# Crystal Rig IV Wind Farm

## Construction Environmental Management Plan (PC 16)

February 2024

1284165

**Fred. Olsen Renewables**

# Document history

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# 1. Introduction

This document has been prepared by Natural Power Consultants (Natural Power) on behalf of Fred. Olsen Renewables (FORL) to discharge Planning Condition (PC) 16 associated with the consent for Crystal Rig IV Wind Farm as granted in March 2021 (planning permission reference 17/01350/SCO).

The objectives of the Construction Environmental Management Plan (CEMP) are to inform the Scottish Environment Protection Agency (SEPA), East Lothian Council and Scottish Borders Council of the proposed environmental management and construction methodologies to be employed during the construction of the consented wind farm and to allow discharge of pre-commencement planning conditions where applicable.

The consented development is referred to in the text as Crystal Rig IV Wind Farm. PC 16 states:

**Planning Condition 16**
No Development shall commence until a Construction and Environmental Management Plan ("CEMP"), which shall include a Construction Method Statement, is submitted to and approved in writing by the Planning Authorities in consultation with SEPA. The CEMP shall include (but is not limited to) the following:

(a) a site waste management plan (dealing with all aspects of waste produced during the construction period other than peat), including details of contingency planning in the event of accidental release of materials which could cause harm to the environment;

(b) details of the formation of the construction compound, welfare facilities, any areas of hardstanding, turning areas, internal access tracks, car parking, material stockpiles, oil storage, lighting columns, and any construction compound boundary fencing;

(c) details of borrow pit excavation, including excavation times and restoration;

(d) a dust management plan;

(e) details of measures to be taken to prevent loose or deleterious material being deposited on the local road network including wheel cleaning and lorry sheeting facilities, and measures to clean the site entrances and the adjacent local road network;

(f) a pollution prevention and control method statement, including arrangements for the storage of oil and fuel on the site;

(g) soil storage and management;

(h) a peat management plan;

(i) a drainage management strategy, demonstrating how all surface and waste water arising during and after development will be managed and prevented from polluting any watercourses or sources;

(j) sewage disposal and treatment;

(k) temporary site illumination;

(l) the construction of the access into the site and the creation and maintenance of associated visibility splays;

(m) the method of construction of the crane pads;

(n) the method of construction of the turbine foundations;

(o) the method of working cable trenches;

(p) the method of construction and erection of the wind turbines;

(q) details of watercourse crossings;

(r) post-construction restoration/ reinstatement of the working areas not required during the operation of the Development, including construction access tracks, borrow pits, construction compound and other construction areas;

(s) a pre-construction and construction fish monitoring programme;

(t) details of all construction works on the site and the timing of these works; and,

(u) pre-construction surveys for curlew and black grouse.

(2) The approved CEMP shall be implemented throughout the construction period and operational phase as appropriate, strictly in accordance with the approved details, unless otherwise agreed in writing by the Planning Authority in consultation with Scottish Environment Protection Agency (SEPA).

***Reason***: *to ensure that all construction operations are carried out in a manner that minimises their impact on road safety, amenity and the environment, and that the mitigation measures contained in the Environmental Impact Assessment Report (2018) accompanying the application, or as otherwise agreed, are fully implemented.*

This document describes the specific mitigation measures required to satisfy commitments made in Crystal Rig IV Wind Farm Environmental Impact Assessment (EIAR)[1].

Following approval from the relevant authorities, this document will form part of the main civil works construction contract as it defines good practice as well as actions required to deliver site-specific mitigation as detailed within the Environmental Impact Assessment Report (EIAR) dated October 2018 and any other relevant planning related documentation, planning consent conditions and pre-construction survey reports.

The methods and principles contained herein, as well as within referenced legislative instruments and published guidance documents, shall be adhered to by the Principal Contractor in developing the detailed design, construction method statements and other plans relating to environmental management as required by the contract.

Wherever other explicit and relevant documents are available, they are referred to rather than repeated in this document.

The appointed Principal Contractor shall maintain all records and submit all relevant information as detailed in this document to FORL for acceptance in accordance with the contract provisions. No works will commence prior to FORL's acceptance.

[1] Fred. Olsen Renewables Ltd (2018) Crystal Rig IV Wind Farm Environmental Impact Assessment Report: Written Text, https://www.energyconsents.scot/ApplicationDetails.aspx?cr=ECU00000607&T=5 [accessed 17/06/2022]

# 2. Project Details

## 2.1. Site Location and Layout

Crystal Rig IV Wind Farm was granted planning consent in March 2021.

Crystal Rig IV Wind Farm is situated on the East Lammermuir Plateau in the Lammermuir Hills approximately 40 km east of Edinburgh and 10 km south of Dunbar in East Lothian. The land consists of existing wind farm infrastructure as well as a mixture of rough, open moorland used for grazing and grouse shooting and areas of conifer plantation. The topography of the site is typical of the surrounding area. It is situated in an upland area with varied relief and a broad topographic high of 363 m Above Ordnance Datum (AOD) is reached in the southern area of the Development. The central location comprises of dense conifer plantation. Slope gradients are generally low and well drained. All of the turbines will be situated within the Scottish Borders Council area and access to the Development will utilise the existing access through the north, which is in the East Lothian Council area. As this development will span two council areas, for clarity regarding areas of infrastructure associated with the Development see Table 2.1.

**Table 2.1: Proposed Infrastructure Locations**

| Scottish Borders | East Lothian |
|---|---|
| Eleven wind turbines including foundations* | New underground electricity cables |
| Crane pads | |
| New site tracks (approx. 8 km) | Extend operating period of Metering Building/Substation |
| Underground electricity cables | Extend operating period of access tracks |
| Up to six borrow pits | Potential enabling works along public roads |
| Forestry felling | |
| Signage | |
| Temporary construction and storage compounds | |
| Install new 132/33 kV transformer inside CR II substation fence | |
| Install CR IV operation building inside CR II substation fence | |
| Build 200 m2 storage building at Friardykes | |

* Crystal Rig IV Wind Farm comprises of eleven turbines, with four turbines of tip height of 149.9 m, three of 174.5 m and four of 200 m.

The site layout is shown on Figure 1 – Site Layout provided in Appendix A.

## 2.2. Access

Access to the site is via the A1 at Innerwick via public road to the site access for the existing Crystal Rig Wind Farm (Phase I, Ia, II, IIa & III).

# 3. Construction Programme of Works

A detailed construction programme, with key dates for construction works, will be produced by the Principal Contractor prior to the commencement of construction. The following list in Table 3.1 provides a summary of key dates for the project incorporating the civil, electrical and turbine works.

**Table 3.1: Key Construction Dates**

| Works | Dates |
|---|---|
| C&E Construction Works | April 2024 – September 2025 |
| WTG Installation and Comms | May 2025 - November 2025 |
| Live Grid | June 2025 |
| Project completion | December 2025 |

*Source: FORL*

The paragraphs below provide a broad description of the anticipated sequencing of works, which will be subject to detailed programming by the Principal Contractor.

Typically following site mobilisation and plant deliveries, the compound area will be established to allow set up of the temporary construction compound. The borrow pits will be developed in order to provide material for the forming of site access tracks and to generate fill material to be installed below the turbine foundations, where rock quality is deemed to be suitable. Site tracks will be formed/upgraded to a suitable standard for construction traffic, initially to key borrow pit locations, and then the remainder of the site tracks and crane hardstandings shall be progressed. Construction of any watercourse crossings will be undertaken as the relevant section of access track construction reaches the watercourse. Where possible, cables ducts shall be installed below access tracks during construction of access tracks in order to avoid disturbing reinstated ground.

Once access tracks have been installed to each of the turbine locations, excavation and construction of the turbine foundations can take place. The crane hardstandings may be also formed at this stage to provide a clear working area for turbine foundation materials and construction.

During/following construction of the turbine foundations site tracks and crane hardstandings can be completed to a suitable standard to allow turbine delivery. Following substantial completion of the civil infrastructure works, the turbines will be delivered and erected, and the electrical fit out of the turbine can be progressed. Grid energisation, testing and commissioning of the wind farm will then be undertaken. Final reinstatement of the site, including track and hardstanding edges, borrow pits, and any other disturbed ground, will then be completed. Finally, snagging items will be completed, the site compound will be cleared and reinstated, before de-mobilisation from site.

# 4. Construction Management

## 4.1. Construction Hours of Work

The hours of work are outlined in PC 21 and are as follows:

| | |
|---|---|
| Monday to Friday | 0700 – 1900 |
| Saturday | 0700 – 1600 |
| Sunday | No construction work |

PC 21 also outlines that:

(1) Construction work shall only take place on the site between the hours of 07.00 and 19.00 on Monday to Friday inclusive and 07.00 and 16.00 on Saturdays, with no construction work taking place on a Sunday or on national public or bank holidays (see definitions below). Outwith these specified hours, development on the site shall be limited to turbine erection, maintenance, emergency works, dust suppression, and the testing of plant and equipment, unless otherwise approved in advance in writing by the Planning Authorities.

(2) Heavy Goods Vehicle ("HGV") movements to and from the site (excluding abnormal loads) during construction of the wind farm shall only take place between the hours of 07.00 to 19.00 Monday to Friday and 07.00 to 16.00 on Saturdays, with no HGV movements to for from site taking place on a Sunday or on national public or bank holidays.

In event of any noise complaints, the local authority can restrict work hours under provisions contained in Control of Pollution Act 1974.

## 4.2. Temporary Site Illumination and Lighting Columns

During the construction phase of the Development, the Principal Contractor may require temporary lighting to be erected. Circumstance requiring artificial lighting may include:

- Provision of lighting at the site compounds for security and safety of staff during the mornings and evenings in winter months.
- Provision of temporary lighting along the access tracks.
- Provision of temporary lighting at the turbine locations should night-time activities be required (including early morning and late afternoons in winter months).
- Provision of aircraft warning lights on the crane and other tall plant.

Should artificial lighting be required the Principal Contractor will ensure the following:

- Unnecessary lighting will be avoided, and following completion of task lighting will be switched of and/or removed.
- All lighting will be designed to avoid visual intrusion and/or light spillage. Lighting will be positioned and directed to avoid nuisance to residents and/or causing distractions to drivers on adjacent roads. Lighting will also avoid spillage onto woodland edges, woodland blocks or other high value habitats such as watercourses.

## 4.3. Boundary Fencing (Construction Compound)

The Principal Contractor will be responsible for the security of the Development site and will implement appropriate security measures to ensure the protection of the public and to prevent unauthorised access on the to the Development site, through installation of boundary fencing. The access to the site will have lockable gates which will be locked whenever there is no site activity.

If the Principal Contractor believes that security cameras are required, these will be located where they do not infringe on the privacy of local residence.

## 4.4. Roles and Responsibilities

All contractors will conduct their operations in accordance with this CEMP and in such a manner as to:

- Prevent adverse environmental impacts;
- Mitigate the impact of construction work on the local community;
- Implement appropriate mitigation and contingency measures for non-preventable incidents should they occur;
- Manage and control waste such that waste material is minimised, reused on site, recycled off site or disposed to correct facilities by licensed waste carriers; and
- Restore the site to a satisfactory condition upon completion of construction.

All contracts will be placed so that responsibilities are clear under Construction Design and Management (CDM) Regulations and to provide on-site monitoring for those activities which fall outside these Regulations, such as ecological, hydrological or archaeological matters.

The document that follows details this and complies with the specific requirements of PC 16.

Further details on specific roles of the Principal Contractor and the ECoW are provided in the following paragraphs.

### 4.4.1. Principal Contractor

The Principal Contractor appoints an appropriately competent person or persons (e.g. Contractor's Environmental Site Engineer or Site Environmental Manager) to undertake relevant environmental tasks as detailed in this document prior to, during and upon completion of the construction works. This role will be referred to as the Contractor's site Environmental Representative with the relevant person based on site unless otherwise agreed by FORL prior to commencement of construction.

The Principal Contractor is responsible for obtaining all necessary consents, licences and permissions for his activities as required by current legislation governing the protection of the environment.

The Principal Contractor considers all mitigation measures and good practice construction methods detailed within this document in their design and in any detailed environmental plans as required. Where any mitigation measures or construction methods described in other documents deviate in any way from those contained within this document, the Principal Contractor abides by whichever is the most onerous and stringent in terms of environmental protection (whilst complying with H&S and civil engineering requirements).

The Principal Contractor will be responsible for providing their own detailed Construction Method Statements (CMS's) and programme prior to construction, which shall be compliant with the information provided in this document.

The CMS's may typically cover the following construction activities:

- Site Construction Compound and Component Laydown Areas;
- Track Construction;
- Watercourse Crossings and Road Construction near Watercourses;
- Borrow Pit Set Up and Operation;
- Turbine Base Construction;
- Crane Pad Construction;
- Installation of Wind Turbine Generators (WTG);
- Cable Installation; and

- Reinstatement.

The CMS's would describe the methods and include appropriate environmental management and mitigation measurements alongside the monitoring and management requirements. The CMS's would be agreed with FORL/Scottish Borders Council and other interested parties prior to the commencement of work.

A copy of this document and related files and documents will be kept in the site offices for the duration of the site works and will be made available for review at any time.

### 4.4.2. Principal Designer

The construction works will fall under the Construction Design and Management (CDM) Regulations 2015. As per the CDM Regulations 2015, the Principal Designer (Natural Power) will produce a pre-construction safety information pack in accordance with CDM regulations. This plan will detail the development construction programme, emergency procedures, site layout, fire plans, method statements and details of the proposed induction training programme.

### 4.4.3. Environmental Clerk of Works

An Environmental Clerk of Works (ECoW) will be appointed by the Client for the period of wind farm construction and for a period of restoration of the site after construction to liaise with the site representative and Principal Contractor. The CEMP will be monitored by the ECoW under PC 12.

In addition, the Principal Contractor may have their own ECoW for the period of wind farm construction. This EcoW will liase with the Client appointed EcoW.

### 4.4.4. Planning Monitoring Officer (PMO)

A Planning Monitoring Officer (PMO) will be appointed by the Client for the period of wind farm construction and for a period of restoration of the site after construction. The PMO will monitor compliance with the CEMP/CMS, in addition to other Condition obligations and commitments, and shall report any continued failures or continued breaches of the commitments and obligations made within Condition documentation to the Planning Authority if action is not taken by the Principal Contractor. The PMO will liaise with the ECoW for any failures or breaches that overlap in scope.

### 4.4.5. Other Roles

A **Site Representative** will be based on site full time and shall report to the Project Manager.

An **Electrical Contractor** will be appointed by the Principal Contractor and will be responsible for the installation and commissioning of the site cables and connection.

The project management for the delivery and erection of the turbines will be the responsibility of the turbine manufacturer. The turbine manufacturer's project manager will liaise directly with the Project Manager and the Site Manager.

There will also be other various contractors employed to undertake specific activities.

# 5. Site Management Practices

## 5.1. Induction Requirements

The Principal Contractor will make sure that all contractor employees, sub-contractors, suppliers, and other visitors to the site are made aware of the content of this document that is applicable to them. Accordingly, environmental specific induction training will be prepared and presented to all categories of personnel working and visiting the site.

As a minimum, and working with the ECoW, the Principal Contractor provides the following information to all inductees:

- Identification of specific environmental risks associated with the work to be undertaken on site by the inductee.
- Summary of the main environmental risks at the site as provided in the ES or identified during the pre-construction surveys:
  - Species and / or habitat protection requirements;
  - Any other areas of environmental sensitivity (ecological, archaeological, hydrological or geological) as demarcated on site or on the constraints map;
  - Pollution prevention (e.g. silt mitigation and protection of the water environment);
  - Ground stability and peat slide risk; and
  - Waste management.
- Environmental Incident and Emergency Response Procedures.

A convenient sized copy of the site constraints plan will be provided to all inductees showing all the sensitive areas, exclusion zones, wash out areas, watercourses, refuelling exclusion areas, location of skips, etc. The map shall be updated and re-issued as required.

## 5.2. Toolbox Talks Topics and Training

During construction, to provide on-going reinforcement and awareness training, the above topics, along with any other environmental issues which arise on site, will be discussed at regular tool box talks provided by the Principal Contractor & ECoW.

Toolbox talks and training will be delivered as required by an appointed person for example the Principal Contractor's Site Environmental Representative or equivalent with input and support from specialist personnel on site as required (e.g. ECoW).

The Principal Contractor shall submit a schedule for tool box talks prior to commencement of works. Additional tool box talks shall be added as required based on circumstances such as unforeseen risks, repeated observation of bad practices, perceived lack of awareness, pollution event, etc.

Specifically, the Principal Contractor provides, as a minimum, the following environmental training:

- Training on the use of spill kits (on ground and in surface waters), to be provided on a regular basis (to account for staff/subcontractor changes etc). Training to be undertaken by a suitably qualified contractor; and
- Training on silt mitigation e.g. installation of silt fencing etc., silt mitigation measures to relevant construction / site staff.

A record of all toolbox talks, their content and the attendees will be maintained and recorded.

## 5.3. Correspondence, Records and Reporting

The Principal Contractor will provide a complete record of all relevant communication and reports associated with all aspects of environmental management and implementation of this document. This documentation shall be made available upon request by the Project Manager. As a guide, the following records will be maintained:

- Minutes and attendance record of start-up meeting (on-site meeting prior to commencement of construction works).
- Weekly rolling Watercourse and Drainage Inspection Register including look ahead activities with required mitigation. This is required to be discussed and recorded at scheduled weekly construction meetings. This will cover all environmental sensitivities, including ecology, archaeology and water quality.
- Communication Plan.
- *Employers* and *Contractor* Audit Reports (according to respective corporate procedures).
- Ground Risk, including a Geotechnical / Mining Risk Register and Excavations Register.
- Water Quality Monitoring Records.
- Waste Management Records.
- Licensing and Consents: copies of all permissions, consents, licenses and permits and related correspondence.
- General correspondence: all other relevant internal and external communication records relating to environmental management issues and implementation of the CEMP.

## 5.4. Risk Assessments and Method Statements

The Principal Contractor will ensure risk assessments and method statements are in place and agreed for all works and tasks prior to these being undertaken. These documents will consider and address all of the environmental aspects of the planned works and will include proposed mitigation measures.

The Contractor's risk assessments and method statements will be submitted for review and comment to the Principal Contractor appointed site Environmental Representative, in consultation with the ECoW, prior to commencement of the relevant works/tasks.

# 6. Construction Method Statement

The wind farm development will incorporate the construction of the infrastructure works detailed below, and as indicated in the site general arrangement and location plan provided in Appendix A

The following sections describe the proposed methods to be used in construction of the works at Crystal Rig IV Wind Farm.

## 6.1. Access Tracks

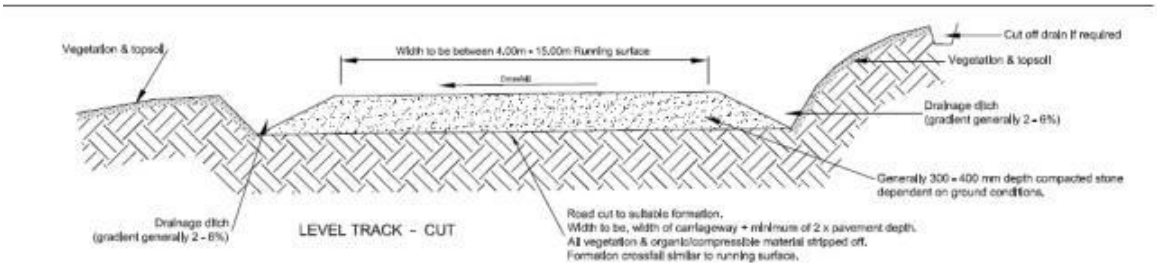
New permanent site access tracks of 7.7km in length and the upgrading of approximately 8.66 km of existing track at the site access are required to facilitate construction of the Crystal Rig IV Wind Farm and the delivery of turbine components. The access tracks will link the wind turbines, borrow pits. Site tracks will generally follow the alignment indicated in the site general arrangement and layout provided in Appendix A. However, they may be subject to micro-siting following detailed site investigation and design, and subject to the written approval by the Local Planning Authorities (LPA).

Access tracks within the site will typically be 6 m wide at the running surface but shall be wider at bends, junctions, and crane hardstanding's to satisfy the requirements of construction and turbine supplier's access specification requirements. Temporary passing places will be constructed where required to facilitate two-way traffic movement during construction. Passing place locations will be determined taking in to account the requirements of the Principal Contractor and the turbine supplier.

It is anticipated that access tracks will be constructed using standard cut and fill founded construction techniques. Due to ground conditions it is currently anticipated that no floating track will be necessary.

Founded track construction will involve the removal of vegetation, topsoil and peat soil (if any), in order to obtain a suitable bearing stratum. The topsoil, together with any incorporated seed bank, will be stored as required for subsequent use in verge reinstatement works. Topsoil shall be stockpiled separately to any sub soil material. A geo-grid/geotextile may then be installed as required, and in accordance with the manufacturer's guidelines, before overlaying unbound aggregate to a depth appropriate for the ground conditions, and in accordance with the detailed track design. Tracks will typically be finished with a running surface of crushed stone. Tracks will be constructed by tipping and compacting the aggregate to the required shape and thickness. Particular attention shall be given to cutting, storing and re-instating topsoil on the road edges and batters in order to encourage regeneration of vegetation following construction. Typical details of a 'founded track construction are provided in Figure 6.1 showing a typical cut and fill track during initial construction.

*Source: Natural Power*



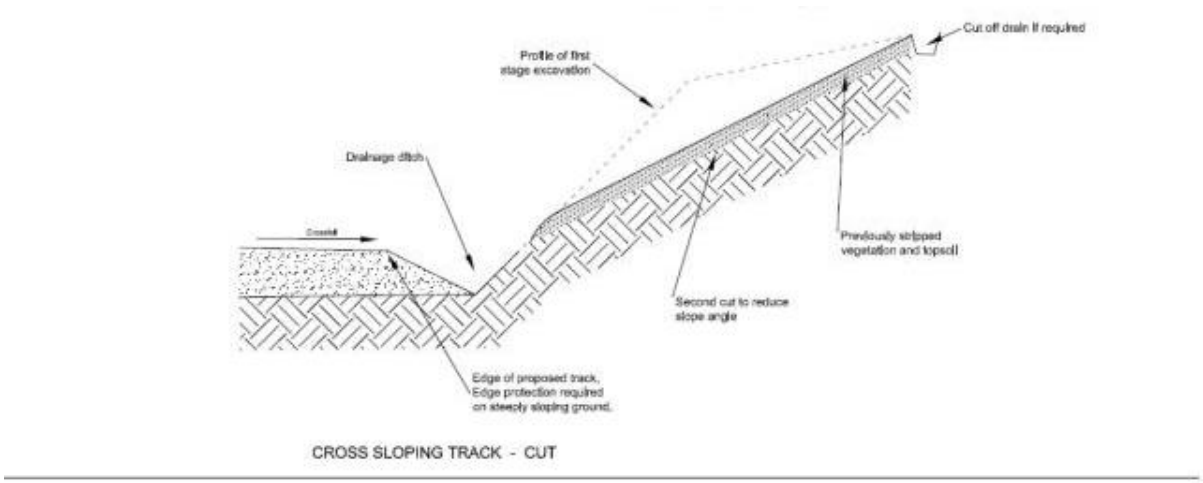



**Figure 6.1: Cut and Sloping Track Detail**

Drainage infrastructure as appropriate to the site conditions and track construction will be provided alongside access tracks and other hardstanding areas to convey water away from construction activities, as well as operational wind farm infrastructure. The drainage system will incorporate sediment management measures to help reduce the volume of silt laden runoff discharging to the hydrological environment. Care will be taken throughout the construction phase to ensure that disruption to the existing drainage regime is minimised. An outline Drainage Management Plan (DMP), which provides the overarching principles of sustainable drainage management is contained in Appendix B. It will be the responsibility of the Principal Contractor to produce detailed design method statements that outline the specific drainage requirements, in the case of new site tracks. In the case of existing access tracks, the design will be the responsibility of the Client, works will be undertaken by the Principal Contractor and remediation, if required, will be the responsibility of the Client.

Where existing boundary features (walls, fences, hedges, gates) are encountered and affected during the works these shall either be relocated, or new boundary features erected, to ensure stock-proofing is provided to standards similar to, or better than before the works were commenced. This may include installation of temporary cattle/deer grids, and agricultural/forestry access arrangements. Where new gates are required on the route of the wind farm site tracks, these shall be of sufficient size to accommodate the turbine delivery and erection vehicles. The cattle/deer grids shall either be designed to accommodate the turbine deliveries or be adequately plated over and removed during each delivery.

## 6.2. Crane Hardstandings

An area of hardstanding will be provided adjacent to each wind turbine for use as a lay-down area, and as a stable base for cranes and other vehicles to operate from during construction of turbine foundations and erection of turbine components. The size of the hardstanding's will be dictated by the requirements of the turbine supplier and the crane contractor.

Hardstanding's are likely to be constructed using a cut and fill method of construction, similar to the Development tracks. This will involve removal of vegetation, peat and top soil, excavation of the underlying subsoil to a suitable bearing stratum, and profiling of the ground as required. The peat and topsoil and any incorporated seed bank will be stored as required in suitable stockpiles for use in reinstatement works. Any acceptable fill that is generated will be stored and used as backfill. Hardstanding's will be constructed from suitable structural material, laid over a geo-grid/geotextile (as required in accordance with the track designers and manufacturers guidelines). Hardstanding's will also be finished with a layer of crushed stone. Hardstanding's will be designed to meet the requirements of the

turbine supplier and crane contractor, and the depth of construction will be dependent on the prevailing ground conditions.

A minimum of 3 no. plate bearing tests will be undertaken at each crane hardstanding area to verify the bearing capacity of the constructed hardstanding's.

Crane hardstanding's will remain in place during operation of the Development to enable any required maintenance work to be undertaken, and for use in the decommissioning of the Development.

## 6.3. Turbine Foundations

Turbines will be installed on reinforced concrete foundations. The foundations may be of gravity design bearing on competent ground conditions, or piled design where ground conditions dictate. The turbine foundations will be installed by the Principal Contractor.

### Excavation and Blinding

Vegetation, peaty soil and topsoil will be stripped and stored for use in reinstatement works where suitable. The underlying ground will be excavated to the appropriate depth, and acceptable material stockpiled for use as backfill. The base excavations will be kept free of surface water by means of a drainage ditches/cut-off drains, or other methods as appropriate. Pumping will be carried out as necessary to remove any surface water or water ingress from excavations, with care taken to ensure that any discharges are located / treated appropriately to avoid the risk of contamination.

Typically, excavation sides will be battered at a suitable angle to ensure stability of the excavation.

**Figure 6.2: Excavation for turbine foundation**

**Figure 6.3: Formation level**

### Setting Out

Following inspection/testing of the foundation formation, blinding will be laid, before the turbine anchor cage, steel reinforcement, ducts and other cast-in items are fixed. Dependant on the foundation design, ducting may be installed prior to blinding works being undertaken to reduce the maximise the bend radius for cabling. Formwork will be erected and sealed before concrete is poured.

**Figure 6.4: Rebar framework (piling shown)**

### Concrete Operations

It is anticipated that concrete may be batched on site but this shall be subject to satisfactory testing of rock encountered in the borrow pits for use as concrete aggregates. If rock is unsuitable for use as concrete aggregates then consideration shall be given to importing the necessary aggregates or alternatively importing ready mixed concrete batched off site.

The concrete specification will be determined during the detailed design phase.

The concrete pour will commence after the reinforcement installation has been inspected and checked. by the Principal Contractor.

Concrete placement will follow industry best practice. The placed concrete will be protected against extremes of weather prior to and during initial curing.

Figure 6.5: Pouring concrete

Figure 6.6: Placing concrete

### Striking of Formwork

Any re-useable shutters used for the foundations will be carefully loosened, removed and cleaned no earlier than 24 hours from completion of the pour. Alternatively, single use, sacrificial formwork designed to be left in situ on completion of the works may be used and if so this will form part of the permanent foundations.

### Backfilling Operations

After construction and curing of the lower base and up stand, the foundation will be backfilled with suitable material and compacted as specified by the designer. An earth mat will be installed around the base, before backfilling is

completed to the finished surface level and the ground is reinstated. Any suitable excess excavated material will be used for reinstatement in other areas of the site. On completion of backfilling an access path will be provided around the base of the foundation and onto the hard standing to allow for permanent access to the turbine during the operational phase for maintenance works.

Any standing water during these operations will be removed by pumping, where appropriate.

A checklist for each step of the installation process will be prepared to show compliance with an adopted Quality Management System. These checklists, once completed, will be stored in the site QA file along with relevant concrete cube test results and will be available for inspection at all times.

Upon completion of the work at site, all the area surrounding the turbines will be reinstated by the placement of excavated soft soils / overburden over the backfilled materials to the perimeter of the hardstandings in accordance with best practice.

## 6.4. Cranes

It is anticipated that at least two large cranes will be required to assemble and erect the wind turbines. The cranes components and ballast will be delivered on a number of lorries. Smaller auxiliary mobile cranes would be used for unloading, assembling the large cranes and to assist the main crane in lifting the tower sections from the horizontal delivery position to the vertical mounting one.

As with all other vehicles, refuelling would be carried out in accordance with site procedures to minimise the risk of spillage or pollution.

All lifting operations would be carried out in strict accordance with the Lifting Operations and Lifting Equipment Regulations 1998 with qualified staff designing, supervising and carrying out the lifts.

During lifting operations, the area around the lift would be cordoned off. No members of the public or non-essential workers would be allowed in this area. The area would be controlled to ensure enforcement.

## 6.5. Tower Erection

The tower sections of the wind turbines would be delivered to the site in separate sections. Lifting would not start until a suitable weather window is available. Each tower section would be lifted off the trailer and bolted in place. The delivery lorry would turn at the designated location before leaving site.

## 6.6. Nacelle Installation

The precise details of the delivery vehicle will depend on the wind turbine selected and may lead to minor changes in the method described. The nacelle would be delivered to the desired location. The crane would lift the unit into place on top of the tower. The installation team would then bolt the nacelle to the tower.

## 6.7. Blade Installation

Three methods can be used to attach the blades; all these methods may be used depending on the terrain and the wind turbine location.

- The First method: The blades can be attached to the hub on the ground. The hub and blades are then lifted as one unit. This is a quicker method than the other methods. However, this method requires a large lay down area and light vehicles have to move in this area. The forestry may limit this type of manoeuvre.
- The Second method: The hub can be attached to the nacelle and two blades attached to the hub while the nacelle is on the ground. The nacelle is then lifted into position and the third blade lifted into place separately. This requires manoeuvring of several components on the ground and usually repositioning of cranes.

- The Third Method: is to lift the nacelle and hub as one unit and then lift the blades one at a time rotating the hub between lifts. The blade lifting operations do not require repositioning of lifting equipment. This method is generally preferred for areas with limited room for manoeuvring, such as forested areas.

## 6.8. Wind Turbine Fitting Out and Connection

Once all the components have been bolted together, the wind turbines are fitted out internally. This involves connecting the pre-assembled units installed in the major components. The wind turbines would then be checked and left in a safe state until the electrical connection is available. Once the electrical connection is available, the connection is made internally to the wind turbine. All the systems are progressively checked to make sure the wind turbines are safe to run. The setting on adjustable equipment are checked and safety systems tested. The wind turbines then go through a closely monitored run in period of at least 240 hours before being cleared for automatic operation.

## 6.9. On Site Cabling/Cable Trenches

Underground cabling will link turbines to the off-site switchgear and metering building at the grid connection point.

Cable runs, including High Voltage (HV) cables, SCADA cables and earth conductors, will generally be located alongside the site tracks where practicable (generally within 2 m of track edges) at nominally 1000 mm depth to the top surface of the HV cables. Routing cabling cross-country will be determined following detailed ground-truthing and site investigation.

Cables shall be suitably protected by appropriate ducting where they crossroads / tracks. The cable trenches shall be backfilled appropriately and reinstated using the topsoil excavated from the initial trench excavation.

Cable trenches will be constructed to detailed construction and trenching specifications, which will be dependent upon the ground conditions encountered. The method selected will depend on electrical and civil engineering properties along the route and may include a combination of direct ploughing, ducting and/or direct burial. Excavated material and vegetation will be appropriately segregated and stored for reinstatement. Cable bedding material, warning tape and markers will be provided in accordance with relevant standards and the Employer's Requirements. The ground will be reinstated to a condition equivalent to the land adjoining the trenches.

All cabling works require drainage mitigation, materials handling and pollution prevention measures, as prescribed. To minimise habitat damage, cable trenches will be designed to prevent creation of preferential drainage channels for sub-/surface flows and constructed to minimise ground disturbance

Where possible, cables or cable conduits shall be laid down and reinstated during construction/prior to reinstatement of access tracks or other adjacent infrastructure, in order to avoid disturbing reinstated ground. However, this cannot be guaranteed as it is not always possible or practicable.

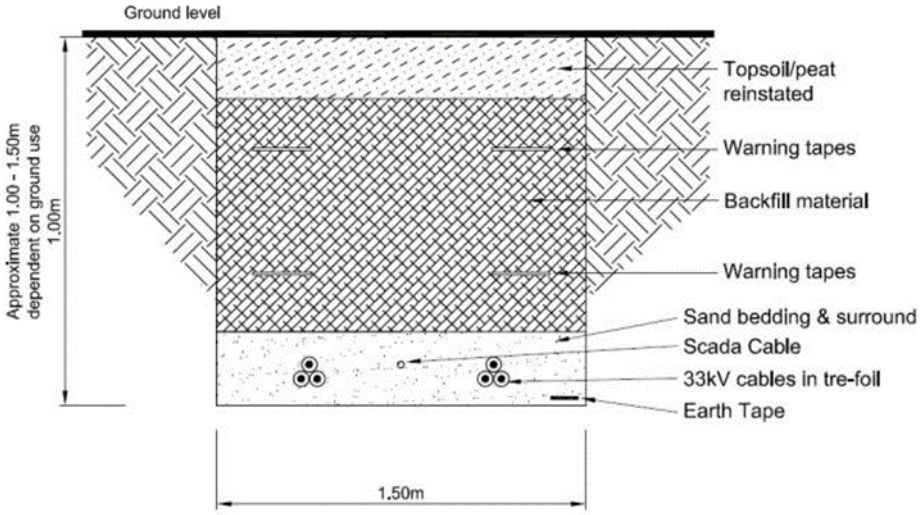



**Figure 6.7: Indicative Trench Cross-Section**

## 6.10. **Temporary Construction Compound**

Due to the requirement under Health and Safety legislation and the CDM Regulations for welfare facilities on site and the exposed nature of the site, temporary construction compounds during the construction phase of the development to provide some or all of the following facilities:

- Temporary portable buildings housing site offices and welfare facilities for contractors.
- Containers used for tool and equipment storage.
- Portable site toilets with provision for sealed waste storage and removal, or suitably approved septic tank installation.
- Parking for contractors' vehicles.
- Generator.
- Storage of components and materials.

The compound area will have room for several reverse parked cars and an area for loading and unloading of material deliveries.

The compound/s will be constructed by stripping vegetation and topsoil, which will be stored separately for future reinstatement following completion of the development. A geotextile base or similar may be installed, before filling the area with compacted stone. Installation of drainage measures and associated silt mitigation shall be provided.

It is anticipated that water for all construction activities will be supplied by water bowser or boreholes. It is anticipated that any sewage associated with the temporary construction compound will be collected in appropriately sized interceptor tanks or treated in a suitably approved septic tank.

The main laydown area will be located as indicated on Site General Arrangement Drawing, provided in Appendix A. Construction compounds will be provided on a temporary basis for the duration of construction only and will be fully reinstated following construction unless agreed otherwise with the LPA.

Access to the construction compound shall be appropriately secured by the Principal Contractor.

## 6.11. **Borrow Pits**

In order to construct the access tracks and hardstandings it is proposed to source the rock fills where possible from on-site borrow pits to reduce the need to import materials.

Prior to any borrow pit works commencing each location shall be surveyed and the area of 'search' pegged out. Once the borrow pit area has been surveyed, the ECoW shall be consulted prior to any further development of the area and following approval borrow pit preparation may commence.A number of control measures will be used to prevent pollution from borrow pit operations as follows:

- Cut off ditches – prevent existing surface water run-off from reaching the work area, and to prevent any run-off leaving the works area being treated. Cut off ditches will be installed where necessary prior to works on the borrow pit commence. Green run-off will be discharged into an area of vegetation for dispersion or infiltration. Silt fencing or gabion stone may be required at the discharge point to alleviate flows and aid in flow dispersion to avoid scour.
- Stockpiles – overburden will be stripped and stored appropriately. All mineral material will be smoothed with the back of an excavator bucket. If silt issues occur, then the stockpiles should be sealed with a covering of turves or geotextile to minimise wash out. Further details on the management of excavated materials is provided in the detailed drainage design. Drainage from stockpiles of material such as overburden will be intercepted and treated appropriately through the use of silt fencing on the downhill side of stockpiled material.
- Settlement lagoons – these will be provided as required to settle out silt from run-off areas, they will be sized to suit site conditions, particle size, anticipated through-flow and available space.

Borrow pit works will not begin until a mitigation plan is put in place by the Principal Contractor. This will ensure that buffer strips are included for the implementation of the necessary mitigation measures, e.g. settlement ponds.

# 7. Environmental Management and Mitigation

## 7.1. Pollution Prevention and Control

The site is surrounded by a number of watercourses and is within the catchment of the River Tweed Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI). In order to prevent pollution of the nearby watercourses by debris, silt and oils temporary soil mounds would be sited away from watercourses and drains as far as practicable. Surface water would be directed away from construction activity to avoid silty run off entering watercourses or ecologically sensitive areas.

The following mitigation measures are proposed to prevent or reduce the likelihood of pollutant leaks on the Crystal Rig IV Wind Farm site:

- All fuels, oils and contaminants will be stored in secure, fit for purpose containers or within bunded containment as appropriate and in accordance with guidelines.
- All oil will be contained within bunded containers and stored, controlled, transferred and disposed of following correct procedures.
- Containers will be securely stored and labelled according to oil legislation.
- All chemical storage methods are to meet within minimum requirements set out in guidelines.
- Oil, lubricants and fuels are not to be stored in areas:
  - Within 50 metres of a spring, well or borehole;
  - Within 50 metres of a watercourse, ditch or drainage channel;
  - Where spilt oil could enter open drains, loose fitting manhole covers or soak into unmade ground and pollute groundwater;
  - Where a tank vent pipe outlet cannot be seen from its filling point; and
  - On roofs as, spilt oil can run down guttering that is connected to surface water systems.
- All oil containers (including mobile bowsers), funnels, couplings, pipes, taps and cloths to be returned to the designated storage area after use.
- Chemicals/fuels/oil storage facilities should be located on impervious bases within a suitable secure bund.
- A secondary containment system (bund or drip tray) will be provided to catch any oil leaking from a container or its ancillary pipe work and equipment.
- Containers with a capacity of 200 litres or above will have a secondary containment system e.g. bund, drip tray, of sufficient capacity to contain at least 110% of the maximum contents of the container. Where more than one container is stored, the bund will be capable of storing at least 110% of the largest tank or 25% of the total storage capacity, whichever is the greater.
- The bund base and walls will be impermeable to water and oil and checked regularly for leaks.
- Any valve, filter, sight gauge, vent pipe or other ancillary equipment must be kept within the bund when not in use.
- Absorbent material [spill kits] will be available on site and will be deployed to contain drips and small spillages.
- All construction plant will be maintained in good condition. Plant operators will check machines daily for oil/fuel leaks and take appropriate action.
- Refuelling of plant, machinery and vehicles, and/or the transfer of oils from one container to another, will be carried out by a designated and trained refuelling operator using an appropriate impermeable drip tray and funnel. This shall occur 50m away from watercourses.
- Refuelling or dispensing undertaken away from a designated area (where possible) should:
  - Be completed over a drip tray or other secondary containment solution; and

  - Use funnels or other appropriate filling equipment to avoid spills.
  - Be 50 m away from drains and watercourses or any private supplies.
- Bowsers will be stored at the construction compound when not in use.
- All plant maintenance will take place in the construction compound except in cases of a breakdown emergency. In such cases, maintenance will be carried out in such a way as to minimise pollution risk. Drip trays will be placed under all stationary plant.
- Above ground pipe work must be properly supported.
- All HGV's taking construction materials or spoil to/from the site shall be sheeted wherever possible to prevent the spillage/deposit of materials on the highway.

Further information on surface water management is contained in Appendices B and C.

## 7.2. Site Waste Management Plan

In accordance with best practice and legalisation the Principal Contractor will provide and maintain a Site Waste Management Plan (SWMP). The SWMP will ensure that the principles of waste minimisation and sustainability are employed. A nominated representative of the site team will take responsibility for the implementation, maintaining and monitoring of the SWMP.

The Principal Contractor ensures compliance with his legal Duty of Care obligations and as a minimum:

- Waste is stored safely and securely on site;
- Prevents any liquid wastes leaching from bins or skips, including dry wastes that may become wet (from exposure to rain); and
- Prevent hazardous wastes being mixed with other hazardous wastes or non-hazardous wastes.

The Principal Contractor utilises only certified waste carriers and contractors and maintains records of these contractors as part of the SWMP documentation on site.

The requirements of the SWMP are communicated to all site operatives during their induction. Furthermore, all operatives on site attend waste management toolbox talks on a frequent basis, as required, to increase awareness of recycling and waste reduction.

Practical measures shall include the following:

- Provision of bins to segregate waste and recyclable materials within all welfare facilities;
- Provision of separate covered skips for recyclable materials (e.g. mixed recyclables, wood, metal etc) within all welfare facilities;
- Provision of secure bunded containers to store special waste (e.g. waste oils, fuels, lubricants etc.) prior to removal from site, in line with applicable regulations;
- Concrete washout cannot be discharged into the ground or water environment and therefore will require separate and designated wash-out areas. These will be sited away from watercourses and once dried can provide opportunity to recycle material;
- Reuse of materials such as formwork and temporary reinforcement where possible; and
- Material arising from excavation works to be reused as fill material and for reinstatement. Note that concrete material cannot be used in borrow pit restoration.

A number of different waste streams are likely to arise during the construction of the wind farm. General guidance for the storage and disposal of specific waste streams can be found within the SWMP. This includes:

- Solid waste from office and welfare areas;
- Liquid waste from office and welfare areas;

- Concrete wash out liquid;
- Waste chemicals, fuel and oil;
- Packaging waste;
- Waste metals; and
- Excavated materials.

The SWMP will be regularly reviewed by the Principal Contractor to ensure that it is being adhered to and that it is practical and appropriate.

## 7.3. Dust Management Plan

Spray bars can be fitted to the processing plant to keep dust down during dry / windy periods. Water will be reused or recycled as much as possible. For example, treated water from settlement ponds/lagoons can be used to damp down access tracks in dry/dusty conditions. The Principal Contractor will provide further details upon appointment on the management of dust arising from construction activities adopting best practice as outlined in the Institute of Air Quality Management Guidance[2].

## 7.4. Noise Management Plan

A Noise Management Plan will be provided by the Principal Contractor, in line with British Standards guidance[3], to identify all sources of construction noise, and any noise sensitive receptors and details any mitigation measures necessary to minimise impacts upon amenity.

## 7.5. Water Management

### 7.5.1. Drainage and Runoff Management

The Principal Contractor will be responsible for designing the water management systems during the construction of the Development. The Principal Contractor will provide detailed drawings and method statements on drainage and runoff management that will be subject to approval by the EcoW prior to works being undertaken.

The following outlines the high level principles of drainage and runoff management with further details provided in Appendix B. An outline drainage statement has been prepared and approved by SEPA and is included as reference in Appendix C.

**Water Pollution**

The following measures, designed to prevent/reduce the likelihood of watercourse pollution, are proposed:

- Where bridges are to be constructed a sediment trap will be installed and the streambed protected during construction works.
- Where soil bunds are to be constructed they will be site at a safe distance from watercourses (minimum of 50 m).
- Construction compounds will be built at a safe distance of more than 10 m from watercourses.

2 Institution of Air Quality Management (2014). IAQM Guidance on the assessment of dust from demolition and construction.

3 British Standards Institute (2014) BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites.

- Any wheel wash facilities will be located more than 50 m from the nearest watercourse or surface drain and run off will be captured using a purpose-built system unless a dry wheel wash facility is used. This facility will be designed and located to the satisfaction of the LPA's
- Waste will not be stored within a 50 m radius of natural watercourse.
- Cut-off ditches will be considered to line the perimeter of the turbine foundation excavation areas to inhibit run off of materials or silt laden water.
- Stockpiling of excavated material will be managed such that the potential contamination of down slope water supplies, and/or natural drainage systems is minimised.

**Surface Water and Ground Water Management**

To protect the environment from contaminated run-off and erosion, the following water management measures would be proposed at the Development:

- Artificial drainage methods will only be employed where necessary.
- Sustainable drainage systems will be incorporated into the drainage system. These may include silt traps, settlement ponds, and buffer strips.
- Surface water will not drain directly into natural watercourses, instead discharging into buffer strips and trenches.
- Where water discharges, erosion protection must be considered.
- Surface water run-off from construction compounds is more likely to be polluted. Fuels, oils and contaminants will be stored within a bounded container. Absorbent material (spill kits) will be available at compound area and will be deployed to contain drips and small spillages as necessary.
- Uncontaminated surface run-off from the compound will be accommodated in a shallow swale or soakaway which will be constructed as a perimeter ditch to avoid contamination of watercourses should there be a spillage.

### 7.5.2. Foul Water Management

The remote and upland position of the site means that connection to a public foul drainage system is unlikely to be a viable option.

During the construction phase, it is expected that foul drainage would be securely stored on-site using a suitable holding system before being removed and disposed of by a suitably licensed contractor under Duty of Care. Visual alarms or similar, and regular inspection of holding system is recommended to prevent overflow into groundwaters or surface waters. There would be no discharge of foul drainage to surface waters or groundwater during the construction phase, unless a sewage treatment plant is used and an "Application to Discharge" is obtained from SEPA.

Existing site facilities at Friardykes Control Centre will be utilised during the operational phase of the Development.
Watercourse Crossings

The track layout at the Development incorporates a number of watercourse crossings for which an assessment was carried out during the preparation of the Environmental Impact Assessment Report (EIAR).

Environmental protection measures will be incorporated into the design and construction of the watercourse crossings to minimise any potential negative impacts. All watercourses at track crossings will be visually checked to ensure all pollutions are minimised and responded to.

The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) (CAR) regulate activities in or in the vicinity of rivers, lochs and wetlands, including engineering activities such as river crossings and culverting.

The Principal Contractor produces relevant detailed information to obtain the necessary registrations/ licences under CAR prior to the commencement of construction works. The Principal Contractor is responsible for the liaising with

and obtaining from SEPA, the relevant consents, licences and authorisations relating to the construction of watercourse crossings at the development.

Construction and maintenance of watercourse crossings must be compliant with SEPA General Binding Rules (GBR)[4]. For reference, rules that are associated with construction of watercourse crossings (GBR 6) and working within the vicinity of watercourses (GBR 9) are outlined below:

- GBR 6
  - Vegetation on any bank of the river, burn or ditch must be removed or modified only to the extent necessary to carry out the works;
  - Any vegetation removed must not be disposed of into the channel;
  - The works must not prevent the free passage of migratory fish;
  - The works must not result in the narrowing of the channel width nor the heightening of either bank;
  - Where the activity requires any work in the wetted part of the channel, the works must not be undertaken during periods in which fish are likely to be spawning in the river, burn or ditch nor in the period between any such spawning and the subsequent emergence of juvenile fish;
  - If necessary, a temporary culvert may be installed to facilitate the works but the culvert must not extend more than 10m along the length of the river, burn or ditch and must be removed on completion of the works.
  - All reasonable steps must be taken to ensure that the works do not result in increased erosion of the bed or banks of the river, burn or ditch;
  - As far as reasonably practicable, within 12 months of the work starting, the bed and banks of the river, burn or ditch must be reinstated at least to their condition before the works started;
  - For temporary bridges, as far as reasonably practicable, and within 12 months of the removal of the bridge, the bed and banks must be reinstated at least to their condition before the works started.
  - The activity must not result in pollution of the water environment; and
  - Any outfall and associated works must be designed and constructed to be no larger than is necessary for the proper operation of the outfall, and in any case must not extend more than 20 metres along the length of the river, burn or ditch.
- GBR 9
  - Machinery should only operate in water where it is impracticable for it to operate on dry land;
  - Refuelling must take place at least 10m away from any surface water;
  - Any static plant or equipment used within 10m of surface water must be positioned on a suitable drip tray with capacity for 110% of the fuel tank supplying the static plant or equipment.;
  - Machinery used in or near surface water must not leak any oil;
  - Washing of any machinery must take place at least 10m away from any surface water and the washings must not be allowed to enter any surface water;
  - Machinery must not be operated in rivers, burns and ditches when fish are likely to be spawning in the affected surface water, or in the period between spawning and the subsequent emergence of juvenile fish;
  - Machinery must not be operated in rivers, burns and ditches if there is a reasonable likelihood that there are freshwater pearl mussels within 50m of such operation;
  - Machinery must not be operated in rivers, burns and ditches during forestry operations; and
  - Following the operation of the machinery, any damage caused by the operation to the bed and banks of the surface water must be repaired, including re-establishing vegetation on any areas of bare earth on the banks

[4] SEPA (2023) The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended): A Practical Guide.

resulting from the operation, either by covering the area with grass turfs or lining them with a biodegradable geotextile and seeding.

Refer to Appendix D for the Watercourse Crossing Assessment.

### Establishment of Working Areas

The Principal Contractor shall consult with the EcoW with regards to all watercourse crossing works. The EcoW carries out the necessary surveys immediately (within 2 weeks) prior to construction or upgrading to identify areas of mammal activity in the watercourses and surround area.

The Principal Contractor programmes the watercourse crossing works to be undertaken out with the fish spawning season unless not reasonably practicable.

### Watercourse Crossing Design

In designing the watercourse crossings, the Principal Contractor will apply general good practice for watercourse crossing design, ensuring that various conditions will be considered during the works, and which are summarised below:

- All watercourses, over which the access roads cross, will be routed through culverts or under bridges appropriately sized and designed not to impede the flow of water. Safe passage for wildlife, such as fish, water voles, otters etc will also be considered in the design through increased capacity of culvert or separate mammal crossing (pipe).
- When constructing culverts, the Principal Contractor takes care to ensure that the construction does not pose a permanent obstruction to migrating species of fish, or riparian mammals;
- Culvert design will be engineered to ensure that the invert can be sunk into the bed of the watercourse allowing riverine substrate to stabilise on the floor of the culvert;
- Designed to convey a minimum of 1 in 200 year plus climate change return period flood events, and individually sized and designed to suit the specific requirements and constraints of its location; and
- All watercourse crossings to include splash boards and run-off diversion measures to prevent any direct siltation of watercourses.

### Erosion Protection

Erosion protection will be implemented at the outfall of all culverts. Where required, the type of erosion protection would depend on a number of factors including:

- Flow;
- Velocity;
- Channel bed material;
- Vegetation;
- The effects/consequences of erosion; and
- Types of erosion protection including:
  - Geotextile bank reinforcement;
  - Vegetation solution;
  - Dumped stone;
  - Laid stone (Rip-rap or equivalent); and
  - Concrete block systems.
- Culvert Design Principles

The Principal Contractor will adhere to the following principles for culvert design and construction:

- Where appropriate, the natural low flow depths are maintained through culvert base;
- The culvert base should be buried below the natural bed level to allow for a naturalised culvert bed to be maintained during scour associated with high flow events;
- The culvert should be at least the same width as the natural active channel width, with consideration to low flows and channel migration;
- Culvert alignment should match alignment of the watercourse i.e. in a parallel direction to flow;
- The slope of the culvert base should be similar to that of the bed of the watercourse;
- The culvert must not present a barrier by creating a step or hydraulic drop at the culvert inlet or outlet;
- The culvert must be designed not to exacerbate or create flooding;
- A natural stone headwall should be provided upstream and downstream to protect the road embankment where necessary;
- Culverts should not be constructed under high flow conditions; and
- A mammal tunnel should be provided where considered appropriate by the EcoW, so that no restriction is created to established animal movement routes.

### 7.5.3. Private Water Supplies

Full details on specific mitigation and/or protection requirements are provided in the Water Quality Monitoring Plan (see Appendix E) and thePrivate Water Method Statement[5] prepared to discharge planning condition 22.

Monitoring will occur on a monthly basis throughout the construction phase of works. A summary of the private water supply monitoring locations is presented in Table 7.1 below.

| Table 7.1: Summary of PWS Monitoring RegimeName & ID | Easting | Northing | Location | Level of Monitoring | Rationale for Inclusion |
|---|---|---|---|---|---|
| Crichness Tank (1a) | 368317 | 666485 | Header tank | Visual & Extractive | Turbine 5 turning head is located approximately 190 m northwest of spring location. Infrastructure is potentially positioned within the possible catchment of the abstraction |
| Crichness Tap (1b) | 368417 | 666025 | Point of consumption (inside tap) | Visual & Extractive | |
| Upper Monynut Spring (2a) | 369684 | 666440 | Groundwater spring location (pond) | Visual & Extractive | Turbine 3 is located approximately 500m from spring location. The indicative PWS catchment area suggests that hydrological connection between the Development and PWS is highly unlikely however, to adopt a precautious approach to this supply it |
| Upper Monynut Tap (2b) | 369672 | 666504 | Point of consumption (outside tap) | Visual & Extractive | |

[5] Natural Power (2022). Private Water Supply Method Statement. Document reference: 1284574

| Table 7.1: Summary of PWS Monitoring RegimeName & ID | Easting | Northing | Location | Level of Monitoring | Rationale for Inclusion |
|---|---|---|---|---|---|
| | | | | | will be monitored throughout baseline and construction. |
| Weatherly Outside Tap (3a) | 367837 | 671706 | Point of consumption (outside tap) | Visual & Extractive | The spring is situated approximately 190 m to the southeast of the access track with planned upgrades. Furthermore, the PWS delivery pipe work crosses under the access track. It is therefore possible that during access track upgrades damage could occur to the pipework consequently impacting water quality or quantity. |
| Weatherly Inside Tap (3b) | 367837 | 671706 | Point of consumption (inside tap) | Visual & Extractive | |

### 7.5.4. Water Quality Monitoring

The Principal Contractor is responsible for ensuring that pollution prevention on site is managed effectively for the duration of the construction works and until such time as permanent measures, such as permanent drainage and silt mitigation controls, are deemed to be adequate and appropriately constructed.

As part of the site induction process the Principal Contractor encourages all personnel and visitors to report, any visual indications of changes in water quality (i.e. discolouration or other evidence of contamination) in any watercourses on site. Any evidence must be reported to the EcoW and Principal Contractor.

The EcoW undertakes visual monitoring on site and liaises with the nominated water quality monitoring consultant and the Principal Contractor. The ECoW will visually monitor all watercourses at track crossings and downstream from risky activities (e.g. concrete pours, fuel filling, borrow pits) to ensure all pollution events are minimised and responded to in a timely manner.

The overall implementation and management of the water quality monitoring programme will lie with the nominated water quality monitoring consultant, employed by FORL. This responsibility extends to overall coordination of both field and laboratory aspects of the monitoring programme, liaison with the ECoW or other nominated site personnel and the Principal Contractor.

#### Monitoring Requirements

The proposed monitoring methodology has been derived based on the following:

- Consideration of the potential natural and anthropogenic influences on the hydrological environment;
- Identification of on-site and downstream sensitive receptors;
- Once all possible effects have been identified, consider water management, construction management and monitoring practices that need to be taken into account; and

- If the sustainable water management measures fail or have not been implemented appropriately or the results of water quality monitoring record prolonged increases in concentrations that do not correlate with climatic conditions, consideration of the emergency procedures that should be implemented to reduce the effects on the hydrological environment.

Water quality monitoring at Crystal Rig IV will include:

- Visual inspections;
- In-situ sampling using a handheld monitoring meter; and
- Extractive sample collection for laboratory analysis; and
- Continuous monitoring

Table 7.2 provides a summary of the monitoring commitments to ensure compliance.

A copy of the approved Water Quality Monitoring Plan is provided in provided in Appendix E.

**Table 7.2: Surface water monitoring summary**

| ID | Easting | Northing | Catchment Description | Watercourse | Level of monitoring | Rationale for Inclusion |
|---|---|---|---|---|---|---|
| SW1 | 369169 | 672395 | Grazing farmland and commercial forestry. | Unnamed tributary within the Dry Burn Catchment | Visual, In-situ & Extractive | To monitor water quality draining part of the access track. |
| SW2 | 367783 | 671625 | Grazing farmland and commercial forestry. | Weatherly Burn | Visual, In-situ & Extractive | To monitor water quality draining part of the access track. |
| SW3 | 366989 | 670935 | Grazing farmland and open muirland with small areas of commercial forestry. | Boonslie Burn | Visual, In-situ & Extractive | To monitor water quality draining part of the access track. |
| SW4 | 366209 | 667845 | Grazing farmland, some areas of commercial forestry and potentially some open muirland in higher areas. | Tay Burn | Visual, In-situ & Extractive | To monitor water quality draining part of the access track. |
| SW5 | 367303 | 666247 | Grazing farmland, commercial forestry and potentially some open muirland in higher areas. | Craig Burn | Visual, In-situ & Extractive | To monitor water quality draining x3 turbines, x3 borrow pits and a construction compound. |
| SW6 | 366933 | 666230 | Grazing farmland and some open muirland. | Elsie Cleugh | Visual, In-situ & Extractive | To monitor water quality draining x2 turbines and x1 borrow pit. |
| SW7 (Ctrl) | 369364 | 667657 | Commercial Forestry with | Monynut Water | Visual, In-situ & Extractive | To monitor water quality upstream of all |

| ID | Easting | Northing | Catchment Description | Watercourse | Level of monitoring | Rationale for Inclusion |
|---|---|---|---|---|---|---|
| | | | some grazing farmland and open muirland. | | | development works within the Monynut Catchment. To be used as control location indicative of natural watercourse variations out with the impact of construction. |
| SWA | 369963 | 666310 | Commercial Forestry with some grazing farmland and open muirland. | Monynut Water | Visual, In-situ, Extractive & Continuous | To monitor water quality draining all infrastructure within the Monynut Catchment. |
| SWB | 368343 | 665388 | Grazing farmland, commercial forestry and potentially some open muirland in higher areas. | Bothwell Water | Visual, In-situ, Extractive & Continuous | To monitor water quality draining all infrastructure within the Bothwell Catchment. |
| SWC (Ctrl) | 365379 | 667735 | Grazing farmland, some open muirland & commercial forestry. | West Burn | Visual, In-situ, Extractive & Continuous | To monitor water quality upstream of all development works within the Bothwell Catchment. To be used as an overall monitor control indicative of natural watercourse variations out with the impact of construction. |

## 7.6. Management of Excavated Material

### 7.6.1. Soil Handling and Storage

The construction of roads, turbine foundations and crane hardstanding areas as well as the establishment of the borrow pit(s) will require the stripping of surface soils / peat soil and its temporary storage.

Topsoil will be stripped keeping some intact. This material will be stored upright adjacent to the working area but sited away from watercourses and drains, as far as is practicable. Surface water would ideally be directed away from construction activity to avoid silty run off entering watercourses or ecologically sensitive areas. The stored mounds will be limited in height to 2 m to minimise the risk of instability and compaction of lower layers. Subsoil and peat that is stripped and stored will be kept separate from the topsoil. Following excavation of the turbine foundation area and construction of the foundation (concrete/reinforced steel) the area will be backfilled with spoil pending turbine erection. The area surrounding the turbine will be reinstated using the retained topsoil/turf to leave a working area for access around the tower base.

The following will also be considered in the handling and storage of excavated soils:

- Sediment Discharges – implementation of a buffer zone to minimise impacts to watercourses and water supplies, undertaking of water quality monitoring particularly after heavy rainfall, and insurance that culverts or bridging of watercourses are of sufficient size and spacing with appropriate erosion mitigation measures (further details on this can also be read in Drainage Management Plan (DMP); and

- Contaminant discharges – follow Pollution Prevention Guidance (PPGs), refuel and store oils and fuels in designated areas only, ensure vehicles are regularly cleaned and maintained to keep contaminant potential to a minimum.

### 7.6.2. Peat Management

Site investigations carried out in support of the EIAR have confirmed that peaty soils rather than peat are present across the site and therefore, as defined by Scottish Government guidance[6], no further consideration is required.

### 7.6.3. Soil Stripping

Soil stripping shall ensure that soils and peaty soils are handled carefully so as to enable their reuse within the site perimeter mounding and for reinstatement purposes, and to avoid damaging the soils present within the surrounding area. Earthworks shall be managed so as to minimise the risk of runoff and erosion of soils. Unless agreed otherwise, all soil striping shall follow the following process:

- Plan soil stripping carefully in advance;
- Check all necessary pre-construction surveys have been completed prior to stripping and mitigation implemented as appropriate;
- Turfs stripped to 300 mm using large toothed bucket;
- Turfs stored vegetation side up and kept watered to prevent drying out;
- Any remaining top soil and all subsoil layers to be removed and stored separately;
- Follow all identified mitigation requirements for the location and method of stripping;
- Check whether the project archaeologist should be on site during the soil stripping; and
- Where possible, strip soil during drier periods. Do not strip soil during periods of very heavy rainfall.

### 7.6.4. Handling of Excavated Material

The Principal Contractor is to ensure that the excavation of soils is undertaken in such a manner as to avoid cross contamination between distinct horizons. The different soil horizons will be kept and stored separately for use at a later date.

During and after excavation, the Principal Contractor will plan the storage, haulage and reuse of excavated material to minimise material movement around the site. Immediate reuse is preferred to temporary storage (where possible).

Turves will be stripped and handled with care and kept in turve bunds. When possible, turves should be stored vegetation side up such that damage to the living vegetation mat is prevented or minimised as far as possible.

### 7.6.5. Temporary Storage of Excavated Material

Excavated material that is stockpiled on site for further use should be managed to prevent silty run-off or losses due to drying out and wind. The temporary storage of excavated material shall seek to minimise the disturbance of peat/soil deposits through minimising haul distance between temporary storage sites.

Temporary storage areas would be checked in association with the ECoW and geotechnical advice obtained as necessary.

The following key control measures will be undertaken:

6 Scottish Government, Scottish Natural Heritage, SEPA (2017), Peatland Survey. Guidance on Developments of Peatland, on-line version only

- Topsoil will be stripped and stored within the pre-identified areas to ensure safe storage and swift and successful reinstatement;
- If space does not allow storage and the surplus is to be stored elsewhere on the site, consult the Environmental Manager in advance to agree appropriate areas;
- Separate areas will be created for the different layers and topsoil will not be mixed with subsoil layers;
- Stacked topsoil will not exceed a height that enables the topsoil to breakdown. The maximum height for stacked material will be agreed with the ECoW;
- Soil storage areas will be located away from watercourses (minimum of 50 m, where practical) protected from run-off from adjacent areas;
- Storage areas should be reinstated to their original condition on completion of their use for storage;
- If soil storage is being carried out on sensitive habitats, consideration will be given to storage on top of a geotextile mat and storage duration shall be minimised;
- Good practice will be adopted in order to minimise the amount of compaction or other disturbance of the general structure of the superficial deposits;
- Other site works will not impact on stored soil (e.g. construction traffic will not track over stored soils);
- If significant soil erosion is occurring from storage piles during periods of heavy rain action will be taken to cover the stockpiles, where practical. The silt fencing or other mitigation around the base of the stockpile will be monitored and replaced as necessary;
- In periods of dry weather check the need for watering to reduce dust and potential nuisance;
- A silt fence will be constructed at the base of the stockpile using a suitable geotextile if required;
- Construct drainage channels to direct surface water away from stockpiles and prevent erosion at the base; and
- Construct drainage channels to direct water through settlement ponds.

### 7.6.6. **Borrow Pit Working Methods**

Detailed geotechnical site investigation has been undertaken across the site. Details of proposed borrow pits, including proposed borrow pit locations, working and reinstatement methods.

It is proposed that the majority of material required for construction of site infrastructure including access tracks, hard standings and concrete foundations will be won from on-site borrow pits.

Typical methods for working of borrow pits are described below.

Borrow pit works will not begin until a mitigation plan is put in place by the Principal Contractor. This will ensure that buffer strips are included for the implementation of the necessary mitigation measures, e.g. settlement ponds.

Overburden will be stripped and stockpiled in appropriate locations for use in reinstatement works, with care taken to segregate materials (seed bank, topsoil, subsoil) to avoid contamination. Any unsuitable material excavated from the borrow pit shall also be temporarily stockpiled and used for reinstatement and landscaping.

It is anticipated that an excavator will be used for extraction of shallower, weathered material. As the excavation proceeds deeper and the weathered layers are removed, more intact and harder rock mass is likely to be exposed. It is anticipated that this rock will be excavated by a ripper tooth or hydraulic breaker. If the rock head proves to be too hard to dig/rip due to the strength of the intact rock mass, blasting operations may be undertaken. Any blasting events shall be designed to maximise the generation of stone from individual events, minimising the amount of disruption from individual blasts.

Some of the harder material won is likely to be unsuitable in the as-dug state and accordingly shall require processing to conform to the required material specifications for the construction of the project. Crushing plant will be used to reduce the rock size to an acceptable standard. It is anticipated that a crusher will be set up inside the respective

borrow pit to reduce noise and dust pollution. The Principal Contractor will fulfil the Pollution Prevention and Control (Scotland) (PPC) Regulations, 2012 (Section 3.5, Part B (a), for crushing operations.

The rock gained from the borrow pits shall be processed, tested, stored and transported to the relevant workface as required.

Borrow pit working is expected to last for the duration of the construction period.

Following construction, any surplus material from hard standings, turbine foundations and cut road excavations will be used for reinstatement of the borrow pits. No concrete should be used in borrow pit restoration. All backfill material will be assessed for suitability by the ECoW before it is used. The final reinstatement profile will be reduced from the existing ground profile. Suitable excavated material will be deposited at the base of the borrow pit and overlain with peaty soil where appropriate to mimic the existing makeup of the soil profile and blend into the surrounding area.

### 7.6.7. Reinstatement

The reinstatement may not take place immediately following completion on the borrow pit but this should be completed within the construction period of the wind farm. All restoration works should be carried out to the approval of an appointed Environmental Clerk of Works.

The Contractor provides outline design proposals for borrow pit re-profiling, including details on reinstatement material origin and classification, placement method, final ground profiles and surface dressing to the Employer for acceptance prior to commencement of re-instatement. Proposals will require acceptance by the ECoW where ground stability risks are identified.

The Contractor maintains comprehensive records of the location, depth and volumes of all materials used in restoration of all borrow pits and provides this information to the Employer on completion of the borrow pit restoration works.

Material arising from other elements of the works which is not required by that element of the works but deemed suitable for the reinstatement of the borrow pit(s) is used to reinstate the borrow pit(s). The Contractor utilises this material to reinstate the borrow pit(s) to as natural a profile as possible and as close to the original profile as can be achieved.

## 7.7. Ground Re-profiling and Landscaping

The Construction Contractor designs and constructs the works in sympathy with the existing landscape, habitats (flora), land use and the requirements contained within the CEMP.

Where landscaping is required, the Construction Contractor consults with the ECoW, prior to implementing the works.

Where feasible, to prevent scour and run off and facilitate vegetation re-establishment, the Contractor grades any down-slope embankments such that the slope angles are not too steep and there is a gradual transition with the surrounding / existing ground profile.

## 7.8. Site Reinstatement

### 7.8.1. General

So far as is reasonably practicable, all disturbed areas which require reinstatement will be reinstated with the same vegetation types as exist at present, thereby ensuring minimum disruption to the surrounding landscape.

The reinstatement and storage of any excavated materials will involve replacement of previously stripped soils, vegetated layers or turves. Timing of reinstatement works will also consider adjacent construction activities which may disturb any reinstatement works already carried out.

The longer the stripped turves are stored for, the more they will degrade and become unsuitable for successful reinstatement. Therefore, the amount of time between the construction activities and subsequent reinstatement will be minimised as much as practically possible.

The fundamental aspects of reinstatement are summarised as follows:

- Stripped soil, including peat will be reinstated as close to where it was removed as possible. This will help to maintain a local seed base and the local geological/hydrological characteristics;
- Subsoil, topsoil and turfs replaced in same order as removed;
- Unless otherwise agreed, turfs will be reinstated following the works;
- Reinstatement will be carried out as soon as is possible following stripping to ensure integrity of material is maintained;
- Where turfs are not available, areas will be left to re-vegetate naturally. If there is not sufficient turf to completely cover an area, then turf will be spread in smaller sections to offer some protection and spread the seed bank rather than leave larger exposed areas;
- Any soil found to be contaminated will not be used for reinstatement but disposed of off-site to a licensed or exempted facility, if necessary;
- The reinstatement of the construction areas will be undertaken to a high standard, using the existing soil and vegetation material wherever possible, in accordance with best practice; and
- If re-vegetation is not successful and has not occurred within an agreed period of time and following consultations with NatureScot re-seeding using a native species mix may be considered.
- The ECoW will be involved in onsite discussion in respect of reinstatement.

### 7.8.2. Reinstatement of Infrastructure Verges and Construction Disturbed Areas

The Principal Contractor forms the final face of all cutting slopes, other than those in rock, with a minimum of 150 mm depth of topsoil (free of stones >150 mm) and seeded in accordance with a pre-approved seed mix accepted by the ECoW. Where cuttings have been formed in areas of peaty soils the final surface is formed with the replacement of excavated peat turfs in a method approved by the ECoW.

The Principal Contractor utilises excavated subsoil (e.g. from cut and fill sections of access tracks, turbine bases etc) for dressing the side slopes of track sections, hardstanding side slopes etc.

Excavated overburden from temporary construction compound or laydown areas will be stored adjacent to these areas and used for final reinstatement post construction.

To prevent silt run off and potential for disruption of hydrological flows, no mineral soil, in particular clay-based soils, will be used for dressing the side slopes of tracks.

### 7.8.3. Borrow Pit Reinstatement

The following principles will be adhered to in the reinstatement of borrow pits:

- The Principal Contractor will provide outline design proposals for borrow pit re-profiling, including details on reinstatement material origin and classification, placement method, final ground profiles and surface dressing to FORL for acceptance prior to commencement of re-instatement. Proposals will require acceptance by the ECoW where ground stability risks are identified;

- The Principal Contractor maintains comprehensive records of the location, depth and volumes of all materials used in restoration of all borrow pits and provides this information to FORL on completion of the borrow pit restoration works; and
- Material arising from other elements of the works which is not required by that element of the works, but assessed as suitable for the reinstatement of the borrow pits is used to reinstate the borrow pits. The Principal Contractor utilises this material to reinstate the borrow pits to as natural a profile as possible.

### 7.8.4. Ground Re-profiling and Landscaping

The following principles will be adhered to ground re-profiling and landscaping:

- The Principal Contractor designs and constructs the works in sympathy with the existing landscape, habitats (flora), land use and the requirements contained within the CEMP;
- Where landscaping is required, the Principal Contractor consults with the ECoW, prior to implementing the works; and
- Where feasible, to prevent scour and run off and facilitate vegetation re-establishment, the Principal Contractor grades any down-slope embankments such that the slope angles are not too steep and there is a gradual transition with the surrounding / existing ground profile.

## 7.9. Emergency Response

It is imperative that appropriate emergency procedures are put in place during the construction of the Development. The Principal Contractor shall provide details of emergency procedures specific to this site when appointed, which will take account of any local conditions and client requirements. The following details will be included:

- Fire evacuation procedures;
- Accident procedures;
- Emergency services contact names and telephone numbers; and
- Existing client rules in place and contact name and telephone numbers.

A site emergency plan will also be provided, and will detail the following items as a minimum:

- Routes of escape from the Development;
- Method of warning (i.e. shout, air horn, etc.);
- Locations of fire-fighting equipment;
- Muster points;
- Nominated persons responsible for co-ordinating an emergency; and
- Location of first aid equipment and names of first aiders.

During the lifetime of the project the Site Emergency Plan shall be kept up to date. All personnel shall be made aware of any updates and/or changes.

### 7.9.1. Environmental / Ecological Incidents

As outlined above, a formal emergency response protocol will be established following the nomination of the Principal Contractor. However, it is assumed that the following principles will be contained within the plan:

- Dependent on where the incident takes places, there is liaison between adjacent works. Works may need to be halted whilst the incident is responded to and nearby resources reallocated accordingly;
- In the event of a leak or spillage the substance is immediately contained and prevented from being discharged to drains or watercourses, or from soaking into the ground, using the emergency spill kits;

- Spillages are not to be washed into drains, or surface water under any circumstance;
- Used absorbent materials and contaminated spoil are swept up, or dug out, and contained in an appropriate container and arrangements made with an appropriately licensed waste contractor for disposal as hazardous waste; and
- Following the satisfactory remediation of any incident, an investigation should be undertaken to determine the lesson learned and how these can be used in future incident mitigation.

**Should an incident occur which has had, or could have, an adverse impact on the water environment SEPA must be notified via its pollution hotline (0800 80 70 60) without delay, and in any case within 24 hours. Within 14 days or a reported incident, a report must be submitted to SEPA as per Schedule 4 of the Construction Runoff Permit (CRP).**

**SEPA CRP Reference - TBC.**

## 7.10. Ecology Management

### 7.10.1. Pre-Construction Fish Monitoring

Pre-construction surveys for fish (salmonids) and macro-invertebrates are a requirement under Planning Condition 16(s), as part of a Fish Monitoring Plan (FMP) (Appendix G). These surveys were carried out in April, July 2022 and September 2023, following good practice guidance, employing established techniques in accordance with the Scottish Fisheries Coordination Centre (SFCC)[7,8] and UK Technical Advisory Group (UKTAG)[9] survey methods.

The River Tweed SAC and Special Site of Scientific Interest (SSSI) lie within 5 km of the Development. The majority of the watercourses which drain the Development discharge to the Bothwell Water and Monynut Water, flowing from northwest to southeast through the Development turbine locations, and converge with the Whiteadder Water to the southeast of the Bothwell Water; all of which form major tributaries of the River Tweed. These tributaries feed to the River Tweed SAC and SSSI, designated for Atlantic salmon, brook lamprey, river lamprey, sea lamprey, otter and as a river habitat with floating vegetation often dominated by water-crowfoot.

Proposed pre-construction macro-invertebrate sampling and fish monitoring were undertaken in the optimal survey window for macro-invertebrates prior to construction The surveys were undertaken to establish pre-construction conditions and determine the presence of fish and macro-invertebrate species. A report has been produced from the results obtained, in Autumn 2022 and 2023.

Fish and macro-invertebrate monitoring will be undertaken on the Bothwell Water. Five electrofishing sites were used (and will be repeated at the same locations in future) to monitor the Development area for fish and macro-invertebrates, with locations listed in Table 7.3 below:

**Table 7.3: Locations of Fish Monitoring Test Sites at Crystal Rig IV**

| Test Site Number | OS Grid Reference |
|---|---|
| 1 | 367672 665978 |
| 2 | 367123 666221 |
| 3 | 366892 666342 |

[7] SFCC, 2007. Electrofishing Team Leader Training Manual. Fisheries Management SVQ Level 2: Catch Fish Using Electrofishing Techniques. Scottish Fisheries Co-ordination Centre, Pitlochry and Inverness College, Inverness.

[8] SFCC, 2007. Electrofishing Team Leader Training Manual. Fisheries Management SVQ Level 3: Managing Electrofishing Operations. Scottish Fisheries Co-ordination Centre, Pitlochry and Inverness College, Inverness.

[9] UK TAG, 2014. UK TAG River Assessment Method. Benthic Invertebrate Fauna. Invertebrates (General Degradation): Whalley, Hawkes, Paisley & Trigg (WHPT) metric in River Invertebrate Classification Tool (RICT). WFD- UK TAG

| Test Site Number | OS Grid Reference |
|---|---|
| 4 | 366538 666569 |
| 5 | 366127 666826 |

*Source: The Tweed Foundation*

The most upstream site will act as a control, as it is located upstream of the new turbine locations[10]. These locations are further detailed and illustrated in the FMP (Appendix G).

Further monitoring work is to be undertaken at the site, during construction and post-construction. Subsequent fish monitoring and macro-invertebrate sampling surveys will be carried out each spring/summer period during construction. The results will be reported after each phase (pre-construction, construction and post-construction). The requirement and the frequency of operational monitoring will be determined following completion of the pre-construction and construction monitoring, in consultation with the Tweed Foundation and SEPA.

### 7.10.2. Pre-Construction Surveys for Curlew and Black Grouse

Pre-construction surveys for curlew and black grouse are a requirement under Planning Condition 16(u). These surveys were carried out in the breeding season 2022, in adherence to current NatureScot guidance[11] and established survey methods.

Specific surveys for black grouse followed methods described in Gilbert *et al.* (1998)[12] and covered areas of suitable black grouse habitat, encompassing the site infrastructure plus a 1 km buffer (access permitting). A two-visit survey approach to establish presence/absence was undertaken in late April (20th and 21st) and in early May (5th and 6th) one hour prior to dawn until one hour after. No black grouse were recorded during the surveys.

A targeted breeding curlew survey was undertaken following the methods for upland breeding birds outlined in Brown and Shepherd (1993)[13] encompassing the site infrastructure plus a 500 m buffer (access permitting). A four-visit survey approach was utilised, with visits undertaken between April and June as follows:

- Visit 1: 20 and 21 April
- Visit 2: 5 and 6 May
- Visit 3: 9 June
- Visit 4: 23 June

A minimum of two pairs of curlew were found breeding within the survey area. Curlew is a species that regularly breeds on Crystal Rig Wind Farm however the nest locations vary between the years therefore further surveys in the breeding season 2023 will be undertaken as part of the mitigation required for breeding birds should construction works are required during the breeding bird season.

The ECoW will undertake a walkover breeding bird survey and nest searches within an appropriate buffer of the construction corridor ahead of any operations, a maximum of two weeks prior to works commencing in any given area. The surveys would comprise: intensive nest searches within a 30 m buffer of the construction corridor from mid-March to end of August, with a wider walkover search to determine the upland breeding bird assemblage within a 500 m buffer of the construction corridor during the core breeding bird season (April to July inclusive). The wider

[10] The monitoring sites, including the control site, were selected by the Tweed Foundation. They are located primarily in relation to turbine and borrow pit locations, rather than auxiliary infrastructure such as tracks. Locating a control site away from all infrastructure would mean comparing dataset from two different watercourses with varying fish numbers (for example, the West Burn is much smaller containing no salmon).

[11] SNH, 2017. Recommended bird survey methods to inform impact assessment of onshore wind farms – version 2. SNH, Inverness.

[12] Gilbert, G., Gibbons, D.W. & Evans, J. 1998. Bird Monitoring Methods. RSPB, Sandy.

[13] Brown, A.F. & Shepherd, K.B. 1993. A method for censusing upland breeding waders. Bird Study, 40, 189-195.

walkover will aim to identify any breeding display behaviour or nesting activity of curlew (and other key species). In the event of an active nesting site being located, construction in the area will cease immediately and an appropriate exclusion zone will be established[14].

[14] Ruddock, M. & Whitfield, D. P. 2007. A Review of Disturbance Distances in Selected Bird Species, Scottish Natural Heritage.

# 8. Recommendations and Concluding Remarks

It is recommended that the CEMP is regularly reviewed by the Principal Contractor to check that it is being adhered to and that it is practical and appropriate.

This document has been prepared specifically for the discharge of Planning Condition (PC) 16 as part of the planning permission (Application Ref: 17/01350/SCO).

It is the responsibility of the Principal Contractor and their sub-contractors to develop detailed construction method statements and design drainage plans utilising the recommendations provided in this document. To allow for appropriate ecological and water management, detail has also been provided of the role and responsibilities of the ECoW including the provision of expert advice. With support and guidance from the Principal Contractor and the ECoW, the wider team will have a continued awareness as to the monitoring and mitigation measures in place and provide input to any additional remedial measures identified.

It is therefore considered that the information provided in this document meets the requirements of PC 16.

# Appendices

## A. Figures

Site Layout

# B. Drainage Management Plan

### Objectives

The key objectives of the DMP are to provide the principles of water management to minimise the impacts from construction and operation of Crystal Rig IV on the hydrological environment. The appointed Principal Contractor will utilise the details provided in this document to fully design and implement drainage that:

- Removes pollutant concentrations in surface water, thus protecting the quality of receiving water bodies;
- Intercept accidental direct discharge of high concentrations of contaminants to receiving water bodies;
- Minimise change to hydrological and groundwater conditions within the site – wherever practicable, drainage is to replicate the natural drainage and hydrological characteristics of the area;
- Manage runoff and prevent flooding of new infrastructure and adjacent land;
- Manage hydraulic erosion on site; and
- Encourage natural groundwater recharge.

It is highlighted that risks to the hydrological environment are generally more significant during the construction phase and as such, the extent of drainage management measures will be proportionate to this. During the operational phase, the extent of exposed ground and general site activity is much reduced. Notwithstanding, the principles of sustainable drainage design are applicable to both the construction and operational phases.

The principles of the sustainable drainage measures to be employed within the drainage design are as follows;

- Control the quantity of runoff to support the management of flood risk and also to maintain and protect the natural water cycle;
- Manage the quality of the runoff and prevent pollution;
- Create and sustain better places for nature; and
- Create and sustain better places for people.

### Key Guidance

The objective of this DMP as well as the principles of drainage outlined herewith are aligned with the following policy and guidance documents;

- The SuDS Manual C697 (CIRIA);
- Drainage of development sites – a guide (CIRIA);
- Flood Risk & Drainage Impact, Supplementary Guidance (THC);
- CAR Practical Guide (Version 9.1, SEPA). Specifically, GBR 10, 11 and 21; and
- Sewers for Scotland - A technical specification for the design and construction of sewerage infrastructure (Scottish Water).

Further relevant drainage and water quality management legislation and guidance documents are referenced in the Environmental Impact Assessment Report (EIAR) and Construction Environmental Management Plan (CEMP).

### General Water Management Requirements

There are a number of general mitigation measures that will be implemented with regard to the sites construction and operation to comply with the sustainable drainage principles and therefore safeguard the quality and quantity of surface and groundwater. These measures include:

- Natural drainage (greenfield) patterns are to be maintained;
- Moor grips and other artificial drainage features shall be retained and integrated within the design, wherever possible, to facilitate management of runoff and avoid unnecessary ground disturbance;

- Nothing will be allowed to directly enter surface watercourses and drains, except for clean rainwater and natural runoff;
- The amount of bare ground exposed at any time during construction will be minimised to prevent erosion and runoff;
- Any stripped turves will be placed back in the invert and sides of the ditches to aid in the regeneration process, as well as reduce erosion potential. This will also assist in reducing colour and carbon loading in watercourses from exposed peat;
- All materials including those from works such as excavated peat and spoil will be stored appropriately and away from watercourses;
- Water usage will be reduced as much as possible. Methods will include the construction of temporary and permanent drainage works to divert water away from construction activities and prevent surface water from entering excavations. Reducing the volume of water entering construction areas will reduce any contamination and subsequent treatment; and
- Water will be reused/recycled as much as possible. For example, treated water from settlement ponds/lagoons can be used to damp down access tracks in dry/dusty conditions.

A schematic illustrating how these measures could be implemented is shown below in Figure B.1.

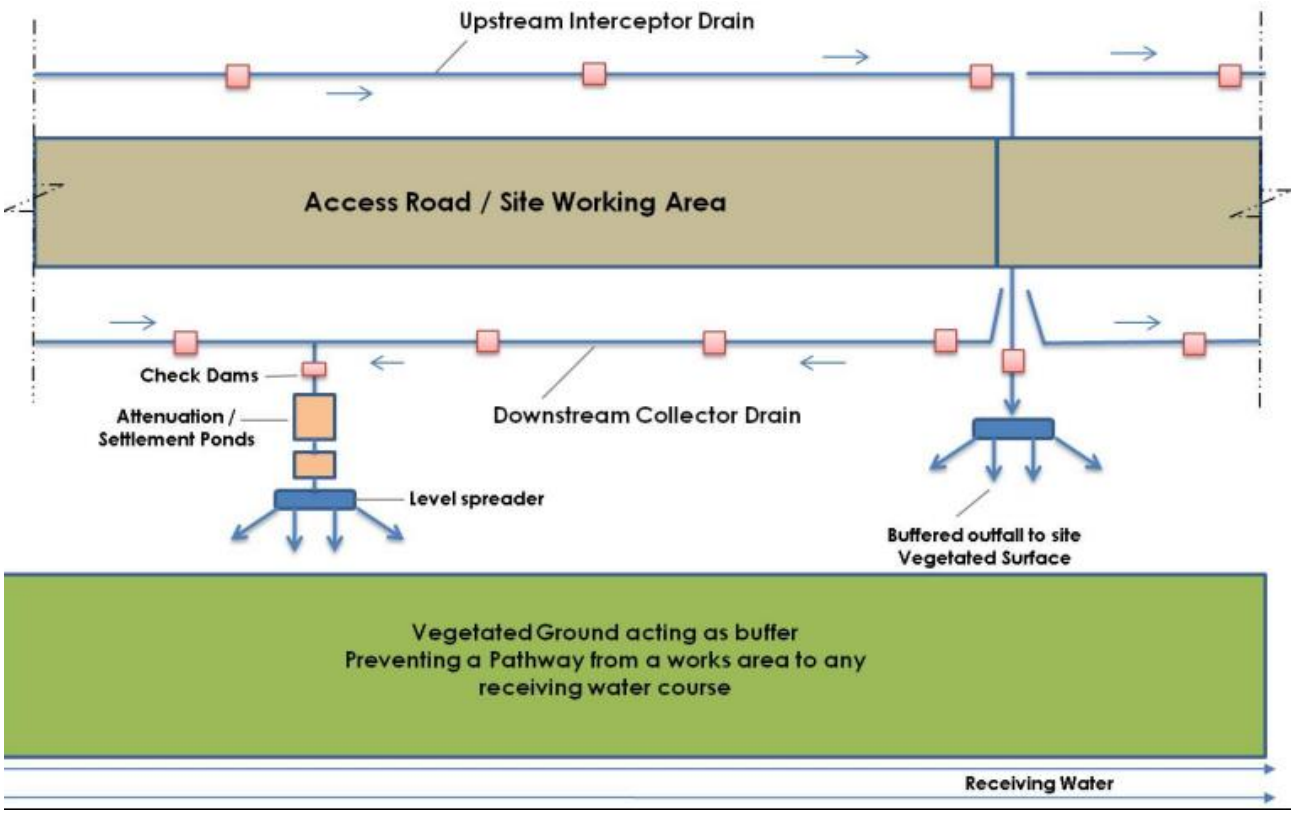



**Figure B.1: Schematic for Drainage Management**

## Planning and Phasing of Drainage Works

### *Site-wide Requirements*

Unless proven technically unfeasible, temporary or permanent drainage & silt management features (SuDS) are to be constructed prior to earthworks (including preliminary or enabling works) proceeding. Drainage associated with existing tracks will also be inspected and upgraded prior to works to ensure they comply with the provision of this DMP.

Drainage features would be designed to accommodate flows up to the 1 in 200 year event and also mimic greenfield runoff patterns.

Suitable prevention measures shall be in place at all times to prevent uncontrolled runoff from the working area entering watercourses prior to receiving sufficient treatment to remove pollutants.

### *Clean Water / Polluted Water Separation*

The Principal Contractor will ensure that temporary drainage during the construction phase is installed to ensure that wherever possible clean water runoff (having not previously come in contact with the works) is not permitted to mix with water from construction areas such as excavation dewatering or track runoff in all practicable instances.

This includes, where ground conditions allow, the provision of cut-off drains (see Figure B.2) that divert water around or through the works and infrastructure. This will reduce the flow of water onto any exposed areas of rock and soil, thereby reducing the amount of potential silt laden run off requiring treatment.

Green field run-off will be discharged diffusely onto vegetation for attenuation and dispersion. Silt traps, selected granular fill, sand bags, silt fencing, natural material attenuation bunds etc. may be required at the discharge point in order to prevent erosion, alleviate flow and aid in flow dispersion across a wider area of vegetation to prevent potential scour.

Clean water / polluted water separation drainage techniques would also be used in the permanent drainage constructed for the operational phase.

*Source: Natural Power*

**Figure B.2: Example of a cut off ditch isolating "clean" upgradient water**

### Sustainable Drainage Features

The following section outlines the primary drainage design components to be employed by the Principal Contractor during construction of Crystal Rig IV. Some of these features are also applicable to the permanent drainage that would remain in place for the duration of the operational phase of Crystal Rig IV. The purpose of the proposed drainage features are to enable the compliance with the objectives outlined at the start of this DMP.

The final drainage layout design will be confirmed following the completion of additional detailed investigations undertaken by the Principal Contractor prior to construction.

#### *Settlement / Silt Removal Features*

Silt laden runoff should be anticipated from any areas of exposed peat/soil, clay, aggregate, or rock. Therefore, it is of the utmost importance that the designed drainage system enables the capture, treatment and direction of silt laden runoff to dedicated temporary or permanent sediment management features located as close as possible to where silt could be generated (known as source control).

Suspended solid (silt) removal features are to be designed in accordance with CIRIA C697 SuDS Manual, specifically Section 3.3 “Water Quality Criteria”; and CIRIA C648 Control of water pollution from linear construction projects, specifically Section 18 “Runoff and sediment control”.

The settlement and silt removal features will be designed to help reduce or wholly mitigate effects on the hydrological environment. The type of sediment treatment/removal system will depend on the nature and extent of construction activities occurring in particular areas across the site. For all of the suggested control measures regular inspection and maintenance is necessary, particularly after prolonged and/or heavy rainfall.

Silt traps, catch pits and other settlement/silt removal features will also be installed within the permanent site drainage system. Silt traps can be a simple and effective method of controlling sediment laden run-off but these are limited by the capacity of expected flows. Silt traps could take the form of terram fences or clean stone. However, the ability of the silt traps to successfully treat runoff will be dependent upon the:

- Permeability of the terram geotextile material;
- Size and source of the clean stone.
- Volume of runoff within the drainage channel; and
- Frequency of monitoring and replacement of the measures.

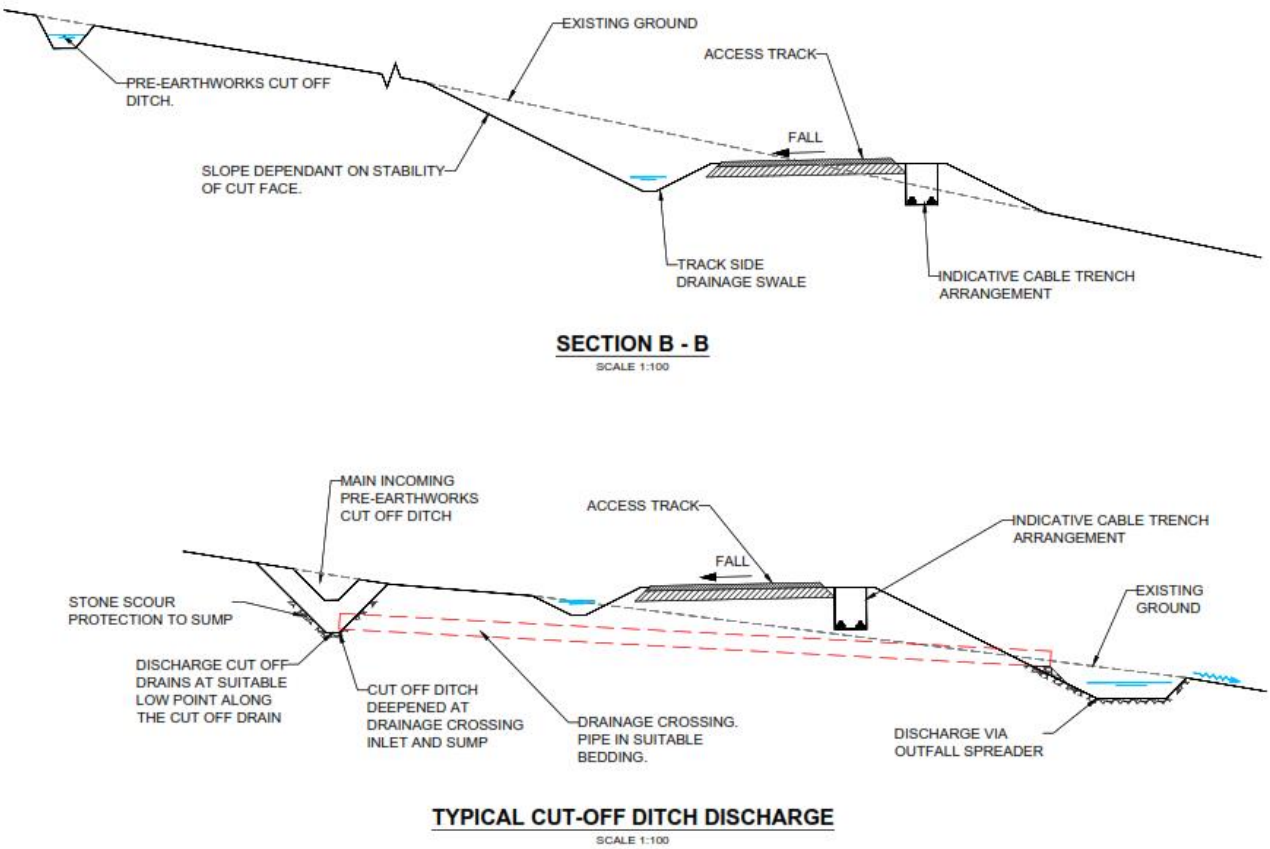
An example of utilising silt traps to attenuate and treat runoff is provided below in Figure B.3.

*Source: Natural Power*

**Figure B.3: Examples of check dams and silt traps being installed at intervals within trackside drainage**

The typical design of trackside and cut off ditches where check dams and silt traps will be installed is shown below in Figure B.4.

*Source: Natural Power*



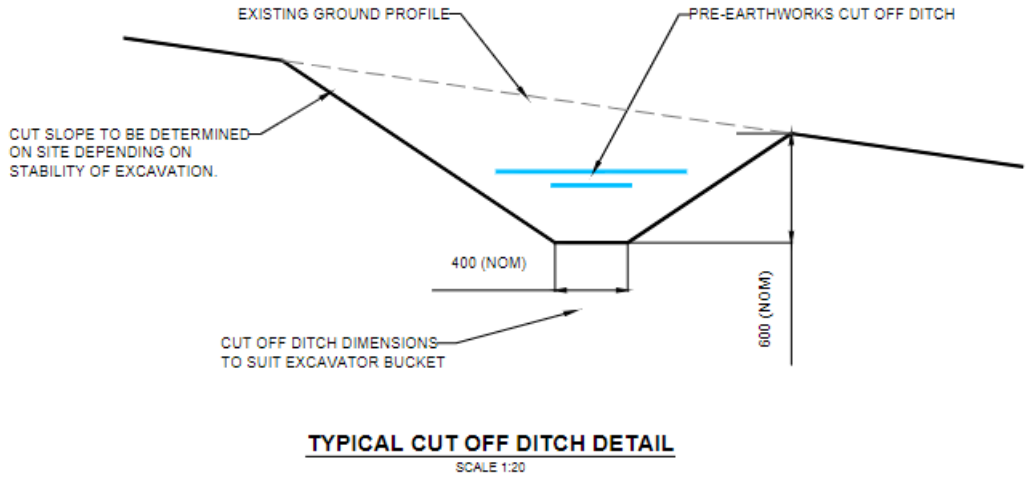



**Figure B.4: Typical cut-off ditch drainage and discharge layout**

### Stages of Treatment

All temporary drainage (and permanent drainage utilised during the operational phase) from the Development will be designed to have as a minimum 3 stages of treatment, as defined in the SuDS Manual. All permanent building roof drainage (i.e. substation building roof) shall have 1 stage of treatment. An example treatment train from a construction working area is shown below in Figure B.5.

A single stage of treatment would be considered as any of the following:

- Filtration of water through filter media (example - stone check dam);
- Filtration / settlement of water across undisturbed vegetated ground;
- Detention / settlement in settlement ponds; and
- Conveyance of shallow depths of water in vegetated swale.

Native materials (soil bunds, clean rock aggregate etc) shall be used in preference to artificial or 'foreign' materials in construction of any silt mitigation measures. Any introduced or artificial materials required for temporary erosion or silt mitigation controls, such as silt fencing, are required to be removed upon completion of construction works or at such times as silt entrained in runoff is no longer considered an environmental hazard. Silt mitigation measures shall be implemented during removal of these materials as disturbance may be caused in drains and ponds which have since bedded in.

*Source: Natural Power*

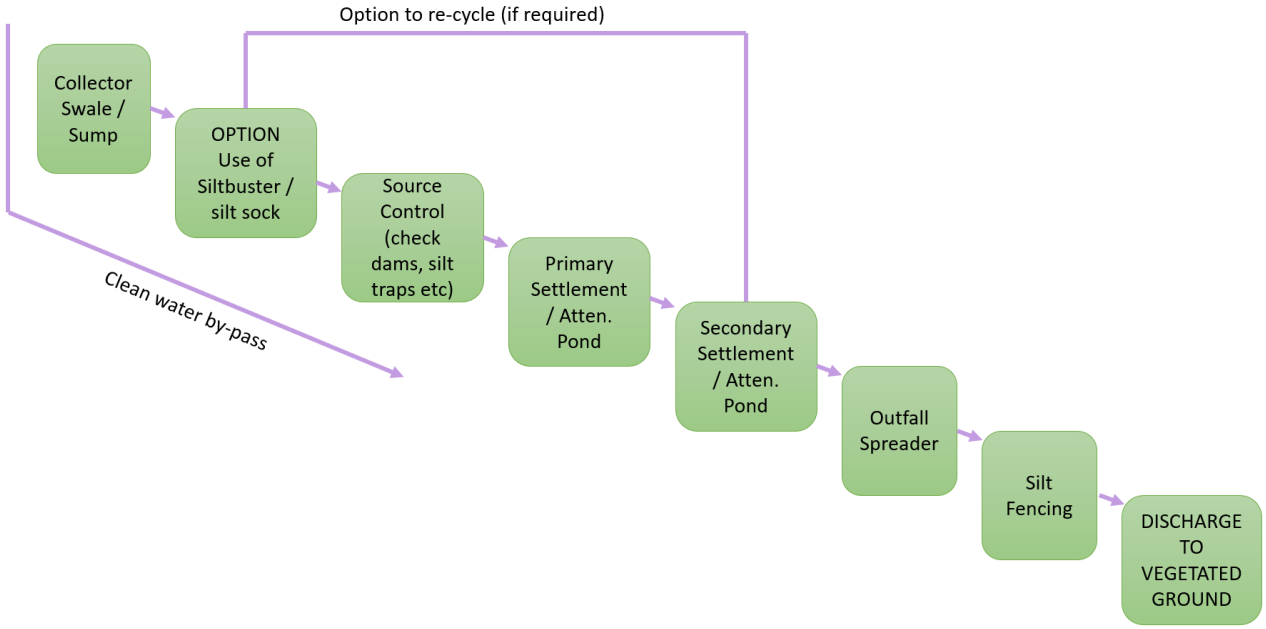



**Figure B.5: Example treatment train from a construction working area**

### Settlement Ponds

Temporary settlement ponds should be anticipated to be required during the construction period in order to provide adequate silt removal. Temporary settlement ponds should comply with the following considerations:

- Sediment control structures may comprise a single or sequence of settlement ponds with additional incorporated filtration;
- The use of flocculant shall not be utilised to treat polluted water unless explicitly authorised by the SEPA;
- In all instances, ponds shall be constructed in such a way to minimise excavations in order to avoid unnecessary spoil arisings. Wherever practicable ponds shall be constructed raised relative to outlying ground with water to be retained by compacted berms formed from existing arising excavated material. The location and dimensions of settlement ponds will depend on:
  - volume of water requiring treatment;
  - rate of inflow, particularly if inflow is pumped from excavations;
  - silt load characteristics; and
  - topography and access constraints.
- Pond dimensions shall be determined to allow sufficient surface overflow rate to permit adequate settlement of suspended solids (based on terminal settlement velocity) such that downstream water quality in the receiving watercourse is not adversely affected;
- The use of synthetic liners within settlement ponds is encouraged in order to prevent additional scour to exposed soils;
- Final discharge from any settlement pond shall be to a swale or dispersed overland on an intact vegetated riparian area. Where water from a settlement pond is pumped out it shall be discharged over intact riparian vegetation or to the head of a swale and utilise a low-velocity-type pump in order to reduce potential for scour at the outlet. Silt fences or other flow attenuation measures may be required at the discharge point in order to disperse the discharge and prevent build-up of settled solids which could be subject to remobilisation. Discharge points from the ponds shall be located a sufficient distance from any stream to allow adequate filtration of

remaining suspended solids prior to entering a watercourse. Siting of discharge dispersal points will consider: the topography and likely overland flow path for the discharged run off; surface vegetation type, infiltration capacity and sensitivity to pollution; and

- In the event that the natural or excavated ground profile in any area of the site does not lend itself easily to construction of an adequate settlement pond(s), water should be directed towards a sump area prior to being pumped away to a suitable settlement pond(s) or vegetated area with adequate silt mitigation measures well away from sensitive habitats or water courses.

**Excavation Dewatering**

All pumping operations e.g. removal of water from turbine base excavations, will be carried out in accordance with industry good practice and would be monitored by the Principal Contractor and ECoW. Suitable measures to minimise the impact of the pumped water on the hydrological environment shall be taken. The following paragraphs outline the measures which can be implemented for the pumping and dewatering of excavations.

Drainage management is to ensure that adequate provision is in place at all times to treat polluted water arising from all excavations. Excavations to firm strata for foundations for infrastructure including tracks, hard standings and turbine foundations would cause potential for accumulations of standing water within excavations.

Major excavations should have specific temporary drainage and silt settlement measures in place prior to dewatering via natural gravity fed runoff or pumped runoff. Silt settlement features should be sized to provide sufficient treatment for the maximum pumped rate of inflow. Site specific plans showing the location and layout of these would be provided in an updated version of this document.

Where linear features such as cable trenches and track excavations channel and convey ground water (with ingress of surface runoff) to a watercourse, necessary steps should be taken to minimise the length of excavation open at any one time to reduce the risk of direct discharges of contaminated flow to the watercourse.

Due to the low permeability of the site soils/peat the potential for groundwater ingress will be limited and vary depending on the individual locations of infrastructure components. If groundwater needs to be extracted from excavations, it is a controlled activity under the Water Environment (Controlled Activities (Scotland) Regulations (2011) (CAR). The Principal Contractor will produce relevant detailed information to obtain the necessary registrations/ licences under CAR prior to the commencement of construction works. The Principal Contractor is responsible for the liaising with and obtaining from SEPA, the relevant consents, licences and authorisations relating to the dewatering of foundation excavations.

Water could still enter the excavations via surface water runoff ingress (if up gradient drainage measures are not installed) or by direct entry from precipitation. It is recognised that this water will need to be removed, and this can be achieved by allowing the water to gravity drain to a designated area before being pumped from the excavation.

Due to the dominance of peaty soils across the site, the throughput rate will be reduced to give longer settlement time within the excavations and settlement tanks. If required, a series of settlement tanks can be deployed to allow maximum settlement of sediment during the construction period. An example of a settlement tank being utilised to remove sediment from groundwater/runoff from an excavation is provided below.

*Source: Natural Power*

**Figure B.5: Utilisation of a Settlement Tank to help treat sediment laden water pumped from excavations**

The treated water from the settlement tanks will not be discharged directly into watercourses but directed onto vegetated surfaces. Any sediment within the treated water will be deposited amongst the rough surface vegetation, away from sensitive habitats. Multiple dispersion points will be created to allow attenuation as well as diffuse dispersion.

To reduce the likelihood of erosion channels being formed by the discharge from the settlement tanks, the water will be discharged at a slow rate, or spread evenly across a surface. For discharge onto rough vegetation to be effective the discharge must be spread efficiently. For example, filtering the water through a length of pipe with multiple discharge points will allow attenuation as well as diffuse dispersion, thus reducing the erosive potential of the runoff.

The discharge can also utilise silt socks, silt traps or other attenuation measures. The utilisation of such measures could help to prevent the formation of erosion channels.

To maximise the efficiency of the settlement tanks, the sediment sludge that collects at the base of the tank will be removed at periods dependent upon the intensity of the construction works.

### Site Drainage

All measures will be monitored and maintained throughout construction and into operation to help maintain efficiency. The philosophy of drainage design shall be to maintain separation of greenfield runoff and development runoff water streams. This will be to reduce volumes which subsequently require treatment.

The following will be considered by the Construction Contractor in the design of the site drainage system:

- Surface drainage ditches will be installed alongside tracks only where necessary:
  - The length, depth and gradient of individual drains will be minimised to avoid intercepting large volume of diffuse overland flow and generating high velocity flows during storm events. Sediment traps, settlement ponds and buffer strips will be incorporated into the drainage system as necessary and will serve the dual purpose of attenuating peak flows, by slowing the flow of runoff through the drainage system and allowing sediment to settle before water is discharged from the drainage system.
  - As well as utilising sediment traps, structures such as v-notched weirs and/or check dams will be installed within the drainage channels (Figure B.6). Such structures will regulate the flow within the channel, thus reducing erosive potential of any runoff and allowing sediment and/or pollutants to settle.

– Access tracks crossing slopes will disrupt surface flow that consequently will collect in drains constructed upslope of the tracks. Cross-drains and or waterbars will be constructed at regular intervals to conduct this surface flow below or across the track where it will be discharged back into the drainage system (Figure 5). Regular discharge points will limit the concentration of surface runoff and the diversion of flows between catchments. Such cross drains need to be strong enough to withstand the expected traffic loadings.

*Source: Natural Power*

**Figure B.6: Example of a cross drain being installed (left) and following installation (right) including measures to prevent soil erosion at the outfall**

- During storm events there is likely to be some ponding on the uphill side of tracks, as percolation alone is unlikely to be able to accommodate surface flows:
  - To minimise this ponding, small diameter cross drains or perforated pipes (similar to plastic pipe field drains) will be incorporated into the track base at regular intervals to allow more flow to pass through the track and maintain the current flow regime. Such pipes will be surrounded by free draining material that is wrapped in a separator geotextile. The number of pipes and associated dimensions will be dependent upon the width of the flush/boggy area and the hydrological regime.
- The constructed drainage system will not discharge directly to any natural watercourse, but will discharge to buffer strips, trenches or other SuDS measures, preferably on flatter, lower lying ground. These buffers will act as filters and will minimise sediment transport, attenuate flows prior to discharge and maximise infiltration back into the soils and peat. The typical design for outfall spreaders is shown below in Figure B.7;
- Drainage from the concrete batching plant, site compound and control building will be collected and treated separately from the main site drainage, as the runoff from these areas is more likely to be contaminated and therefore will require treatment. Appropriate treatment, such as oil interceptors and treatment for high alkalinity, will be installed;
- Permanent drainage features will constructed with an appropriate level of resilience to scour (armouring in high energy sections) and in other areas may also be encouraged to become vegetated to both increase friction on flow and thus slow the rate of discharge but also to encourage infiltration (Figure B.8).

*Source: Natural Power*

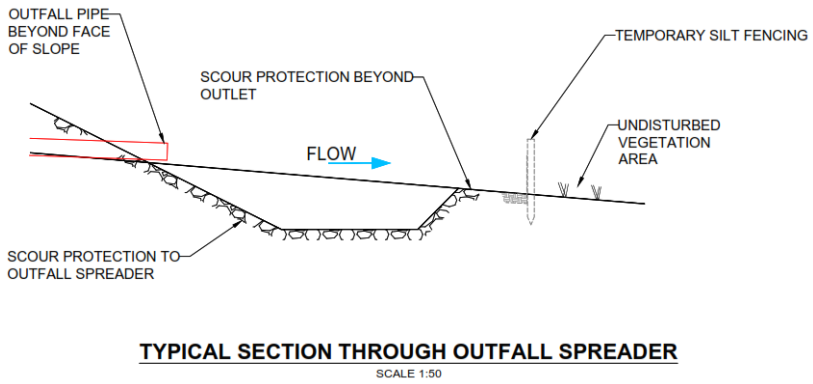



**Figure B.7: Typical section through outfall spreaders downslope of infrastructure**

*Source: Natural Power*

**Figure B.8: Soft revetment scour protection for a cross drain. Rock can also be used.**

### Drainage Maintenance

The Principal Contractor shall implement a programme of monitoring and maintenance to ensure the following as a minimum:

- Where settlement management features have become fully blocked with silt, they should be replaced;
- Debris is removed from all drainage features;
- Side slopes of drainage channels are monitored with any areas of slope slippage reinstated by battering back or otherwise as may be appropriate;
- Should there be noticeable effects of erosion along drainage features including on the downstream side of silt traps and/or at discharge points, suitable erosion protection measures such as placement of large stones or erosion protection textiles should be installed at the area affected;
- Any temporarily stored or stockpiled material will be placed in a manner to ensure stability and set back sufficiently far such that in the case of unforeseen collapse, spoil would not cause infilling of drainage channels;
- Any flow control device (orifice, weir or similar) to be checked and cleared of any debris; and
- Any required maintenance of existing drainage features and culverts will be undertaken in line with the principles of this DMP and water crossing requirements outlined in the CEMP.

# C. Site Access Drainage Statement

# D. **Watercourse Crossing Assessment**

# E. **Water Quality Monitoring Plan**

# F. Legislation and Guidance

All work will be conducted in compliance with all relevant Legislation as detailed Table F.1 Where consents/permits from external authorising bodies are required, the Principal Contractor will apply for these in timely manner to allow continuity of the work.

### Legislation

The following sets out the regulations that govern the environmental management principles that all project contractors (Principal Contractor, ECoW etc.) must adhere to during the construction of Crystal Rig IV Wind Farm:

**Table F.1: Legislation**

| Topic | Source of information |
|---|---|
| Construction Specific | The Control of Pollution Act 1974 (as amended);<br>Environmental Noise (Scotland) Regulations 2006;<br>The Waste (Scotland) Regulations 2012; and<br>Waste Management Licensing (Scotland) Regulations 2011. |
| Ecology Specific | Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora;<br>The Conservation (Natural Habitats, &c.) (Amendment) Regulations 2007;<br>The Conservation of Habitats and Species Regulations 2017;<br>Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019, which ensures domestic implementation of the Habitats Directive continues from 1 January 2021;<br>Wildlife and Countryside Act 1981(as amended);<br>Protection of Badgers Act 1992;<br>The Nature Conservation (Scotland) Act 2004;<br>The Wildlife and Natural Environment (Scotland) Act 2011; and<br>Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003. |
| Hydrology Specific | Flood Risk Management (Scotland) Act 2009;<br>The Private Water Supplies (Scotland) Regulations 2017;<br>Water Environment and Water Services (Scotland) Act 2003;<br>The Water Supply (Water Quality) (Scotland) Regulations 2010;<br>Water (Scotland) Act 1980 and amendments;<br>Water Intended for Human Consumption Private Water Supplies (Scotland) Regulations 2017;<br>The Water Environment (Groundwater and Priority Substances) (Scotland) Regulations 2009; and<br>The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended). |
| Other Environmental Legislation | Environmental Protection Act 1990, Part III;<br>Environmental Protection (Duty of Care) (Scotland) Regulations 2014;<br>Environment Act 1995; and<br>The Control of Substances Hazardous to Health Regulations 2002. |

This list is not exhaustive, it is recommended that periodic checks of legislation are carried out to check there have been no updates or changes.

### Guidance

The following guidance documentation outlined in Table F2 should be used as a reference for the environmental management measures outlined in this document:

**Table F.2: Guidance and Best Practise**

| Topic | Source of Information |
|---|---|
| Scottish Government Planning Advice Notes (PAN's) | PAN 51: Planning, Environmental Protection and Regulation (Scottish Government, 2006); and<br>PAN 60: Natural Heritage (Scottish Government, 2000). |
| SEPA Guidance for Pollution Prevention (GPPs) and Pollution Prevention Guidelines (PPGs) | GPP 01 General guide to the prevention of pollution;<br>GPP 02 Above ground oil storage tanks;<br>PPG 03 Use and design of oil separators in surface water drainage systems;<br>GPP 04 Treatment and disposal of sewage where no foul sewer is available;<br>GPP 05 Works and maintenance in or near water;<br>PPG 06 Working at construction and demolition sites;<br>PPG 07 Safe Storage - The safe operation of refuelling facilities;<br>GPP 08 Safe storage and disposal of used oils;<br>GPP 13 Vehicle washing and cleaning;<br>PPG 18 Managing fire water and major spillages;<br>GPP 21 Pollution incident response planning;<br>GPP 22 Incident Response - dealing with spills; and<br>GPP 26 Safe Storage - Drums and intermediate bulk containers. |
| Construction Industry Research and Information Association (CIRIA) | Control of Water Pollution from Construction Sites – Guidance for Consultants and Contractors (C532);<br>Control of Water Pollution from Linear Construction Projects – Technical Guidance (C648);<br>Control of Water Pollution from Linear Construction Projects – Site Guide (C649);<br>Culvert Design Guide, C689, CIRIA, 2010;<br>Environmental Good Practice – Site Guide (C650);<br>The SUDS Manual (C753); and<br>Site Handbook for the Construction of SUDS (C698). |
| Construction Specific | Good Practice During Wind Farm Construction, Version 4 (Scottish Renewables, Scottish Natural Heritage, Scottish Environment Protection Agency, Forestry Commission Scotland, Historic Environment Scotland, Marine Scotland Science 2019);<br>Scotland's Zero Waste Plan (Scottish Government, 2010);<br>Developments on Peatland: Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste, Version 1 (Scottish Renewables and the Scottish Environment Protection Agency, 2012);<br>Engineering in the Water Environment, Good Practice Guide, Construction of River Crossings (SEPA, 2010); |

| Topic | Source of Information |
|---|---|
| | Guidance on Developments on Peatland (Scottish Government, Scottish Natural Heritage, SEPA, 2017);<br>SEPA Regulatory Position Statement: Culverting of Watercourses, Version 2 (SEPA, 2015);<br>Prevention of Pollution from Civil Engineering Contracts: Special Requirements publication (SEPA, 2006);<br>British Standards Institute: Code of Practice for Earth Works, BS6031:2009; and<br>British Standards Institute: Code of practice for noise and vibration control on construction and open sites. Noise, BS5228-1: 2009. |
| Planning Specific | Local development plan (adopted) (Scottish Borders Council, 2016);<br>Third National Planning Framework (NPF3) (Scottish Government, 2014); and<br>Scottish Planning Policy (Scottish Government, 2014). |
| Ecology Specific | Scottish Borders Local biodiversity action plan (Scottish Borders Council);<br>UK Post 2010 UK biodiversity framework (JNCC and Defra, 2012);<br>Biodiversity policy underpinned by the Scottish Biodiversity Strategy and the 2020 Challenge for Scotland's Biodiversity;<br>SNH (2019) / NatureScot (2021). Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation;<br>National Vegetation Classification Users' handbook (Rodwell, 2006);<br>Monitoring the Otter (IN112) (Natural England, 2007);<br>The Water Vole Mitigation Handbook (Dean et al., 2016); and<br>Practical Techniques for Surveying and Monitoring Squirrels (Gurnell et al., 2009). |
| Other Guidelines | Forest and Water Guidelines, UK Forestry Standard Guidelines (Forestry Commission, 2011);<br>Scottish Natural Heritage Commissioned Report 591: Research and guidance on restoration and decommissioning of onshore windfarms, 2013 (Welstead et al., 2013); and<br>River Basin Management Plan for the Scotland River basin district 2015-2027 (SEPA, 2015). |

# G. **Fish Monitoring Plan**

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