Appendix 10-3- Surface Water Management Plan

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1.0 SURFACE WATER MANAGEMENT PLAN

1.1 INTRODUCTION

This Surface Water Management Plan (SWMP) details control measures for avoiding, preventing or reducing any significant adverse effects on the surface water environment during the proposed construction, as identified in Chapter 10 (Hydrology and Hydrogeology) and associated technical appendices.

The objective of this SWMP is to manage the movement of surface water during the construction, operation and decommissioning of the proposed Derryadd Wind Farm (proposed development). The measures implemented for the proposed construction phase will provide flow management for the operational and decommissioning phases.

The measures in the SWMP are consistent with those detailed within the Chapter 10 (Hydrology and Hydrogeology), of the Environmental Impact Assessment Report (EIAR). This SWMP is a working document and will be finalised by the appointed Contractor following appointment and prior to commencing works on the proposed development to include any additional conditions stipulated by An Bord Pleanála.

All of the content provided in this SWMP will be delivered by the appointed Contractor and its finalisation by the appointed Contractor will not affect the robustness and adequacy of the information presented here and relied upon in the EIAR and Natura Impact Statement (NIS). Relevant guidelines were considered in the development of this surface water management plan[1] .

[1] The following guidelines were considered in the development of this surface water management plan:

- COFORD (2004) Forest Road Manual, Guidelines for the design, construction and management of forest roads
- CIRIA Document C741 'Environmental Good Practice on Site'
- CIRIA document C532 – 'Control of Water Pollution from Construction Sites – Guidance for Consultants and Contractors'
- CIRIA document C648 and C649 – 'Control of Water Pollution from Linear Construction Projects'
- The Irish Wind Energy Association (2012) Best Practice Guidelines
- 2006 Wind Energy Planning Guidelines, Department of Environment, Heritage and Local Government;
- Inland Fisheries Ireland, (2016) Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters;
- Scottish Natural Heritage (2010) A Report into Good Practice in Design, Construction and Use of Floating Roads on Peat with particular reference to Wind Farm Developments in Scotland;
- Consultation with Inland Fisheries Ireland, with responses to the EIAR Scoping Report detailed in Chapter 1 Introduction

1.2 OVERVIEW OF THE PROPOSED DEVELOPMENT

The proposed wind farm site is located across three bogs (Derryaroge, Derryadd and Lough Bannow) within the Mountdillon Bog Group in Co. Longford. There are works as part of the proposed development which will take place outside of the wind farm site along the turbine delivery route (TDR).

The proposed development comprises of the construction of 22 no. wind turbines and ancillary works including works along the TDR. The turbines will have a blade tip height of 190 m above the top of the foundation level and will be accessible from internal access routes within the Bord na Móna site. The overall area of the proposed wind farm site is approximately 1,900 hectares (ha) spread across the three bogs.

2.0 PROPOSED SITE DRAINAGE

2.1 DRAINAGE DESIGN OVERVIEW

The proposed development is located within a former peat extraction site. An extensive network of drainage channels are present throughout the peatland which is managed under IPC licence P0504-01 Mountdillon Bog Group.

The measures described within Section 2 apply to the proposed wind farm site. Proposed drainage measures are also included in Section 3.6 of Chapter 3 – Description of the Proposed Development.

The drainage layout for the construction phase of the proposed development has been designed to collect surface water run-off from hardstanding areas within the proposed wind farm site and discharge to temporary construction settlement ponds prior to entering existing IPC drainage system within the bogs. Hence any surface water from the proposed works that finds its way into the existing drainage system will then be captured in the existing system of IPC silt / settlement ponds, before final discharge to the receiving watercourse. The existing IPC silt / settlement ponds are upstream and downstream of the external pumping stations to allow sediment to settle out of the water before it is discharged to the external streams, which is managed under IPC licence P0504-01 Mountdillon Bog Group. During the construction phase, all run-off from construction areas will be controlled and treated to reduce suspended solids concentration prior to being discharged into the existing drainage network. Suspended solid (silt) removal features will be implemented in accordance with CIRIA C697 SuDS Manual, and CIRIA C648 Control of water pollution from linear construction projects. Drainage details are proposed on Planning Drawings 20852-NOD-01-XX-DR-C-08001 to 20852-NOD-01-XX-DR-C-080015.

Within the proposed wind farm site layout there are sections of proposed floating road between turbine infrastructure. In these sections, and depending on intermediate topography, a collector drain (road/hardstanding water system) may be used during the construction phase, or over the edge (OTE) drainage will occur. Over the edge drainage allows runoff from site roads/access tracks to flow into local field drains and be managed via the existing site drainage system. OTE drainage will only occur where topography allows, and it is only proposed in areas of low risk and remote from outfall locations (at least 150 m from bog outfall locations). Silt traps and check dams will be installed in field drains downstream of OTE drainage areas, and these will provide attenuation and treatment of water from roads/hardstand areas.

During the construction phase, all runoff from works areas (i.e., hardstands, roads) will be attenuated and treated prior to being released within the proposed wind farm site. All drainage

outfall from the proposed wind farm site is routed through existing settlement ponds. All temporary and permanent drainage from the site will be designed to have as a minimum three stages of treatment, as defined in the SuDS Manual. Management of runoff will include the following:

- Filtration of water through filter media (sand / stone check dam, silt fence);
- Detention / settlement in settlement ponds or behind check dam in swales; and,
- Conveyance of shallow depths of water in vegetated swale.

The main drainage design principles are outlined below:

- The roads are expected to be constructed of granular material, so a runoff coefficient of 0.6 is applied to the rainfall to determine the runoff volume. This gives an effective rainfall of 61.68 mm;
- Roads shall crossfall in one direction to the downgradient side following the natural gradient of the ground;
- Road drainage will be provided on the downgradient side of the road;
- The road will drain over the edge to a road drainage swale;
- Roadside swales will capture and attenuate the rainfall and will discharge by infiltration and evaporation. Based on a 6 m road width, the runoff per metre length of road will be 61.68 x 6 = 370 mm/m = 0.37 m3/m;
- Each swale will have a base width of 1 m and side slopes of 1V:2H, so a 250 mm depth on the swale will store a volume of 0.375 m3/m, which is sufficient to store the 100 year 24 hour storm, including allowance for climate change;
- Interceptor drainage will be provided on the upgradient side of the road to collect the drains crossed by the road;
- 600 mm culvert pipe is proposed for drainage crossing the infrastructure access tracks;
- 1200 mm culvert pipes are proposed for infrastructure crossing any large collector drains;
- Road drainage will be provided in swales with check dams;
- Each roadside swale will be arranged with 400 mm high check dams spaced so as to retain 100 mm of water at the upstream end of the swale when the downstream end is full. This will give an average depth of 250 mm across the length of the swale;
- Check dams will be installed at 300 m intervals where possible. The purpose of check dams is to provide flow attenuation, slow down runoff to promote settlement and to reduce scour and ditch erosion. The design of the check dam is such that small (20 mm) single sized stone which provides a large surface area is held in place by large (75 mm) single sized stone on the downstream side;
- The road drainage swales will be sized to act as attenuation storage for the 100 year 24 hour event. Swales will generally empty by infiltration and evaporation. This will return the runoff to the bog as close as possible to where it has fallen;
- Interceptor drains will discharge either to existing collector drains or will be piped under the road at intervals to allow the water to continue towards the existing drainage outlet.
- The existing drainage network will be retained where possible, in some locations the existing drainage is required to be rerouted around the wind farm infrastructure to maintain connectivity;
- For proposed floating road sections between turbines infrastructure, OTE drainage maybe incorporated;
- OTE drainage allows runoff from access tracks to flow into local field drains and be managed via the existing site drainage system;
- OTE drainage will only occur where topography allows, and it is proposed in areas of low risk and remote from outfall locations (at least 150 m from bog outfall locations).

- Silt traps and check dams will be installed in field drains downstream of OTE drainage areas, and these will provide attenuation and treatment of runoff from roads/hardstands;
- Pump stations will be upgraded for H&S requirements, refer to Table 3-6 for list of work at each pumping station;
- The existing pump discharge will not be increased;
- Temporary settlements ponds will be installed for dewatering at excavations of the wind farm infrastructure (substation, foundations, met mast etc);
- During the construction phase, dewatering silt bags will also be used as required. They can be used downgradient of turbine bases, where temporary pumping is required. Discharge from dewatering silt bags will flow into settlement ponds and treated water from settlement ponds will outfall to existing field drains and main drains; and,
- Culverts will be required where site roads and proposed hardstands cross the main bog drainage networks. These will be installed with a minimum gradient to reduce the entrainment of suspended solids. All culverts will be inspected regularly and maintained where appropriate. Culverts will remain in-situ during the operational phase of the proposed development.

The proposed development drainage will not significantly alter the existing drainage regime at the proposed wind farm site. Moreover, the proposed drainage system will be fully integrated into the existing bog drainage systems. Existing field drains and main drains will be routed under/around proposed internal site access roads and amenity access tracks using culverts as required.

The proposed operation phase drainage design is utilising the existing onsite drainage. During the operational phase all drainage water leaving the proposed wind farm site will drain via field drains, main drains, pumping station and be treated in the existing settlement ponds prior to outfall. Any surface water run-off will make its way into the existing field drains and existing IPC surface water settlement / slit ponds infrastructure before being discharged to the receiving watercourse through existing discharge points by pump or gravity flow. There will be no direct discharges from the proposed wind farm to any existing natural watercourse.

The surface water drainage system utilises sustainable drainage devices and methods where appropriate with surface water runoff to be maintained at existing runoff rates i.e. 1.7 l/ha/sec.

Check dams will be provided in drainage channels to reduce the velocity of surface water run-off and are depicted in Figure 2-1. Swales will be constructed adjacent to the site access roads (See Appendix 1-2, Planning Drawings pages 20852-NOD-01-XX-DR-C-08001 to 20852-NOD-01-XX-DR-C-080015 and 20852-NOD-ZZ-DR-C-08001 to 20852-NOD-ZZ-DR-C-08005.) to provide drainage as depicted in Figure 2-2.

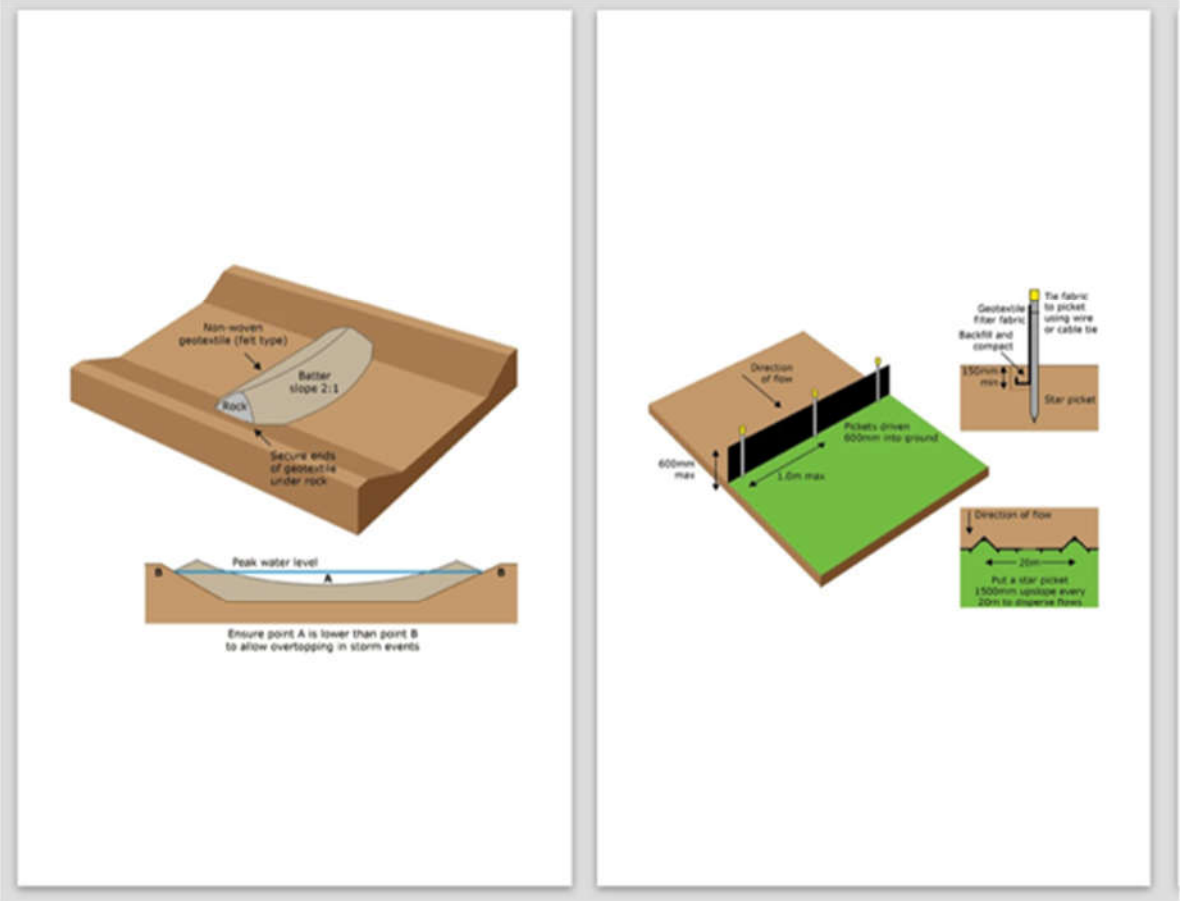


Figure 2-1 Check dam and silt fence examples (Source: Guidelines for Environmental Management, EPA Australia, 2004)

Figure 2-2 Vegetated Swale Example

2.2 FLOOD RISK ATTENUATION

The creation of impermeable areas, such as hardstands, have the potential to locally increase rates of runoff, which in turn may increase flood risk and flood severity downstream. The proposed wind farm site is relatively low permeability and will have limited potential to increase flows.

A Flood Risk Assessment was completed by Nicholas O' Dwyer in 2024 for the proposed development. Refer to Appendix 7-3. As summary of the findings are as follows.

The Catchment-based Flood Risk Assessment and Management (CFRAM) coastal flood maps do not indicate any coastal flood risk at the site due to the inland location at ca. 36mOD to 50mOD. The Geological Survey Groundwater Flooding Probability Maps do not predict groundwater flooding within the site.

In long rainfall events and during the wintertime pluvial flooding has been observed to occur across parts of all three bogs. The GSI maps of the extent of historical flooding seen in 2015. These maps show areas seen to have been wet during winter 2015-2016. The CFRAM mapping does not show any expected impact inside the site boundary. The National Indicative Flood Mapping (NIFM) indicates two areas potentially at risk on Derryadd bog in the 1% and 0.1% AEP events, and a further location potentially at risk on Derryaroge bog in the 0.1% AEP event. The fluvial flooding shown in the NIFM represents flooding of the site due to high water levels in the surrounding rivers. It should be noted that since the drainage from the southern part of Derryadd bog is pumped over the surrounding bank it is unlikely that river water can flood over the bank and into the bog. The presence of pumping would not have been known or incorporated in the preparation of the NIFM.

The streams around the proposed wind farm site are too small to have been included in the CFRAM project flood mapping. The National Indicative Flood Mapping (NIFM) covers rivers such as these which have not been subject of detailed studies.

Based on the FRA analysis, the proposed substation is not located in a flood prone area (Flood Zone A or B) based on the flood risk assessment. This dataset suggests that fluvial flooding does not occur at proposed turbine or substation locations. Based on the information available and a site-specific risk assessment it is not considered a flood risk. There is no evidence of historic groundwater flooding at the proposed wind farm. The site access roads in Derryaroge bog cross through an area identified on the flood maps as Flood Zone B.

Drainage management within the IPC licence site reduce the potential for surface water ponding/flooding. OPW records do not indicate that flooding occurs on the downgradient streams. Small areas of pluvial flooding occur within the proposed wind farm site. The drainage within the proposed wind farm site is controlled by a pumping regime in accordance with the IPC licence (P0504-01).

Residual risks at the proposed development and to the proposed development during an extreme flood event can be managed to an acceptable level through a dedicated stormwater drainage system and effective landscaping and topography. The layout of the proposed development will minimise the flood risk to people, property, the economy, and the environment.

2.3 TURBINE DELIVERY ROUTE

There will be limited construction activities required for the temporary works areas of the proposed Turbine Delivery Route (TDR). Further details in relation to the accommodation works on the TDR are outlined in Section 3.3.15 of Chapter 3 – Description of the Proposed Development.

No refuelling of machinery will take place within 50 m of a watercourse. Excavated material will not be stockpiled or side-cast within 50 m of a watercourse. Appropriate steps will be taken to prevent soil/dirt generated during the temporary upgrade works to the TDR from being transported on the public road. Road sweeping vehicles will be used as required, to ensure that the public road network remains free of soil/dirt from the location of the TDR works when required. This will reduce the potential for sedimentation of surface watercourses locally.

3.0 WATER QUALITY MEASURES

The drainage design measures outlined in Section 2 will manage flow and quality within the proposed wind farm site. Specific water quality measures in relation to concrete and fuel management are detailed below.

Hydrocarbon and Concrete

Concrete is required for the construction of the turbine bases, met masts and substation foundations. After concrete is poured at a construction site, the chutes of ready mixed concrete trucks must be washed out to remove the remaining concrete before it hardens. Wash out of the main concrete bottle will not be permitted on site; wash out is restricted only to chute wash out. Wash down and washout of the concrete transporting vehicles will take place at an appropriate facility offsite i.e., at the premises of the concrete supplier.

The best management practice objectives for concrete chute washout are to collect and retain all the concrete washout water and solids in leakproof containers or impermeable lined washout pits so that the wash material does not reach the soil surface and then migrate to surface waters or into the groundwater. The collected concrete washout water and solids will be emptied on a regular basis at a waste licence facility.


Plate 10.1 and Plate 10.2: Example Photos of Concrete Washout On Site Fuels and Chemicals

With regard to on-site storage and handling of potentially pollutant materials:

- All on-site refuelling will be carried out by a trained competent operative;
- Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations;
- The contractor will have a dedicated area within the compound for refuelling plant or any other equipment that is bunded and has the necessary spill kit equipment available.
- The production, transport and placement of all cementitious materials will be strictly planned and supervised. Site batching/production of concrete will not be carried out onsite and therefore these aspects will not pose a risk to the waterbodies or sensitive receptors present, namely any exposed groundwater, the onsite surface water settlement ponds or onsite groundwater monitoring wells;
- Mixer washings and excess concrete will not be discharged directly into the drainage network, or any drainage ditches, surface water bodies, the onsite surface water settlement pond or onsite groundwater monitoring well;
- Surplus concrete will be returned to batch plant after completion of a pour;
- No refuelling will take place within 50 m of any water body;
- All equipment and machinery will have regular checks for leakages and quality of performance, and will carry spill kits;
- Any servicing of vehicles will be confined to designated and suitably protected areas such as construction compounds;
- Additional drip trays and spill kits will be kept available on site, to ensure that any spills from vehicles are contained and removed off site;
- Fuels, lubricants, and hydraulic fluids for equipment used on the construction site, as well as any solvents, oils, and paints will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best codes of practice;
- Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the proposed development for disposal or re-cycling;
- All fuel /oil deliveries to the onsite storage tanks will be supervised with records of delivery dates and volumes retained on site; and,
- Strict supervision of contractors will be adhered to in order to ensure that all plant and equipment utilised on-site is in good working condition. Any equipment not meeting the required standard will not be permitted for use within the site. This will minimise the risk of groundwater becoming contaminated through site activity.

Generators and associated fuel tanks to be used at the site will either be placed within bunds as per fuel storage tanks or will be integrated units (i.e., fuel tank and generator in one unit) that are intrinsically bunded. No external tanks and associated fuel lines will be permitted on the proposed wind farm site unless these are housed within a fixed bund with the generator.

The temporary contractor's compounds will incorporate a bund for the storage of small vehicles and oil filled equipment, such as hand portable generators, pumps, etc. Storage of small volume oils or chemicals, in barrels, IBCs, etc, will be stored in a covered bunded area. Where barrels or other containers are required at work locations these shall be stored in enclosed bunded cabinets, and drip trays shall be used where distribution of the material is required.

The main storage areas for oil filled equipment, vehicles, plant, etc, shall be impermeably surface and the discharge of surface water from these areas will be via oil interceptors. An oil spill response plan will be developed for the construction works and appropriate containment equipment will be available at work locations in the event of a spillage. Oil spill response will form part of site personnel induction and training at the site.

A response procedure will be put in place by the Contractor to deal with any accidental pollution events. Any spillage of fuels, lubricants or hydraulic oils will be immediately contained and the contamination removed from the proposed development and disposed of in accordance with all relevant waste management legislation.

Relevant Material Safety Data Sheets along with oil absorbent materials will be kept on site in close proximity to any fuel storage tanks or bowsers during proposed site development works.

The works programme for the construction stage of the development will also take account of weather forecasts and predicted heavy rainfall events in particular. Large excavations and movements of peat/subsoil or peat 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.

There will be no direct discharges to the surface water streams during the operational phase. Surface water will be treated with the drainage network prior to discharge from the proposed wind farm site.

Construction Phase Site Facilities

During the construction phase, temporary site compounds will be required and will include a site office and portaloo/chemical toilets in temporary portacabin type buildings. Temporary toilets will be used during the construction phase as part of the welfare facilities for site staff and visitors. Wastewater from toilets will be directed to a sealed storage tank, which will be collected and tankered off site by an appropriately consented waste collector to wastewater treatment plants.

3.1 EROSION AND SEDIMENT CONTROL

It is proposed, that during the ground clearance of the proposed development the contractor will implement water control measures to limit the impact on water quality using standards measures. Suspended solid (silt) removal features will be implemented in accordance with the Construction Industry Research and Information Association (CIRIA) C697 SuDS Manual, and CIRIA C648 Control of water pollution from linear construction projects.

Interceptor drains will be installed up-gradient of all proposed infrastructure to collect clean surface runoff, in order to minimise the amount of runoff reaching areas where suspended sediment could become entrained. These flows will discharge diffusely overland, within the buffer zone before entering any watercourse. Regular cross flow and energy dissipation devices will be installed to divert overland flows and prevent these flows from entering the borrow pits.

All drainage from the proposed wind farm site shall be designed to have as a minimum three stages of treatment, as defined in the SuDS Manual. Management of runoff will include the following:

- Filtration of water through filter media (sand/stone check dam, silt fence);
- Detention/settlement in the surface water settlement ponds or behind check dam in swales; and

- Conveyance of shallow depths of water in vegetated swale.

Drainage drawings are presented in Drawing 20852-NOD-01-XX-DR-C-08002 to 20852-NOD-01-XX-DR -080015.

Check Dams/ Silt fences

Track edge drainage/swales are required to control run-off from the running surface to lower water levels in the subgrade, to control surface water and to carry this flow to outlet points. Swales along internal site access roads are to be installed in advance of the main construction phase. On sections of road where there is significant longitudinal gradient, regular surface water interception channels will be employed – these will typically be at 10–20-meter intervals to collect any surface water that is discharging as sheet flow along the road and discharge the flow into the roadside swale. Track edge drainage/swales are required to control run-off from the running surface to lower water levels in the subgrade, to control surface water and to carry this flow to outlet points. Swales will be re-vegetated by hydro-seeding with indigenous seed mix as soon as is practicable following excavation. This will reduce the flow velocity, treat potential pollutants, increase filtration and silt retention.

Check dams will also be installed in some existing drainage channels that will receive waters from works areas of the site. Check dams will restrict flow velocity, minimise channel erosion and promote sedimentation behind the dam. The check dams will be installed as the interceptor drains are being excavated. Check dams may also be installed in some of the existing field drains on the proposed wind farm site, downstream of where drainage swales connect in to. Check dams will have a minimum 0.2m freeboard (from top of check dam) to top of swale level, to prevent overtopping of flows onto the site access roads. All check dams, etc to be checked at least once weekly via a walkover survey during the period of construction. All excess silts will be removed. Where check dams have become fully blocked with silt, they will be replaced. The following measures will be implemented.

Silt fencing is to be installed in the path of sheet flow runoff to filter our heavy sediments. Silt fences are to be located at the toe of stockpiled areas to reduce sediment transport. Additional silt fencing and emergency spill kits will be kept on the proposed wind farm site for use in emergencies. All silt fencing on the proposed wind farm site will also require regular cleaning and maintenance in accordance with manufactures guidelines. Silt build ups, within settlement ponds, check dams, silt fences are to be removed as required to ensure no carryover/breakthrough of suspended matter downstream in the drainage system. Any sediment removed will be disposed of so as to prevent any reintroduction into the drainage system.

Surface water flow

The swales and surface water settlement ponds will serve to slow water flow and attenuate ammonium and suspended solids concentrations. The sustainable drainage devices will mimic existing runoff in terms of volume, rate of runoff and quality of the runoff. In this case, it is proposed to decrease the quantity of run-off to existing runoff rates by providing surface water settlement ponds. The Surface Water Settlement Pond Plan and Sections are depicted on Drawing No. 11399-2034 (Appendix 1-2 within the EIAR).

All surface water run-off from the proposed wind farm site will pass through the surface water settlement ponds. It is proposed to locate the surface water settlement ponds immediately downstream of the proposed infrastructure, including each hardstand and along all site access roads and amenity tracks.

Temporary Construction Settlement ponds

Run-off arising from the proposed development will discharge into settlement ponds specifically constructed for managing surface water from the construction of the wind farm. Settlement ponds will be located downstream of road swale sections and at turbine/hardstand locations, to manage/buffer volumes of runoff discharging from the drainage system during periods of high rainfall, thereby reducing the hydraulic loading to watercourses.

Temporary settlement ponds will be located as close to the source of sediment as possible while also maintaining the appropriate setback distance from existing watercourses (i.e. 50 m). Temporary settlement ponds will be established during the construction phase along roadways, hardstands and in areas of high construction activity to minimise silt laden run-off entering the drainage network.

Once treated in the settlement pond, the treated surface water will then be allowed to spread across the adjacent cutaway peatland / dispersed across vegetation to further filter the discharge. Dispersal in this manner has the effect of allowing the smaller particle sizes to be taken up and naturally filtered by the vegetation. A typical detail of the proposed settlement ponds is shown on Planning Drawing 11399-2034. Settlement ponds will require regular inspection and cleaning when necessary. This will be carried out under low or zero flow conditions so as not to contaminate the cleaned surface water from the settlement pond and in accordance with the existing IPC license SOP (Standard Operating Procedure). All temporary settlement will be removed post construction. Subject to potential planning permission and associated conditions, and prior to commencement of construction activity, this drainage design (including construction specific measures) will be reviewed by the appointed Contractor.

Works near Watercourses

No instream works are proposed as part of the proposed development. Existing smaller peatland drains will be crossed using normal culverts. Culverts will be of a size adequate to carry expected peak flows i.e., 1: 1:100-year flood events.

Culverts will be installed to conform to the natural slope and alignment of the drainage. Where required, culverts will be buried at an appropriate depth below the channel bed and the original bed material placed in the bottom of the culvert. Embedded culverts should be buried to a depth of 0.3 m or 20% of their height (whichever is greatest) below the bed.

4.0 SURFACE WATER MONITORING

Details of the proposed surface water monitoring during the pre-construction, construction and post-construction phases and maintenance activities are given in this section of the SWMP. No operational phase monitoring is required due to the low risk of contamination.

Records of all monitoring and maintenance activities will be retained by the Contractor for the construction phase.

4.1 RECORDING AND REPORTING

Inspections will be recorded during the construction phase of the proposed development. In the event that pollution indicators are observed, works will cease, and sampling will immediately be undertaken as described for the weekly monitoring, and an investigation of the potential cause will be undertaken by the appointed Contractor.

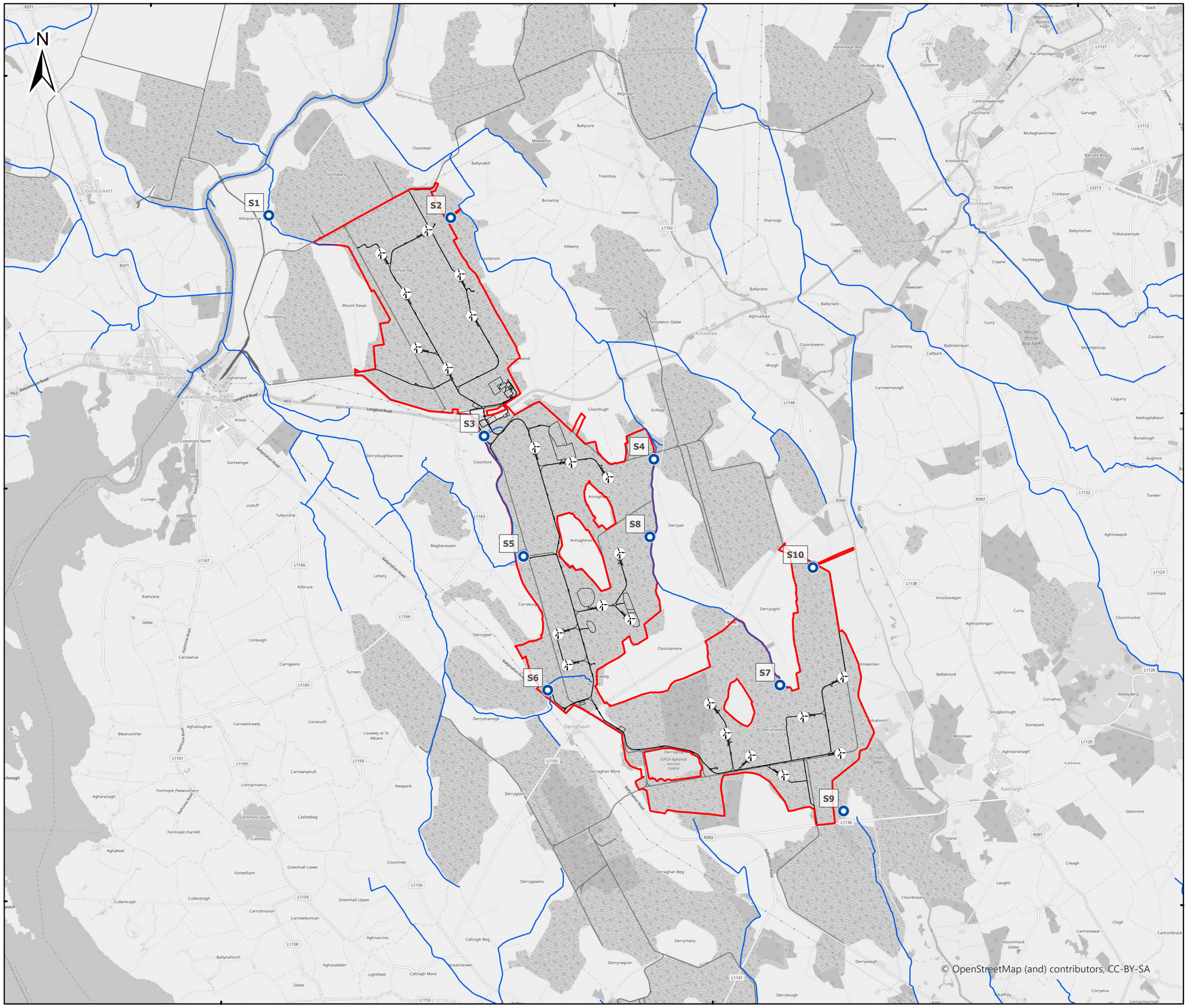
- Where the construction works are identified as the source causing the exceedance, the following details will be recorded (the requirement for this will be included in the SWMP);
- Nature of the impacts and mechanism of pollution;
- Details of the activity identified as causing the incident or, in the event no clear pathway still exists, activities capable of causing the incident and an assessment undertaken as to the most likely source; and
- Details of measures proposed and implemented to ensure that such an incident does not re-occur.

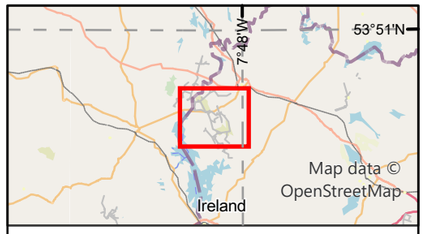
This information will be shared with the Employer and the regulators. Through monitoring and this open and transparent reporting, there is a much-reduced likelihood of a small incident becoming a serious one that may require regulator action; proactively providing this information gives the regulator and Bord na Mona comfort that these issues are taken seriously on the proposed wind farm site and addressed in a professional manner.

4.2 DETAILS OF MONITORING LOCATIONS ON SITE

There are 10 no. surface water monitoring locations (see Figure 4-1) to monitor surface water quality. These points are focussed on areas where turbines are located close to streams/rivers. The proposed monitoring schedule is robust and sufficient for the scale of the proposed development and in line with the relevant guidance. It is discussed below in detail.

8°0'0"W
7°54'0"W
7°48'0"W
53°42'50"N
53°39'40"N
53°36'30"N
601000
608000
769000
762000





Legend

- Proposed wind farm site boundary
- Surface water monitoring locations
- Rivers
- Turbine Layout
- Site Layout

0 1.6 3.2
Kilometres

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING\
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE\
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES\
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev	Date	Description	By	Chkd.
A	13/01/2025	First issue	S.P	J.D

Client: Bord na Móna

Project: Derryadd Wind Farm

Title: Figure 4-1 Surface Water Monitoring locations

Scale @ A3:	1:50,000	
Prepared by:	Checked by:	Date:
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Map Ref: 11399-010-SW.M.L-S.BO-TOB-A

Draft: A

Surface Water Monitoring Schedule

All surface water control measures for the proposed development will be adhered to in accordance with the mitigation measures detailed in Chapter 10 (Hydrology and Hydrogeology) of the EIAR and CEMP (Appendix 3-2 of the EIAR). A surface water monitoring schedule for the construction phase of the proposed development has been developed (See Table 4-1 below) and outlines the selected parameters with their associated trigger limits (See Table 4-2 below), as well as the frequency of monitoring to be completed prior to, during, and at the post construction phase of the proposed development. The discharge is screened primarily against the EPA IPC Licence conditions[2], existing baseline conditions as well as the Surface water regulations[3].

Schedule of Monitoring

The critical water parameters in terms of their potential to cause damage to aquatic life, ecosystems, human health and water quality in the receiving waters are outlined in the surface water monitoring schedule (see Table 4-1 below).

Table 4-1 Surface Water Monitoring Schedule for the Proposed Development

Phase	Pre construction	Construction	Post construction
Monitoring Period	3 Months	24 Months	3 Months
Frequency	Daily		
Surface Water Parameters	Turbidity and visual checks (examination of surface drainage/sediment control measures/watercourses)	Turbidity and visual checks (examination of surface drainage/sediment control measures/watercourses)	Turbidity and visual checks (examination of surface drainage/sediment control measures/watercourses)
Frequency	Weekly		
Surface Water Parameters	pH, Electrical Conductivity, Turbidity, Temperature (Handheld Meter)	pH, Electrical Conductivity, Turbidity, Temperature (Handheld Meter) Monitoring during clearance phase and construction works at Turbines	N/A
Frequency	Monthly		
Surface Water Parameters	Conductivity, Chloride, Dissolved Oxygen, Molybdate Reactive Phosphorus, Mineral Oil, pH, Turbidity,	Conductivity, Chloride, Dissolved Oxygen, Molybdate Reactive Phosphorus, Mineral Oil, pH,	Conductivity, Chloride, Dissolved Oxygen, Molybdate Reactive Phosphorus, Mineral Oil, pH,

[2] EPA Licence P0504-01 Mountdillon Group, Mountdillon Works, Lanesborough, Longford.

[3] S.I. No. 77/2019 - European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2019

	Total Ammonia, Total Phosphorus, Total Suspended Solids (Grab Samples)	Turbidity, Total Ammonia, Total Phosphorus, Total Suspended Solids (Grab Samples)	Turbidity, Total Ammonia, Total Phosphorus, Total Suspended Solids (Grab Samples)
Frequency	Quarterly		
Surface Water Parameters	N/A	Conductivity, Chloride, Dissolved Oxygen, Molybdate Reactive Phosphorus, Mineral Oil, BTEX, pH, Turbidity, Nitrate, Total Ammonia, Total Phosphorus, Total Suspended Solids (Grab Samples)	N/A
Frequency	Pre-Construction Report	Monthly and Quarterly Monitoring Report	Final Monitoring Report
Surface Water Parameters	Upgrade limits/trigger values for construction phase water monitoring	Results screened against construction phase surface water monitoring trigger levels	Results screened against construction phase surface water monitoring trigger levels

Surface water Monitoring Trigger Values

Surface Water Quality Monitoring (SWQM) will be conducted by the appointed contractor in accordance with the monitoring schedule proposed in Table 4-1 above. Prior to the commencement of construction, baseline preconstruction monitoring will be conducted. The results of this monitoring suite will determine the baseline and trigger values for the construction monitoring phase of the proposed development. This will be completed in order to establish if local trigger values are required due to existing water quality exceedances.

The final details of the monitoring schedule will be agreed with the relevant authorities, prior to the commencement of construction. Construction and post construction sampling results will be screened against the agreed trigger values as proposed in Table 4-2, except where local triggers are required.

Table 4-2 Analysis and Proposed Trigger Values (Pre-Construction)

Parameter	Indicative Limits	Units	Source
pH	6-9	pH units	Surface water regulations
Chemical Oxygen Demand	100 mg/l or within preconstruction values	mg/l	EPA Licence limits
Total Ammonia	0.14 mg/l or within preconstruction values	mg/l	Surface water regulations
Total Phosphorus	0.1 mg/l or within preconstruction values	mg/l	Surface water regulations
Total Suspended Solids	35 mg/l or within preconstruction values	mg/l	EPA Licence limits

Conductivity	1,000 µS/cm or within preconstruction values	µS/cm	Based on existing surface water quality
BTEX	<0.005 mg/l	mg/l	Based on existing surface water quality
Mineral Oil	10 µg/l or within pre construction values	µg/l	Based on existing surface water quality

Field measurements will be taken by the contractor on a weekly basis during the main earthworks phase of the construction period. In addition, daily visual inspections of the surface drainage and sediment control measurements and the watercourses will be completed. Daily turbidity monitoring will also be undertaken on the proposed wind farm site. Indicators that show evidence of water quality issues include the following and will be noted.

- Changes in water quality; and
- Changes in water transparency.

In-situ field monitoring will also be conducted during major rainfall events i.e., 15 mm in a 6-hour period. The Environmental Manager will undertake monitoring during the rainfall events.

Laboratory samples will be taken on a monthly basis during construction as shown in Table 4-1.

Surface Water Quality Monitoring Locations

Monitoring will be undertaken at 10 no. locations around the site (see Figure 4-1). The proposed monitoring for the construction phase will be completed at the following locations along the following streams.

- SM1 – Shannon (Upper)_100
- SM2 –Ballynakill_010
- SM3 – Lough Bannow Stream_010
- SM4 – Ballynakill_010
- SM5 – Lough Bannow Stream_010
- SM6 – Lough Bannow Stream_010
- SM7 – Ballynakill_010
- SM8 - Ballynakill_010
- SM9 -Ledwithstown_010
- SM10 - Ballynakill_010

Monitoring records should include the date and time of the monitoring period and relate to the relevant consent conditions, where applicable. A written log of the environmental performance of the works will be maintained. A monthly monitoring report on the findings of the monitoring exercises will be prepared within two weeks of receipt of analytical results. The monthly monitoring reports will cover the construction and post construction works.

Proposed Monitoring Frequency and Parameters

4.2.1.1 Pre-Construction Monitoring

It is proposed that the surface water monitoring will be scheduled in conjunction with the pre-construction stage. Continuous turbidity monitoring will be undertaken upgradient and downgradient on the four WFD rivers.

4.2.1.2 Construction Phase Monitoring

Surface water monitoring will be undertaken daily during the construction phase of the proposed development. The daily monitoring will include for a site walk around, visual inspection of the watercourses and field measurements for turbidity to be undertaken as required and, as a minimum, on a weekly basis. Weekly surface water monitoring will take place as per the daily surface water inspection and will include for a routine weekly measurement of turbidity at the surface water locations.

Monthly surface water samples will be collected during the construction phase of the proposed development and laboratory analysis will be undertaken for those monitoring parameters included in Table 4-2 of this SWMP.

4.2.1.3 Operational Monitoring (Post-Construction)

During the operational phase of the proposed wind farm, annual surface water samples will be collected, and laboratory analysis will be undertaken for those monitoring parameters included in Table 4-2 of this SWMP.

Trigger Values

The trigger values for the surface water monitoring programme are those listed in Table 4-2 of this SWMP and where relevant Surface Water Quality standards given in the Surface Water (Environmental Objectives) Regulations S.I. 272 of 2009, or as otherwise agreed with the Planning Authority in consultation with Inland Fisheries Ireland where required. Refer to Table 4-3.

An Environmental Manager will be engaged for construction phase monitoring. Should the trigger values not be met, the Environmental Manager will have 'Stop Works Authority' to direct the contractor's construction manager to cease all works and activities on the proposed wind farm site pending further instruction.

Table 4-3 Proposed Surface Water Parameters and Trigger Values

		Proposed Trigger Values	SI No. 77 of 2019 EU Surface Water Environmental Objective Regulations	EPA Licence P0504-01
Parameter	Units	Standard	Standard	Standard
Electrical Conductivity (EC)	µS/cm	1,000	NA	NA

		Proposed Trigger Values	SI No. 77 of 2019 EU Surface Water Environmental Objective Regulations	EPA Licence P0504-01
pH	pH units	>4.5 and <9	Soft Water 4.5< pH < 9.0	NA
MRP	mg/l	0.025 (mean – high status) 0.035 (mean- good status)	0.025 (mean – high status) 0.035 (mean- good status)	NA
Dissolved Inorganic Nitrogen as N	mg/l	2.6	2.6	NA
Total Suspended Solids	mg/l	35		35
BOD Unfiltered	mg/l	<5	<2.6 (95%ile) good status <2.2 (95%ile) high status	NA
COD Unfiltered	mg/l	100	NA	100
Magnesium	mg/l	Natural Background	NA	NA
Calcium	mg/l	Natural Background	NA	NA
Sulphate	mg/l	200	200	NA
Total Inorganic Carbon	mg/l	No abnormal change	NA	NA
Total Organic Carbon	mg/l	No abnormal change	NA	NA
Total Alkalinity as $CaCO_3$	mg/l	No abnormal change	NA	NA
Hydroxide Alkalinity as $CaCO_3$	mg/l	No abnormal change	NA	NA

4.3 MAINTENANCE ACTIVITIES

Construction Phase

Settlement ponds will be regularly cleaned/maintained to provide effective and successful operation throughout the works. Outfalls and ditches should be cleaned, when required, starting up stream with the outfalls blocked temporarily prior to cleaning. Settlement pond management will also include the following:

- Sediment/silt removed via the contractor from ponds is to be disposed of at suitable locations on the proposed wind farm site, away from watercourses. Machine access is required to enable the accumulated sediment to be excavated.
- Settlement pond maintenance and/or cleaning will not take place during periods of extended heavy rain. Settlement ponds will be clearly marked for safety.
- Settlement ponds will be constructed on even ground and not on sloping ground and where possible will discharge into vegetation areas to aid dispersion.
- The settlement ponds will be monitored closely over the construction timeframe to ensure that they are operating effectively.

Operation Phase

Ongoing monitoring will be undertaken as part of the IPC licence P0504-01[4]. During the operational phase impediments to flows can generally occur as a result from blockages to watercourse crossings, ditches and watercourses themselves, resulting from vegetation and erosion debris. The surface water infrastructure will be maintained by the operator through the lifetime of the planning permission.

Decommissioning Phase

A review of the relevant guidelines will be undertaken prior to the decommissioning phase. The operational phase surface water management infrastructure will be utilised for the decommissioning phase. The operational road layout will remain in place and therefore limit the potential for siltation during the decommissioning phase. Water quality measures as outlined in Section 3 will be implemented.

5.0 CONCLUSION

This Surface Water Management Plan, as designed, will ensure that all water generated during the construction works will be collected and treated before being dispersed overland to the downstream watercourses. The attenuation system will ensure that there will be no increase in flow rates downstream and consequently there will be no increase in flood risk downstream of the site as a result of the proposed development.

[4] [4] EPA Licence P0504-01 Mountdillon Group, Mountdillon Works, Lanesborough, Longford.