Kype Muir Wind Farm Extension

Technical Appendix 2.1 (Draft Construction Management Statement)

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Kype Muir Extension
Construction Management Statement

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1 Introduction

1.1 Introduction

This draft Construction Management Statement (CMS) has been produced to provide an overview of the likely methods which will be used and limited to the construction of the Kype Muir Extension Wind Farm (the Development), in order to mitigate against any potential environmental impacts. The methods outlined in this draft CMS are based on previous experience and take into account good and/or best practice as appropriate. The appointed Contractor will develop and update this CMS and therefore it should be noted the construction methods are likely to be updated in line with best practice, the particular Site circumstances and from the results of the site investigation (SI).

1.2 Kype Muir Extension

The Development is located in west of Scotland approximately 6.5km south-west of Strathaven, South Lanarkshire. The application boundary occupies an area of approximately 942ha (centred on Ordnance Survey National Grid Reference (NGR) NS 69832 37323. The Development comprises 15 wind turbines, each with an installed capacity of up to 5MW, and associated infrastructure including access tracks, crane pads, underground cabling, a meteorological mast and control building. The Development will have a total installed capacity of up to 75MW. A detailed description of the Development is contained within Chapter 2 (The Proposed Development) of the Environmental Statement (ES). Construction noise associated with the Development is assessed in Chapter 10 (Noise).

1.3 Draft Construction Management Statement

This draft CMS has been updated to reflect proposed infrastructure changes to the consented Kype Muir Extension wind farm under Section 36 of the Electricity Act. The document should be considered as a preliminary document which will be developed in detail following the consent decision and award of construction contracts.

Contractors will likely be selected through a Tender process. Should consent be granted, the draft CMS will be used to inform the tender submissions for the Balance of Plant contract. The successful contractor(s) will be bound by an obligation to comply with a CMS during the execution of the works. All references to design in this document (whether explicit or implied) shall not be deemed exhaustive. The selected contractor(s) shall be required to verify, adopt and/or, where applicable, improve the CMS and the current design captured in the contract drawings. The client will also ensure that all design and construction works are undertaken in accordance with their obligations outlined within the Construction, Design and Management Regulations 2015 (CDM 2015).

2 Site Conditions

2.1 Site Description

The Development is located in a rural area of South Lanarkshire, approximately 6.5km south-east of Strathaven. The Development is located on the north-east facing slopes of Goodbush Hill (475m AOD), Auchengilloch (462m AOD), Harting Rig (450m AOD), Side Hill (430m AOD) and Hawkwood Hill (389m AOD) which form a broad undulating ridge along the south-western boundary. There are a number of watercourses within the Development, which all drain generally in a north-western direction towards the Avon Water which is part of the River Clyde catchment.

Land use within the Development is generally split between open moorland in the north-west of the Site and commercial forestry in the south-east of the Site.

2.2 Ground Conditions

The British Geological Survey (BGS) 1:50,000 drift geology map indicates that the Development is underlain by peat deposits, glacial till ('diamicton'), alluvium, glaciofluvial deposits as well as areas where bedrock as at or near the surface.

Peat deposits are generally present across the vast majority of the Site and are likely to be largely underlain by glacial till deposits with isolated areas, notably hill tops, where the peat is underlain directly by bedrock. Peat is generally absent on the banks of watercourses across the Site and in larger areas on the slopes of Hawkwood Hill.

Peat depths have been identified through on Site peat probing which has found depths very from <0.5m along the south-western boundary to >5m in the centre of the Development on the flat ground to the north of Harting Rig.

The glacial till is described by the BGS as "*rock fragments in a stiff to hard clay, silt and sand matrix*".

Alluvium is restricted to three areas in the open moorland area to the north-west of the Site, the largest of which is adjacent to the Feeshie Burn. The two other localised areas are present, one being located in the valley between Hawkwood Hill and Feeshie Rig and the other on the northern boundary of the Site. The BGS describes the alluvium as "*clay, silt, sand and gravel*".

Bedrock is present at or near to the surface in areas along the southern boundary, the largest of these areas are on the slopes of Harwood Hill and the steep north facing slopes of Harting Rig.

Two small pockets of glaciofluvial deposits, described by the BGS as "*sand and gravel*", are located in the south-east of the Site adjacent to the Sach Burn.

The BGS 1:50,000 solid geology map indicates the Development is primarily underlain by sandstones, conglomerates, siltstones and mudstones of the Waterhead Group and the Dungavel Group of Silurian age. The Waterhead Group covers the north, east, south and central areas of the Site with the Dungavel Group being present along the western boundary.

A tertiary-age tholeiitic dolerite intrusion (Mull Dyke Swarm) is also present and runs along the southern part of the south-western boundary in a north-west to south-east direction, and generally following the ridge line formed by Auchingilloch, Harting Rig and Side Hill

For more detail on the existing ground conditions of the Development please refer to Chapter 7 (Ground Conditions & Hydrology) of the ES.

2.3 Hydrology

The entire Site is contained within the headwaters of the Avon Water which is part of the River Clyde catchment.

The north-western area drains into the Lochar Water, which flows generally north-west off the Site. Named tributaries of the Lochar Water within the Site are the Feeshie Burn and Red Bog Burn.

The south-eastern area of the Site drains into the Long Knowe Burn, which flows generally east off the Site, towards Kype Water Reservoir. Named tributaries of the Long Knowe Burn within the Site are the North Feeshie Burn, South Feeshie Burn, Back Burn and Long Knowe Burn.

The western tip of the Site is drained by the Dykes Burn which flows west off the Site.

For more detail on the existing hydrological conditions of the Development please refer to Chapter 7 (Ground Conditions & Hydrology) of the ES.

2.4 Land Use

The historical land uses of the Site and its surroundings have been determined from historical Ordnance Survey (OS) maps obtained as part of the Envirocheck Report at scales of 1:10,000 and 1:10,560, and covering the period from 1864 to 2013

A review of these maps identified the major land use on Site as agricultural activities, mainly grazing. From 1864 through to 1980 there is almost no evidence of change on Site; however maps dated from 2001 show coniferous commercial forestry on the south-east of the Site.

2.5 Ecology

The ecology of the Development site is summarised in Chapter 6 (Ecology & Nature Conservation) of the Environmental Statement. The following statutory designated sites have been identified immediately adjacent to the Site:

- Muirkirk and North Lowther Uplands Special Protection Area (SPA) - Adjacent to south-eastern edge of Site boundary.

- Muirkirk Uplands Site of Special Scientific Interest (SSSI) - Adjacent to south-eastern edge of the Site boundary.

Other than those referenced above, there are no other statutory designated sites within sufficient proximity to be adversely affected by the proposed wind farm.

2.6 Cultural Heritage & Archaeology

Cultural heritage and archaeology are assessed in Chapter 8 (Cultural Heritage and Archaeology) of the Environmental Statement.

Ten heritage assets have been identified within the Site boundary. The location and extents of all the assets identified by the study are shown on Drawing ES09 and details of their character and baseline condition are provided in Chapter 8 (Cultural Heritage).

There are no Scheduled Monuments within the Site boundary, and no part of the Development would lie within a Garden and Designed Landscape, Inventory Battlefield or Conservation Area. There is one Category B Listed Building within the Site boundary.

3 Kype Muir Extension Wind Farm

3.1 Introduction

The design of the Development has been informed by a range of environmental, technical and engineering considerations. In order to develop a design for the purpose of making a planning application, the maximum parameters of the Development including micro-siting tolerance within which, should planning permission be granted, Kype Muir Extension would be constructed and operated have been identified and are outlined in Table 3.1.

Table 3.1 Kype Muir Extension Key Characteristics

Component	Description
Wind Turbines	Proposed Candidate Turbine Tip Height: 4 x 156m; 4 x 200m; 4 x 220m and 3 x 176m Maximum Rated Output per turbine: 5 MW
Turbine Foundations	Footprint: 26m diameter foundation (TBC) Depth: 5.25m (TBC)
Transformers Kiosks	Assumed to be located out with each turbine tower and sited within the adjacent hardstanding area. These are typically 5m by 3m by 3m.
Crane Pads	Total number: 15 (adjacent to wind turbines) Footprint: 2,770m^2
Permanent Anemometer ('met') Mast	Total number: 1 Mast Height: 80m
Wind Farm Control Building Compound	Footprint: 1,176m^2 Location: centred on NS 71185 37234
Access Tracks (New)	Total length: 9,043km Running width: 5m up to 7.5m at corners and junctions
Access Tracks (Upgraded Existing)	Total length: 2.265km Running width: 5m up to 7.5m at corners and junctions
Access Track Turning Heads	Total number: 8 (1 for fully loaded delivery vehicles & 7 for unloaded delivery vehicles) Individual Lengths: 75m (fully loaded) & 42.5m (unloaded)
Cable Trenches	Cables will be installed along access tracks Trench Depth: 0.75m (approx.) / Trench Width: 0.45m (approx.)
Watercourse Crossings	Total number: 4 (within the Site)
Borrow Pits	Total number: 4

Table 3.1 Kype Muir Extension Key Characteristics	
Component	**Description**
Temporary Construction Compounds	Total number: 1 Footprint: 10,125m^2 (NS 71087 37174)
Material Requirements	Stone: 95,200m^3 , Concrete: 17,500m^3 , Steel:2,500 tonnes

3.2 General Design Principles

The design process is reported in Chapter 3 – Design Iterations, of this EIAR. The approach to the design has been iterative informed by a number of key considerations with the aim of avoiding and/or reducing adverse effects on the environment and ensuring the Development can be constructed and operated safely, which are considered within Chapter 2 (The Proposed Development) within Volume 1 of this ES. Key design principles include:

- Fully utilise existing on Site infrastructure (access tracks) where possible;
- Avoid areas of steep topography;
- Minimise depth to formation level;
- Minimise excavation depths;
- Minimise excavation volumes;
- Promote the re-use of excavated material as structural fill;
- Reduce required volume of imported fill;
- Minimise the construction traffic volumes on public carriageway;
- Reduce excess spoil volumes and storage requirements;
- Reduce effect on watercourses;
- Avoid areas of potentially deep peat;
- Minimise the risks to slope stability;
- Avoid clashes with existing Microwave and Telemetry links;
- Reduce the construction stage carbon footprint and tree felling where possible;
- Control the removal of forestry; and
- Avoid environmental constraints identified during the EIA process.

3.3 Specific Philosophy

3.3.1 Site Access

Access to the Development will be from the B743 via the minor public road to Lambhill and then via the consented access track for Kype Muir Wind Farm and hence into the Development.

3.3.2 Access Track

The alignment of tracks through the Development have been designed with consideration to the local topography and ground conditions so that the tracks can be constructed safely, deliveries to Site can be undertaken and construction and operation of the tracks can be undertaken with minimal impact on the local environment.

The access track layout has minimised the number of watercourse crossings required and has, as far as possible, avoided areas with peat depths >1.5m. Some sections of floating road (track) may be required. The majority of the new infrastructure will be located on shallow peat (between 0m to 1m).

The access track layout design has been developed with consideration to slope stability and it is considered that the current layout is low risk in terms of peat slide and slope failure.

The new access track construction will consist of either one or two layers of stone (crushed rock aggregate) depending on the load bearing capacity of base layer. Where the underlying layer is not rock, it is anticipated that a minimum of two layers of stone will be used; the 6F2 stone capping layer(s) and the Type 3 running layer. In areas where the load bearing layer is rock, the capping layer may be omitted, and the Type 3 running layer would potentially be installed directly onto the rock surface.

The capping layer thickness is designed taking account of both the formation bearing capacity and the loadings typically required by turbine manufacturers. The structural make-up will consist of a compacted stone structure which is to be installed in accordance with the Highways Agency Manual of Contract Documents for Highway Works (MCDHW) including latest revisions. All stone used within the structure will be graded in accordance with the MCDHW and will be of Type 6F2 specification or similar approved for capping layers and of Type 3 specification or similar approved for the running course.

Straight sections of the track have running width of approximately 5m. All bends will be designed using AutoTrack or another suitable design tool available at the detailed design stage and the effective width at these locations will be widened to suit. The access track width has been designed with additional 250mm minimum shoulders.

Under track drainage will be incorporated within the SuDs design in agreement with SEPA and SNH. Existing watercourses / drainage ditches will be culverted using an adequately sized pipe or bottomless arch at locations where the proposed access track crosses.

Turning heads have been provided at selected locations to allow turning of vehicles where otherwise they would have to reverse for unreasonable distances. Turning heads have been designed to be either 75m long to allow turning (if necessary) of delivery vehicles loaded with turbine components or 42.5m to allow turning of unloaded delivery vehicles. The turning heads have a 5.5m running width and a minimum bend

radius of 25m, refer to Drawing ES03. Construction of the crane pads will be as per new access tracks. The location of the turning heads has been selected to avoid steep slope gradients to minimise cut and fill requirements.

3.3.3 Crane Pads

Crane pad hardstandings are required at each turbine location in order to provide a safe area from which a crane can erect the turbine tower and associated components safely. Due to the size and weight of most turbine components it is necessary to use a large crane, which requires significant space. During detailed design the ground conditions will be assessed and the crane pads designed accordingly. The preliminary design has considered the topography and the available micro-siting at each turbine location in order to minimise cut and fill requirements and minimise volumes of peat excavation. A general micro-siting allowance of 70m has been included in the consent application to account for any issues encountered on Site.

All crane pad construction make up will be designed to take into account both the local bearing capacity of the formation (foundation) and the loadings from fully laden cranes (information to be provided by the turbine manufacturer), and is likely to consist of a compacted stone structure which would be installed in accordance with the MCDHW.

All crane pads are likely to be formed from a suitably stiff layer and the finished crane pad surface strength will meet or exceed the minimum strength as specified by the turbine manufacturer and in accordance with relevant standards, including Eurocode 7: Geotechnical Design. Floated construction is not deemed to be acceptable for crane pads due to the inherent flexibility of a floated platform. The use of this construction method would result in inevitable differential settlements that could cause a catastrophic crane overturning accident, therefore, this has not been considered as an option.

Crane pad formation is likely to consist of either one or two layers of stone depending on the properties of the underlying load bearing layer. Geogrid layer(s) may be included to enhance the strength.

The turbine manufacturer will have specific requirements in relation to the crane pads. These requirements will be reviewed and taken into account during detailed design of the crane pads. Should a lattice crane be required for the larger 220m tip height turbines, the crane pads will require a long level area to allow the jib to be erected. To assist with the jib erection a smaller auxiliary crane will be required and will have separate, smaller crane pad. The footprint shown on drawing ES03 will accommodate the auxiliary crane pad.

3.3.4 Turbine Foundation Design

The wind turbines foundation is likely to be a reinforced concrete gravity base. Maximum foundation loads will be provided by the wind turbine supplier, including suitable factors of safety in accordance with European design regulations (Eurocodes). The turbine tower will be anchored to the foundation by bolting it to an assembly cast into the concrete. Typical dimensions of the base are illustrated on Drawing ES08 of the ES.

At this stage a reinforced concrete gravity foundation is the only type proposed, however, this will be reviewed during the detailed design phase.

The foundation design will be based on the information contained in the ground investigation report and / or geotechnical design report. The ground investigation will not be undertaken prior to submitting the planning application. Based on the available information, it is currently anticipated that gravity foundations will be used for all associated infrastructure within the Development.

3.3.5 Control Building Design Philosophy

The control building and adjoining compound will be designed, sized and positioned to be sympathetic with the surroundings and to comply with the requirements set out in the proposed layout. A full description of the components of the control building compound is presented in Chapter 2 (The Proposed Development).

The foundations for the building will be designed based on ground investigation and / or geotechnical design report.

The structure will be designed in accordance with the mechanical and electrical requirements. It is expected that the compound will require outdoor switchgear to connect at a maximum of 33kV. Outdoor switchgear is proposed to minimise the size of the control building required.

The control building will need to house:

- An outdoor 33kV bay,
- A 33kV indoor transformer,
- a substation building containing:
    - switch room with 33kV switchboard and protection equipment;
    - wind farm control room with WC facilities; and
    - DNO control and protection room.

The control building could be approximately 45m x 28m and approximately 6m high.

In total, including clearance, security, access, storage and fencing etc, the land area required for this control building could be approximately 45m x 28m.

Finally, the control building construction shall comply will all current Building Regulations as well as all the appropriate electrical design standards applicable.

3.3.6 Site Drainage Design

Prior to construction commencing a Pollution Prevention Plan (PPP) will be developed and agreed with SEPA. The PPP will be developed with the appointed Contractor, and will include both temporary and permanent drainage measures, but will be in line with the following.

Interception drains will be installed to collect natural overland flows before they reach the access tracks. These flows will be transferred under the tracks and discharged through silt fences (or similar filtration) to the natural ground downstream of the tracks. All new access tracks will have swales at either side and cross drains as required. Rainwater falling on the access tracks will be picked up by the swales and discharged via regular breakouts through silt fencing to the natural ground. At sensitive locations such as turbine pads and adjacent to watercourses, flows will discharge to settlement lagoons before being transferred back to natural ground. New connections to existing land drains and watercourses will be avoided. In low lying wet areas, new drainage will be omitted to avoid drying out these areas.

The construction works are to be phased such that the interception drainage and any required settlement lagoons are in place prior to the majority of the access roads (as practical as it is to do so).

3.3.7 Spoil Management Plan

It is anticipated that the volume of spoil to be generated will be manageable so as to be contained exclusively within the Site boundary. It is anticipated that the glacial till and rock will generally have sufficient load bearing capacity for access track and crane pad hardstanding foundations, therefore it is anticipated that significant volumes of non-peat material will not need to be excavated at hardstanding locations.

On Site peat probing has identified areas of deep peat (depth >5m), however, the design of the Site infrastructure layout has avoided the areas of peat deposits wherever possible. Where these cannot be avoided floating roads may be required. Turbine locations have also been selected to avoid areas of deeper peat to prevent the requirement for significant excavations in peat and de-watering of excavations. No evidence of past or current peat or other slope instability issues was observed during the site walkover visit.

It is envisaged that due to the low spoil volumes, surplus excavated material will generally be accommodated along the sides of access tracks and adjacent to crane pad and turbine locations within the Site boundary and as restoration material for the borrow pit(s). Spoil will not be placed within or adjacent to Groundwater Dependent Terrestrial Ecosystems (GWDTEs). Where placed on verges, the shallow peat bunds shall have a maximum width of 2m and a maximum height of 0.5m; this will reduce the visual impact of hardstanding areas (e.g. crane pads). No spoil will be distributed outside the Site boundary, or within the 50m buffer zones identified at watercourse locations.

Cut off drains will be installed on the uphill side of spoil deposits to intercept any surface water run-off and prevent the deposited spoil material from becoming saturated.

Where tracking of excavators is required on areas of undisturbed weak or boggy ground (i.e. during the pre-installation of SuDS features) only a specialist low ground contact pressure ‘Bog Master’ type excavator (or similar) will be used.

Where required, excavation and compaction of peat will be carried out in accordance with a Peat Management Plan, which will be developed, if required, prior to construction and will be incorporated into the updated CMS.

For reinstatement, if a deficit of fibrous peat is available, amorphous peat (where present) is to be graded and smoothed off with the back of a bucket to prevent against water ponding and promote controlled surface runoff drainage. Effective re-seeding of barren swathes of peat spoil will be undertaken during the first

growing season following spoil placement. Seed mix will be selected with a view of restoring the original ecology.

Only a special low ground contact pressure excavator will be permitted to travel on the vegetated peat surface. The same type of excavator will be used to form the necessary SuDS features so that damage to any existing peat surface is minimised.

Spoil materials will not be deposited in areas that could potentially affect private water supplies (within or down gradient of the Site). Spoil materials will not be deposited in areas that are either to remain forested or will be replanted with forestry.

4 Construction Methods & Mitigation

4.1 Programme

Construction will commence once suspensive conditions have been discharged and will last approximately 24 months. The following schedule outlines the key activities and associated estimated timescales and preliminary dates:

Activity	Start	Finish	Weeks
Forestry / Felling Activities	Month 1	Month 4	20
Junction widening	Month 4	Month 5	6
Pre-construction and track drainage installation	Month 5	Month 9	20
Opening of borrow pits	Month 4	Month 7	16
Construction compound	Month 4	Month 4	2
Access track construction	Month 5	Month 17	48
Control Building Civil works	Month 19	Month 22	16
Turbine foundations and crane pad hardstandings	Month 12	Month 20	36
Control Building Electrical fit out and collector circuits cabling	Month 21	Month 23	8
Turbine Delivery Route – Road Upgrades	Month 11	Month 13	12
Turbine and Permanent Met Mast erection	Month 16	Month 22	28
Commissioning and tests on completion	Month 21	Month 24	16

4.2 Pre-Construction Survey and Monitoring

It is anticipated that the following surveys and monitoring will be undertaken prior to construction:

- Ground investigation (prior to detailed design);
- Topographical survey (prior to detailed design);

The ground investigation will be carried out pre-construction and in accordance with industry best practises to mitigate against pollution to the existing environment.

4.3 Construction Method

4.3.1 Forestry / Felling Activities

Forestry activates will consist of key holing areas of forestry prior to construction work commencing on Site.

The construction method to be implemented is as follows:

Ref	Activity	Notes for Consideration
1	Identification of trees to be felled	*Where key holing is taking place trees to be felled will be spray painted.*
2	Felling of trees	*Contractor will use a harvester to fell and strip trees, using brancwood to construct brash mats which allow machinery to traverse safely and reduce impact on underlying soil.*
3	Removal of felled trees	*Forwarders will be used to remove the felled and stripped trees leaving branchwood behind. The trees will be temporarily stored before being removed from Site.*

4.3.2 Site Entrance

Access to the Development will be from the B743 via the minor public road to Lambhill and then via the consented (but not yet constructed) access track for Kype Muir Wind Farm and hence into the Kype Extension Development.

The access from the public road will be within the Kype Muir Wind Farm development (which is consented but not yet constructed). The following describes the anticipated requirements for the Kype Muir Wind Farm development entrance. The site entrance for Kype Muir Wind Farm will be reviewed for the Kype Muir Extension development and any required upgrades will be carried out in conformance with the requirements of SLC. Measures to ensure compliance are as follows:

- Site gates at the access will be positioned 20m from the edge of the carriageway so that a 16m long vehicle can stop clear of the carriageway when the gates are closed.
- Measures will be employed to ensure that the public carriageway is kept free from dirt and debris as far as is practical to do so.
- The contractor will liaise with the Council and arrange for a pre-construction and post construction condition surveys to be undertaken of the road access in advance of construction works.

The construction method to be implemented is as follows:

Ref	Activity	Notes for Consideration
1a	Carry out Topographical Survey	*The client will arrange and provide prior to the mobilisation of their Contractors to Site (exception: Enabling works)*
1b	Prepare/update the Traffic Management Plan in coordination with Road Service and implement	*Contractor required to agree an approved TMP with the local Roads Service traffic management division.*
2	Set out the alignment of the Site entrance with the use of GPS (RTK) equipment.	*The contractor shall ensure that markers which are to be used for setting out purposes are not harmful to the environment i.e. untreated wooden pegs or similar – Paints or other manmade materials shall not be used.*
3	Carry out any amendments to the existing drainage features if required	*Requirements to be reviewed on Site prior to construction*

4	Excavate and/or clear the area which is required to accommodate the visibility splays	*Contractor will ensure that the top layer of vegetated material is set aside for re-use as a sealing layer where required.*
5	Private fence boundary is to be re-aligned to as is dictated by the visibility splays	*The contractor shall ensure that this is undertaken simultaneously with the visibility splay works to ensure that the property is left secured overnight.*
6	Excavate to track formation level along the extent of the Site entrance and excavate a trench to accommodate under entrance drainage.	*The contractor shall ensure that any surplus excavated material is carefully distributed and banked adjacent to the entrance within the construction boundary. Surplus material will be managed as per the spoil management plan.*
7	Stone placement and bitmac apron to be installed	*Where possible stone placement will be phased so as to minimise the potential for soil and debris to collect on the public road. Where site debris is present on the carriageway the contractor shall implement measures to clean the carriageway.*
8	Security gates installed and tied into the re-aligned fence	*This will ensure that the Site is secured.*

4.3.3 Pre-Construction and Track Drainage

The principal drainage design philosophy is to intercept natural surface water run-off before it reaches the new access tracks and transfer flows underneath the tracks before discharging to natural ground. It is intended to achieve this by installing shallow swales on the upstream side of tracks with under-track drainage at natural drainage paths. Stone check dams will be installed within the swale to encourage flow through the under-track drainage.

Track construction will create swales on both sides to collect run-off. At critical locations such as adjacent to watercourses, it will be necessary to install small settlement ponds to treat flows before discharge. It will be important to install settlement ponds as soon as is practical to ensure the facility for treatment is in place prior to continuing with construction of the access tracks

Ref	Activity	Notes
1	Check the weather	*The Contractor shall review the current and forecast weather conditions and determine whether it is appropriate to carry out drainage works. Working adjacent to streams during periods of heavy rainfall is to be avoided whenever possible.*
2	Set out the Site tracks with the use of GPS (RTK) equipment.	*The contractor shall ensure that markers which are to be used for setting out purposes are not harmful to the environment i.e. untreated wooden pegs or similar – Paints or other manmade materials shall not be used. For setting out operations*
3	Set out the drainage features the length of track to be constructed (approximately 100m)	
4	Remove and locally store the top layer of vegetated material over a length of approximately 100m.	*This material will be stored for re-use to cover and promote natural re-vegetation of the amorphous peat and /or inorganic spoils that may have to be deposited along the track.re-vegetate the respective section of track where necessary.*
5	Control of ground and surface water	*Over pumping will not discharge directly to watercourse but to natural ground at least 20m away of to the head of an installed treatment train.*
6	Install interception drains	*Interception drains to be installed to divert uncontaminated water around the working area.*
7	Install drainage features including settlement ponds, silt fencing and check dams	*In areas of peat only 'bog master' low contact pressure excavators will be used to minimise the impact on the vegetation layer. SuDS will ensure that any suspended solids generated during the construction stage are effectively mitigated.*
8	Excavate to formation level for access tracks and remove any excess material.	*If suitable this material will be re-used within the track construction or it may be used as general backfill. Otherwise the material will be deposited at the locations specified within the spoil management plan and will be sealed with a vegetated layer.*
9	Install under-track drainage	*This will ensure that, in wet periods, surface water flow is maintained without damaging the newly installed track structure.*

4.3.4 Site Access Tracks

Site access tracks include a significant portion of the civils infrastructure in the project and will therefore require careful management to ensure that during the construction and operational stages the impact on the environment is kept to a minimum, the allowance of 70m micro-siting will allow the contractor to alter the track route should any further environmental constraints be identified once on Site. In order to make this possible it is necessary to implement a phased construction method to ensure that provisions are in place to manage surface water run off during and post construction, and to also ensure that sections of Site track are brought to their permanent state as soon as possible. Sections of track will be sequentially completed in manageable lengths of approximately 100m.

Ref	Activity	Notes
1	Clearing of forestry areas (as detailed above).	*The contractor will clear fell areas of forestry identified during the design phase.* *It is anticipated that suitable felled timber will be sold commercially. Brash from timber processing shall remain on Site within forested areas and if necessary shall be mulched to reduce the volume and speed to composting process. See section 4.3.1.*
2	Set out the Site tracks with the use of GPS (RTK) equipment.	*The contractor shall ensure that markers which are to be used for setting out purposes are not harmful to the environment i.e. untreated wooden pegs or similar – Paints or other manmade materials shall not be used. For setting out operations*
3	Set out and install SuDS features the length of track to be constructed (approximately 100m)	*In areas of peat only 'bog master' low contact pressure excavators will be used to minimise the impact on the vegetation layer. SuDS will ensure that any suspended solids generated during the construction stage are effectively mitigated.*
4	Remove and locally store the top layer of vegetated material over a length of approximately 100m.	*This material will be stored for re-use to cover and promote natural re-vegetation of the amorphous peat and /or inorganic spoils that may have to be deposited along the track.re-vegetate the respective section of track where necessary.*
5	Excavate to formation level and remove any excess material.	*If suitable this material will be re-used within the track construction or it may be used as general backfill. Otherwise the material will be deposited at the locations specified within the spoil management plan and will be sealed with a vegetated layer.*
6	Under-track drainage will be installed where necessary and in accordance with the SuDS requirements.	*This will ensure that, in wet periods, surface water flow is maintained without damaging the newly installed track structure.*
7	Place aggregate in accordance with the design to form the track structure.	
8	Where Site tracks cross existing watercourses it will be necessary to install culverts to maintain flows within the existing watercourse	*In accordance with the SuDS design.*
9	In the vicinity of private water supplies it may be necessary to monitor the water quality and consider further protection measures (e.g. bunding)	*Private water supplies are not expected to be affected from construction works on Site.*
10	Excavated faces will be cleared of uneven surfaces and slopes will be set at a safe slope, between 1:1 and 1:2 depending on the natural angle of repose of the exposed ground.	*A gentler slope may be utilised where deemed necessary by the Contractor's designer*

11	Vegetated material (Ref 3 above) will be placed in areas where excavation faces are exposed.	*It is important that this is undertaken promptly following construction of a particular section (100m) of access track as it will speed up the re-vegetation process.*
12	This process then begins again for the next section of track to be constructed.	

Construction of floating tracks will be according to the following methodology.

Ref	Activity	Notes
1	Clearing of forestry areas (as detailed above).	*The contractor will clear fell areas of forestry identified during the design phase.* *It is anticipated that suitable felled timber will be sold commercially. Brash from timber processing shall remain on Site within forested areas and if necessary shall be mulched to reduce the volume and speed to composting process or reused for brash mats. See section 4.3.1.*
2	Set out the Site tracks with the use of GPS (RTK) equipment.	*The contractor shall ensure that markers which are to be used for setting out purposes are not harmful to the environment i.e. untreated wooden pegs or similar – Paints or other manmade materials shall not be used. For setting out operations*
3	Set out and install SuDS features the length of track to be constructed (approximately 50m rolling construction)	*In areas of peat only 'bog master' low contact pressure excavators will be used to minimise the impact on the vegetation layer. SuDS will ensure that any suspended solids generated during the construction stage are effectively mitigated.*
4	Clear area of all major obstacles such as rocks, trees and bushes down to ground level.	*Stumps and roots will be left in place. Where possible, local surface vegetation and soils will also be left in place. The existing vegetation and roots is often the strongest layer therefore care should be taken to preserve it.*
5	Fill any local hollows and depressions.	*A suitable lightweight fill such as brash or logs should be used. On difficult ground brash mast and fascines can be used.* *In very wet areas and areas with broken vegetation a geomembrane should be used to prevent contamination of aggregate layers.*
6	Install geogrid along the route of the access track by unrolling by hand.	*Adjacent geogrids should be overlapped as per manufacture instructions. Care should be taken when spreading the aggregate to ensure overlaps are protected and maintained.*
7	Place and compact aggregate in accordance with the design to form the track structure.	*Aggregate should be placed by either pushing it forward from a previously constructed section of track or by dropping it from a low height. Aggregate should not be dozed directly onto geogrid as it may cause damage to geogrid.*
8	Step 7 should be repeated for the second and subsequent layers	*Care should be taken not to place the second layer to quickly after the first to allow the underlying peat layer to gain strength. Generally the second layer should be started until a sufficient length of first layer is constructed, approx. 50m. If the peat is loaded to quickly it can exceed its sheer strength and fail.*
9	In the vicinity of private water supplies it may be necessary to monitor the water quality and consider further protection measures (e.g. bunding)	*Private water supplies are not expected to be affected from construction works on Site.*
10	This process then begins again for the next section of track to be constructed.	

4.3.5 Watercourse Crossings

Watercourse crossings will be installed in accordance with SEPA guidelines and will be based on the following principles:

- The alignment of the culvert will be parallel to the existing channel;
- The gradient of the culvert will be similar to the existing channel and less than 3%;
- The width of the culvert will be greater than the active width of the channel;
- The height of the culvert will be greater than the active height of the channel;
- There will be no hydraulic drops at the inlet or outlet to the culvert; and
- The culverts will be partially buried and natural bed material reinstated within the culvert.

As the watercourses being crossed are considered to be minor, it is anticipated that a piped culvert or bottomless arch culvert will be used at each crossing.

Ref	Activity	Notes
1	Apply for CAR licence	*CAR licences for all watercourse crossings will be obtained well in advance of the works.*
2	Check the weather	*The Contractor shall review the current and forecast weather conditions and determine whether it is appropriate to carry out drainage works. Working adjacent to streams during periods of heavy rainfall is to be avoided.*
3	Set out and install SuDS features to be constructed	*In areas of peat only 'bog master' low contact pressure excavators will be used to minimise the impact on the vegetation layer. SuDS will ensure that any suspended solids generated during the construction stage are effectively mitigated. Silt fencing to be installed downstream of the works.*
4	Control flows	*Temporary dam are to be installed upstream and downstream of the works. Temporary bank and bed scour protection is to be installed downstream of the works and clean flows pumped to this protected area.*
5	Remove and locally store the top layer of vegetated material over a length of approximately 100m.	*This material will be stored for re-use to cover and promote natural re-vegetation of the amorphous peat and /or inorganic spoils that may have to be deposited along the track.re-vegetate the respective section of track where necessary.*
6	Install culvert	*Type of culvert to be installed in accordance with SEPA's defined criteria*
7	Backfill	*Backfill track and bank with acceptable material ensuring no fill material enters the watercourse.*
8	Remove dams and over pumping	*Carried out as quickly as possible to minimise disturbance of the bed. Silt fencing to remain in place downstream to prevent transfer of sediment.*

4.3.6 Temporary Construction Compound

The construction compound is to be located approximately 1,700m south-east of the main Site entrance (at NS 71087 37174). An allowance of 70m micro-siting as well as flexibility in the overall dimensions of the construction compound will allow the appointed contractor capacity to adapt the compound around any additional constraints observed once on Site,

The construction compound will be constructed and Site establishment will be completed to an acceptable standard (to provide adequate welfare, safe parking, office cabins & training room and all other fit for purpose facilities) prior to proceeding beyond this point with the road construction activities. Prior to installation of the construction compound, temporary welfare facilities will be provided in the form of a self-contained cabin comprising office, mess, drying room, toilet and washing facilities. This will ensure that the essential facilities and systems are effectively in place from the very beginning of the project. Establishment of the Site compound at the outset will guarantee that all Site operatives are inducted and thoroughly versed in the project specific Environmental Management Plan prior to commencing work on Site. Security measures in addition to the Site entrance gates will be put in place as a priority.

The construction method for the construction compound is outlined below.

Ref	Activity	Notes
1	Set out the perimeter of the Site compound with the use of GPS (RTK) equipment or similar.	*Setting out must be undertaken to OS Grid co-ordinates and to sub-centimetre accuracy in the X, Y and Z plane. The contractor shall ensure that markers which are to be used for setting out purposes are not harmful to the environment i.e. untreated wooden pegs or similar – Paints or other manmade materials shall not be used.*
2	Install SuDS features as per the SuDS design	*This will ensure that any suspended solids generated during the construction stage are effectively managed.*
3	The top layer of vegetated material will be stripped and stored for re-use on Site.	*Contractor will ensure that the top layer of vegetated material is set aside for re-use as a sealing layer on spoil or excavated faces where required. Enough top layer quantity shall be put aside for re-use and reinstatement of the compounds at the completion of the project.*
4	Imported stone will be placed in layers to form the hardstanding area for the Site compound.	*The thickness of stone will be nominal as the loads within the compound area during construction are expected to be relatively low.*
5	Perimeter security fence will be erected in accordance with the contract drawings.	*This will ensure that all hazardous materials are safely and securely stored.*
6	The accommodation, eating and sanitary cabins will be installed in accordance with the construction drawings.	*All toilets will be linked to self-contained double skin flushable chemical system which will be maintained weekly by the supplier of the unit. Alternatively a double skin bio-digester can be used with weekly monitoring of effluents for control of effectiveness. Temporary power supply and telecommunications will be connected to the relevant cabins.*
7	Storage units for hazardous products and covered waste skips will be installed as per best industry practice.	*All storage units for hazardous products will be fully lockable and bunded proprietary steel containers. Waste segregation skips will be deployed for optimum recycling and re-use of materials. Skips will be covered with lid.*
8	Construct a reinforced concrete impervious bunded area for plant refuelling and plant maintenance operations.	*An oil interceptor will be installed on the drainage outlet from the bunded area to separate any oils from the surface run off. Generators and associated diesel tanks are to be installed on such an area.*
9	Reinstatement	*Compound areas to be restored to near to pre-construction condition at completion and demobilisation stage.*
10	Parking	*All parking areas shall be identified by signage with a handrail system or barrier separating pedestrian areas and vehicle routes (example indicated in the preconstruction plan)*

4.3.7 Borrow Pits

Bedrock is present at or near surface in areas of the Site and Site-won material appears to have been used in construction of existing access tracks. Surface rock outcrops are rare within the Site, except within existing borrow pits. It is noted that near-surface bedrock is weathered and variable but it is anticipated that more competent and consistent material is likely to be present at relatively shallow depth. It is therefore proposed to use Site-won material as aggregate fill for access tracks and hard-standing areas (subject to suitability testing as part of the ground investigation). The daily operation and management of the borrow pit(s) will be the responsibility of the contractor, however, general procedures for careful management of the borrow pit(s) will be adhered to. During construction and operational stages the impact on the environment is kept to a minimum.

Borrow pits will be created, operated and reinstated in accordance with the relevant requirements of The Quarries Regulations 1999.

In order to make this possible it is necessary to implement a working method which ensures that provisions are in place to manage peat and topsoil removal and storage, control of surface run-off and the re-vegetating of working faces post construction, Borrow pits will be extended in to existing slopes, where floor levels are sloped gently towards the Site entrance. Any water ingress will be managed by the floor slope which will divert water to a sump located at the Site entrance. Where significant water ingress is encountered this would be pumped out to a settlement lagoon, located within the borrow pit search area, and not discharged directly to a watercourse.

Ref	Activity	Notes
1	Set out the Site tracks with the use of GPS (RTK) equipment.	*The contractor shall ensure that markers which are to be used for setting out purposes are not harmful to the environment i.e. untreated wooden pegs or similar – Paints or other manmade materials shall not be used. For setting out operations*
2	Set out and install SuDS features, primarily the swale located at the borrow pit entrance.	*In areas of peat only 'bog master' low contact pressure excavators and breakers will be used to minimise the impact on the vegetation layer. SuDS will ensure that any suspended solids generated during the construction stage are effectively mitigated.*
3	Remove and locally store the top layer of vegetated material around the crest of the borrow pit face.	*This material will be stored for re-use to cover and promote natural re-vegetation of the peat and /or inorganic spoils that may arise. Whilst stored the material will form a bund around the crest of the working faces, diverting surface water flow away from the face and towards the borrow pit floor.*
4	Excavate to rockhead level and remove any excess material.	*If suitable, this material will be re-used as general backfill. Otherwise the material will be deposited at the locations specified within the spoil management plan and will be sealed with a vegetated layer.*
5	Where ripping proves unsuitable, establish a first line blast to form a productive face. Utilise pattern blasting to extend the borrow pit in the desired formation.	*Typically, face height will not exceed 10m or 70° slope angle and will generally follow HSE The Quarry Regulations.1999 guidance where appropriate.*
6	Stockpiles, where present, will remain below 5m in height and will rest at their natural angle of repose.	*Fine aggregate dust will be managed to prevent transport via surface run-off in to the swale.*

7	Excavated faces will be cleared of uneven surfaces and slopes will be set at a safe slope, between 1:1 and 1:2 depending on the natural angle of repose of the exposed ground.	*A gentler slope may be utilised where deemed necessary by the Contractor's designer.*
8	Vegetated material (Ref 3 above) will be placed in areas where excavation faces are exposed.	*It is important that this is undertaken promptly after borrow pit operation ceases; it will speed up the re-vegetation process.*

4.3.8 Public Road Upgrades

The proposed access route (and candidate turbines) for Kype Muir Extension is the same as the Kype Muir Wind Farm. An access study was carried out by WYG in June 2013 an update to this has been presented in Chapter 11 – Traffic and Transport and Technical Appendix 11.1 Traffic Assessment of this EIAR. The study confirmed that the route proposed in the 2016 Consented Scheme was suitable for the proposed Development. It is envisaged that the modification works associated with the turbine delivery route will be completed to coincide with the later delivery of the Turbine components, please refer to ES Chapter 11 Traffic and Transport for more detail.

The following Method Statement will be implemented for the works associated with the turbine delivery route.

Ref	Activity	Notes for Consideration
1	Prepare/update the Traffic Management Plan in coordination with Road Service and implement	*TMP as agreed with the local Roads Service traffic management division.*
2	Engagement with stakeholders	*Early consultation will take place with SLC and the local police department to agree details and timings for the works.*
3	Set out works in accordance with the contract drawings with the use of GPS (RTK) equipment. Erect adequate warning signage along route and hazard chevrons at each end of the passing bays.	*The contractor shall ensure that markers which are to be used for setting out purposes are not harmful to the environment i.e. untreated wooden pegs or similar – Paints or other manmade materials shall not be used.*
4	Remove hedgerows and top soil.	*Contractor will ensure that the top layer of vegetated material is set aside for re-use to reinstate verge around passing bay locations.*
5	Excavate to suitable formation level	*The contractor shall ensure that a suitable formation is found.*
6	Reinstate land drains where required	*Pipe diameter will be sized to a diameter which at least matches the diameter of the existing pipe or the cross sectional area of the existing open channel*
7	Install compacted stone formation in accordance with the design	*Stone to be compacted and installed in accordance with the Highways Specification*
8	Place bitmac reinstatement in accordance with the design	
9	Reinstate fence and replant hedgerow to match existing around the passing bay	*Reinstatement of field boundaries shall be to the landowners reasonable satisfaction.*
10	Road surface upkeep during all construction stages	*The public road Contractor and the Civil Work Contractor on Site shall ensure at all times that the conditions of the public roads are not deteriorated by the activities associated with the development. Deterioration attributable to the development shall be addressed and rectified diligently in coordination with SLC.*

4.3.9 Crane Pads

The crane pad requirements are specified by the turbine manufacturer and require strict compliance to ensure that no stability issues are encountered during the critical turbine erection phase. Due to the high loads associated with the turbine erection operations it is necessary to use a formation which is considerably stiffer than that required for the Site tracks which in some locations will result in a slightly deeper excavation.

Ref	Activity	Notes for Consideration
1	Set out the crane pads with the use of GPS (RTK) equipment.	*The contractor shall ensure that markers which are to be used for setting out purposes are not harmful to the environment i.e. untreated wooden pegs or similar – Paints or other manmade materials shall not be used. For setting out operations*
2	Set out and install SuDS features around the crane pad and turbine area.	*In areas of peat only 'bog master' low contact pressure excavators will be used to minimise the impact on the vegetation layer.*
3	Remove and locally store the top layer of vegetated material over the area of the crane pad excavation.	*This material will be stored for re-use to cover and promote natural re-vegetation of the amorphous peat and /or inorganic spoils that will have to be deposited at the nearest suitable location to the excavation.*
4	Excavate any surplus material to the required formation level.	*The formation level for the crane pads will be on weathered rock or stiff overlaying material. Due to the dimensions of the crane pad and the requirements for a flat surface it may be necessary to excavate rock in order to acquire a suitably level formation. Where suitable the excavated material will be re-used as structural material to minimise the required volumes of spoil and imported stone.*
5	Place imported stone in accordance with the design to form the crane pad harstanding structure. Where appropriate, geotextile and/or geogrid should be used to help reduce the volume of imported stone. Fence off steep edges.	*Due to the turbine manufacturer requirements and the local topography it is likely that some areas will require a significant depth of structural fill in order to provide the required hardstanding surface. Therefore special consideration will be given towards the stone placement and compaction to ensure the structural integrity meets the loading requirements.*
6	Plate bearing tests will be undertaken following completion of the hardstanding structure.	*The number and location of the plate bearing tests shall be specified by Contractor's designer.*

4.3.10 Turbine Foundations

It is anticipated that gravity foundations will be suitable for the development (as opposed to piled foundations). Turbine foundation construction involves the installation of significant concrete volumes of up to approx. 1,150 m^3 for turbines with a tip height of 220 m, although this depends on the ground conditions level at each location. Due to the risks to the environment associated with installing such large volumes of concrete, the construction methodologies outlined in the following table shall be adhered to.

Ref	Activity	Notes for Consideration
1	Set out the Site tracks with the use of GPS (RTK) equipment.	*The contractor shall ensure that markers which are to be used for setting out purposes are not harmful to the environment i.e. untreated wooden pegs or similar – Paints or other manmade materials shall not be used. For setting out operations*
2	Set out and install SuDS features the length of track to be constructed (approximately 100m).	*In areas of peat only 'bog master' low contact pressure excavators will be used to minimise the impact on the vegetation layer.*
3	Remove and locally store the top layer of vegetated material over the excavation area.	*This material will be stored for re-use to cover and promote natural re-vegetation of the amorphous peat and /or inorganic spoils that will have to be deposited at the nearest suitable location to the excavation.*
4	Excavate any surplus material to the required formation level.	*The formation level for the foundations will be on weathered rock or similar. It may be necessary to excavate rock in order to acquire a suitably level formation. Where suitable the excavated inorganic material will be re-used as structural ballast to minimise the required volumes of spoil and imported stone.*
5	Plate bearing test to verify and record suitability of formation.	*The exact number and location of plate bearing tests shall be determined by the Contractor's Designer following excavation and inspection of the proposed formation layer. This will ensure that maximum benefit is gained from these insitu tests.*
6	Install a layer of compacted stone to protect the formation until concrete blinding is ready to be laid to provide a level formation and smooth working surface.	*The formation level will be left as flat as is practicable to reduce the volume of concrete required to form a flat working surface.*
7	Reinforcement steel will be fixed for the bottom part of the foundation along with the turbine foundation anchor bolt arrangement.	*The contractor will ensure that the bolt cage is securely fixed and levelled prior to concreting operations. The bolt cage shall be set out in compliance with the turbine manufacturer's requirements and within the specified tolerances.*
8	Erect the formwork required for the first concrete pour.	*Formwork will be re-used and eventually removed offsite.*
9	Pour concrete for the bottom section.	*To be undertaken in accordance with the Environment Management Plan (EMP).*
10	Reinforcement steel for the top section of the foundation is fixed along with the required number of cable ducts.	*Reinforcing steel shall be checked for design compliance and signed off upon acceptance.*
11	Erect a cylindrical steel shutter around the newly formed reinforcement steel in accordance with the dimensions set out within the contract drawings.	
12	Pour concrete for the base top section in accordance with the requirements set out within this document.	*To be undertaken in accordance the EMP.*
13	Once the concrete has set the formwork is then removed for use at another foundation location.	

4.3.11 Control Building

It is proposed to locate the control building approximately1,700msouth-eastfrom the Site entrance at NS 71189 37209, south-west corner, and adjacent to the temporary construction compound.

Ref	Activity	Notes for Consideration
1	Set out the control building and compound with the use of GPS (RTK) equipment.	*The contractor shall ensure that markers which are to be used for setting out purposes are not harmful to the environment i.e. untreated wooden pegs or similar – Paints or other manmade materials shall not be used. For setting out operations*
2	Set out and install associated SuDS features in accordance with the SuDS design.	*In areas of peat only 'bog master' low contact pressure excavators will be used to minimise the impact on the vegetation layer.*
3	Remove and locally store the top layer of vegetated material over the excavation area.	*This material will be stored for re-use to cover and promote natural re-vegetation of the amorphous peat and /or inorganic spoils that will have to be deposited at the nearest suitable location to the excavation.*
4	Excavate any surplus material to the required formation level.	*Where suitable, excavated material will be re-used as structural material to minimise the required volumes of spoil and imported stone.*
5	Install foundations in accordance with the design	*Concrete works shall be undertaken in accordance with the EMP.*
6	Substructure block work walls are constructed and cable trenches are formed.	
7	Ducts and pipework are installed as required and hardcore material is placed and compacted to the underside of the floor slab.	
8	Install damp proof membrane and pour concrete floor slab to finished floor level.	*Concrete works to be undertaken in accordance with the guidelines in section 4.4.4 below and in accordance with best practice. Consumables store room will be surrounded by a concrete bund.*
9	Construct external and internal walls and roof in accordance with the contract drawings.	*This includes the installation of cavity insulation, damp proof course, window sills, lintels and ventilation openings.*
10	Install windows and doors and seal the building	
11	Install external switch gear	
12	Connect control building to the grid and carry out commissioning	

4.3.12 Cabling and Instrumentation

All cabling to be installed as part of this project will be laid below ground. Cables will be kept as close to the access tracks as possible so that disruption to the local habitat is kept to a minimum and all works can be contained within the construction area.

Ref	Activity	Notes for Consideration
1	Should ground conditions throughout the Site allow, ploughing method of installing cable will be promoted by the client.	*The ploughing method does away with the need of excavation of trenches and has therefore a lesser impact on the ecology along the cable route.*
2	Set out the cable route with the use of GPS (RTK) equipment.	*The contractor shall ensure that markers which are to be used for setting out purposes are not harmful to the environment i.e. untreated wooden pegs or similar; Install cable as close to the access track as possible.*
3	Select plant so as to cause minimal damage to the environment	*In areas of peat only 'bog master' low contact pressure excavators will be used to minimise the impact on the vegetation layer.*
4	Set out and install temporary SuDS features should the open trench method be adopted	*Particular attention will be given to prevent scouring and erosion of trenches that could act as preferential channel to run off during rain fall events.*
5	Remove and separately store the vegetated top layer of the trench excavation	*This material will be re-used for reinstatement of the vegetated layer at backfilling stage*
6	Excavate remaining material to 1m depth and segregate organic material from mineral material.	*Selected excavated organic material will be considered for re-use a backfilling material*
7	Immediately dispose off all materials unsuitable for backfilling operations in a way that mitigates against detrimental effects to the environment	*Inorganic spoils are unlikely to be suitable for backfill re-use as they are likely to contain stones that could damage the cables*
8	Lay selected bedding material as necessary at the bottom of the trench	
9	Lay cables on the bedding material and surround cable with selected backfill. Lay warning tape on top of the surround layer	*Warning tape is installed so as to warn of danger due to the presence of cable underneath it, should any excavation work be undertaken in the future at that location.*
10	Complete backfill above cable surround material and finish off backfill with vegetated layer stored separately earlier	
11	General reinstatement including restore any land drains affected by the operation	
12	Install 1m high cable marker posts along the cable runs at 50m OC and at every change of direction	*Warning sign will be fitted to posts so as the cable route is clearly identified and the danger of life cables made known to all.*

4.3.13 Wind Turbine Erection

The erection of wind turbines will be carried out in accordance with the manufacturer's recommendations, which can vary significantly. The turbine manufacturer will be chosen as part of the wind turbine procurement process following consent for construction of the Development.

Ref	Activity	Notes for Consideration
1	Prepare/update/implement the Traffic Management Plan in coordination with SLC and local police.	*TMP as agreed with SLC traffic management division; local police will be involved for necessary road permits and escort*
2	Turbine manufacturer to organise one month prior to the start of the delivery of the Turbine components so as to verify the adequacy of the road modifications along the Turbine Route	*No Turbine components shall be allowed to commence until the public road modifications and conditions are fit for purpose; Contractors to rectify short-comings as necessary*
3	Turbine manufacturer to verify Site infrastructure readiness prior to the commencement of the delivery and erection activities	*Contractors to rectify short-comings as necessary*
4	Mobilise main crane to Site and assemble the same at the hardstanding of the first Turbine to be erected	
5	Deliver Turbine components to Site	*All turbine erection works to be undertaken by the turbine supplier*
6	Erect in the following sequence: • Bottom Tower section • Top Tower section • Nacelle • Assemble blades to hub on the ground • Rotor erection	
7	Cabling hooking up	
8	Turbine energisation and commissioning	
9	Tests on completion and handing over	

4.4 Environmental Management Plan (EMP)

A draft EMP has been developed as part of the 2014 assessment, including the following key areas:

- General management;
- Water quality monitoring programme (commence pre construction);
- Dust;
- Noise;
- Ecology;
- Surface water management plan (including storage of oils and fuels);
- Site waste management;
- Borrow pits;
- Soil handling and management.

The contractor will be required to develop this EMP and keep it up to date for the duration of the works in accordance with the requirements of the Developer.

4.4.1 EMP Promotion and Awareness

The contractor's environmental managers shall provide suitable on-site training for their supervisory staff on the project and shall prepare user friendly media material to be used by their supervisory staff at the induction.

The environmental induction shall form part of the site induction for all site workers and visitors. Refresher tool box talks will be given weekly to address a specific topic requiring special attention in a particular phase or aspect of the Development at that time.

Records of the environmental inductions and tool box talks shall be kept at the Site office.

The key aim of the EMP is to promote an ethos amongst all Site staff which will help to prevent any environmental incidents. The environmental awareness training and induction will cover the following topics as a minimum.

- The law – to emphasise obligations
- Importance of Planning – as outlined in GPP21
- Hazardous materials – specific risks and handling/storage requirements
- Spoil management (clays, silts - risks with cohesive materials)
- Peat slides and slope stability
- Watercourses and SuDS
- Contingency Plans – Hands on 'dry run' training
- Reporting procedures

Other methods to raise awareness will be used, including but not limited to:

- Posters and notices in cabins
- Prepare and issue all staff and labour a stripped down version of the EMP by way of laminated A5 map showing key environmental features (watercourses, concrete washing points and other relevant features) and highlighting the salient environmental aspects to be considered while carrying out duties – "The 12 Environmental Site Rules"
- Copy of Key contacts list in all cabins and site based vehicles
- 'Environment' item second on the agenda (after Health and Safety) in all weekly and monthly progress site meetings

4.4.2 Excavation and Spoil Management Guidelines

Excavation and ground works will be required for all Site infrastructure, the guidelines below will be followed throughout the construction period by the contractor.

Ref	Activity	Notes for Consideration
1	Excavation works will only take place following implementation of the SuDS design.	
2	Contractor to submit project detailed spoil management plan as part of his EMP. Spoil plan drawing to be provided	*The spoil plan shall be focused on reducing the excavation and spoil volumes and on optimising the re-use of the excavated material. It shall also focus on the ongoing and final reinstatement*
3	A Method Statement, Risk Assessment and Aspect Assessment shall be developed for each and every excavation location to be carried out on Site	*The focus in these documents is the control measures to mitigate safety, stability and environment risks specific to the local conditions.*
4	The vegetated layer will always be removed and set aside separately from any spoil material.	*To provide a constant supply of local vegetated material for capping and re-vegetation.*
5	Permanent cuttings shall have a limited cut face angle. Peat thickness is anticipated to be minimal.	*To mitigate against peat slide failure and protect local habitat.*
6	Surcharge on peat will be limited to areas where slope gradients are gentle and peat thickness is minimal. NB - Peat thickness is anticipated to be minimal.	*To mitigate against peat slide failure and protect local habitat.*
7	Should plant be required to traverse a peat layer this will be undertaken only with the use of a (low pressure) 'bog master' excavator	*To mitigate against peat slide failure and protect local habitat*
8	Excavated material will only be stored to a maximum depth of 1.0m along access tracks.	*Prevent movement of stored material. To reduce surcharge on the existing peat surface and mitigate against peat slide failure.*
9	Excavated material will not be stored in areas which have been identified as unsuitable for spoil storage.	*Prevent movement of stored material and protect watercourses.*
10	Excavated material other than peat will be separated and stored so that it is not left exposed to the elements. This will be ensured through the immediate application of a vegetated capping layer.	*Prevent movement of stored material and protect watercourses. against harmful run offs*
11	Interim (temporary) material storage during the construction stage will be kept to a minimum by the implementation of a continuous construction cycle: 1) Excavate material; 2) Handle material; 3) Permanently store material	*Return and re-vegetate the Site to its original state as soon as possible.*

Ref	Activity	Notes for Consideration
12	Permanent excavated or spoil surfaces shall be re-vegetated without undue delay	*To encourage growth of local habitat and speed up the rejuvenation process.*
13	The Civil Contractor will detail in the EMP and implement effective peat stability monitoring measures commensurate to the level of risk. NB - Peat thickness is anticipated to be minimal.	*Identification of early signs of potential peat slides and peat burst; Early deployment of mitigation measures and remediation measures.*
14	In particular, the area surrounding excavation and spoil deposition works in sloped areas of peat will be monitored to identify any creeping in the peat layers. NB - Peat thickness is anticipated to be minimal.	*To mitigate against peat slide failure and protect local habitat.*
15	The area surrounding excavations in rock which use vibratory methods such as rock breaker will be monitored to identify any subtle movements in the overlaying soil layers.	*To mitigate against peat slide failure and protect local habitat.*
16	Surplus material from excavations in rock, suitable sands and gravels will be carefully managed and re-used as structural fill in the locality of the excavation where possible.	*To minimise the volume of imported material required, and reduce the impact on the local PH level.*

4.4.3 Placement of Stone Guidelines

The placement of stone will be required to construct access tracks as well as areas of hardstanding such as crane pads, the guidelines below will be followed throughout the construction period by the contractor.

Ref	Activity	Notes for Consideration
1	Placement of stone will only take place following implementation of the SuDS design.	*To prevent the migration of suspended solids at the commencement of and during construction of the access track and crane pad hardstandings*
2	Where possible suitable excavated material will be re-used on Site as structural or non-structural fill.	*This will minimise the required volume of imported structural fill which will reduce the disruption to local road users and residents, and will help to retain the local PH levels as much as possible.*
3	On Site stone lorries will only be permitted access to completed stone roads and hardstandings.	*Dirt on the roads – To minimise the imposed loadings and vibrations on the underlying strata. This will also help to minimise transfer of cohesive soils and other debris to the public road.*
4	Stone delivery vehicles and all mobile plant will be restricted to a speed of 15 mph	*Heavy loads / Vibration - To minimise the imposed loadings and vibrations on the underlying strata.*
5	Stone deliveries will be carefully co-ordinated with the supplier to ensure that deliveries are adequately spaced out.	*High vehicle numbers on Site – To reduce the number of vehicles on Site at any one time which will minimise the imposed loadings and vibrations.*
6	Reversing distance of lorries shall be limited to 100m maximum. Areas for turning the lorries and trucks at such intervals are to be constructed	*To mitigate against risk of vehicle losing the track and against the risk of overturning due to soft verges*
7	Stone deliveries will be co-ordinated so that only stone which is required will be delivered to Site. Just in time stone deliveries philosophy will be adopted	*To minimise Site storage requirements for imported materials*
8	A lorry load of imported stone will only be deposited onto either; 1) An excavated and prepared formation layer or; 2) A partly or fully completed hardstanding.	*To prevent surcharging of the existing overlying softer material*
9	Where excavated material is used for structural fill only suitable materials will be permitted.	*Promote re-use of excavated materials and help to reduce surplus spoil volumes.*

4.4.4 Concrete Works Guidelines

Concrete will be poured in-situ for various infrastructure items such as turbine foundations and control building foundations, the guidelines below will be followed throughout the construction period by the contractor.

Ref	Activity	Notes for Consideration
1	Concreting operations will not be carried out during times of wet weather.	*To minimise the volume of potentially harmful surface run off during concreting operations.*
2	Concreting works will only be carried out following implementation of the SuDS design.	*To prevent the migration of suspended solids at the commencement of and during construction of concrete structures.*
3	Where possible only concrete with low water content will utilised for concrete pours.	*Minimise the potential for run off during concreting operations*
4	An impermeable membrane will be utilised as a liner for all significant concrete pours below ground level.	*Prevent escape of the cement matrix from the concrete pour and effectively mitigate against ground water contamination*
5	Sufficient quantity and clearly signposted temporary concrete lorry washout areas will be created at convenient locations throughout the Site.	*In accordance with the SuDS CMS*
6	All concrete truck drivers shall be inducted and made aware of concrete washing facilities and concrete EMP guidelines on the day preceding the pour	*Prevent against accidental pollution by concrete due to lack of awareness and training.*
7	Orders for concrete will made for volumes which are marginally in excess of the required volume(s)	*Minimise the volume of potentially harmful waste concrete.*
8	Placement of concrete will be undertaken with care to ensure that splashing is minimised. Where this is difficult to manage, an impermeable membrane will be placed around the perimeter of the concrete pour to catch any potential splashes.	*Prevent migration of the cement matrix into the surrounding strata.*
9	Water should not be added to concrete mixes which arrive on Site	*To ensure that concrete contains a low water content at all times.*
10	An impermeable membrane will be placed on the ground (and held securely in place) during the transfer of concrete from the lorry.	*To prevent splashes entering the installed SuDS scheme.*
11	Pre-fabricated re-useable formwork will be used for the majority of concrete pours.	*To reduce the material and waste requirements*

4.4.5 Hazardous Material Storage Guidelines

Storage of hazardous material should be in accordance with requirements detailed in the EMP and all statutory and regulatory requirements and best practice.

Ref	Activity	Notes for Consideration
1	Oils, fuel and all potentially harmful materials will be stored within an impermeable bunded proprietary enclosure/container. The bunded enclosure will be drained and will also have an oil interceptor installed on the outlet pipe.	*This will ensure that spills do not enter the natural drainage system*
2	All potentially harmful materials will be brought back to the secured storage facility immediately after use and after each shift.	*To reduce the chance that a spill can be caused by vandals*
3	No hazardous substance shall be permitted to be left unattended at any time when taken outside the secured storage.	*To reduce the chance of spill and of inappropriate use of the substance*
4	All hazardous substance will be transported to location of use in their proprietary sealed container. Containers shall be secured with lid or cap in the secured storage, during transport and immediately after use	*To reduce the chance of spill and of inappropriate use of the substance*
5	All containers shall have their content clearly labelled	*To reduce the chance of inappropriate use of the substance*
6	Spill kits will be kept close to the permanent storage area. Clearly signposted field spill kit stations shall also be provided at other strategic locations across the Site and also in foremen/gang leader's Site vehicles.	*This is to minimise the time that a spill is left uncontrolled and reduce the chance of a hazardous material entering the natural drainage system.*
7	Specific containers will be used to collect and temporarily store contaminated material and soiled spill kits material. Temporary storage shall be in the secured facilities.	*This is to ensure that hazardous materials are easily identifiable and are not mistakenly discharged into the natural drainage system.*
8	Only waste carrier holding the appropriate license will transport hazardous waste away from Site	*To ensure the hazardous waste is handled and disposed of properly according to the legislation*
9	Material quantities will be carefully managed so that only a limited amount of each material is stored on Site at any one time.	*This will make the materials more manageable and can help to minimise the impact of a spill.*
10	The storage area will be arranged so that each area is readily accessible by site operatives and that materials can be easily removed for use when required.	*This will minimise the chance of containers becoming accidently damaged due to the effects of a poorly laid out storage area.*
11	The material storage areas will be regularly monitored to check if any containers have signs of damage or are leaking. Should a container be leaking or damaged it will be removed and disposed buy a specialist disposal company as per item 8	
12	Mobile storage such as fuel bowsers will be bunded to prevent spills. Tanks for bowsers and generators shall be double skinned.	*Bunds will have potential to store 110% of the bowser capacity. Bunds will be regularly monitored to ensure that the full capacity is available at all times (other than just after a spill)*
13	When not in use all valves and trigger guns from storage containers will be lockable.	*This will prevent accidental spillages and deter vandalism*
14	All refuelling and bulk deliveries will be supervised.	*To maintain high standards and prevent potentially harmful spillages.*

4.4.6 Site Construction Plant (Machinery) Management Guidelines

Various items of construction plant will be used and parked within the Site, the guidelines below will be followed throughout the construction period by the contractor.

Ref	Activity	Notes for Consideration
1	Strict procedures for plant inspection, maintenance and repairs shall be detailed in the Contractor's EMP.	
2	All Site plant will be inspected at the beginning of each day prior to use. Defective plant shall not be used until the defect is satisfactorily fixed.	*In order to identify any existing or potential defects and prevent an environmental incident.*
3	In the event of a defect or maintenance necessitating work on the hydraulic system or engine the concerned plant will be brought back to the bunded area to be seen to by the mechanics. In the event the plant cannot be brought back to the bunded area a specific environmental risk assessment shall be produced.	*This will ensure that any spills are caught and contained by the oil separator and prevented from entering the drainage system*
4	In the event the plant cannot reasonably be carried out within the bunded area for such repair or service, a specific environmental risk assessment shall be produced.	*To ensure that control appropriate control measures are put in place to reduce the risk of ground contamination.*
5	As a minimum a spill kit and effective drip trays shall be available for all such field repairs and maintenance.	*This will ensure that any spills are caught and contained by the drip trays and prevented from entering the drainage system*
6	All site repairs and maintenance will be carried by a competent person only	*To ensure that repairs are undertaken to a high standard and to minimise the chance of an unforeseen leak occurring*
7	All major repair and maintenance operations will take place off Site	*To ensure that the bunded area is not occupied for long periods and forcing maintenance to take place outside the bunded area.*
8	Stringent plant refuelling procedures shall be detailed in the Contractor's EMP.	
9	Bulk deliveries of fuel shall be restricted to the bunded area at the Site compound	*This will ensure that any spills are caught and contained by the oil separator and prevented from entering the drainage system.*
10	All refuelling mobile bowsers will be checked regularly for signs of wear and tear.	*In order to identify any existing or potential defects and prevent an environmental incident.*
11	Each contractor will train and nominate a single operative and its deputy (for cover). Refuelling operations shall be carried out under the supervision of that dedicated competent person only.	*To ensure that all refuelling operations are undertaken under competent supervision*
12	Spill kit and drip trays as appropriate shall be available for all re-fuelling operations.	*This will ensure that any spills are caught and contained by the drip trays and absorbed by spill kit.*
13	Use of biodegradable hydraulic oils instead of mineral oils shall be promoted.	*To minimise the impact should an accidental oil leak occur.*
14	A register of fuel consumption for all plant and generators shall be kept.	*To establish carbon footprint of development.*

4.4.7 Aspect Assessment (Health & Safety and Environmental)

In order to achieve excellence, activities must be frequently monitored, assessed and where necessary improved. This approach helps to keep standards at the highest level throughout the duration of a project. There is to be compliance with the agreed EMP through the implementation of the Aspect Assessment model.

The contractor is required to provide a comprehensive Technical Risk Register (TRR) which considers all aspects associated with the construction stage which has the potential to impact on the following categories:

- Environment
- Health and safety (including adherence to the Construction Design and Management Regulations 2015, and appointment of a Principal Designer)
- Technical
- Programme
- Public Relations

All aspects and risks will be quantitatively assessed and the resultant impact obtained. Where possible, the contractor shall endeavour to eliminate potential risks and where this is not possible, agreed mitigation and control measures will be identified and implemented. Prior to the commencement of each key construction phase the contractor is required to submit a TRR as part of the proposed construction pack for acceptance by the client prior to construction start of the respective phase. Once agreed, construction can proceed with the TRR being reviewed at all weekly site meetings. This dynamic approach will ensure that all aspects are being considered throughout construction including the less obvious risks which may only be encountered at interim stages during construction.

The client will also implement a monitoring regime which will focus on Safety, Health and the Environment (SHE). Monitoring will be undertaken by the client and lead by their SHE Manager. These audits will be held on a regular basis and will be scheduled to coincide with key construction phases. A frequent monitoring regime by the client will ensure that the Principal Contractor is working in compliance with the EMP.

4.4.8 Incident Contingency Planning

The aim of the EMP is to help prevent against any potential environmental incidents. However, in the unlikely event of an incident occurring, contingency plans will be swiftly implemented when deemed necessary so that the potential for pollutants to cause harm is minimised. The effectiveness of the contingency plans will be enhanced by the EMP awareness training.

The contractor's EMP will elaborate on a detailed Incident Contingency plan for the project.

Where an oil or chemical spill has occurred a spill kit shall be deployed immediately. Various types of spill kits will be kept on-site which are capable of dealing with specific types of spills. EMP awareness training will cover all potential spills and will provide all staff with specific guidance on all potential spill incidents. As

part of the Incident Contingency plan for the project, the construction phase plan will be reviewed to ensure that the necessary competence is available and arrangements detailed as noted above to address any such safety and health related risks to site operatives, as well as the potential harm to the environment.

Where there is a risk that sediments may enter the natural drainage system straw bales must be placed adjacent to this location and shall be deployed immediately if required.

A key element of the contingency plan will involve regular maintenance and replenishment of contingency measures where required. At the outset the contractor shall provide suitable stock of contingency apparatus and as with all construction materials, this apparatus must be continually recorded and logged to ensure a readily available supply at all times during the contract.

4.4.9 Incident Reporting Procedures

When an incident occurs the first action shall be implementation of a contingency plan in order to prevent significant pollution. Once implemented, or if it is deemed too dangerous or impossible to implement a contingency plan the contractor shall follow the **30 minute Reporting Rule**.

It is a requirement that all accidents and incidents are reported directly to the client's Project Manager and SHE Manager within 30 minutes. This includes the following at a minimum:

- Reportable Accident
- Environmental Incidents/Pollution
- Call out of Emergency Services
- Medical Treatment
- First Aid
- Road Traffic Accident
- Damage to Plant & Equipment
- Fire or Explosion
- Electric Shock and electrocution
- Near Miss Incidents

As part of the initial liaison with the contractor prior to commencement on Site, the Principal Designer review of the construction phase plan will incorporate a complete review of the management responsibilities and arrangements for the management of the works on Site that will include, but not limited to, emergency procedures and the reporting and investigation of accidents, incidents and near misses as noted above. This will further include the consideration and implementation of agreed project health and safety goals and client engagement processes to be implemented for the duration of the works, including the RIDDOR Regulations (2012).

Following initial contact, it shall be necessary to complete an initial report form (SEARS). The SHE Manager will conduct any detailed investigation and reporting should the severity of the incident justify it.

In the event the above listed persons are not contactable, the Principal Contractor shall revert to contacting the next person on the 'incident contact list'

5 References

The following references have been used during the compilation of this document:

- Construction Industry Research & Information Association (CIRIA), 2010, CIRIA Report C692: Environmental Good Practice on Site
- Scottish Environment Protection Agency (SEPA), 2010, Engineering in the Water Environment Good Practice Guide: River Crossing (WAT-SG-25), 2nd Edition
- Scottish Executive, 2012, River Crossings and Migratory Fish: Design Guidance
- Scottish Natural Heritage (SNH), 2013, Commissioned Report No. 591 Research and Guidance on Restoration and Decommissioning of Onshore Wind Farms
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- Scottish Natural Heritage (SNH), Forestry Commission Scotland (FCS), 2010, Floating Roads on Peat.
- Scottish Executive, 2017, Peat Landslide Hazard and Risk Assessment.
- Scottish Environmental Protection Agency (SEPA) Pollution Prevention Guidance Notes (PPGs) and Guidance on Pollution Prevention (GPP).