Appendix 10.1 Good Practice Methods

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Appendix 10.1 Good Practice Methods

Introduction

There are many good practice techniques that will be employed at the Proposed Development during the construction and operation of the Proposed Development. The most important aspects with respect to the water environment are summarised here. These techniques are considered the standard techniques that will be applied and are not considered as mitigation. This list is not exhaustive and guidance and good practice literature will be used to further develop these methods in the detailed CEMP and for method statements for each type of work. Mitigation measures are over and above these standards and will be specific to the source-pathway-receptor identified at risk. These are described within **Chapter 10** and are specific to the identified impacts.

Procedures

Specific procedures will be required for activities such as:

- Fuel handling and storage, including the locations of both periodic and regular fuelling points and emergency spill response. These should be agreed with the Environmental Clerk of Works (ECoW).
- Management of concrete wash out areas, including pollution prevention measures and drainage controls.
- Responsibilities and details for monitoring and training in relation to pollution prevention and mitigation measures.
- Design, management and mitigation measures for surface water drainage.
- Design, management and mitigation measures for watercourse crossings.

Good Practice Methods to Reduce Impact on Peat Hydrology

In order to reduce the impact on peat hydrology the following mitigation measures should be taken into account in the construction and operational period of the Proposed Development:

Tracks

- On slopes above tracks the cut off ditch should be positioned close to the track so that as much water as possible has the opportunity to infiltrate into the upgradient peat.
- Regular discharge of water from the track and from the upgradient diversion channel to the down gradient land is required. This process will allow the water to infiltrate a short distance from the track and can help counter potential down gradient dewatering effects.
- Dressing the cut slopes alongside the tracks with low permeability material can potentially help reduce flow rates from more permeable sections as it will act as a barrier to groundwater flow.

Turbine Bases and Other Infrastructure

- Dewatering of the turbine bases may be required depending on the permeability of the surrounding geology, however evidence suggests this is low. This will be limited to as short duration as possible to keep the excavation dry until the concrete is poured, cured and the void space backfilled.

- Any water from dewatering excavations should be discharged to peat areas surrounding the turbine base excavation during this period to promote recharge and reduce the impact of dewatering. This is a recognised method of mitigating the environmental impact of an abstraction (Forestry Commission, 2011). If there are no peat areas immediately surrounding the infrastructure but they are close by then the water should be discharged between the excavation and the peat to reduce the extent of drawdown in the other formations that may extend to the peat.
- Cut off ditches on upgradient slopes should also be as close to the excavated areas as is practical to allow water to recharge the surrounding peat.
- Excavations should be left open for as short a duration as practical to reduce the impact of dewatering on the surrounding peat.

Peat Habitat and Deep Peat Avoidance

- The layout has been designed to avoid good quality peat habitats and areas of deep peat (>1.0m; Scottish Government, Guidance on Peat Surveys 2017) where possible. This has been conducted through habitat mapping and through probing and coring to establish the spatial distribution of peat across the site (Appendix 10.2 Figure 1 and 2).
- Additional micro-siting of infrastructure will be undertaken in conjunction with the ECoW prior to construction for further avoidance as described in the Outline Peat Management and Restoration Plan (Appendix 10.3 of the EIAR).
- Areas of disturbed peat will be reinstated as described in the Outline Peat Management and Restoration Plan (Appendix 10.3 of the EIAR).

Good Practice Measures to Protect the Water Environment

Mitigation undertaken at the construction stage involves both management and monitoring. Given the significance of a number of nearby hydrological and water dependent receptors mitigation measures, which at least meet those required within current Good practice Guidelines, will be applied.

Contractor Tendering Process

During the tendering process for the works, environmental specifications and objectives will be included in the tender documents so that all contractors can allow for mitigation measures in their tender costs. Sub-contractors will be required to implement Energy Isles Environmental Management Procedures.

Site Induction

During the induction of contractors a specific session on good practice to control water pollution from construction activities would be included. The responsibility for protecting the water environment would be shared with all staff on the site with an appropriate level of support from construction managers to achieve this. The site induction process would be based on the Pollution Prevention Guidance and good practice documents indicated within the hydrology chapter (Chapter 10 of this EIAR).

Construction Method Statement (CMS)

The Tender procedures for construction contracts will include the requirement to produce a CMS, in consultation with SEPA, SIC and Scottish Water.

Following the more detailed design of tracks and drainage, the CMS will define the construction planning and procedures to be applied. The CMS will demonstrate, to the satisfaction of SEPA, how construction will be in accordance with Guidance for Pollution Prevention (PPG5), Pollution Prevention Guidance (PPG6) and the Forests and Water Guidelines 2011. This document will be produced to function alongside the CEMP.

In all construction designs Sustainable Urban Drainage Systems (SUDS) shall be incorporated to minimise hydrological effects of the development and to maintain the current hydrological systems.

Watercourse Crossings

The layout of the turbines and on-site tracks and the access route was designed in line with good practice guidelines and the number of crossings of watercourses have been minimised where possible. As a result, up to 14 new main watercourse crossings and up to 25 minor watercourse crossings are required along with numerous minor /ephemeral drain crossings.

The main watercourses are shown to be at risk of flooding however the flood risk zones are close to the main channels as a result of the steep valleys. The crossings should be designed so that their presence does not increase flood risk down gradient by having adequate capacity and by avoiding any structure within the channel or flood zone. The crossings of main watercourses will also allow for appropriate fish, eel and otter passage.

Watercourse crossings will be the subject of detailed design within a Construction Method Statement (CMS) to be submitted to SEPA and the local authority (as appropriate) prior to commencement of construction. A monitoring programme for maintenance of crossings (to prevent blockages and flooding) will be provided within the CMS.

Where it is necessary to cross watercourses or flowing drains, appropriately designed crossings and culverts will be installed, and licensed where appropriate, in consultation with SEPA (see Mitigation below).

Setback Distances

Another form of avoidance is locating turbines, tracks, and other construction disturbance a minimum buffer distance from water features. A set-back distance of 50 m from main watercourses is routinely recommended as a preliminary good practice measure for wind farm sites. This more than complies with the Forests and Water Guidelines, published by the Forestry Commission (2011) that requires setback distances of between 5m and 20m. Forestry practices generally pose a much greater risk in terms of sediment loss than a wind farm site.

Infrastructure within the site has therefore been located in so far as possible over 50 m from watercourses, with the exception of where tracks approach watercourse crossings.

Track and Cable Trenching Design

Tracks which are orientated at 90 degrees to the slope contours may act to create rapid surface flows resulting in erosion of the tracks and provide a direct pathway for discharge to watercourses. Tracks have been oriented along contours where possible; however some sections of on-site access track are at 90 degrees to the slope.

Accordingly, these will require standard design features such as cut off drains, spoon drains or water bars etc. for tracks, and internal plugs for cables, to be installed such that water flow and sedimentation is minimised.

All tracks that will be excavated will have the material removed and replaced in the same manner, particularly the peat and the topsoil layer, in accordance with **Appendix 10.3** (Peat Management Plan).

Water Abstraction and Dewatering Activities

All dewatering activities will be managed through dewatering permits and method statements and the ECoW must be consulted and agree pumping and associated mitigation measures prior to commencement of works.

Suitable mitigation measures will be installed to minimise the volume of silt contained within pumped waters and to avoid or minimise the impact of the pumped water discharge on the water environment, including:

- Installation of upgradient cut off drains to reduce the volume of water entering excavations.
- In order to prevent disturbance from the base of excavations or from the bed of watercourses during abstraction, any pump intakes will be protected from sediment by raising the intake using a floating rose and a geotextile filter.

- The discharge of abstracted water through sediment control structures and over natural vegetation to filter and infiltrate.

Good Practice Management of Sedimentation

Management of Track Construction

Loose track material generated during the use of access tracks will be prevented from reaching watercourses by adequate maintenance of the track. In dry weather, dust suppression methods will be employed.

Standard erosion control techniques and sediment control structures are used across the site during the construction period.

Drainage will be installed on either side of tracks to enable appropriate management, capture and discharge of clean, and potentially sediment laden runoff. Regular discharge of upgradient water to down gradient vegetation will be installed and appropriate sediment control structures to manage contact water.

Roadside drains likely to carry high sediment loads will not be allowed to discharge directly into watercourses but will discharge into sediment control structures or buffer areas of adequate width. The purpose of these drainage ditches is to collect track drainage, control run-off during intense rainfall events and mitigate erosion. These ditches will have filter check dams at intervals along their length to encourage infiltration and reduce velocity of flow within the channels. The drainage design will encourage run-off to leave access tracks quickly and prevent their acting as flow pathways and will also protect the site’s soils from erosion. Sediment control structures will be located at the end of all cross drains and cut off drains.

Watercourse Crossings

The locations of watercourse crossings are presented on Figure 10.6 of the EIAR. Watercourse crossings will be sized sufficiently to avoid overloading, blocking or washout, and will be protected and well bedded to avoid settlement.

Where reasonably practicable, any engineered watercourse crossings would be designed to minimise erosion and to use soft engineering measures, rather than hard where erosion cannot be avoided (i.e. riprap rather than gabion baskets). All watercourse crossings will aim to leave the watercourse in as natural a condition as possible.

Main watercourse crossings will comprise of: cast insitu concrete abutments with single span precast concrete beam deck or cast insitu strip footings with precast concrete or galvanised corregated steel arch segments, headwalls, if required, to be precast concrete. Minor watercourse crossings will comprise of cast insitu strip footings with precast concrete or galvanised corregated steel arch segments/half-moon culverts will be used in preference to pipe culverts where reasonably practicable to retain the natural stream bed.

Minor ephemeral drains will be twin wall UPVC or precast concrete pipe culverts or half-moon culverts where reasonably practicable to retain the natural stream bed.

Excavation of Turbine Foundations and Cable Trenches

Turbine bases are to be located at least 50m away from any watercourse mapped on the 1:50,000 scale Ordnance Survey mapping and confirmed to be present during site visits where reasonably practicable.

Soil movement will be undertaken with reference to good practice guidelines Good Practice Guide for Handling Soils (MAFF 2000). Subsoil from the foundation excavations would be primarily replaced around the foundations following pour and curing. Any remaining spoil would be used to fill borrow pits or spread in areas that are not environmentally sensitive as agreed by landowners and relevant consultees. Topsoil and turfs will be stored so as to maintain their vitality and used to recover the foundation. This will help to maintain surface hydrological characteristics in terms of near surface infiltration and run-off regimes.

The installation of the electrical cables will be within small trenches. Where trenches are dug on steep slopes they will be dug in sections or plugs of soil may be left in place at intervals to prevent them acting as preferential drainage pathways and increasing soil erosion. As indicated above, good practice cable installation means that the trenches will not remain open for long periods of time and will be restored by replacing the subsoil and topsoil removed earlier.

Run-off and discharge water from the excavation sites will be discharged into sumps where sediment would be allowed to settle, and the drainage waters would be pumped out and discharged via vegetated soakaways to a vegetated area or infiltration trench down gradient of the excavation site. The exact method of site discharge will be confirmed with the SEPA prior to the commencement of construction. These measures are also designed to reduce soil erosion by controlling discharges from the excavations.

In the event of shuttering collapse during a concrete pour it is unlikely that material will escape as the excavation required to erect the shuttering will be below ground and of a larger volume than the shuttering capacity. However, in this unlikely event, actions as defined below would be put in place. When the concrete has solidified, it would be dug out and disposed of appropriately.

Management of Soil Stockpiles

Careful consideration will be given to the location of topsoil and subsoil storage areas for all facilities during construction, either by siting in a flat dry area away from watercourses or by the addition of cut-off drains above the storage, which will help to maintain a buffer from streams. The areas will be regularly inspected to ensure that erosion of the material is not taking place.

Settlement lagoons and silt traps will be inspected regularly especially after periods of heavy rainfall. This inspection period will be agreed with SEPA during the development of the CMS. Maintenance will be carried out in periods of dry weather where practicable.

Good Practice Management of Oils, Fuels and Chemicals

Fuel and oil spillages are potential sources of contaminants. Tracks, compounds, the car park where vehicles are re-fuelled and areas where chemicals and fuel are stored, are potential sites of contamination. The construction compound will have provision for the storage of fuel, oil and chemicals in designated areas, together with areas for vehicle compounds, refuelling sites, waste depots and on-site sewage systems.

Mitigation is to be demonstrated in accordance with PPG1, GPP2, GPP4, PPG6, GPP8 and PPG 26. Good practice will be adopted for handling potentially polluting substances (such as fuel, oil, cement and concrete additives) including:

- Designated facilities designed and used for storage and refuelling, located away from watercourses.
- Fuel, oils and chemicals will be stored on an impervious base within a bund able to contain at least 110% of the volume stored. Rainwater will not be allowed to accumulate within the bund and in any way compromise the required 110% volume capacity.
- Interceptor drip trays will be positioned under any stationary mobile plant to prevent oil contamination of the ground surface or water.
- A site oil, chemical and product inventory.
- A site drainage plan, including notations of areas of highest sensitivity.
- A list of emergency procedures, responsive to a risk assessment of areas of high sensitivity.

- Site induction of all personnel on emergency spillage procedures and staff trained in emergency procedures.
- A contact list for emergency services, the relevant environmental regulators, the local water supply and sewerage undertakers, the Health and Safety Executive and specialist clean up contractors, if required.
- Emergency response equipment will be available at appropriate locations.

In the event of an accidental spillage, a predefined 'Procedure in the event of a contaminant spillage' will become effective.

The Management and Movement of Liquid Concrete

Concrete foundations will adhere to a specific code of practice for concrete design to ensure that the concrete mix is designed to withstand concrete attack. Concrete for the turbine bases will be batched on site.

A discharge licence from SEPA may be required in respect of this activity, and this possible requirement will be monitored.

Within the emergency spillage procedure actions and contingency measures are described which would address major events such as a concrete spill. Machine operators would carry a supply of absorbent material in their cabs, and there would be a central stock of material stored within the construction compounds.

Disposal of Waste Materials

On site engine and hydraulic oil waste will be stored in an appropriately constructed compound and storage bund.

Waste oils will be stored in the construction compounds in an above ground tank within a concrete bunded area to prevent oil escaping to the environment in the event of leakage from the main tank. The bund will be 110% of the storage tank capacity. The bund will be emptied by a specialist company. Procedure for storage, removal and accidental spillage will be defined in the 'Pollution Incident Response Plan' with spill kits available adjacent to the bunded area.

The following additional measures will also be implemented:

- Drip trays will be provided for machinery.
- Machinery will be repaired and maintained, where practicable, in suitable designated locations.
- Facilities will be provided to ensure appropriate waste management.
- Wheel washing facilities where required will be located away from watercourses.
- Should dewatering be required pumped water will be discharged via settlement ponds or filter strips prior to direct discharge into a watercourse.

Design Optimisation

Subsequent to consent, if approved, further detailed ground investigations will be undertaken to support the detailed design of the Proposed Development. The proposed micrositing allowance of 50m, extending to up to 100m in any direction with written authorisation, will permit the optimum orientation of crane hardstandings; exact location of turbine bases and adjustment of other infrastructure including track alignments within this buffer zone; marrying the best line for engineering purposes with the maximum avoidance of sensitive receptors where possible. Any micrositing will be documented and undertaken in consultation with the ECoW.

Further investigations will include sub surface drilling to obtain further information on the formations across the infrastructure, additional detailed habitat mapping and further baseline surveys.

Monitoring

Baseline Monitoring

In order to monitor for any changes during the construction and operational phases of the Proposed Development, baseline information on the existing conditions will be required.

Prior to commencement of any invasive investigations or site works, a strategic set of water sampling locations will be identified. The locations will be considered within the choice of sampling locations as well as any upgradient works on other developments. Any samples taken will be analysed for a suite of typical determinands used by SEPA for their water quality assessments in freshwater rivers and updated to include any requirements arising from the Water Framework Directive or Scottish Water requirements.

Monitoring During Construction

Monitoring will be required, as determined through consultation with SEPA and Scottish Water. Water samples during construction will be collected from the same locations as during baseline sampling and taken at intervals agreed with SEPA. Sampling locations will include some control points outside the influence of the construction. These will be analysed for a suite of typical determinands used by SEPA and Scottish Water in order to ensure that there is no negative effect on surface water quality during the construction phase.

In addition, temporary drainage features, access track drainage channels, drainage crossings on tracks, silt traps, sediment lagoons etc. will be inspected on a regular basis to ensure they are clear and capable of performing their functions.

Monitoring During Operation

Periodic inspection of the river beds and banks will be undertaken during the operational phase of the works and culverts will be modified if required (for example by installing baffles within the culverts to reduce flow rates exiting the culvert). Streams and drains will be inspected to ensure they are operating correctly and they will be cleaned of silt or vegetation if required.

Monitoring During Decommissioning

In the decommissioning phase, monitoring will be undertaken to the same level and frequency as for the construction phase as activities and risks to receptors are similar.

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