high power gas line;
- 275kV electric line;
- high power gas line; and
- ethylene pipeline.

Operators of services would be consulted and a suitable design of access tracks would be approved by the operator prior to any construction works being undertaken. Consideration would be given to both overhead and underground service crossings.

It is anticipated that access tracks would be constructed from a combination of aggregate won from local quarries and would be constructed to the best practices for wind farm access tracks.

Access tracks shall be constructed to a minimum running width of 5m, plus shoulders of approximately 1m on either side, to accommodate the maximum transport requirements.
Track shoulders may be up to a width of 2-3m to accommodate cabling along the access track alignment.

The access tracks for the proposed development have been carefully designed. The tracks have been designed to follow the existing contours to minimise the requirement for cut and fill and would be formed with a maximum gradient of 8 degrees. The access tracks would be a minimum of 5m wide (straight sections) with appropriate widening on bends with additional provision of inter-visible passing places at track junctions and crane hardstandings. The average working corridor for the construction of access tracks (and where relevant cable trenches) would be 14m.

For the construction of tracks topsoil would be stored beside the track for use in reinstatement of shoulders at the end of the construction period where appropriate. The material shall be stored/stockpiled in accordance with good practice so that it would be reused for reinstatement.

Track restoration works would be undertaken in accordance with SNH good practice guide *Constructed tracks in the Scottish Uplands 2nd Edition, June 2013, updated September 2016* [Ref: 26].

**Existing Tracks**

There is approximately 2.8km of existing access tracks within the Site. Existing tracks would be widened and upgraded to meet the new track design.

**New Tracks**

A new access track to the wind farm would be located starting in the east corner of the Site, adjacent to the A702 with NGR 295127, 617670. The junction of the new access track and A702 would be sited and aligned such that delivery vehicles can drive directly into the Site. As the delivery vehicles would turn right across the oncoming carriageway, traffic management would be required during delivery periods.

It is anticipated that the access tracks from this junction with the A702 would be made up using imported granular material from local quarries.

Access tracks would be formed on suitable underlying material (soil or rock with sufficient bearing capacity) in the following manner:

- Stripping of surface vegetation (turves) and careful stockpiling of this material;
- Excavating the remaining superficial soil materials (overburden) and stockpiling this material;
- Where different overburden materials are present these would be stored according to type. This material shall be monitored and watered (as appropriate) to be retained for reinstatement purposes;
- The exposed suitable track formation shall have rock fill material tipped from dumper trucks directly onto the proposed access track alignment; and
- This material shall then be either spread by a dozer or placed by a hydraulic excavator and compacted in layers, typically using vibratory rollers.

Access tracks shall be formed from a sub-base of general fill, and finished off with a capstone / wearing course of graded crushed rock to provide a nominal Type-2 (Series 800)
finish. Wearing course stone shall be of a suitable material that is not susceptible to breaking down / weathering to a high fines content material.

Maintenance of the running surface would be carried out on a regular basis, as required, to prevent undue deterioration. Loose track material generated during the use of access tracks would be prevented from reaching watercourses by maintaining an adequate cross fall on the tracks. Periodic maintenance of tracks by way of brushing or scraping would be carried out to minimise the generation of wheel ruts, which could lead to some track material being washed away. In dry weather, dust suppression methods may be required for track and hardstanding areas. The Site access tracks, hardstandings and trackside drains would be inspected on a regular basis by the Contractor.

ES Figure 3.2 (Indicative Track Detail) illustrates a typical track/road construction detail.

**Cut Tracks and Drainage**

In areas where the soil is shallow the track formation would be created by a cut (and fill) or by a cut operation where the side slope is severe. A lateral drain would be established on the uphill side of the track to drain water from the slopes and cross drains would be established at intervals of no less than 30m. Topsoil, where present, would be stored beside the track for use in re-instatement of track shoulders where appropriate. Consideration would be given to the potential for entrapment of snow and water in their placement.

**Floating Tracks and Drainage**

It is anticipated that approximately 300m of floating track would be required near to Turbine No.8. In general, where existing gradient is relatively flat and the peat layer is 1.0m or more, a floating track design would be used, using suitable construction methods, ensuring that the risk of failure due to landslip is mitigated.

Floating track construction essentially comprises the laying of a Geosynthetic (geotextile mat or geogrid reinforcement) across the soils prior to constructing the track. Like cut tracks, regular cross drains would be used to maintain existing surface water flow paths beneath the floating track. Erosion processes on the track side embankments and cuttings would be mitigated by ensuring that gradients are below stability thresholds, which would also enable effective regeneration of vegetation or reseeding with appropriate species. Sediment traps would be required in the early years following construction until natural regeneration/reseeding is established. Should significant erosion or sedimentation, (which is not expected) take place at any location it would be addressed by re-grading of slopes.

ES Figure 3.2 (Indicative Track Detail) illustrates a typical floating track construction detail.

**On Site Vehicle Movements**

As noted above, access tracks would be designed to be single track, a minimum of 5.0m wide including the provision of intervisible passing places at appropriate locations taking account of horizontal and vertical track alignments. Additional widening would be provided on bends to facilitate the movement of the large delivery vehicles associated with turbine tower and blade delivery, and these would double as passing places where appropriate.

During the periods of delivery of the large components, the Contractor would use appropriate site communications and access control techniques to enable safe one way operation of the tracks.
The presence of crane pads within the construction compound would facilitate traffic movement on site. Internal track junctions would also be used to facilitate multiple options for construction traffic movement. This would allow vehicle to move more direct between construction locations and double as passing places.

**Unstable Ground**

Unstable ground is herein considered to be any ground conditions encountered along the proposed alignment, or within the immediate vicinity and influence, of the access tracks that has insufficient strength in its existing state to support the proposed load conditions.

If any unstable ground is encountered during access track construction, the following procedure shall be adopted:

- Access track construction in the immediate area of the unstable ground shall cease with immediate effect;
- The Principal Contractor shall immediately assess the situation and develop a solution; and
- If relocation within the approved 50m micro-siting allowance of the proposed access track alignment is possible and acceptable to the ECoW, without potential for further ground instability to occur, then construction may recommence along the newly agreed alignment, and any stabilisation / mitigation measures that may be required of the unstable ground shall occur in parallel.

**Signage**

Sufficient signage would be employed on site, for both site personnel and the public, to clearly define the boundary of the works where they coincide with areas accessible to the public.

**4.6 Turbine Foundations**

A total of 17 No. turbines would be erected on reinforced concrete gravity foundations. The preliminary ground investigation data supports this foundation solution at all WTG foundation locations.

Proposed turbine foundation locations shall be inspected by the Contractor to ensure that all potential ecological and archaeological constraints have been identified, demarcated and/or mitigated for prior to the on-set of construction in that area. The final location of the turbines would be within approved micro-siting allowances of the consented positions in accordance with Planning Conditions. The regularity of inspections (daily, weekly, as appropriate) during construction shall be determined in advance for each particular section, based on anticipated ground conditions, known ecological, hydrological or archaeological sensitive receptors, prevailing weather conditions, and anticipated rate of progress.

**Construction of Turbine Foundations**

Construction of the turbine foundations shall be the responsibility of the Contractor.

The limits of each of the foundation excavations would be surveyed and pegged out at least two weeks in advance of any proposed works, and the ECoW shall be consulted to ensure all necessary pre-construction checks have been completed.
Typically, approximately 450m$^3$ of concrete would likely be required for each turbine foundation, which would be imported onto site. Each turbine would also require steel reinforcement which would be delivered to site on a flatbed vehicle and then connected together to provide the reinforcing cage (see ES Figure 3.5).

The turbine requires a reinforced concrete foundation that measures 18.5m x 18.5m. To facilitate the construction of this, an area typically 3-4m wider around the perimeter would be required e.g. 23m x 23m. This can vary however, depending on the ground profile and the depth required to prepare the turbine base formation level (i.e. underside of the concrete base or any engineering fill to create a suitable platform prior to installing the concrete foundation).

The typical construction activities associated with the turbine foundation are detailed as follows:

- Stripping of surface vegetation (turves) and careful stockpiling of this material as per CEMP requirements;
- Excavating the remaining superficial soil and rock materials and stockpiling of this material as per CEMP requirements;
- The stockpiled materials are to be retained for restoration purposes;
- Soil would be excavated until a suitable formation can be achieved. Where rock is encountered this would most likely be removed by mechanical excavation to the required depth and material stockpiled as described above. The potential impacts associated with the use of hydraulic breakers or other such vibratory equipment in the vicinity of sensitive ecological receptors or watercourses shall be assessed and appropriate mitigation measures implemented where required in consultation with the ECoW;
- The foundation design would be based on the most efficient use of materials and local ground conditions. From geotechnical investigations it has been shown that bedrock is at or near surface for all the proposed wind turbine locations;
• Temporary fencing shall be erected at locations where there are safety implications for any persons likely to be present on the site e.g. around open excavations. Signage would be displayed clearly to indicate deep excavations and any other relevant hazards associated with the foundation excavation works;

• Cut off ditches would be used at the perimeter of foundation excavations to divert clean water away from the work areas thereby reducing the volume of water potentially requiring pumping/treatment in silt traps/settlement lagoons. It is not anticipated that large scale dewatering would be required during the excavations. Water from dewatering of excavations shall be pumped via surface silt traps to ensure that sediment does not enter surrounding watercourses. Settlement lagoons would be employed in areas where the level of runoff is likely to exceed levels normally contained within a silt trap, however it is considered unlikely that these would be required. Wash-out areas at each base, (if required) would be lined and contained to prevent wash-out water entering drainage/surface waters. The material from the wash-out would be disposed of appropriately off site;

• Following excavation, levels would be set to allow the blinding concrete to be placed and finished to the required line and level;

• The steel reinforcement shall then be finished to the required design specification. Most of the steel reinforcement would have been fabricated off site, and then delivered to site and stockpiled adjacent to the respective turbine base.

• The formwork would be pre-fabricated of sufficient quality and robustness to allow repeated use. Formwork would be cleaned after each use and re-sprayed or painted with mould oil within the blinded foundation excavation prior to being fixed in place. The placement of containers with mould oil would be strictly monitored to ensure that storage is only in bunded areas (i.e. in the TCC) on sealed hardstanding. Spraying of mould oil and storage of such sprayed materials would be undertaken in such a way as to avoid pollution;

• Sulphate resistant concrete or other suitable concrete, as appropriate for the prevailing ground conditions, would be used in the turbine base. Prior to pouring the base concrete, the overall quality of the steel fixing would be checked to ensure there is sufficient rigidity to cope with the weight of personnel and small plant during the pour. The quantity, size and spacing of the reinforcement bars would be checked against the construction drawings to ensure compliance with the design detail. The position of the foundation insert, or other appropriately designed foundation mechanism supplied by the turbine manufacturer would be checked to ensure that the level is within the prescribed tolerances. A check would also be carried out to make sure the correct cover from edge of reinforcement to edge of concrete is maintained throughout the structure. A splay would be formed on all external corners;

• Cable ducts would be checked so as not to leave sharp corners that would cause cable snagging and that all bend radius comply with the design illustrated on the construction drawing. All earthing cable or strip connections would also be examined to prove their adequacy to withstand the rigors of the concrete placing process;

• Concrete would be imported pre-batched. As with all concrete deliveries, a record shall be kept against each turbine to indicate the source of supply, type and consistency of the mix. A record would also be kept of the personnel involved, the time and date the pour commenced and finished;

• The concrete pour would commence after the blinding concrete has been cleaned of debris and other loose material. Vibrating pokers would have been checked to ensure they are fuelled by compressed air and in good working order. The pour would proceed under the control of the Contractor. Personal Protective Equipment (PPE) would be worn by the site operatives and as detailed in the Construction Phase Plan.
Pouring would follow best working practice procedures and fresh concrete would be protected from hot and cold weather as required;

- Shutters would be carefully loosened, removed and cleaned no earlier than 24 hours from the finish of the pour; and
- Backfilling to the turbine base would proceed in layers of approximately 0.3m with compaction as necessary. Further layers of material would be laid until the original till level is attained. Soil would be replaced from the appropriate storage area until the original ground level is reached, or a shallow mound (up to 500mm above existing ground level) is formed. In the event that there is limited on site material to compact above the turbine foundation, then imported material may be required. This would typically be a well graded granular product.

A checklist for each foundation would be prepared to show compliance with the documents of each step of the installation process. These lists, once completed, would be stored in the contractor’s QA file along with relevant cube test results, and be available for inspection at all times.

Following the completion of all construction activities, the area surrounding the base shall be reinstated.

ES Figure 3.5 is an indicative turbine foundation design.

4.7 Crane Pads

Crane pads would be required to allow installation and removal of the turbine components. Location and orientation would be optimised to make best use of the existing topography, prevailing wind conditions (to enable safe lifting) and the chosen erection procedure. Additionally, the crane pad orientation would take account of ecological or other constraint. As with access tracks, topsoil and subsoil would be removed wherever possible and stored separately adjacent to the removal area for later reinstatement up to the edge of the hardstanding.

The area would be set out to the required dimensions (typically a main crane and a tail crane pad would be required) and excavated to a suitable formation. Coarse rock fill would then be placed and compacted in layers using compaction equipment. Geotextile may be used depending on the suitability of the underlying strata. The final surface would be formed from selected granular material and trimmed to allow surface water run-off to drainage ditches. The crane pad would remain in-situ for the operational life of the wind farm.

ES Figure 3.6 is an indicative crane hardstanding design.

4.8 Control Building and Sub-Station

A single storey blockwork control building would be constructed at NGR 294420, 617350; adjacent to the existing Scottish Power Elvanfoot 275/33kV substation. The control building would be built on a pre-cast concrete base (installed on a levelled area) measuring approximately 25m x 8m and 5.5m high. The building’s external finishes would be agreed in consultation with South Lanarkshire Council.

Welfare facilities including a toilet would be provided for the duration of the operation of the wind farm. Sewage waste would be tankered off site by a licensed approved waste contractor. Alternatively, a septic tank could be installed and maintained for the duration of the works in accordance with SEPA’s PPG 4 (see Section 11), including regular emptying by an approved contractor.
A rainwater collection and purification system would be installed to service the welfare room, and electricity would be provided from a local electricity connection or a back-up diesel generator.

The proposed sub-station would be located in the control building compound, measuring 4,000m² in total. The compound would include an area for car parking and High Voltage (HV) equipment, such as transformers, circuit breakers and 4 x 3MW battery storage units. The control building is located close to the site entrance and public road to assist access during inclement weather such as snow.

Lighting would be limited within the compound and would be limited to emergency flood lights around the switchgear, security/motion sensor lights to building, and then any internal lighting within the building.

ES Figure 3.7 provides indicative information on the substation compound.

4.9 Cable Laying

The proposed development would be connected to the Transmission Grid Network at the existing Scottish Power Elvanfoot 275/33kV substation; located at NGR 294360, 617305. The Scottish Power Elvanfoot 275/33kV substation is located close to the B7040 and is out with the Site boundary.

Underground power cables would be run from each turbine site, the proposed substation and the existing Scottish Power substation. Cables would be laid in a trenching operation. The proposed layout runs the cables along new access tracks. Cable trenches would be approximately 650mm wide and 0.95m deep.

Electrical cabling is typically buried or ducted adjacent to the access track network. Cable trenches would either be excavated into existing ground, made ground (such as access track verges) or areas consisting of shallow peat. Irrespective, the cable trenches would require excavation, laying of the cables and backfilling with original material from the point of origin.

The position of trenches would be marked out and the line stripped of turfs and soils and set aside for reinstatement. Ecologically sensitive areas would be avoided by construction plant or vehicles. The majority of cable run installation would be undertaken adjacent to and within the track construction zone, to minimise intrusion into the surrounding areas. Where topography or ecological constraints dictate (over limited sections), the cables would be installed in ducts within the existing track corridor. In areas of trenching, the vegetation layer and topsoil would be removed and segregated from the removed subsoil for use in reinstatement. If necessary where depth allows, further segregation of the vegetation layer and topsoil would be undertaken to prevent burying of the upper vegetation layers in deeper soil upon replacement.

Where the depth of the original topsoil layer is very thin there may be insufficient material for reinstatement.

Where cables cross open gullies and ditches they would be installed in ducts. Alternatively, they would be incorporated in the access track crossing points. During installation operations, these would be temporarily dammed and a filter placed downstream to avoid pollution of the downstream watercourse by suspended solids.

Following testing, the trench would be backfilled and compacted in layers with suitable material and reinstated with previously excavated surface soils (from which stones would
have been removed). Sand would be imported to site and would be placed around the cables as protection. Suitable duct marker tape shall be installed in the trench prior to backfilling.

Clay bunds would be placed at intervals to prevent longitudinal drainage.

4.10 Soil Storage

The proposed construction would require surface soils to be excavated and its temporary storage.

At turbine foundations top soils would be stripped keeping the top 200mm of turf intact. This material would be stored adjacent to the base working area and would be limited in height to 2m to minimise the risk of overheating. Subsoil would then be stripped and stored, keeping this material separate from the topsoil.

Following excavation of the turbine foundation area and construction of the foundation (concrete/reinforced steel) the area would be backfilled with spoil. The area would be reinstated using the retained topsoil/turf where appropriate materials are available. Where required a gravel area would be left around the tower base for access. Reinstatement at turbine foundations would begin as soon as possible after foundation and plinth installation is complete.

The risk of water pollution from excavation works in terms of sediment loss would be prevented / mitigated by the following measures:

- Careful location of turbine bases and track line to minimise excavation where applicable;
- Stripped topsoil/subsoil would not be stored adjacent or in close proximity to watercourses, where a construction area requiring soil stripping is close to a watercourse the soil would be stored a suitable distance from the watercourse;
- Soil would be stored in accordance with best practice in order to remain intact as the soil would be essential to the site reinstatement;
- Where turf requires excavation for track construction an excavator would lift turf and place it to the side leaving space between the edge of the track and the embankment to be constructed. The excavator would then lift out the soil and would place it to the side of the proposed track. The soil stored by the side of the access track would be graded by an excavator and the turfs would be replaced by the excavator over the graded soil beside the track. The timescale for this operation is short and the methodology has been successfully applied at other wind farms; and
- Excavated soil would not be placed where it would block established surface or drainage channels.

4.11 Watercourses

General

This section concerns the proposed operations required for watercourse crossing works in areas associated with the wind farm. This document shall be used by the Contractor in developing the detailed design of all watercourse crossings prior to construction.

Chapter 13 of the ES describes the watercourse crossings that have been identified during the Environmental Impact Assessment.
As part of the iterative design process for the proposed development the number of new watercourses has been minimised. Three new watercourse crossing points would be required:

- WC1: Over a tributary of the Elvan Water at NGR 291105, 617720;
- WC2: Over a tributary of Glengonnar Water at NGR 290239, 617703; and
- WC3: Over a small tributary of the River Clyde near the site entrance.

The Contractor is required to produce a detailed Watercourse Crossing Plan prior to commencement of the works. This plan shall be submitted to the ECoW and SEPA for review and approval where appropriate.

The Contractor is responsible for liaising with and obtaining from SEPA all relevant consents, licenses and authorisations relating to construction of watercourse crossings at the Site.

All construction works on the Site, and specifically construction works to be undertaken within and in the vicinity of any watercourses, shall be completed in compliance with current legislation and best practice as detailed within this document.

As part of the design mitigation all wind turbine locations, site compounds, and other permanent and temporary structures (with the exception of tracks at watercourse crossings) have been sited with a minimum separation of 50m from watercourses where possible.

Tracks have been routed to minimise any crossing of watercourses, where possible. However, as tracks are required to cross watercourses at certain limited locations, appropriate and careful design and construction of watercourse crossings is required.

The ECoW shall be consulted on all watercourse crossing works. Surveys by the ECoW would be carried out immediately prior to construction of the crossings to identify areas of ecological interest and more specifically, mammal and fish activity in watercourses to ensure that adequate mitigation is built into the design.

**Design Philosophy**

All watercourse crossings (WC1 WC2 and WC3) are small and less than 0.5m deep and 0.5m wide. Spoil was evident near to WC2 and it is possible that the watercourse channel has developed in an historic mineral working/exploration area. As stated in Chapter 11 (Geology and Peat) site investigation would be required at this location before any development could take place to confirm the nature and extent of any mining workings so that appropriate design and mitigation measures can be developed to ensure structural integrity and protection of water resources.

In addition to the watercourse crossings the access track would be required to cross a 10 bar pressure water main, near the site entrance. Prior to starting works the Contractor shall carry out a site investigation at this location to allow for an appropriate design to be developed to prevent damage to the water main. The Contractor is responsible for liaising with and obtaining all consents from the owner of the water main (Scottish Water) prior to construction.

The wind farm construction would cover areas where watercourses (rivers, streams, burns and drains) exist. The Controlled Activities (Scotland) Regulations 2011 (CAR regulations) require that all new river, loch and wetland engineering activities, including river crossings and culverting for watercourses shown on the Ordnance Survey 1:50,000 scale map, would
require authorisation by SEPA, which may include (depending on the nature of the works) Registration with, or a Licence from, SEPA. Even if a proposed crossing does not require a Registration or Licence, due to its compliance with a General Binding Rule (GBR), as defined in the CAR, SEPA are still required to be notified.

General good practice in Watercourse Crossing design would ensure that various conditions would be taken into account during the works, and are summarised below:

I. Where appropriate watercourses, over which the access tracks cross, would be routed through culverts appropriately sized and designed not to impede the flow of water and would allow safe passage for wildlife, such as fish, water voles, otters etc. (i.e. the crossings would have a capacity well in excess of the design flow);

II. When installing culverts, care would be taken to ensure that the construction does not pose a permanent obstruction to migrating species of fish, or riparian mammals (i.e. the crossings would make provision for fish and wildlife migration);

III. Culverts should be sized so that they do not interfere with the bed of the stream during construction, (i.e. the crossings would leave the watercourse in as natural condition as possible);

IV. Culverts with a single orifice would be used in preference to a series of smaller culverts that may be more likely to become blocked with flotsam and create erosion (i.e. the crossings would not constrict the channel);

V. Ease and speed of construction are important to minimise disruption to the watercourse and surrounding habitat;

VI. Designed for the life of the project;

VII. Low maintenance; and

VIII. Visually in keeping with the surroundings.

In accordance with CAR guidance, each Watercourse Crossing shall be designed on a case by case basis to be appropriate for the width of watercourse being crossed, and the prevailing ecological and hydrological situation (i.e. the “sensitivity” of the watercourse). A number of factors, both environmental and engineering would influence the selection of structure type and the design of the crossing. Potential designs for watercourse crossings are shown in the Chapter 13 of the ES.

All river crossings would be designed to convey a minimum 1 in 200 year plus climate change return period flood event, and individually sized and designed to suit the specific requirements and constraints of its location.

All watercourse crossings shall include splash boards and run-off diversion measures to prevent direct siltation of watercourses.

**Structural Design**

Consideration needs to be given to aspects such as:
• Bearing capacity of foundations (and variability of capacity);
• Design loadings – likely to be larger during construction and decommissioning of the wind farm; and
• Design options such as bridges or culverts.

**Culverts**

Medium to large culverts or large Armco culverts would be used where a culverted solution is desirable or where a small piped culvert is not appropriate for environmental or capacity reasons.

Depending on size, a natural stone headwall would be provided upstream and downstream to protect the track embankment where necessary. Further protection would be provided to the banks using soft engineering techniques as much as possible.

**Bridges**

Bridges are the preferred solution for larger spans, and for higher flow watercourses. Bridge construction is less likely to interfere with the watercourse to the same extent as culvert construction, and can be built over the existing alignment of the river without the need for diversion. Foundations would be required on both banks (down to a competent bearing stratum) in order to support the bridge deck.

It is anticipated that spans up to 10m can be constructed using pre-cast concrete beams. Spans greater than 10m may be constructed using a proprietary bridge decking system. It may be necessary, depending on the local conditions to provide a revetment protection to the bridge supports. It may also be necessary to provide bed protection.

The design of the abutments would depend on local ground conditions. Where possible the foundation would be excavated to material which would provide the required bearing pressures.

The watercourse would then be crossed with either pre-cast beams or proprietary decking systems depending on the span. These would be delivered to site on a HGV and a suitably sized crane used to lift the decks into place. Local widening and strengthening of the track would be required on one side of the bridge to accommodate the crane.

**Relevant Mitigation from the Environmental Statement**

The following is a summary of the relevant mitigation measures and general good practice associated with the development of water crossings:
• Appropriate care would be given to the construction of the crossings and all loose materials left from construction would be collected and disposed accordingly;
• Site track crossings would be constructed with granular materials, which would limit the production of surface runoff and the direct discharge of sediment into the watercourses;
• The methods of drainage proposed for the site tracks prevent the significant discharge of surface runoff and suspended solids into the watercourses adjacent to the tracks. This is owing to the runoff being collected within the upslope ditch, the presence of peat dams and culverts at appropriate intervals so as to limit longitudinal flow and the discharging of water to the downslope ground. There would therefore be no long runs of ditches that directly discharge into watercourses; and
• All watercourse crossings would be designed to avoid disruption and / or habitat loss to aquatic systems or to affect free passage of fish.

4.12 Permanent Anemometer Mast

A single 95m Anemometer mast is proposed at a location southwest of Turbine No.18, NGR 290416, 617056, as shown on ES Figure 3.1 The mast would be lattice in structure and is to provide operations and performance monitoring data. An indicative Anemometer mast is shown on ES Figure 3.8.

The mast would be delivered to site in sections and constructed using a crane located on a hardstanding measuring 20m x 20m adjacent to the proposed mast location.

The mast would be supported using a reinforced concrete pad measuring approximately 8.5m x 8.5m and 2.5m thick, with the mast itself bolted to a concrete pedestal measuring 3m x 3m and 1.3m high centred on this larger pad. The indicative Anemometer mast is shown on Figure 3.8.

A 3m high anti-climb fence would also be installed around the base of the Anemometer mast to restrict access.

4.13 Temporary Power Performance Mast

Two temporary Power performance masts would be used at the Site. These masts would be used to enable calibration with the permanent mast. The power performance masts are likely to be erect for a period of up to 6 months.
5.0 GENERAL CONSTRUCTION GOOD PRACTICE

5.1 Introduction

The Site Waste Management Plan (SWMP) Regulations 2008 came into force in April 2008. Although these regulations only apply to England, the principle of SWMP are recommended as good practice within the construction industry, and as such are recommended to be adopted in this project.

The SWMP would detail how all waste materials would be managed, including the management and definition of excavated materials.

The Principal Contractor would take all reasonable steps to ensure that all waste from the site is dealt with in accordance with the requirements under the Environmental Protection (Duty of Care) Regulations 1991 (and amendments) and that materials would be handled efficiently and waste managed appropriately.

Appropriate waste management, disposal and waste carrier documentation and licences would be obtained (e.g. complete waste transfer notes prior to waste leaving site, ensure all waste carriers have a valid waste carrier’s registration certificate, ensure wastes are disposed of at a correctly licensed site, complete notification for hazardous waste to SEPA).

Surplus materials would include materials generated by the excavation/extraction works during construction of tracks, lay down compounds and turbine foundations, mainly comprising excavated excess turf and sub-soils where they are appropriate.

Waste streams would include wastes generated by plant, machinery and construction workers over the period of the works, for example waste oils, sewage, refuse (paper, carton, plastic etc.), wooden pallets, waste batteries, fluorescent tubes etc.

5.2 Soils and Spoils

It is planned that any materials excavated on site in the course of the construction works (i.e. soil stripping for track construction, turbine foundations) would be stored on site and re-used where it is appropriate to do so. As such, offsite disposal of this material is not anticipated.

Table 5-1 lists some of the waste types that may be generated during the construction works. Although some waste types may be generated in locations other than the construction compound such waste materials would be stored within the construction compound only. Waste materials generated outside the construction compound would be taken to the compound on a daily basis to be managed thereafter.
### Table 5-1
Common Construction Wastes

<table>
<thead>
<tr>
<th>EWC Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 01 10*</td>
<td>Used mineral hydraulic oil (non-chlorinated)</td>
</tr>
<tr>
<td>13 02 08*</td>
<td>Other waste engine, gear or lube oil</td>
</tr>
<tr>
<td>13 02 05*</td>
<td>Waste engine, gear or lube oil (non-chlorinated)</td>
</tr>
<tr>
<td>13 02 08*</td>
<td>Other waste engine, gear or lube oil</td>
</tr>
<tr>
<td>16 01 07*</td>
<td>Oil filters</td>
</tr>
<tr>
<td>20 01 23*</td>
<td>Discarded equipment containing CFCs e.g. waste fridges &amp; freezers</td>
</tr>
<tr>
<td>16 06 01*</td>
<td>Lead batteries</td>
</tr>
<tr>
<td>16 07 08*</td>
<td>Oily waste from transport and storage tanks</td>
</tr>
<tr>
<td>16 10 01*</td>
<td>Hazardous liquid wastes to be treated off-site</td>
</tr>
<tr>
<td>20 01 21*</td>
<td>Fluorescent tubes and other mercury-containing waste</td>
</tr>
<tr>
<td>20 01 33*</td>
<td>Hazardous batteries and accumulators that are collected separately</td>
</tr>
<tr>
<td>15 02 02*</td>
<td>Absorbents, filter materials, wiping cloths, clothing contaminated by dangerous substances</td>
</tr>
<tr>
<td>15 01 01</td>
<td>Cardboard or paper packaging</td>
</tr>
<tr>
<td>15 01 02</td>
<td>Plastic packaging e.g. toner &amp; ink cartridges, polythene sheeting</td>
</tr>
<tr>
<td>15 01 03</td>
<td>Wooden packaging e.g. timber pallets</td>
</tr>
<tr>
<td>15 01 04</td>
<td>Metallic packaging e.g. drink cans, paint tins</td>
</tr>
<tr>
<td>16 01 03</td>
<td>Tyres</td>
</tr>
<tr>
<td>16 01 15</td>
<td>Antifreeze fluids that do not contain dangerous substances e.g. Coolants</td>
</tr>
<tr>
<td>16 01 17</td>
<td>Ferrous metal from vehicles e.g. car parts</td>
</tr>
<tr>
<td>16 02 14</td>
<td>Non-hazardous waste electricals e.g. washing machines, power tools</td>
</tr>
<tr>
<td>16 05 05</td>
<td>Gases in pressure containers i.e. gas cylinders</td>
</tr>
<tr>
<td>17 01 01</td>
<td>Concrete</td>
</tr>
<tr>
<td>17 02 01</td>
<td>Wood from construction or demolition e.g. timber trusses, supports, frames, doors</td>
</tr>
<tr>
<td>17 04 11</td>
<td>Cables that do not contain dangerous substances e.g. electric cabling</td>
</tr>
<tr>
<td>20 01 01</td>
<td>Paper &amp; card similar to that from households e.g. office paper, junk mail</td>
</tr>
<tr>
<td>20 01 30</td>
<td>Non-hazardous detergent e.g. flushing agent/universal cleaner</td>
</tr>
<tr>
<td>20 01 39</td>
<td>Separately collected plastics e.g. plastic containers, bottles</td>
</tr>
<tr>
<td>20 03 01</td>
<td>Mixed waste similar to that from households e.g. mixed office, kitchen &amp; general waste</td>
</tr>
<tr>
<td>20 03 04</td>
<td>Septic tank sludge</td>
</tr>
</tbody>
</table>

* Denotes Hazardous Waste, as categorised by the European Waste Catalogue.

Foul water from the onsite facilities at the construction works compound would be removed from site by an appropriately licensed contractor (see also Section 4.3). Portable toilet facilities would be provided out with the compound near track/turbine construction locations.

### 5.3 Dust Mitigation

Good practice measures would be adopted during construction to control the generation and dispersion of dust such that significant impacts on neighbouring habitats should not occur. The hierarchy for mitigation would be prevention – suppression - containment.
Table 5-2
Dust Mitigation Measures

<table>
<thead>
<tr>
<th>Task</th>
<th>Mitigation Measures</th>
</tr>
</thead>
</table>
| Excavation and Earthworks         | - Working areas would be stripped as required in order to minimise exposed areas;  
                                  | - During excavation works drop heights would be minimised to control the fall of materials reducing dust escape; and  
                                  | - Temporary cover may be provided for earthworks if necessary, and completed earthworks and other exposed areas would be covered with topsoil and re-vegetated as soon as it is practical in order to stabilise surfaces. |
| Stockpiling of loose materials    | - Ensure that stockpiles exist for the shortest possible time;  
                                  | - Material stockpiles would be low mounds without steep sides or sharp changes in shape;  
                                  | - Wherever possible, stockpiles would be kept securely sheeted;  
                                  | - Material stockpiles would be located from the site boundary, sensitive receptors, watercourses and surface drains;  
                                  | - Material stockpiles would be sited to account for the predominant wind direction and the location of sensitive receptors; and  
                                  | - Any long term stockpiles would be seeded or turfed to stabilise surfaces. |
| Track works/ traffic movements    | - Water bowsers would be available on site and utilised for dust suppression where required;  
                                  | - Daily visual inspections would be undertaken to assess need for use of water bowsers; and  
                                  | - Daily visual inspections would be undertaken to assess the condition of the junction of the site track with the B6368 and its approaches. |

5.4 Site Lighting

Temporary site lighting may be occasionally required for specific activities to ensure safe working conditions, but would be carried out within the limits of the permissible working hours. It is intended the type of lighting would be non-intrusive and specifically designed to negate or minimise any affect to local properties.

Lighting during Construction Phase

Given the proposed size and scope of the development, it is most likely that the construction timetable would require elements of the works to be undertaken during periods of the year when natural daylight is limited.
The use of artificial lighting may therefore be required in order to facilitate the works, such as vehicle and plant headlights; compound lighting; office complex lighting; and localised floodlights/mobile lighting units. There would be fewer requirements for artificial lighting in the summer months when natural lighting would be present during normal working hours. It is not known of any issues with regards to the limit of lighting levels in this area, but lighting would be provided to meet the required lighting levels for the respective works which are being undertaken, especially where there is plant and machinery involved. Any issues identified with regards to limiting the lighting levels, either the lux values, or the time/duration of the lighting would be taken into consideration as part of the developed construction method statement.

**Permanent Lighting**

Lighting requirements for the operational phase would be limited to internal lighting to turbines, the control building and sub-station which can all generally be controlled to have minimal impact.

External lighting would be restricted to emergency and security lighting at the compound and sub-station, and would not be a source which is regularly used. It is not proposed to use street lighting either internally on site tracks, or at the junction with the public highway.

5.5 **Vehicle Storage**

An appropriate area would be provided within the site compound to allow staff and visitor vehicles to be parked.

5.6 **Fuel Storage**

Generally, re-fuelling of mobile plant and machinery would be carried out at a designated location within the site compound only.

Vehicle re-fuelling would take place within the compound at a dedicated impermeable refuelling pad. The pad would be bunded and equipped with a collection sump. Refuelling would be carried out using an approved mobile fuel bowser with a suitable pump and hose. Absorbent material (spill kits) would be available on site and would be deployed to contain drips and small spillages. All other fuels, oils and potential contaminants, as well as waste oils, would be stored within the site compound in secure, fit for purpose containers with bunded containment as appropriate and in accordance with SEPA guidance (PPG 2: Above ground oil storage tanks, August 2011). The bunded containment shall have a capacity of 110% of the volume to be stored and shall have impervious, secured walls and base. Maintenance of mobile plant would take place within the construction compound only and shall comply with SEPA PPG 7 (The safe operation of refuelling facilities, July 2011).

There shall be no fuel storage outside the compound. Plant shall be maintained in good operational order and any fuel/oil leaks recorded for attention. Absorbent pads/granules in the case of an accidental leak/spillage shall be available at the temporary construction compound.

5.7 **Spillage**

Spillage of fuel, oil and chemicals would be minimised by implementation of an Emergency Pollution Prevention Plan (EPPP) which would be prepared by the Principal Contractor. In the event of any spillage or pollution of any watercourse the emergency spill procedures as described in the EPPP shall be implemented immediately.
5.8 Other Storage

Track stone material stockpiles would generally be limited to the compound or within work areas. This material would be transported and deposited directly to the point of use from the compound. Therefore track stone would generally not be stockpiled around the site.

Stripped topsoil/subsoil would be stockpiled in a suitable location away from the area of movement of heavy vehicles, machinery and equipment, to minimise compaction of soil. Stockpiling of excavated material shall be managed such that the potential contamination of down slope water supplies and/or natural drainage systems is mitigated/minimised.

Low mound stockpiles would be formed from excavated material, adjacent to access tracks, turbine areas and compound areas, away from open drains.

Waste storage and raw material would be at the construction works compounds as detailed in Section 5.1.

5.9 Prevention of Mud and Debris on Public Roads

Plant and wheel washing facilities and road sweepers shall be provided as required to prevent mud and deposits from being transferred from site onto the public highway.

Plant and wheel washing, where provided, shall be located within the construction compound. Runoff from the facility shall be captured within a purpose designed system for re-cycling and re-use where possible within the site. Settled solids shall be regularly removed and disposed of by an appropriately licensed contractor. This facility shall be located and designed in consultation with SEPA.

5.10 Water Quality Monitoring and Contingency Plans

General

With regard to the protection of watercourses the following risks would be addressed:

- Siltation of watercourses;
- Discolouration of raw water;
- Potential pollution from construction traffic due to diesel spillage or similar;
- Alteration of raw water quality resulting from imported track construction material;
- Excavation of turbine bases and use of large quantities of concrete;
- Site compound and associated drainage/foul drainage and diesel spill issues;
- The Principal Contractor shall compile a monitoring and maintenance plan for the drainage system and surface water runs which would as a minimum include:
  - Visual Monitoring/Inspections
  - During site works including and water crossing construction works, the relevant drainage/surface water runs potentially being impacted by these works would be inspected on a daily basis by the ECoW while works are ongoing in this area.

Monitoring of Surface Water Quality

Laboratory analysis of selected determinants would be undertaken during the pre-development and construction phase at strategic points within the catchment areas. The frequency and parameters would be finalised in conjunction with SEPA and the Clyde River
Foundation, following appointment of the Principal Contractor, however, the following parameters and frequency are proposed initially:

**Table 5-3**

*Proposed Surface Water Monitoring*

<table>
<thead>
<tr>
<th>Monitoring Parameter</th>
<th>Reasoning</th>
<th>Frequency pre-development, during and post construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour</td>
<td>Important particularly where water is used for private water supplies.</td>
<td></td>
</tr>
<tr>
<td>Dissolved oxygen</td>
<td>Likely to be high in all streams but needs determining as an important indicator of water quality.</td>
<td>Monthly, initially, then on a quarterly basis</td>
</tr>
<tr>
<td>Electrical conductivity</td>
<td>Useful indicator of the overall salinity of surface or spring water.</td>
<td></td>
</tr>
<tr>
<td>pH</td>
<td>Overall water quality parameter</td>
<td></td>
</tr>
<tr>
<td>Suspended solids</td>
<td>Relevant to surface water quality/turbidity especially with regard to private water supplies / aquaculture.</td>
<td></td>
</tr>
</tbody>
</table>

*Post-construction: Initially for a period of 1 year, further monitoring as required by SEPA and Tweed Foundation*

The above parameters would also be monitored on a monthly basis for three months prior to commencement of construction works.
6.0 PRE-CONSTRUCTION SURVEYS, PROTECTED SPECIES AND MONITORING

6.1 EIA Surveys

Full site details are in the ES. However, pertinent investigation details are appropriate to this draft CEMP as follows:

- Site Investigation;
- Hydrology Study; and
- Ecological Report.

6.2 Pre-Construction Surveys

Prior to the commencement of the construction of the proposed development, detailed site investigations would be undertaken to inform the designers/engineers of the development components, including wind turbine foundations and detailed track construction methods to ensure the materials beneath these discrete locations are adequate to support the concrete bases and foundations. As stated in Chapter 11 (Geology and Peat), site investigation of historical mining areas would be required to ensure that appropriate design and mitigation measures can be developed in order to provide suitable protection of water resources. It would also allow designers/engineers to determine if any micrositing is required.

Where necessary, in the vicinity of identified features of interest, an archaeologist would be employed to look over the marked out infrastructure to identify potential additional mitigation (if necessary) or cordon off archaeological sites.

A pre-construction otter survey would be completed to ascertain if the baseline situation has changed before construction works commence. A pre-commencement survey would be undertaken to ensure that nest destruction and disturbance to sensitive bird species (i.e. Schedule 1/Annex 1 raptors/owls and breeding waders) are avoided.

A pre-construction survey, to determine the status of the black-headed gull colony within the existing electricity substation, would be undertaken during the spring prior to construction commencing.

6.3 Ecological Mitigation

Where applicable, construction would not take place within specified disturbance-free buffer zones for sensitive bird species during the breeding season. Further details regarding the extent of disturbance-free buffer zones for particular species are set out in ES Chapter 8: Ornithology.

If large numbers of gulls are still present in the colony at the existing substation, construction of the proposed substation would avoid the period whilst gulls are nesting, likely to be April to July inclusive.

All construction workers would be briefed by the ECoW as part of their site induction so that workers are aware of the ecological sensitivities on the Site and the legal implications of not complying with agreed working practices.

Mitigation would be employed to reduce the chances of inadvertently killing or injuring individual common lizards during construction works. Where appropriate and safe to do so, all construction working areas with potentially suitable habitats for reptiles would initially be cut or stripped during the active season for reptiles (April to October), under the guidance of
the ECoW, who would search for and remove any suitable refugia prior to cutting. Working areas would then be kept unsuitable for reptiles through regular cutting, as required, until construction in that location commences.

During construction, site speed limits of 15mph would reduce the likelihood of accidental injury/killing of otter by construction traffic. All potentially dangerous substances or materials would be carefully stored to prevent them causing any harm to otters. During construction, all excavations greater than 1m depth would either be covered at night or designed to include a ramp to allow otters and other animals, a means of escape should they fall in. If required following pre-construction surveys, additional mitigation for otter would be determined in advance of works commencing and agreed where required with SNH.

6.4 Reinstatement and Monitoring

For all reinstated areas, immediate aftercare provision would include an inspection of reinstated areas after completion of the reinstatement work at each location. In addition, the wind farm operator would make regular maintenance visits to the site and would visually monitor the success of re-vegetation.

Erosion processes on trackside embankments and cuttings would be mitigated by appropriate design, including suitable gradients and stabilization measures, which would also enable effective regeneration of vegetation or establishment of areas which are reseeded. Sediment traps would be required in the early years following construction until natural regeneration is / reseeding areas are established. Should significant erosion or sedimentation, which is not expected, take place at any location it would be addressed by re-grading. Any disturbed ground situated along the edges of tracks would be reinstated to match adjoining ground as soon as practicable to avoid unsightly scarring of the landscape, particularly along the main access track. [Ref: 24 and 26 SNH good practice guides]

Reinstatement and Monitoring - Outline

Reinstatement would be undertaken either by re-use of onsite vegetation and soil using turf/clodding methods, by natural regeneration, or by reseeding with appropriate species, which may include heather in moorland areas. Proposed methods would be finally agreed and confirmed with SLC/SNH following appointment of the Principal Contractor. If seeding is required, this would be via cutting and strewing of heather brash or via the use of treated heather seeds only.

Monitoring Methods - Outline

The progression of vegetation recovery and survival on restored areas would be monitored to ensure satisfactory development and to allow early identification of any remedial measures required.

6.5 Ecological Clerk of Works

As stated in Section 2 of this CEMP, an ECoW would be appointed for the period of the construction and reinstatement of the site after construction. The appointment of the ECoW would be approved by South Lanarkshire Council, and if necessary provision would be made available for an additional ECoW to be employed during busy periods. Authority would be given to the ECoW to authorise, oversee and identify actions, including any temporary stoppage of works, to ensure satisfactory construction arrangements and any necessary mitigation. It is proposed that the ECoW would also carry out or supervise the monitoring and mitigation programmes described in 6.3.
### 7.0 REFERENCES

#### 7.1 Reference Documents

**Table 7-1 Reference Documents**

<table>
<thead>
<tr>
<th>Doc Ref</th>
<th>Reference Documents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors, CIRIA, 532, 2001</td>
</tr>
<tr>
<td>2</td>
<td>Control of Water Pollution from Linear Construction Projects, technical guidance, CIRIA 648, 2006</td>
</tr>
<tr>
<td>3</td>
<td>Non-Statutory Guidance for Site Waste Management Plans, April 2008</td>
</tr>
<tr>
<td>5</td>
<td>Health and Safety at Quarries. Quarries Regulations 1999. Approved code of practice, HSE, 1999</td>
</tr>
<tr>
<td>9</td>
<td>Prevention of Pollution from Civil Engineering Contracts: Special Requirements, Version 2 June 2006</td>
</tr>
<tr>
<td>10</td>
<td>Prevention of Pollution from Civil Engineering Contracts: Guidelines for the Special Requirements, Version 2 June 2006</td>
</tr>
<tr>
<td>11</td>
<td>The Water Environment (Controlled Activities), (Scotland) Regulations 2011, A Practical Guide, Version 6, August 2011</td>
</tr>
</tbody>
</table>

**Pollution Prevention Guidelines (PPGs)**


<table>
<thead>
<tr>
<th>Doc Ref</th>
<th>Reference Documents</th>
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<tbody>
<tr>
<td>12</td>
<td>PPG1 General Guide to the Prevention of Pollution: PPG1</td>
</tr>
<tr>
<td>13</td>
<td>PPG2 Above Ground Oil Storage Tanks: PPG2, April 2010</td>
</tr>
<tr>
<td>14</td>
<td>PPG3 Use and design of oil separators in surface water drainage systems: PPG 3, April 2006</td>
</tr>
<tr>
<td>15</td>
<td>PPG4 Treatment and disposal of sewage where no foul sewer is available: PPG4, July 2006</td>
</tr>
<tr>
<td></td>
<td>Description</td>
</tr>
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</tr>
<tr>
<td>16</td>
<td>PPG5 Works and maintenance in or near water: PPG5, October 2015</td>
</tr>
<tr>
<td>17</td>
<td>PPG6 Working at Construction and Demolition Sites: PPG6, July 2010</td>
</tr>
<tr>
<td>18</td>
<td>PPG7 Refuelling Facilities: PPG7, August 2004</td>
</tr>
<tr>
<td>19</td>
<td>PPG8 Safe Storage and disposal of used oils: PPG8, February 2004</td>
</tr>
<tr>
<td>20</td>
<td>PPG21 Incident Response Planning: PPG 21, March 2009</td>
</tr>
<tr>
<td>21</td>
<td>PPG26 Storage &amp; handling of drums &amp; intermediate bulk containers: PPG 26, February 2004</td>
</tr>
<tr>
<td>22</td>
<td>Technical Flood Risk Guidance for stakeholders (section 4.3) [SEPA, 24/4/11].</td>
</tr>
<tr>
<td>23</td>
<td>WAT-PS-06-02: Culverting of Watercourses – Position Statement and Supporting Guidance [SEPA, June 2015]</td>
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</table>

**SNH Guidance**

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
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<tr>
<td>26</td>
<td>Constructed tracks in the Scottish Uplands, 2nd Edition June 2013, Updated September 2015</td>
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</table>
### 7.2 Abbreviations

#### Table 7-2 Table of Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Description</th>
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</thead>
<tbody>
<tr>
<td>CAR regulations</td>
<td>The Controlled Activities (Scotland) Regulations 2011</td>
</tr>
<tr>
<td>CDM</td>
<td>Construction (Design and Management)</td>
</tr>
<tr>
<td>CEMP</td>
<td>Construction and Environmental Management Plan</td>
</tr>
<tr>
<td>DVAR</td>
<td>Dynamic Volt-Amps Reactive</td>
</tr>
<tr>
<td>ECoW</td>
<td>Ecological/Environmental Clerk of Works</td>
</tr>
<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<tr>
<td>EPPPP</td>
<td>Emergency Pollution Prevention Plan</td>
</tr>
<tr>
<td>EPS</td>
<td>European Protected Species</td>
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<td>ES</td>
<td>Environmental Statement</td>
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<tr>
<td>FCS</td>
<td>Forestry Commission Scotland</td>
</tr>
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<td>FDSFB</td>
<td>Findhorn District Salmon Fisheries Board</td>
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<tr>
<td>FMP</td>
<td>Fisheries Management Plan</td>
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<tr>
<td>LOLER</td>
<td>Lifting Operations &amp; Lifting Equipment Regulations</td>
</tr>
<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
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<tr>
<td>QA</td>
<td>Quality Assurance</td>
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<tr>
<td>SAC</td>
<td>Special Areas of Conservation</td>
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<tr>
<td>SEMP</td>
<td>Site Environmental Management Plan</td>
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<tr>
<td>SEPA</td>
<td>Scottish Environment Protection Agency</td>
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<tr>
<td>SLC</td>
<td>South Lanarkshire Council</td>
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<tr>
<td>SNH</td>
<td>Scottish Natural Heritage</td>
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<tr>
<td>SPA</td>
<td>Special Protection Area</td>
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<tr>
<td>Abbreviation</td>
<td>Full Description</td>
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<tr>
<td>--------------</td>
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<tr>
<td>SSSI</td>
<td>Site of Special Scientific Interest</td>
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<td>SWMP</td>
<td>Site Waste Management Plan</td>
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<td>TCC</td>
<td>Temporary Construction Compound</td>
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<tr>
<td>TMP</td>
<td>Traffic Management Plan</td>
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<tr>
<td>TRL</td>
<td>Temporary Reception Laydown Area</td>
</tr>
<tr>
<td>WTGs</td>
<td>Wind Turbine Generators</td>
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</table>
8.0 CLOSURE

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