

Ballyfeeny Green Energy Project



Environmental Impact Assessment Report Volume III

Appendix 2.1.1 – Surface Water Management Plan

September 2025

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Surface Water Management Plan

Project:

Ballyfeeny Green Energy Project

Applicant:

Ballyfeeny Green Energy Limited

Date of Report:

11th September 2025

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1.0 Introduction

This Surface Water Management Plan (SWMP) has been developed by Mable Consulting Engineers on behalf of Ballyfeeny Green Energy Limited (the Applicant), who intend to apply to Roscommon County Council for planning permission to construct Ballyfeeny Green Energy Project (the 'Project').

This SWMP has been prepared in conjunction with the Environmental Impact Assessment Report (EIAR) which will accompany the planning application for the proposed Project. The SWMP outlines the steps which will be taken during the construction, operation and decommissioning phases of the Project to ensure compliance with the EIAR, relevant guidance and statutory requirements in relation to watercourses, drainage and the environment.

This SWMP is to be read in conjunction with the following documents:-

- **EIAR, Volume III, Chapter 2.1; Construction and Environmental Management Plan (CEMP);**
- **EIAR, Volume III, Chapter 2.1.1; Surface Water Management Plan (SWMP);**
- **EIAR, Volume III, Chapter 2.1.3; Traffic Management Plan (TMP);**
- **EIAR, Volume III, Chapter 2.1.4; Decommissioning Management Plan (DMP);**
- **The Planning Drawings.**

1.1 Proposed Project

A detailed description of the proposed Project is contained within the **EIAR, Volume II, Chapter 2 Project Description** and the **Planning Statement** that accompanies the planning application.

1.2 Report Layout

The SWMP is structured as follows:-

- Section 1.0 Introduction
- Section 2.0 Existing Site Drainage Features
- Section 3.0 Potential Impacts
- Section 4.0 Surface Water Mitigation Measures
- Section 5.0 Surface Water Drainage Design
- Section 6.0 Surface Water Drainage Management
- Section 7.0 Surface Water Quality Monitoring
- Section 8.0 Drainage Maintenance
- Section 9.0 Compliance and Review
- Section 10.0 Summary

1.3 Statement of Authority

This SWMP has been prepared by Mr. Barry McGinn of Mable Consulting Engineers Limited.

Mr. Barry McGinn is a Chartered Engineer with over 28 years' experience in the design, construction and project management of civil and structural engineering projects including; Wind Farms, Solar Farms, Battery Storage, Electrical Substations, Flood Alleviation, and multiple other development types. Barry is a member of Engineers Ireland and holds a BSc(Eng) in Structural Engineering, BEng (Ord) in Civil Engineering and Post Graduate Diplomas Planning and Environmental Law, Construction Law & Contract Administration and Project Management.

Mr. Eoin Roche is a Project Engineer with over 5 years of experience in the design and construction of civil and structural engineering works, as well as renewable energy infrastructure projects. His portfolio includes Wind Farms, Solar Farms, Battery Energy Storage Systems (BESS), Synchronous Compensators and Electrical Substations. Eoin holds a Bachelor of Engineering (Hons) in Structural Engineering and a Postgraduate Diploma (Distinction) in Sustainable Energy and the Environment.

1.4 Relevant Guidance and Literature

This report has been prepared in accordance with the Legislation & Guidance set out in the EIAR, Chapter 8: Water, Hydrology (Flood Risk Assessment) & Hydrogeology, Section 8.2.

In preparing this report, Mable Consulting have also referred to the following:-

- Roscommon County Development Plan 2022-2028;
- Greater Dublin Regional Code of Practice for Drainage Works;
- Greater Dublin Strategic Development Study; (GDSDS);
- Inland Fisheries Ireland (IFI) Guidelines on protection of fisheries during construction works in and adjacent to waters;
- Pollution Prevention Guidance Notes (PPGs):-
 - PPG01 General guide to the prevention of water pollution;
 - PPG02 Above ground oil storage tanks;
 - PPG05 Works in near or liable to affect watercourses;
 - PPG06 Working at construction and demolition sites;
 - PPG07 Refuelling Facilities;
 - PPG11 Preventing pollution at industrial sites;
 - PPG18 Control of spillages and firefighting run-off;
 - PPG20 Dewatering underground ducts and chambers;
 - PPG21 Pollution Incident Response Planning;
 - PPG23 Maintenance of Structures over Water; and,
 - PPG26 Pollution Prevention Storage and Handling of Drums & Intermediate Bulk Containers.
- Construction Industry Research and Information Association (CIRIA):-
 - CIRIA Report C502 Environmental Good Practice on Site;
 - CIRIA Report C532 Control of Water Pollution from Construction Sites;
 - CIRIA Report C648 Control of Pollution from Linear Construction Project; Technical Guidance;
 - CIRIA Handbook C650 Environmental good practice on site;
 - CIRIA Handbook C651 Environmental good practice on site checklist;
 - CIRIA Report C609 - SUDS – hydraulic, structural & water quality advice; and,
 - CIRIA Report C697 – The SUDS Manual.

1.5 Live Document

This SWMP is considered a 'live' document and as such will be reviewed and updated as required during the construction phase design and as required during the construction works.

Updates to the SWMP may be required due to changes in legislation or due to changes in construction and environmental best-practices. Updates may also be required to incorporate measures for compliance with any conditions of planning by the Local Authority.

Prior to commencement of construction works, this SWMP will be refined further by the construction contractor to the requirements of Roscommon County Council and other appropriate Stakeholders and incorporated into its construction management systems.

2.0 Existing Site Drainage Features

The local hydrology of the site includes the Cullagh Stream which runs adjacent to the Project's eastern redline boundary, approximately 70m from the nearest cut area of Turbine T03. The Cullagh Stream flows south and turns east to join the Feorish River (EPA code 26F03) (also referred to as the Tammonbary) before joining the Shannon Upper River (EPA code 26S02). Existing Site Drainage Features are detailed in Figure 2-1 below.

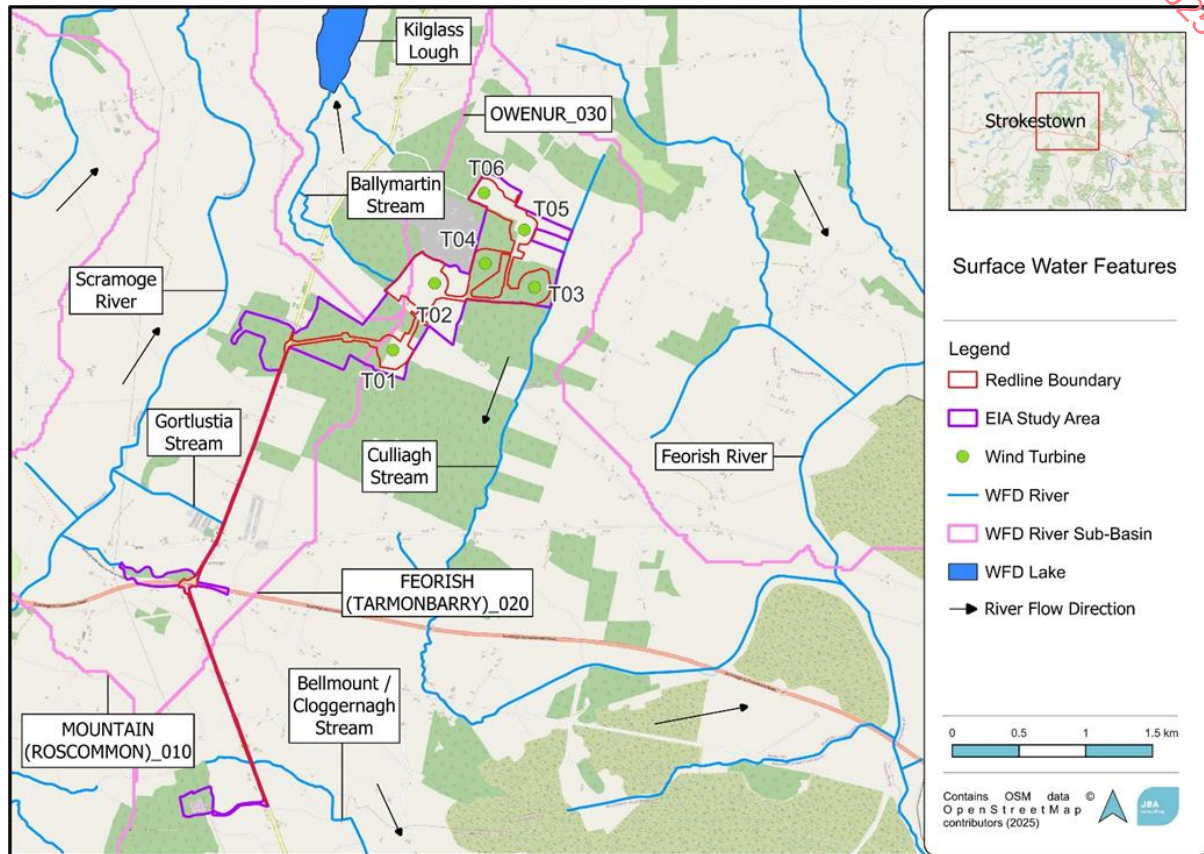


Figure 2-1 – Existing Site Drainage Features

The Ballymartin Stream is also located approximately 60m from the proposed Onsite Substation and Relay Tower and approximately 220m from the nearest cut area for Turbine T02. The Ballymartin stream flows west before turning north to flow into Kilglass Lough. The proposed Grid Connection Route (GCR) travels past the Gortlusia Stream (EPA Code 26G29) to its west which flows west into the Scramoge River which flows into the Mountain West and finally into Kilglass Lough.

The proposed GCR also transects the Bellmount or Cloggernagh Steam further south just before the GCR turns west to join the Sliabh Bawn 110kV Substation.

3.0 Potential Impacts

3.1 Construction Phase Impacts

During the construction period, the Project has the potential to lead to impacts on hydrology and water quality, unless appropriate mitigation is applied. Tree felling, new site access tracks, turbine hardstanding areas, the on-site substation and other new, hard surfaces have the potential to contribute to an increase in runoff, release of sediments, hydrocarbons, and pollutants in the watercourses. During construction, the transport of both dissolved and sediment-bound nutrients from soil to water could deleteriously affect water quality downstream, in the absence of mitigation measures.

Construction phase impacts on hydrology and water quality is set out in the **EIAR, Volume II, Chapter 8: Water, Hydrology (Flood Risk Assessment) & Hydrogeology**.

3.2 Operational Phase Impacts

Due to the revegetation of drainage works and other exposed surfaces, and the non-intrusive nature of operations, the risk of sediment release to the watercourses during the operational phase is relatively low.

During the operation phase, small quantities of oil will be used in cooling the transformers associated with the facility. There is therefore a potential for small oil spills. It is not envisaged that the operation phase will involve significant effect on the water quality of the area.

3.3 Decommissioning Phase Impacts

The potential impacts associated with decommissioning will be similar in nature to those associated with construction of the wind farm albeit to a lesser extent.

It is proposed that turbine foundations and hardstanding areas are left in place and covered with local topsoil and revegetated. It is also proposed to leave grid connection ducting in the ground. Removal of this infrastructure would result in considerable disruption to the local environment in terms of an increased possibility of sediment release. It is considered that leaving the turbine foundations hardstanding areas in-situ will cause less environmental damage than removing them. Access tracks will continue to be used for recreation, forestry and agriculture unless otherwise agreed with the landowner and Roscommon County Council.

The decommissioning works are set out in the Decommissioning Management Plan (DMP) contained in the **EIAR Volume III, Appendix 2.1.4**. A detailed description of the potential decommissioning phase impacts on hydrology and water quality are contained in the **EIAR, Chapter 8: Water, Hydrology (Flood Risk Assessment) & Hydrogeology**.

4.0 Surface Water Mitigation Measures

Construction, Operation and Decommissioning Phase mitigation measures are detailed in the **EIAR, Volume II, Chapter 18 – Mitigation**. Surface water mitigation requirements are summarised in the CEMP, Section 7.3 (**EIAR, Volume III, Chapter 2.1; Construction and Environmental Management Plan**).

Measures to address the surface mitigation are detailed in Sections 5.0 to 9.0 below.

5.0 Surface Water Drainage Design

5.1 Design Principles and Methods

5.1.1 Design Principles

The drainage strategy for the wind farm Site will ensure minimal impact on the existing flow regime, water quality, and run-off quantity.

The nature of the ground conditions dictates the drainage methodology that can be employed. On wet sites with soft ground, tracks are dug down to a more solid bearing stratum and this results in a requirement for trackside drains where dirty water will accumulate. Where ground conditions are good, and the top surface is deemed suitable as a bearing stratum, tracks can be constructed from that surface. This latter method does not result in a requirement for trackside drains.

Dirty water is generated on wind farm sites predominantly during the construction phase. The dirty water is generated through movement of soil material around the site and breaking down of the track surface under sustained loading from construction traffic. Silt removal from dirty water runoff will be either by filtration or by means of Settlement Ponds as described below.

An important aspect of the treatment process is that clean water from outside the works area is not mixed with dirty water from within the works area. This minimises the quantity of water to be treated and consequently reduces the size and quantity of Settlement Ponds where they are used.

Clean water flows from the uphill side of catchments to the downhill side. Having this water pass through the works unimpeded reduces the risk of mixing with dirty water and ensures a smaller quantity of dirty water remains for treatment. Clean water will pass through tracks of stone construction due to its porosity via overland flow. Separation of clean and dirty water drains is shown in Figure 5-1. Clean water cut-off drains will be provided on the uphill side of infrastructure where it is undesirable to have clean water enter the works. Such locations would be on the uphill side of material storage areas where overland flow is unlikely to pass through unimpeded and mixing with dirty water is likely to occur. These drains are routed through to the downhill side of the works and discharged through buffered outfalls.

Where drains are constructed, they will incorporate a series of check dams that will attenuate the flow and provide storage for the increased runoff from exceptional rainfall events. Check dams will comprise single size drainage stone a geotextile barrier that will be embedded into the base and sides of ditches by at least 100mm.

5.1.2 Design Methods

Two distinct methods will be employed in the management of construction surface water runoff. The first method involves 'keeping clean water clean' by avoiding disturbance to natural drainage features, minimising any works in or around artificial drainage features, and diverting clean surface water flow around excavations, construction areas

and temporary storage areas. The second method involves collecting any drainage waters from works areas within the site that might carry silt or sediment, and nutrients, and to route them to Settlement Ponds prior to controlled diffuse release over vegetated natural surfaces. At the construction phase, there will be no direct discharge to streams or rivers; and all release of wind farm drainage is to be carried out outside of hydrological buffer zones.

A schematic of this approach is presented in **Figure 5-1**. During the construction phase all runoff from works areas (i.e. dirty water) will pass through a series of In-Line Control measures, to Water Treatment Control measures prior to being released via buffered outfalls to vegetated natural surfaces.

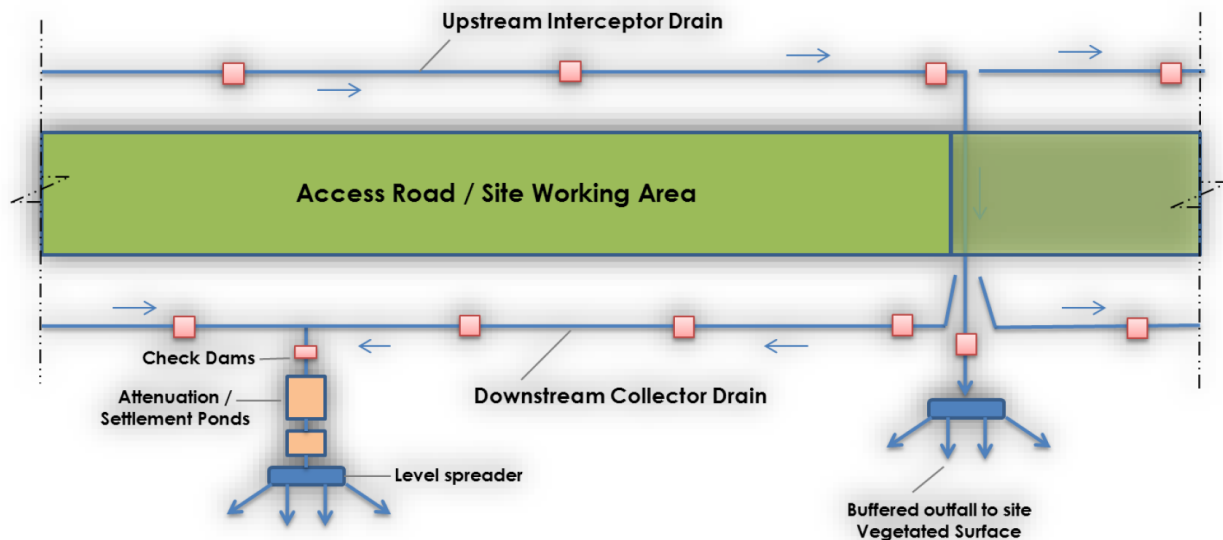


Figure 5-1 - Surface Water Drainage Control Measures Schematic

5.2 General Drainage Provisions

The Temporary and Permanent Surface Water Drainage network and systems has been designed to be easily maintained and suitable for the duration of the cConstruction and Operation of the proposed Project. Crossfalls on constructed elements will have a minimum cross fall of 1:40 to avoid ponding of surface water. Existing drainage networks will be retained and protected where possible.

At the construction phase there will be no direct discharge to existing watercourses; discharge will be by means of Level Spreaders discharging over vegetated natural surfaces.

On completion of the works, constructed permanent works drainage will be incorporated and discharge into the existing drainage arrangements but will include Attenuation / Settlement Ponds at discharge points to ensure drainage discharges are controlled, inspected and managed throughout the operational phase of the proposed Project.

5.3 Detailed Surface Water Drainage Design

Prior to commencement of construction works this SWMP and the drainage design will be refined further by the Civil Engineering Design Engineer and incorporated into the Construction Contractor's construction phase CEMP (EIAR, Volume III, Chapter 2.1; Construction and Environmental Management Plan).

The SWMP along with detailed Construction Method Statements will be submitted to Roscommon County Council, the IFI and other relevant Stakeholders prior to commencement of construction.

This detailed drainage design will include as a minimum:-

- Design statement including philosophy and standards used;
- Design calculations;
- Designer's Risk Assessment;
- Drawings of the proposed drainage system and details;
- Construction Method Statement;
- Details of scheduled and non-scheduled maintenance requirements during the construction phase and defects period;
- Details of scheduled and non-scheduled maintenance requirements during the operational phase;
- Details of the drainage arrangements post decommissioning phase.

5.4 Identification of Buffer Zones

Buffer zones will be maintained around all identified watercourses and surface water open drains. 50m buffer zones are to be provided to watercourses and 10m buffer zones are to be provided to open drains where possible.

At design phase, Buffers Zones have been used in the infrastructure layout design in order to constrain siting of key infrastructure elements of the proposed wind farm including:-

- Wind Turbine Foundations;
- Wind Turbine Hardstands;
- Temporary Construction Compounds;
- Onsite Substation Compound;
- Relay Tower and hardstand.

Where the local site environment requires, additional protection (e.g. steep slopes or lack of vegetation between construction corridor and watercourse) the buffer zone will be increased or additional mitigation measures such as the placement of silt fences will be introduced. Buffer areas will act as riparian zones allowing filtration and settlement, minimising sediment transport and attenuating flows.

5.5 Identification of Works at Watercourses and Surface Water Drainage

5.5.1 Wind Farm

An On-Site Assessment of the proposed wind farm was carried out by Mable Consulting Engineers and the following was noted:-

- The Culliagh Stream runs adjacent to the Project's eastern redline boundary.
- The Ballymartin Stream is located approximately 10m from the Project's western redline boundary.
- There are a number of surface water open land drains within the proposed wind farm Site.

The above streams and open drains with Buffer Zones are marked on the **Planning Drawing No's 23604-201 to 208**.

It is proposed to divert short sections of the open drains in order to facilitate the Project. Also, it is proposed to cross the open drains with new access track and wind farm internal cabling during the construction phase. As far as is practicable the diversions and crossing of open drains will be programmed to be carried out between the time period 1st May to 30th September when surface water flow volumes are at their lowest.

A topographic survey of the land drains was completed and the survey details were incorporated into the wind farm design. Both Temporary and Permanent Construction details for the proposed works to the open drains are shown in the **Planning Drawing No's 200 to 208 and 250 to 258**.

5.5.2 Grid Connection Route

An On-Site Assessment of the proposed GCR was carried out by Mable Consulting Engineers and the following was noted:-

- A number of watercourses and surface water drainage pipes crossing the public road on the GCR.
- The proposed GCR travels past the Gortlustia Stream (EPA Code 26G29) to its west.
- The GCR also transects the Bellmount or Cloggernagh Stream further south just before the GCR turns west into the existing Sliabh Bawn Wind Farm.

The above watercourses with associated Buffer Zones are marked on the **Planning Drawing No.s 23604-301 to 308**.

In order to facilitate the construction of the GCR, it will be necessary to cross watercourses and surface water drainage pipes which cross the public road. This will be carried out in-the-main using open trenching with either an undercrossing or an overcrossing, depending on the depth of the service. Where this method is not suitable, the directional drilling method will be used.

Details for proposed GCR crossing of watercourses and surface water drainage pipes are contained in the **Planning Drawing No.s 23604-563 and 564**.

5.5.3 Office of Public Works Section 50 Approval

All works to bridges and culverts on watercourses require the approval of the Office of Public Works (OPW) in accordance with Section 50 of the Arterial Drainage Act 1945.

As part of the construction phase detailed design process, Section 50 consent will be sought from the OPW for all works that effect bridges and culverts on watercourses.

5.6 Design of Works at Watercourses and Surface Water Drainage

5.6.1 Culvert Crossings

All new permanent works culvert crossings will have a minimum pipe diameter of 900mm and pipe embedment of 300mm.

All new culverts and upgrades to existing crossings will be designed to accommodate the projected peak flow rates, factoring in local hydrology and the depth of the track subbase. In locations with constrained depth, the installation of multiple smaller diameter pipes may be necessary, though this practice will be minimized to reduce the risk of blockages. Where feasible, culverts will be oversized to facilitate easy access for cleaning and long-term maintenance.

Culverts will be installed with a minimum internal gradient of 1% (1 in 100) to ensure optimal water conveyance and to prevent sediment accumulation. In areas with higher water energy, downstream armoring with large stones (riprap) will be employed to dissipate flow energy and prevent erosion, safeguarding the integrity of both the infrastructure and the surrounding environment. For smaller watercourses, properly sized pipes will be buried in the track's subbase at the correct invert levels to avoid ponding or pooling either upstream or downstream of the culvert, ensuring that natural water flow remains uninterrupted.

During the operational phase and after a storm event, biannual inspections will be conducted to ensure all crossings remain free of blockages from debris or vegetation.

Further details on proposed temporary and permanent culvert crossings can be found in the **Planning Drawing No's 23604-200 to 208 and 250 to 258**.

5.6.1.1 Maintenance and Inspection Protocols

During the construction phase, all culverts will undergo regular weekly inspections, particularly following heavy rainfall or storm events, to ensure they remain clear of obstructions such as debris, vegetation, or sediment.

During the operational phase, biannual inspections will be conducted to monitor the condition of the crossings, ensuring the continued free flow of water and early detection of any maintenance needs.

5.6.1.2 Inspection and Maintenance

During the construction phase, weekly inspections of culverts will be conducted to monitor for any potential blockages or environmental issues, particularly following storm events. In the operational phase, biannual inspections will continue, focusing on the structural integrity, build-up of debris, and erosion control measures. These inspections will ensure that culverts function effectively, without disrupting the natural flow or causing ecological harm to the stream.

5.7 Control Measures

Control Measures designed to control and manage silt in construction-related surface water runoff will be deployed during the works. Table 5-1 below provides detail on the proposed Control Measures and locations where're they will be deployed.

Management Type	Description of SuDS drainage control method	Applicable Works Area
Avoidance Controls:	- Application of 20m buffer zones to natural watercourses where possible; - Using small working areas; - Working in appropriate weather and suspending certain work activities in advance of forecasted wet weather.	Construction work areas where sediment is being generated.
Source Controls:	Use of upstream interceptor drains and downstream collector drains / oversized swales, vee-drains, diversion drains, flumes and culvert pipes.	Construction work areas where sediment is being generated.
	- Erosion and velocity control measures such as: - sand bags; - filter fabrics; - weirds or check dams; - and other similar/equivalent or appropriate systems.	Drainage crossings
	- Using small working areas; - Covering stockpiles; - Weathering off / sealing peat stockpiles where applicable.	Stockpiles areas
In-Line Controls:	- Interceptor drains; vee-drains, oversized swales/collector drains; - Erosion and velocity control measures such as: - sand bags; - filter fabrics; straw bales; flow limiters; weirs or check dams; - and/or other similar/equivalent or appropriate systems. - Silt fences, filter fabrics; - Collection sumps, temporary sumps, pumping systems; - Attenuation ponds; - Swales - Sediment traps, stilling / Settlement Ponds. - Sedimats - Silt Bags	Interceptor and collection drainage systems
Water Treatment Controls:	- Temporary sumps; - Swales - Sediment traps, stilling / Settlement Ponds. - Sedimats - Silt bags, proprietary settlement systems such as Siltbuster, and/or other similar / equivalent or appropriate systems.	Pumping and surface water treatment locations
Outfall Controls:	- Level Spreaders; - Buffered outfalls; - Vegetation filters; - Flow limiters and weirs.	Drainage run outfalls and overland discharge points

Table 5-1 – Control Measures and their Applications

5.8 Surface Water Drainage Measures

The surface water drainage has been designed to ensure that surface water runoff from the development matches the existing "Green Field" runoff rate.

5.8.1 Construction Phase

At construction phase this will be achieved by the provisions of Dirty Water Cut-off Drains which will intercept runoff from tracks, hardstands and other works and direct it to infiltration and settlement ponds. The Dirty Water Cut-off Drains will also provide attenuation storage and soakage infiltration.

The Dirty Water Cut-off Drains will flow into Settlement Ponds, these will be designed to attenuate the surface water flow allowing soakage into the subsoil and settlement of suspended solids. The outflow from the Settlement Ponds will discharge overland via buffered outfalls.

Silt fencing, check dams and swales have also been incorporated into the design to provide filtration measures, to slow the flow rate of runoff water into the Dirty Water Cut-off Drains.

Measures that will be implemented at the construction phase will include:-

- Clean Water Cut-off Drains;
- Dirty Water Cut-off Drains;
- Silt Fencing;
- Check Dams;
- Swales;
- Buffered Outfalls;
- Settlement Ponds;
- Silt Buster;
- Silt Bags;
- Sedimats;
- Wheel Wash;
- Vegetation Filters.

The above features are described further in the sub section below, further details can be found on **Planning Drawings 23604-400 to 405**.

5.8.2 Operation Stage Measures – the Permanent Works

At completion of the permanent works (operation phase), attenuation ponds with infiltration drains and level spreader outfalls will be provided to permanent drainage measures to ensure flow is discharged in a controlled manner. These measures will provide filtration and settlement thus ensuring adequate removal of suspended solids and sediments and prevent any deleterious matter from discharging into any natural watercourses.

The existing surface water and ground water flow patterns will also be maintained by the uses of "Plugs" and diffuse flow paths details.

Water quality will be monitored on site once construction is complete – this will involve a visual inspection of open drains as well as monthly sampling and testing.

Sampling will cease when Roscommon County Council, IFI and other appropriate Stakeholders are satisfied that there are no adverse impacts to the natural watercourses and that surface water quality parameters are in line with baseline levels.

Measures that will be implemented at Operation Phase will include:-

- Maintenance Manual and Regime;
- Open Drains and Swales;
- Check Dams;
- Level Spreaders;

The above features are described further in the sub section below, further details can be found on **Planning Drawing 401**.

5.8.3 Decommissioning Phase

Measures that will be implemented at decommissioning phase will be as per the measures listed at construction phase above. The decommissioning works are set out in the Decommissioning Management Plan (DCMP) contained in the **EIAR Volume III, Appendix 2.1.4**.

5.8.4 Clean Water Cut-off Drains

Clean Water Cut-off Drains will be installed on the uphill side of works areas to intercept surface water runoff. The Clean Water Cut-off Drains will direct upslope clean surface water away from the works area, thus preventing it from coming into contact with exposed surfaces and picked up silt and sediment.

The drains will divert the upslope clean surface water to a location where it can be redistributed over the ground surface as sheet flow. This will minimise the volume of potentially silty runoff to be managed within the construction area.

Clean Water Cut-off Drains will be installed in advance of any main construction works commencing. The material excavated to make the drain will be placed on the downslope edge of the drain.

The velocity of flow in the Clean Water Open Drains will be controlled by the use of Check Dams, (see Section 5.8.7 below), which will be installed at regular intervals along the drains to ensure flow in the channel is non-erosive. On steeper sections where erosion risks are greater, a geotextile membrane will be added to the channel. The check dams will also promote sedimentation behind the dam. The check dams will be installed as the Clean Water Open Drains are being excavated.

Clean Water Open Drains will be installed horizontally across slopes to run in parallel with the natural contour line of the slope. Intercepted water will travel along the Clean Water Open Drains to areas downgradient of works areas, where the drain will terminate at a Buffered Outfall or Level Spreader. Across the entire length of the Clean Water Open Drains, the design elevation of the water surface along the route of the drains will not be lower than the design elevation of the water surface in the outlet at the Buffered Outfall or Level Spreader.

The Clean Water Cut-off Drains are detailed on **Planning Drawing No's 23604-200 to 208**.

On completion of the construction works, the Clean Water Open Drains will either be removed or reconfigured to be incorporated into the operational phase surface water drainage. Where the drains are to be removed, they will be backfilled with the material placed on the downslope edge of the drain.

The operational phase surface water drainage is detailed on **Planning Drawing No's 23604-250 to 258**.

5.8.5 Dirty Water Cut-off Drains

Dirty Water Cut-off Drains will be installed downgradient of works areas to collect surface flow runoff and to prevent run off from excavations and construction areas of the site into existing watercourse, where it might have come into contact with exposed surfaces and picked up silt and sediment. The drains will be used to take runoff from the works area to a location where it can be treated via Settlement Ponds or other silt and sediment removal measures.

Dirty Water Cut-off Drains will be installed in advance of any main construction works commencing.

The velocity of flow in the Dirty Water Open Drains will be controlled by the use of Check Dams, (see Section 5.8.7 below), which will be installed at regular intervals along the drains to ensure flow in the channel is non-erosive. On steeper sections where erosion risks are greater, a geotextile membrane will be added to the channel. The check dams will also promote sedimentation behind the dam. The check dams will be installed as the Dirty Water Open Drains are being excavated.

The Dirty Water Cut-off Drains are detailed on **Planning Drawing No's 23604-200 to 208**.

On completion of the construction works, the Dirty Water Open Drains will either be removed or reconfigured to be incorporated into the operational phase surface water drainage. Where the drains are to be removed, they will be backfilled with the material excavated from the Site.

The operational phase surface water drainage is detailed on **Planning Drawing No's 23604-250 to 258**.

5.8.6 Silt Fencing

Silt fences will be installed as a water protection measure along cut-off drains and around existing watercourses in certain locations, particularly where works are proposed within the 50-metre buffer zones. Silt fences will also be installed around existing access track crossing culverts and pipes.

Silt fences will be installed as single, double or a series of triple silt fences, depending on the space available and the anticipated sediment loading. The silt fence designs follow the technical guidance document 'Control of Water Pollution from Linear Construction Projects' published by Construction Industry Research and Information Association (CIRIA, No. C648, 1996). Up to three silt fences may be deployed in series.

All silt fencing will be formed using Terrastop Premium or equivalent silt fence product.

Silt fences will be inspected regularly to ensure water is continuing to flow through the fabric, and the fence is not coming under strain from water backing up behind it. A typical silt fence is shown in **Figure 5-2**.



Figure 5-2 – Typical Terrastop Silt Fence

5.8.7 Check Dams

The velocity of flow in the Clean Water Open Drains and drainage swales, particularly on sloped sections of the channel, will be controlled by check dams, which will be installed at regular intervals along the drains to ensure flow in the swale is non-erosive.

Check dams will restrict flow velocity, minimise channel erosion and promote sedimentation behind the dam. The check dams will be installed as the Clean Water Open Drains are being excavated. Check dams may also be installed in some of the existing artificial drainage channels on the Site, downstream of where drainage swales connect in.

The proposed check dams will be made up of straw bales or stone, or a combination of both depending on the size of the drainage swale it is being installed in. Where straw bales are to be used, they will be secured to the bottom of the drainage swale with stakes. Clean 4 to 6 inch stone will be built up on either side and over the straw bale to a maximum height of 600mm over the bottom of the interceptor drain. In smaller channels, a stone check dam will be installed and pressed down into place in the bottom of the drainage swale with the bucket of an excavator.

Figure 5-3, below, shows illustrative examples of check dams.

The check dams will be installed at regular intervals along the Clean Water Open Drains to ensure the bottom elevation of the upper check dam is at the same level as the top elevation of the next down-gradient check dam in the drain. The centre of the check dam will be approximately 150mm lower than the edges to allow excess water to overtop the dam in flood conditions rather than cause upstream flooding or scouring around the dams. Check dams will not be used in any natural watercourses, only artificial drainage channels and Clean Water Open Drains. The check dams will be left in place at the end of the construction phase to limit erosive linear flow in the drainage swales during extreme rainfall events.

Check dams are designed to reduce velocity and control erosion and are not specifically designed or intended to trap sediment, although sediment is likely to build up. If necessary, any excess sediment build up behind the dams will be removed. For this reason, check dams will be inspected and maintained regularly to ensure adequate

performance. Maintenance checks will also ensure the centre elevation of the dam remains lower than the sides of the dam.



Figure 5-3 – Typical Check Dam

5.8.8 Swales

Swales are shallow drains that will be used to intercept and collect run off from construction areas of the Site during the construction and operational phase. A swale is an excavated drainage channel located along the down-gradient perimeter of construction areas, used to collect and carry any sediment-laden runoff to stilling ponds for attenuation and treatment. Swales will be installed in advance of any main construction works commencing. All swales and ponds will be kept as shallow as possible so that they do not pose a health and safety risk to personnel. Maximum depth of standing water will be limited to 0.3m within the swales.

5.8.9 Buffered Outfalls

Buffered Outfalls will be constructed at the end of Cut-off Drains, Silt Ponds and other Control Measures to convert concentrated flows into diffused sheet flow on areas of vegetated ground. Buffered Outfalls will be located downgradient of any proposed works areas in locations where they are not likely to contribute further to water ingress to construction areas of the Site.

Buffered Outfalls will distribute clean drainage water onto vegetated areas where the water will not be re-concentrated into a flow channel immediately below the point of discharge. The discharge point will be on level or only very gently sloping ground to prevent erosion.

The slope in the channel leading into the Buffered Outfall will be less than or equal to 1%. The slope downgradient of the spreader onto which the water will dissipate will have a grade of less than 6%. The availability of slopes with a grade of 6% or less will determine the locations of Buffered Outfalls.

5.8.10 Settlement Ponds

Settlement Ponds will be used to attenuate runoff from works areas of the Site during the construction phase.

The purpose of the Settlement Ponds is to intercept runoff potentially laden with sediment and to reduce the amount of sediment leaving the disturbed area by reducing runoff velocity. Reducing runoff velocity will allow larger particles to settle out in the Settlement Ponds, before the run-off water is redistributed as diffuse sheet flow in filter strips downgradient of any works areas.

The points at which water enters and exits the Settlement Ponds will be stabilised with rock aprons, which will trap sediment, dissipate the energy of the water flowing through the Settlement Pond system, and prevent erosion. Water will flow out of the secondary Settlement Pond through a stone dam, partially wrapped in geo-textile membrane, which will control flow velocities and trap any sediment that has not settled out. Figure 5-4 shows an illustrative example of a Settlement Pond system.

Water will flow by gravity through the Settlement Pond system, they will be sized according to the size of their catchment area.

The Settlement Ponds will be dimensioned so that the length to width ratio will be greater than 2:1, where the length is the distance between the inlet and the outlet. Each Settlement Pond will be a minimum of 1-1.5 metres in depth. Deeper ponds will be used to minimise the excavation area needed for the required volume.

The embankment that forms the sloped sides of the Settlement Ponds will be stabilised with vegetated turves, which will have been removed during the excavation of the Settlement Ponds area. All material excavated during pond construction will be used locally for landscaping and berm construction around these ponds.

Settlement Ponds will be located towards the end of swales, close to where the water will be reconverted to diffuse sheet flow. Upon exiting the Settlement Pond system, water will be immediately reconverted to diffuse flow via a fan-shaped rock apron if there is adequate space and ground conditions allow. Otherwise, a swale will be used to carry water exiting the Settlement Pond system to a Buffered Outfall or Level Spreader to reconvert the flow to diffuse sheet flow.

Settlement Ponds will be inspected weekly and following rainfall events. Inlet and outlets will be checked for sediment accumulation and anything else that might interfere with flows.

5.8.10.1 Settlement Pond Design

Settlement Ponds will be designed in accordance with the requirements set out in the following documents:-

- Roscommon County Development Plan 2022-2028
- The SuDS Manual (C753) 2015, CIRIA;
- The Greater Dublin Regional Code of Practice for Drainage Works.
- Inland Fisheries Ireland (IFI) Guidelines on protection of fisheries during construction works in and adjacent to waters;
EPA - Environmental Management Guidelines; Environmental Management in the Extractive Industry (Non-Scheduled Minerals)

The size of the Settlement ponds will be based on the following parameters:-

- A 1 in 10 year rainfall return design.
- 11 hour retention period.
- Outlet flow rate from the pond will be the appropriate Greenfield runoff rate for the pond catchment area..
- The rational method is subsequently applied to calculate the flow volumes into each attenuation pond over these respective periods. The Rational Method is expressed by the formula $V = 2.78.C.A.I.t$, where V is the volume of water generated in the stilling pond, C is the run-off co-efficient, A is the area of the hardstanding / catchment, I is the rainfall depth and T is the duration of rainfall occurrence.
- A runoff coefficient of 0.95 (95%) is conservatively applied to all hardstanding areas.

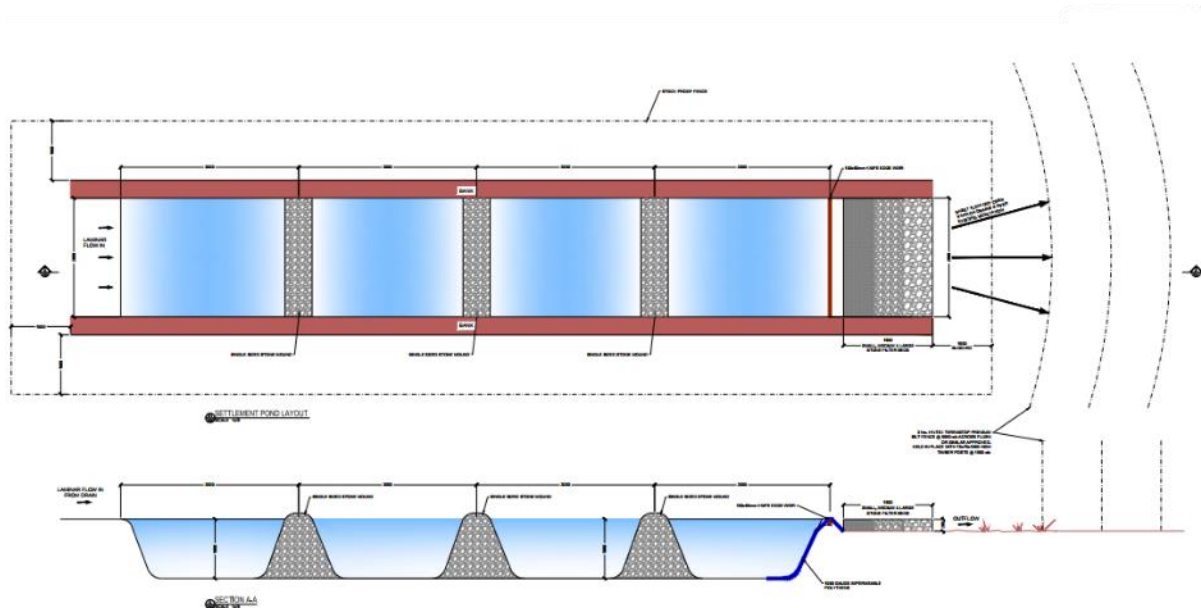


Figure 5-4 – Settlement Pond

5.8.11 Silt Buster

A “Siltbuster” or similar equivalent piece of equipment will be available to filter any water pumped out of excavation areas, if necessary, prior to its discharge to stilling ponds or swales.

Siltbusters are mobile silt traps that can remove fine particles from water using a proven technology and hydraulic design in a rugged unit. The mobile units are specifically designed for use on construction sites.

The unit stills the incoming water/solids mix and routes it upwards between a set of inclined plates for separation. Fine particles settle onto the plates and slide down to the base for collection, whilst treated water flows to an outlet weir after passing below a scum board to retain any floating material. The inclined plates dramatically increase the effective settling area of the unit giving it a very small footprint on site and making it highly mobile. Figure 5-5 below shows an image of the Siltbuster.

The Siltbuster units are now considered best practice for the management of dirty water pumped from construction sites. The UK Environment Agency and the Scottish Environmental Protection Agency have recommended the use of Siltbuster units on construction projects.



Figure 5-5 – Typical Silt Buster

5.8.12 Silt Bags

Dewatering silt bags allow the flow of water through them while trapping any silt or sediment suspended in the water. The silt bags provide a passive non-mechanical method of removing any remaining silt contained in the potentially silt-laden water collected from works areas within the Site.

Dewatering silt bags are an additional drainage measure that can be used downgradient of the stilling ponds at the end of the drainage swale channels and will be located, wherever it is deemed appropriate, throughout the Site. The water will flow, via a pipe, from the stilling ponds into the silt bag. The silt bag will allow the water to flow through the geotextile fabric and will trap any of the finer silt and sediment remaining in the water after it has gone through the previous drainage measures.

The dewatering silt bags will ensure that there will be no loss of silt into the stream. The dewatering silt bag that will be used will be approximately 3 metres in width by 4.5 metres in length (see Figure 5-6) and will be capable of trapping approximately four tonnes of silt. The dewatering silt bag, when full, will be removed from Site by a waste contractor with the necessary waste collection permit, who will then transport the silt bag to an appropriate, fully licensed waste facility.



Figure 5-6 – Typical Silt Bag Installation

5.8.13 Sedimats

Sediment entrapment mats, consisting of coir or jute matting, will be placed at the outlet of the silt bag to provide further treatment of the water outfall from the silt bag. Sedimats will be secured to the ground surface using stakes/pegs. The Sedimat will extend to the full width of the outfall to ensure all water passes through this additional treatment measure. Figure 5-7 below shows an image of a Sedimat Installation



Figure 5-7 – Typical Sedimat Installation

5.8.14 Wheel Wash

To prevent the spread of dirt off the site from vehicle wheels, Wheel Washes will be deployed at site entrance numbers SE1, SE2 and SE3. Details on the proposed Wheel Washes are set out in the Traffic Management Plan (TMP), Section 7.1.16. Details on the proposed Wheel Wash locations are contained in the **Planning Drawing No's 23604-206 and 208**.

5.8.15 Vegetation Filters

Vegetation filters are the existing vegetated areas of land that will be used to accept surface water runoff from upgradient areas. The selection of suitable areas to use as vegetation filters will be determined by the size of the contributing catchment, slope and ground conditions.

Vegetation filters will carry outflow from the Level Spreaders as overland sheet flow, removing any suspended solids and discharging to the groundwater system by diffuse infiltration.

Vegetation filters will not be used in isolation for waters that are likely to have higher silt loadings. In such cases, silt-bearing water will already have passed through Settlement Ponds prior to diffuse discharge to the vegetation filters via a Level Spreader.

5.8.16 Level Spreaders

Level Spreaders will be utilised at the permanent works surface water drainage outfall points. These will be used to convert concentrated surface water flows in drains into diffuse sheet flow on areas of vegetated ground. The Level Spreaders will distribute clean drainage water onto vegetated areas where the water will not be re-concentrated into a flow channel immediately below the point of discharge.

Level Spreaders will be located down slope of works areas, the spreader will be constructed in-line with ground contours. Concentrated surface water flow will be diffused into overland flow via a "capping" perforated drainage pipe surrounded in clean single sized drainage stone. The length of the capping pipe will be subject to the ground conditions local to the Level Spreader and the design drainage flow at that location. A Level Spreader detail is provided in **Figure 5-8**.

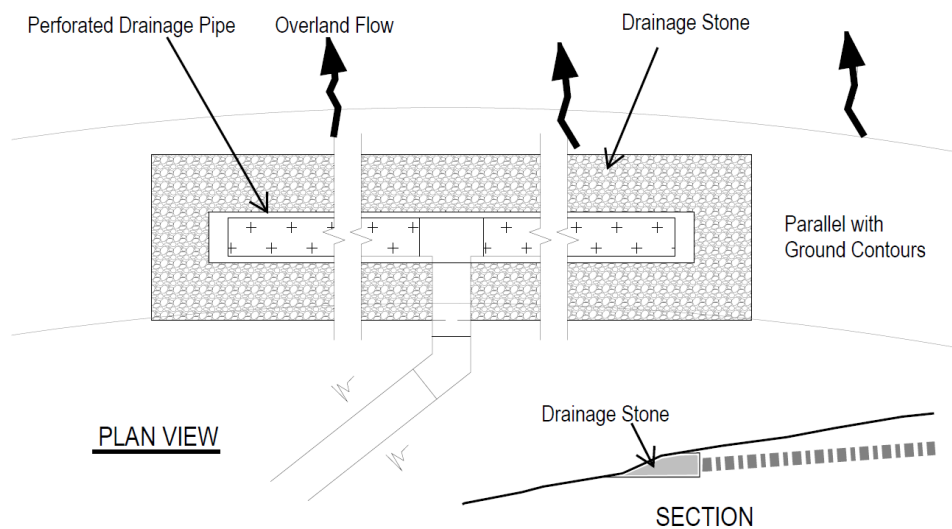


Figure 5-8 - Level Spreader

6.0 Surface Water Drainage Management

6.1 Environmental Management

Environmental management mitigation and procedures are set out in the CEMP, Section 07 (**EIAR, Volume III, Chapter 2.1; Construction and Environmental Management Plan**).

6.2 Works Programme

Timing of the wind farm ground works can strongly influence the potential for damaging the freshwater environment. Operations during wetter periods of the year pose a significantly greater risk of causing erosion and siltation, which can be particularly severe following major rainfall or snowmelt events.

As far as is practicable, the wind farm ground works will be to be programmed to avoid main works being carried out during the winter months.

6.3 Weather Monitoring

The works programme for the groundworks will take account of weather forecasts, and predicted rainfall in particular. Large excavations, large movements of overburden or large-scale overburden or soil stripping will be suspended or scaled back if heavy rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast.

The weather will be monitored using the on-line Met Éireann Weather App as amended. The Met Éireann Weather App is Ireland's official meteorological application, it will provide detailed 7-day forecasts specific to the location of The Project.

The Site Manager and the Environmental Clerk of Works (ECOW) will be responsible for monitoring the weather and implementing the planned response.

6.4 Construction Phase Drainage

The Project Hydrologist will attend the site to set out and assist with the implementation of the proposed drainage controls as outlined in Section 4.0 above and detailed in the **Planning Drawing No's 23604-200 to 208**. Construction phase drainage measures will be installed prior to, or at the same time as the works they are intended to drain.

6.4.1 Preparative Construction Phase Drainage Management

All materials and equipment necessary to implement construction phase drainage measures will be brought on-site in advance of any works commencing. An adequate number of straw bales, clean stone, geotextile, stakes, etc will be kept on Site at all times to implement the drainage design measures as necessary.

6.4.2 Pre-emptive Construction Phase Drainage Management

The works programme for the groundworks part of the construction phase of the proposed Project will also take account of weather forecasts, and predicted rainfall in particular, working under a schedule of works operation system (SOWOR) system as proposed in the planning application. Large excavations, large movements of overburden or large-scale overburden or soil stripping will be suspended or scaled back if heavy rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast.

6.4.3 Reactive Construction Phase Drainage Management

The construction phase SWMP and design will provide for reactive management of drainage measures. The effectiveness of drainage measures will be monitored continuously by the ECoW.

The ECoW will respond to changing weather, ground or drainage conditions on the ground as the Project proceeds, to ensure the effectiveness of the drainage design is maintained in so far as is possible. This may require the installation of additional Check Dams; Clean Water Open Drains or other Control Measures as deemed necessary on-site. The drainage design may have to be modified on the ground as necessary, and the modifications will draw on the various features outlined above in whatever combinations are deemed to be most appropriate to situation on the ground as a particular time.

In the event that works are giving rise to siltation of watercourses, the ECoW will stop all works in the immediate area around where the siltation is evident. The source of the siltation will be identified and additional drainage measures such as those outlined in Section 4.0 above will be installed in advance of works recommencing.

6.5 Operational Phase Drainage

The measures for control of runoff and sediment relate to the construction phase of the Project when there is a high volume of site vehicles and delivery vehicles moving around the wind farm Site. Following construction, the amount of on-site traffic will be negligible and there will be no particular risk of sediment runoff. Runoff from the tracks, hardstands, and other works areas will continue to be directed to the Settlement Ponds, which will be left in place. Check dams within the drainage channels will remain in place. The retention of this part of the drainage infrastructure will ensure that runoff continues to be attenuated and dispersed across existing vegetation before discharge into the ground.

In the operational phase of the wind farm, the reliance on the drainage system discussed above will become reduced as areas naturally revegetate. Once areas revegetate, this will result in a resumption of the natural drainage management that will have existed prior to any construction.

6.6 Decommissioning Phase Drainage

Similar to the construction phase drainage, silt protection controls will be put in place during the decommissioning phase. The drainage system will remain operational during the decommissioning phase and will serve to treat any sediment laden surface water runoff due to a renewed disturbance of soils. Revegetation following the backfilling of hardstanding areas will be monitored. If it is deemed necessary, erosion control matting will be used to assist in the re-establishment of vegetation.

The decommissioning works are set out in the Decommissioning Management Plan (DMP) contained in the **EIAR Volume III, Appendix 2.1.4**.

6.7 Activity Specific Drainage Control and Mitigation Measures

6.7.1 Site Tracks

The Access Tracks are to be constructed by excavating to a suitable bearing strata and filling with imported and selected excavated material. The formation level for excavated tracks has a tendency to form a preferential flow route for surface water. In addition, typically track surface levels are lower than adjacent existing ground levels. In these instances, the following drainage design philosophies, will apply:-

- an upslope cut-off drain will generally be designed to be installed in advance of the main earthworks, in order to reduce overland runoff onto the permanent track and construction phase working strip. Cut-off drains may be omitted on gently sloping land or where a very limited upslope catchment exists.
- track edge drainage swales will be installed on one or both sides of the track hard standing. Permanent down slope edge drainage may be omitted in instances where finished ground levels allow surface water to shed directly on to undisturbed vegetated ground.
- additional temporary drainage swales and settlement / filtration features will be provided down slope of the working strip where higher than anticipated silt loading is observed, or where additional control of surface water in proximity to watercourses is required;
- drainage swales and track shoulders will be top soiled and re-vegetated as soon as is feasible in order to accelerate the establishment of vegetation within drainage channels as soon as is feasible after completion of the track and drainage across the site; and
- outlets from track edge drainage will flow through temporary mini Settlement Ponds and/or sequences of silt fences in order to remove silt from runoff, for duration of the construction phase.
- Under track culverts will be installed beneath the track section to allow the flow of clean surface runoff to the down-gradient side;
- Track culverts / pipes will be installed regularly to disperse clean surface water runoff onto natural vegetated surfaces on the down-gradient side of the track in a diffuse manner;
- Use of in-line erosion and velocity control measures such as Check Dams, Silt Fences and other Control Measures will be used;
- Temporary Settlement Ponds will be placed on the down-gradient side of the section of track to be excavated to collect any potential dirty excavation runoff and keep it away from clean surface water runoff; and,
- Temporary Sumps, Settlement Ponds, Sediment Traps along with proprietary settlement systems such as Siltbusters will be used to treat dirty construction water runoff prior to controlled release onto the natural vegetation surfaces.

Trackside swales will be trapezoidal in section and be at least 300mm wide at the bottom and 450mm deep.

Check dams will be provided at prescribed intervals on all drainage channels to decrease potential for erosion and trap silts.

Any existing site drains, over which the new site tracks are to be constructed, will be culverted / piped. Culverts will be of a cross-sectional area that will not impede the flow of water, and will be a minimum diameter of 225mm to allow for cleaning and maintenance.

No vegetation will be stripped from existing drains unless considered absolutely necessary. Existing vegetation within existing drains can act as a final filter during the conveyance of runoff to the watercourse (provided sufficient pre-treatment is in place).

Trackside drainage will include regular 'breakouts' to provide continual discharge to existing vegetated ground.

6.7.2 Tracks and Drainage Paths

It is recommended that the existing drainage paths are not unnecessarily re-routed or changed, which will minimise any impact to local hydrology. Normally cross drains will be sized at 150mm diameter where sheet flows from the ground surface is being collected. Cross drains will be placed at all low points along the access track where natural

flows may collect. Existing drainage paths will be maintained through the placement of 225/300mm drainage pipes (or larger as may be required by the calculated design flow at the site specific location) at existing drainage paths locations. The drainage path will be maintained throughout the construction period to ensure free flow of water through the track.

As a minimum, cross drains will generally be placed at 80m intervals where the track runs perpendicular to local contours, and 40m intervals where the track runs parallel to local contours.

6.7.3 Turbine Hardstands

Due to crane stability requirements, the maximum crossfall on the Turbine Hardstands will not exceed 1/100. The Contractor will provide perimeter drainage channels to collect surface run-off and route this to a suitably sized Settlement Pond, prior to discharge to existing vegetated ground.

In addition, the following drainage management measures will apply:-

- Installation of cut-off drains around the working areas to intercept uncontaminated surface runoff and divert it around and away from the construction or excavation works; surface water runoff may also be diverted around the excavation using heavy timbers, or similar, laid on the surface of the ground.
- Minimising the stockpiling of materials and locating essential stockpiles as far away as possible from watercourses.
- The base of the excavation will be at constructed level, and water will be gathered in a slump, and pumped at a low flow rate into either the mini-settlement pond or track swale.
- If pumping of flows to a SuDS feature is not feasible or the rate of flow is too high then flows will be collected and pumped out to the downhill side of the excavation over an area of flat vegetated land and well away from watercourses.
- If the downhill slope is steep, a shallow trench will be dug parallel to contour lines, to ensure it filters into the soil layers. The trench will be in-filled with the excavated material after completion of the turbine base.
- The foundation working areas will be re-vegetated as soon as possible after construction.

6.7.4 Concrete Pouring

Turbine Foundations and other structural elements will be constructed using poured ready-mix concrete.

Concrete will not be allowed to enter watercourses under any circumstances. Excess ready-mix concrete will be returned to the plant for recycling. Concrete delivery trucks, tools and equipment will be cleaned at the designated Concrete-Washout-Areas located at site entrance SE2 and SE3. The Concrete-Washout-Areas will be lined with an impermeable material to protect ground water from pollution.

Further details are set out in the **CEMP Section 5.6.6 Cement Based Products (EIAR, Volume III, Chapter 2.1; Construction and Environmental Management Plan)**

6.7.5 On-site Substation and Temporary Construction Compounds

During construction of the Onsite Substation and Temporary Construction Compounds, similar measures to those implemented during Turbine Crane Hardstanding construction will be used to limit water ingress, sediment erosion and concrete pollution.

'French drains' or similar will be constructed around the substation to ensure ground water levels around the building can be managed.

6.7.6 Wind Farm Cable Duct Trenching

To minimise impacts from disturbance, cable ducts will be laid in relatively short trench lengths off the side of Access Tracks and Roads as far as possible. The trenches will be excavated during drier periods as far as possible.

Excavated material will be temporarily placed to the side of the excavation and used to backfill the trenches on completion of duct installation. The cable trenches will be backfilled as soon as possible to minimise the ingress of water into the trenches. Temporary Settlement Ponds, Siltbusters or other Control Measures will be provided in the longer trench runs and on steeper slopes.

On completion of the backfilling works, the works area will be topsoiled and reinstated as soon as practicable.

6.8 Management of Works in the Vicinity of Watercourses

As mentioned above, during the construction phase there will be no direct discharge to existing watercourses; discharge will be by means of Buffered Outfalls discharging over vegetated natural surfaces.

The following procedures will apply should there be general construction activities in the vicinity of drainage features:-

- Avoid construction near streams in wet weather whenever possible.
- Avoid using acidic, metal or sulphide-rich material for track construction.
- Implement the drainage design to ensure drains do not discharge directly into watercourses, but rather to Settlement Ponds, Silt Busters, Silt Bags or other Control Measures.
- Keep cement and raw concrete out of watercourses.
- Run off from excavations will not be pumped directly to watercourses. Where dewatering of excavations is required, water will be pumped to the head of a Control Measure in order to be treated prior to discharge via Buffered Outfall.

6.9 Pumping Water from Excavations

Cut-off drains will be installed up-gradient and around excavations to intercept clean surface runoff and divert it around and away from the works; surface water runoff may also be diverted around the excavation by silt fences, sandbags or similar, laid on the surface of the ground.

The base of the excavation will be constructed level, and water will be gathered in a temporary sump and pumped at a low flow rate into a Control Measure such as a Temporary Settlement Pond or Silt Bag for treatment prior to controlled release onto the natural vegetation surface. The use of a proprietary settlement system such as Siltbuster may also be used to treat silt laden construction water if additional treatment is required.

6.10 Management of Diffuse Flow Paths

Where diffuse flow paths intersect access tracks, material storage areas, hardstands or any works area, there will be a requirement to form a drainage pathway across the works area within the stone fill make-up of the access track/hardstand so that flows can be maintained. This can be achieved by making a section of the installed access

track porous (free draining). Use of clean 100mm to 150mm crushed stone in a 300mm to 400mm layer at the base of access track or hardstand platform will be sufficient. A schematic of this arrangement is shown in **Figure 6-1 & Figure 6-2**.

An impermeable membrane will be required above the porous fill to prevent vertical migration of surface water into the stone track fill and to prevent finer material from the track surface layer/material storage stockpiles being washed down and blocking the porous layer. The following will be maintained:-

- There will be no discharge of surface water runoff from the windfarm construction areas or hardstanding areas directly into diffuse flow pathways;
- All surface water runoff from the windfarm construction areas will be released onto natural vegetated surfaces away from diffuse flow pathways; and,
- Construction of access tracks in the area of diffuse flow pathways will be undertaken during dry periods if possible.

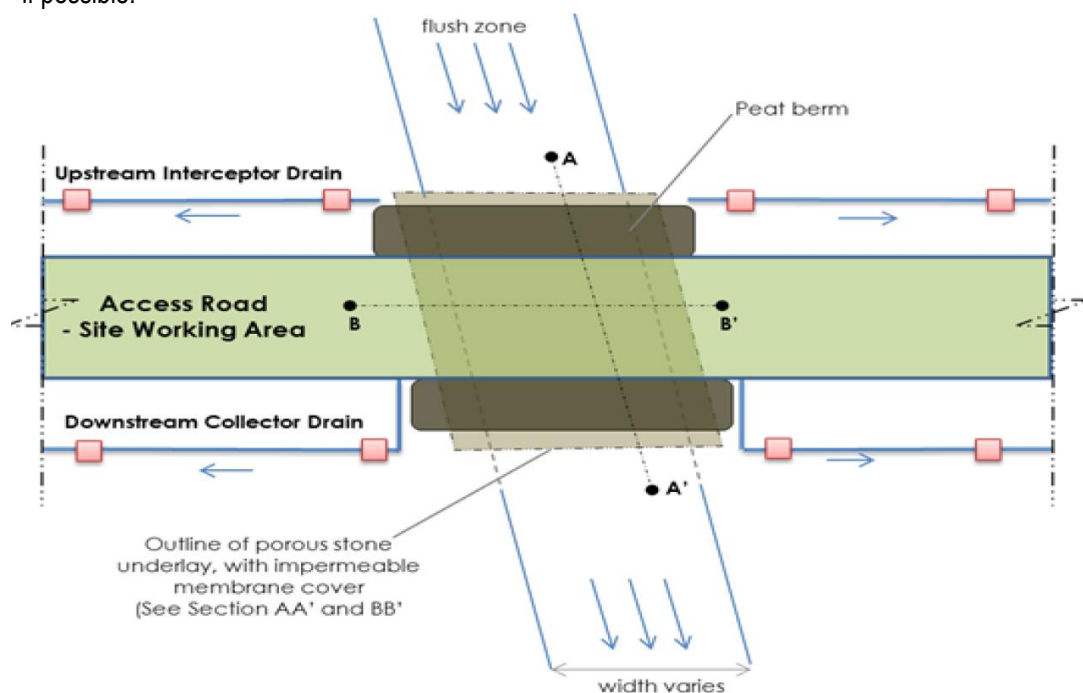
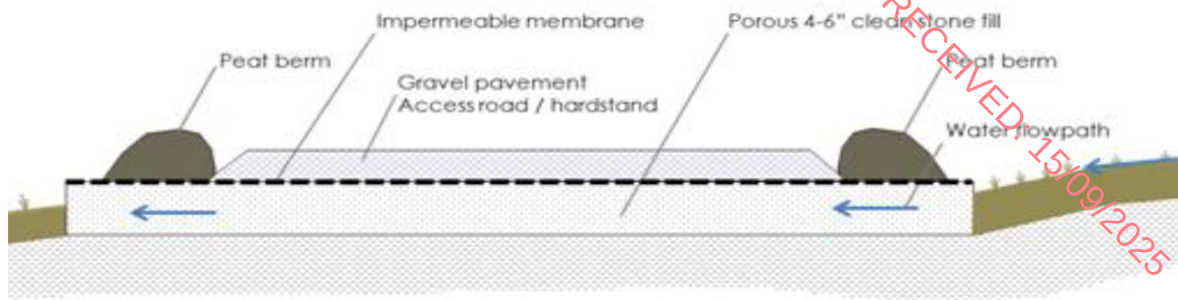
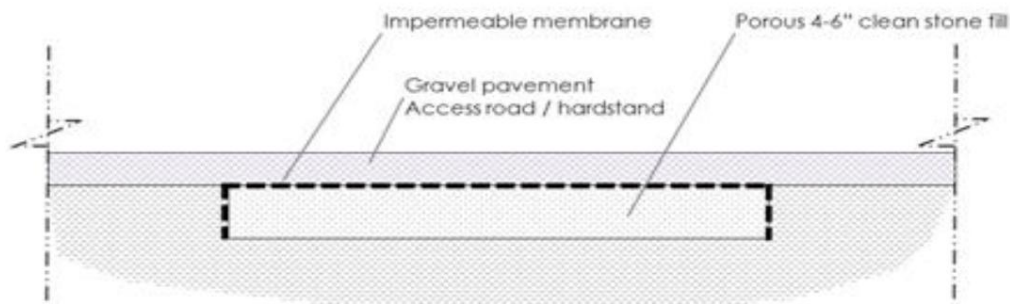


Figure 6-1 – Schematic of Drainage Management for Diffuse Surface Water Flow



Section AA' – Access road or hardstand platform with porous under drainage layer



Section BB' – Access road or hardstand platform with porous under drainage layer

Figure 6-2 – Section AA' & BB' Through Porous Track / Hardstand

6.11 Maintaining Existing Site Hydrology

In order to maintain the hydrology of the existing ground located along the permitted Access Tracks, the construction phase detailed design will include proposals for the continuation of the existing drainage regime found on Site. This may include installing plugs to control longitudinal drainage within the actual access track construction detail as shown in **Figure 6-3**.

Plug material will be low permeability selected excavated material such as clay.

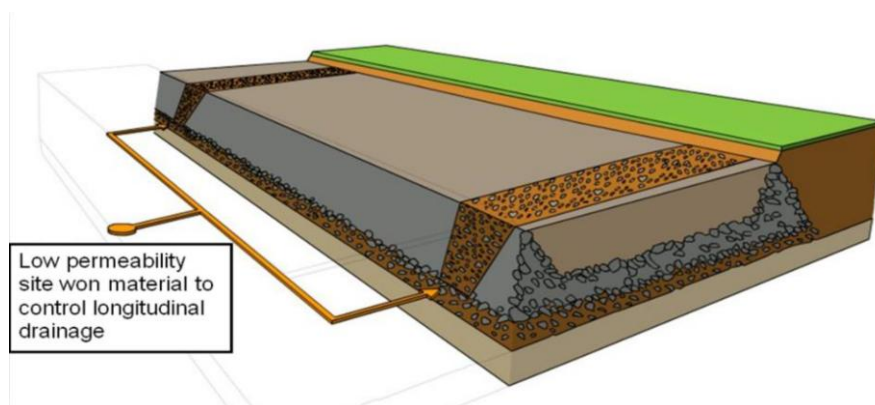


Figure 6-3 – Plugs to Control Longitudinal Drainage within Access Track

7.0 Surface Water Quality Monitoring

7.1 Pre-Construction – Existing Conditions

A Hydrological Walkover Survey was carried out by Rowan Engineering Consultants on 16th May 2024 as part of an Aquatic Baseline Report. Detail on Aquatic Baseline Report, the Hydrological Walkover Survey and the Laboratory Analysis carried out can be found in the **EIAR Volume II, Chapter 8: Water, Hydrology (Flood Risk Assessment) & Hydrogeology** and the **EIAR Volume III, Appendix 6.6: Aquatic Ecology**.

A total of 16 locations were selected as part of the Aquatic Baseline Report to assess potential direct and indirect impacts from the proposed Project.

Of the 16 locations assessed in the Aquatic Baseline Report, 8 number were selected for water sampling and Laboratory Analysis. These were selected to assess direct impacts to surface water quality from the proposed Project as these will be the first points to be impacted from the proposed Project if impacts were to occur.

The water sampling locations are outlined in **Figure 7-1**. The locations sampled were; C1, C2, A1, A2, A3, B1, B2, B3, see **Table 7-1** below for water course details and coordinates of the Surface Water Sampling Locations.

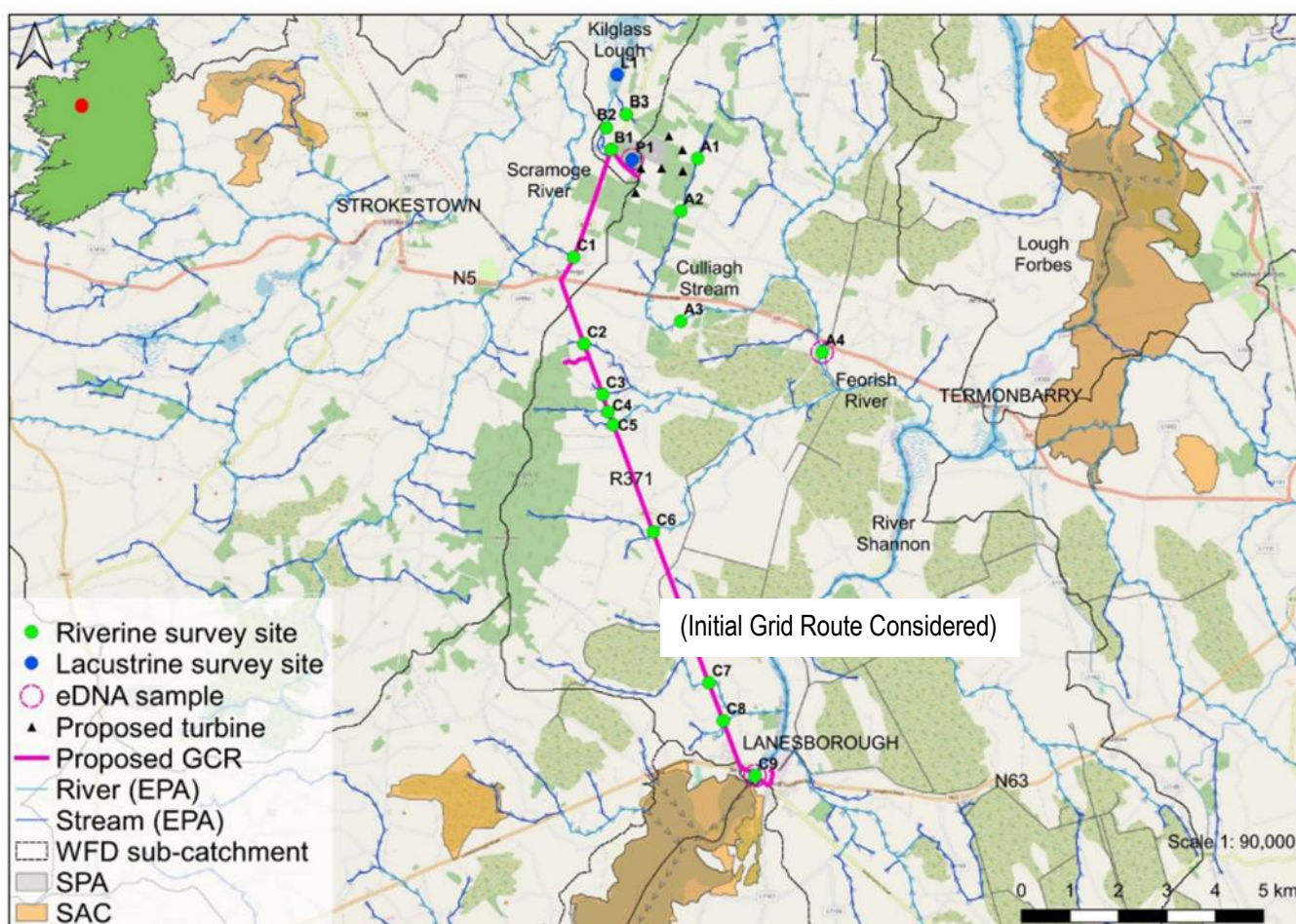


Figure 7-1 – Aquatic Survey Points and Surface Water Sampling Locations

Site No.	Watercourse	EPA Code	Location	X (ITM)	Y (ITM)
C1	Gortlustia Stream	26G29	R371 Road crossing	596764	596764
C2	Bellmount Stream	26B99	R371 Road crossing	596977	778274
A1	Culliagh Stream	26C14	Culleenaghmore	599315	782096
A2	Culliagh Stream	26C14	Northyard	598969	598969
A3	Culliagh Stream	26C14	Cloonshannagh	601882	778105
B1	Ballymartin Stream	26B82	Ballyfeeny	597532	782282
B2	Ballymartin Stream	26B82	Tully	597437	782729
B3	Glen Stream	26G38	Tully	597847	783004

Table 7-1 - Surface Water Sampling Locations

7.1.1 Surface Water Sampling Laboratory Analysis

The Surface Water Samples were analysed for the parameters below, further detail is outlined in the EIAR, Chapter 8: Water, Hydrology (Flood Risk Assessment) & Hydrogeology:-

- pH
- Conductivity
- Dissolved Oxygen
- Turbidity (Surface Water)
- BOD (Surface Water)
- Solids (Total Suspended)
- Ammonia (Surface Water)
- Arsenic (Dissolved)
- Cadmium (Dissolved)
- Chromium (Dissolved)
- Chemical Oxygen Demand (Surface Water)
- Copper (Dissolved)
- Lead (Dissolved)
- Mercury (Dissolved)
- Nickel (Dissolved)
- Nitrate (Surface Water)
- Phosphate (Ortho) Surface Water
- Selenium (Dissolved)
- TPH (>C10-40)
- Zinc (Dissolved)

7.2 Construction Phase Monitoring

Construction phase Monitoring of watercourses will be carried out during the works, this will include the following:-

Monitoring Regime

- Daily Visual Inspections;
- Weekly physical water parameter testing (monthly in periods of no earthworks)
- Monthly Sampling and Laboratory Testing (during periods of earthworks)
- On-Site physical water parameter testing of Sample Locations.

Further details on the surface water Monitoring Regime are given in Section 7.2.4 below.

7.2.1 Surface Water Sampling Locations

It is proposed to carry out surface water sampling at the same 8 locations as those described in Section 7.1 and called-up on **Figure 7-2** below. Locations are; C1, C2, A1, A2, A3, B1, B2, and B3.

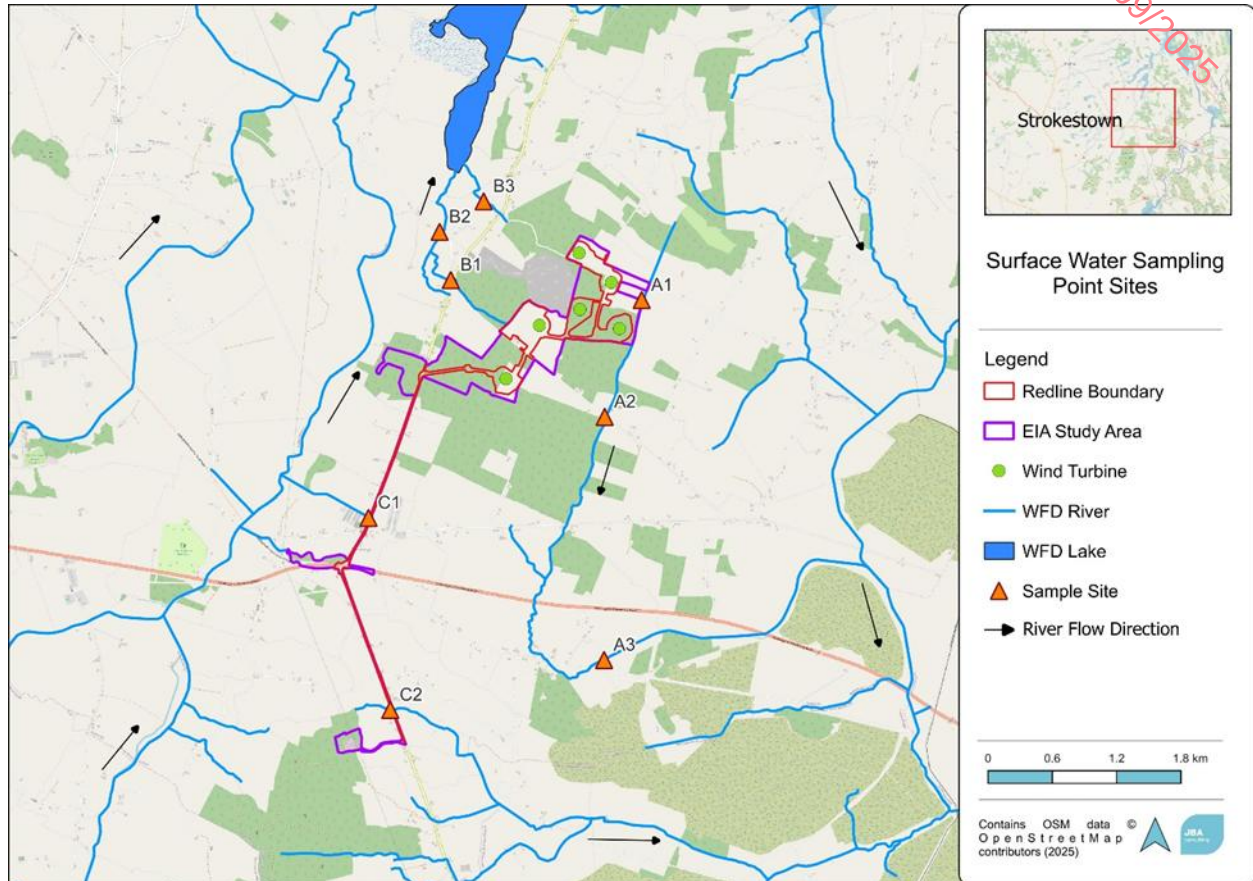


Figure 7-2 – Proposed Surface Water Sampling Locations

7.2.2 Monitoring Parameters

The monitoring parameters at the construction phase are to align with the parameters outlined in Section 7.1.1. and any subsequent Pre-Construction Sampling and Analysis.

7.2.3 Surface Water Monitoring Reporting

The results from surface water Visual Inspections, Continuous Monitoring, Monthly Laboratory Testing and On-Site Physical Testing of Sample Locations will be compiled into a monthly report by the ECoW and made available to Roscommon County Council and other Stakeholders.

The ECoW will present the surface water quality monitoring results at or in advance of regular site meetings. The monitoring results will be used to monitor compliance and if necessary provide detail on where improvements in drainage controls and pollution prevention measures are required.

Reports on water quality will consider all field monitoring and visual inspections, and results of Laboratory Analysis completed for that period. Reports will describe how the results compare with baseline data as well as previous reports on water quality. The reports will also describe whether any deterioration or improvement in water quality

has been observed whether any effects are attributable to construction activities and what remedial measures or corrective actions have been implemented.

7.2.4 Monitoring Regime

7.2.4.1 Daily Visual Inspections

Daily visual inspections of the surface water drains and outfalls will be performed during the construction period to ensure suspended solids are not entering streams and rivers on site, to identify any obstructions to channels and to allow appropriate maintenance of the drainage regime. Should the suspended solids levels measured during construction, at the locations shown in **Figure 7-2**, be higher than the baseline levels, the source will be identified, and additional mitigation measures implemented.

Inspection sheets and photographic records will be kept on site. Inspection points will include the in-situ field monitoring point locations, the Laboratory Analysis sampling points and continuous monitoring locations. Inspection points will depend on works being completed within the catchment upstream of the identified monitoring locations. Visual inspections will also be completed after major rainfall events, i.e. after events of >25mm rainfall in any 24-hour period and data including photographs will be collected by visual inspections and independently assessed by the supervising hydrologist who will monitor and advise on the records being received.

7.2.5 Monthly Laboratory Tests

The proposed sampling locations for Laboratory Analysis are shown in **Figure 7-2**. Baseline Laboratory Analysis of a range of parameters with relevant regulatory limits and EQSs have been undertaken for the overall windfarm Project and each primary watercourse. This will not be restricted to just these locations around the immediate wind farm site with further sampling points added as deemed necessary by the ECoW, in consultation with the Project Hydrologist and Site Manager, as the construction phase progresses.

7.2.6 On-Site Testing of Sample Locations

On-site physical water measurements of unstable parameters, (pH, conductivity, temperature) will be taken at the surface water monitoring locations using a suitable probe or sensor. This analyses will be carried out by either the ECoW or the Project Hydrologist. In-situ field monitoring will be completed on a weekly basis. In-situ field monitoring will also be completed after major rainfall events, i.e. after events of >25mm rainfall in any 24-hour period. The Project Hydrologist will monitor and advise on the readings collected by in-situ field monitoring.

7.3 Post Construction Monitoring

7.3.1 Monthly Laboratory Analysis Sampling

Monthly sampling for physical water measurements and for Laboratory Analysis (if required) for the range of parameters adopted will continue after construction is complete. The Project Hydrologist will monitor and advise on the readings received from the testing laboratory and monitoring will only cease once the hydrologist is satisfied that the chemical and biological monitoring results show that there is no adverse impact on the quality of surface water within the natural watercourses draining the Project.

8.0 Drainage Maintenance

An inspection and maintenance plan for the drainage system onsite will be prepared in advance of commencement of any works on the proposed Project. Regular inspections of all installed Drainage Control Measures will be carried out, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water at parts of the systems where it is not intended. The inspection of the drainage system will be the responsibility of the ECoW.

Control Measures will be regularly maintained and when required excess sediment build up behind Control Measures will be removed.

The frequency of drainage system inspections will be reduced following completion of the construction phase of the proposed Project. The Project Hydrologist will inspect and review the drainage system after construction has been completed to provide guidance on the requirements of an Operational Phase drainage system.

9.0 Compliance and Review

Key to the implementation of this SWMP is the delegation of responsibility for the SWMP to the Construction Manager, the Project Hydrologist, the ECoW and their Site Management Team.

9.1 Site Inspections and Auditing

Field inspections and testing will only be carried out by an experienced ECoW to ensure all correct protocols are carried out. The Project Hydrologist will also assist in compliance of testing and monitoring as required.

9.2 SWMP Review and Update During Works

This SWMP is considered a 'live' document and as such will be reviewed and updated as required during the construction phase design and as required during the construction works.

The SWMP will be reviewed in line with the CEMP (**EIAR, Volume III, Chapter 2.1; Construction and Environmental Management Plan**) and updated as required prior to commencement of construction to address any relevant planning conditions and mitigation measures, and also every six months thereafter during the construction phase of the Project.

10.0 Summary

This SWMP presents a summary of the overall proposed Project works, the management of the Site during the construction works and the mitigation measures required to ensure the proposed works do not have a significant effect on the environment.

This document has been prepared in accordance with Best Practice documents as set out above and in all relevant documents submitted with this planning application.