Appendix 3.1 Drainage Strategy

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Introduction

This Drainage Strategy (DS) is intended to demonstrate the likely measures that will be implemented across the Proposed Development site to remove both surface and foul water from site whilst protecting hydrological, and related resources.

Detailed proposals for such measures will be documented prior to Construction and will provide the same or greater provision in terms of protecting the water environment as those described in this document. The measures are proportionate to the risk and, where greater risk is highlighted at specific locations prior to construction, specific measures would be agreed at that time.

It should be noted that there are no known water courses on site, there are however a number of field drains and ditches which discharge directly into the sea. All measures will seek to replicate the current environment as much as possible.

The methods set out in this report are generally based on good practice and the following guidance:

- Forestry Commission, 'Forest and Water Guidelines, 4th Edition';
- The Construction Industry Research and Information Association (CIRIA), 'Environmental Good Practice on Site (C650)' (2005);
- CIRIA, 'Control of Water Pollution from Construction Sites (C532)' (2001); and
- SEPA flood mapping.

The DS takes into account activities during the construction and operational phases of the Proposed Development, including:

- access roads;
- turbine foundations; and
- hardstanding areas and buildings (including crane hardstandings, construction compound and associated infrastructure).

The appropriate methodology to cover water control and the means of drainage from all hard surfaces and structures within the site are described below.

Drainage from the site will be based on a Sustainable Urban Drainage Systems (SUDS) design. SUDS replicate natural drainage patterns and have several benefits:

- attenuation of run-off will reduce the peak flow and flooding issues which may arise downstream;
- measures such as retention ponds and lagoons will treat run off and reduce sediment whilst also producing a suitable habitat environment; and
- treatment of run-off will reduce contamination of watercourses by reducing direct discharge of water back into the natural drainage network.

Surface Water Management

Access Tracks and Turbine Hard standings

Access tracks and turbine hard standings will be designed to have adequate cross fall in accordance with the turbine manufactures guidance to permit safe delivery of equipment and ensuring that are free drainage to avoid ponding of rainwater and overland flow.

All surface water run-off from the access tracks and turbine hard standings will be side cast to a swale which will offer one level of treatment in removing silts and sediment before being allowed to discharge into the existing drainage ditch network.

Permanent swales and drainage ditches adjacent to access tracks will have outlets at specified intervals to reduce the volume of water collected in a single channel and, therefore, reduce the potential for erosion.

During the construction of new access tracks and the upgrade of existing infrastructure, run-off will require treatment by several measures. These will include silt traps, and filtration measures as appropriate will be used. These will be carefully sited at locations such as junction between swales to offer maximum benefit.

Any material excavated during the construction of access tracks will be stored adjacent to the track and compacted in order to increase stability and erosion potential. Silt fences and mats will be employed to minimise sediment levels in run-off. Material will be stored at least 50 m from existing drainage ditches in order to reduce the potential from sediment to be transferred into the wider drainage system.

The site benefits from relatively shallow gradients which will assist in slowing the rate of surface water discharge.

Loose material associated with the construction of the access tracks will be prevented from entering the existing drainage network by implementing the following methodology:

- silt fences will be erected; and swales will be inspected weekly and cleaned out as required to ensure their continued effectiveness;
- culverts, swales and drains will be checked after periods of heavy precipitation;
- silt matting will be checked daily and replaced as required; and
- the access tracks will be inspected daily for areas where water collects and ponds.

Existing drainage crossings

The access track layout has been designed to follow the existing farm track network where possible and to minimise the number of drainage ditch crossings required.

New and upgraded crossings will be designed in a way that ensures they do not adversely affect the current drainage within the site and can also accommodate the predicted flow generated from the site.

For existing crossings with culverts, these will be widened and strengthened. Upgrades to existing crossings will also include increasing the load bearing capacity for the delivery of turbine components.

To reduce the possibility of adversely affecting the existing drainage upgrade works will not be conducted during times of heavy rain.

Prior to access track construction, site operatives will identify flush areas, depressions or zones which may concentrate water flow. These sections will be spanned with plastic pipes or drainage matting to ensure hydraulic conductivity under the road and reduce water flow over the road surface during heavy precipitation.

All existing, and all new, watercourse crossings are anticipated to be suitable for either pipe or culvert designs. These will be either box culverts, circular concrete or plastic pipe culverts.

The use of in-situ concrete in the construction of drainage ditch crossings will be avoided in favour of pipes or precast units.

Surface Water Treatment

Silt traps will be installed to trap and filter sediment-laden surface water run-off from excavation works at the Proposed Development. Silt traps will be installed on the down-slope side of tracks adjacent to existing drainage crossings to ensure sediment is not transferred into the wider drainage network.

Settlement lagoons will be installed to allow settlement of sediment within the surface water run-off by allowing suspended solids to settle out of water before being discharged to ground or the wider drainage network. All settlement lagoons will be actively managed to control water levels and ensure that any runoff is contained,

especially during times of rainfall. If required to achieve the necessary quality of the final run-off, further measures could include the use of silt traps or hay bales to further improve the removal of suspended solids.

Settlement lagoon outflow will be inspected on a daily basis and following periods of high rainfall. Discharge may be pumped, when required, for maintenance purposes. Any pumping activities will be supervised and authorised by the site Project Manager and in accordance with the approved detailed Risk and Method Statement.

The site is subject to coastal flooding but these areas are out with the area where turbines and associated infrastructure will be sited. There is some evidence of small areas of localised surface water flooding within the extent of the site. In extreme storm events, there would be elevated levels of run-off from the hardstanding elements such as access tracks and hard standings compared to green-field run off rates. This has potential to contribute to down-stream, off-site, flood risk. These areas of hard standing account for a small proportion of the total area of the site and are not perceived to be a risk given the close proximity to the sea.

The likelihood of flooding in a storm event is considered to be very low, temporary storage for storm run-off from crane hard standing areas and access tracks can be provided settlement lagoons.

Drainage grips within the swales will be provided on the downside slope which would shed run-off to adjacent rough ground approximately every 20 m, to attenuate flow and allow natural filtration. In areas within 50 m of a primary drainage ditch or where cross-slopes exceed 1 in 20, drainage channels will be bunded and outflow will be monitored daily. Appropriate licensing and discharge consents will be sought (under CAR) before the construction phase of the Proposed Development.

Surface Water Monitoring

A surface water monitoring programme will be established in agreement with SEPA prior to the construction of the Proposed Development. Given the lack of water courses and private water supplies on site, this is a precautionary measure rather than being required from a legislative perspective.

Conclusion and Recommendation

The purpose of this DS is to detail appropriate measures to control surface water run-off and drain hardstandings and structures during the construction and operation of the Proposed Development. The measures detailed throughout this report would ensure that any effects on the surface and groundwater environment are minimised.

This document would be adapted to meet the additional requirements of the construction contractor, when appointed, to ensure that all measures implemented are effective and site-specific. Consultation with bodies including SNH and SEPA would be carried out to confirm agreement with the measures proposed prior to construction commencement.

The DS is considered to be a live document, such that modifications can be made following additional information and advice from consultees.

References

CIRIA (2001). Control of Water Pollution from Construction Sites (C532). Available at: https://www.ciria.org/CIRIA/Home

CIRIA (2005). Environmental Good Practice on Site (C650). Available at: https://www.ciria.org/CIRIA/Home

Forestry Commission (2003). Forest and Water Guidelines, 4th Edition. Available at: https://www.thenbs.com/PublicationIndex/Documents/Details?DocId=275579

SEPA (2019).Flood Mapping. Available at: https://www.sepa.org.uk/environment/water/flooding/flood-maps/

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