APPENDIX 9-5

WATER FRAMEWORK DIRECTIVE ASSESSMENT

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WATER FRAMEWORK DIRECTIVE ASSESSMENT
PROPOSED GLENARD WIND FARM, CO. DONEGAL

FINAL REPORT

Prepared for:

FUTURENERGY GLENARD DAC

Prepared by:

HYDRO-ENVIRONMENTAL SERVICES

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1. INTRODUCTION

1.1 BACKGROUND

Hydro-Environmental Services (HES) were requested by MKO, on behalf of FuturEnergy Glenard DAC, to complete a Water Framework Directive (WFD) Compliance Assessment for a planning application for a proposed wind farm and grid connection development at Glenard, Co. Donegal. The proposed development comprises a 15 no. turbine windfarm, underground grid connection and all associated site development works.

The purpose of this WFD assessment is to determine if any specific components or activities associated with the proposed wind farm development will compromise WFD objectives or cause a deterioration in the status of any surface water or groundwater body and/or jeopardise the attainment of good surface water or groundwater status . This assessment will determine the water bodies with the potential to be impacted, describe the proposed mitigation measures and determine if the project is in compliance with the objectives of the WFD.

This WFD Assessment is intended to supplement the EIAR submitted as part of the wind farm planning application.

1.2 STATEMENT OF AUTHORITY

Hydro-Environmental Services (HES) are a specialist hydrological, hydrogeological and environmental practice that delivers a range of water and environmental management consultancy services to the private and public sectors across Ireland and Northern Ireland. HES was established in 2005, and our office is located in Dungarvan, County Waterford. We routinely complete impact assessments for hydrology and hydrogeology for a large variety of project types including wind farms.

This WFD assessment was prepared by David Broderick and Michael Gill.

David Broderick (BSc, H. Dip Env Eng, MSc) is a hydrogeologist with over 13 years' experience in both the public and private sectors. Having spent two years working in the Geological Survey of Ireland working mainly on groundwater and source protection studies David moved into the private sector. David has a strong background in groundwater resource assessment and hydrogeological/hydrological investigations in relation to developments such as quarries and wind farms. David has completed numerous geology and water sections for input into EIARs for a range of commercial developments. David has worked on the EIS/EIARs for Derrykillew WF, Croagh WF, and Oweninny WF, and over 60 other wind farm related projects across the country.

Michael Gill (P. Geo., B.A.I., MSc, Dip. Geol., MIEI) is an Environmental Engineer with over 18 years' environmental consultancy experience in Ireland. Michael has completed numerous hydrological and hydrogeological impact assessments of wind farms in Ireland. He has also managed EIAR assessments for infrastructure projects and private residential and commercial developments. In addition, he has substantial experience in wastewater engineering and site suitability assessments, contaminated land investigation and assessment, wetland hydrology/hydrogeology, water resource assessments, surface water drainage design and SUDs design, and surface water/groundwater interactions. For example, Michael has worked on the EIS/EIARs for Slievecallan WF, Cahermurphy (Phase I & II) WF, Carrownagowan WF, and Croagh WF and over 100 other wind farm related projects across the country.

1.3 WATER FRAMEWORK DIRECTIVE

The EU Water Framework Directive (2000/60/EC), as amended by Directives 2008/105/EC, 2013/39/EU and 2014/101/EU ("**WFD**"), was established to ensure the protection of the water environment. The Directive was transposed in Ireland by the European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003).

The WFD requires that all member states protect and improve water quality in all waters, with the aim of achieving good status by 2027 at the latest. Any new development must ensure that this fundamental requirement of the WFD is not compromised.

The WFD is implemented through the River Basin Management Plans (RBMP) which comprises a six-yearly cycle of planning, action and review. RBMPs include identifying river basin districts, water bodies, protected areas and any pressures or risks, monitoring and setting environmental objectives. In Ireland the first RBMP covered the period from 2010 to 2015 with the second cycle plan covering the period from 2018 to 2021.

The River Basin Management Plan (2018 - 2021) objectives, which have been integrated into the design of the proposed wind farm development, include:

- Ensure full compliance with relevant EU legislation;
- Prevent deterioration and maintain a 'high' status where it already exists;
- Protect, enhance and restore all waters with aim to achieve at least good status by 2027;
- Ensure waters in protected areas meet requirements; and,
- Implement targeted actions and pilot schemes in focused sub-catchments aimed at (1) targeting water bodies close to meeting their objectives and (2) addressing more complex issues that will build knowledge for the third cycle.

Our understanding of these objectives is that water bodies, regardless of whether they have 'Poor' or 'High' status, should be treated the same in terms of the level of protection and mitigation measures employed.

We note that the River Basin Management Plan 2022-2027 is out for public consultation presently, and that closes in March.

2. WATERBODY IDENTIFICATION CLASSIFICATION

2.1 INTRODUCTION

This section identifies those surface water and groundwater bodies with potential to be affected by the proposed development and reviews any available WFD information.

2.2 SURFACE WATERBODY IDENTIFICATION

Regionally the proposed wind farm site including the grid connection are located in the Lough Swilly surface water catchment (IE39_02) within Hydrometric Area 21 of the North Western International River Basin District (NWIRBD). Lough Swilly is located between 9 and 13km downstream of the proposed development.

Turbine Delivery Route (TDR) works, which includes the 2 no. link roads at the L1731, are located in the Culdaff – Clonmany – Donagh coastal regional catchment. This regional catchment is also located within the NWIRBD.

On a more local scale, the northern half (~61% of the EIAR study area) of the wind farm site (including 9 no. of the proposed 15 no. turbines) is located in the Crana River surface water catchment (Crana_SC_10). The southern half (~36% of the EIAR study area) of the wind farm site (including 6 no. of the proposed 15 no. turbines, substation and the grid connection cable) is located in the Owenkillew/Mill River surface water catchment (Burnfoot_SC_10). Both the Crana River and the Mill River drain to Lough Swilly which is a transitional waterbody.

The TDR works drain locally to the Cabry River surface water catchment (BogstownRiver_SC_010) and the Donagh River catchment (Glennagannon_SC_010).

Figure A below is a local hydrology map of the area.

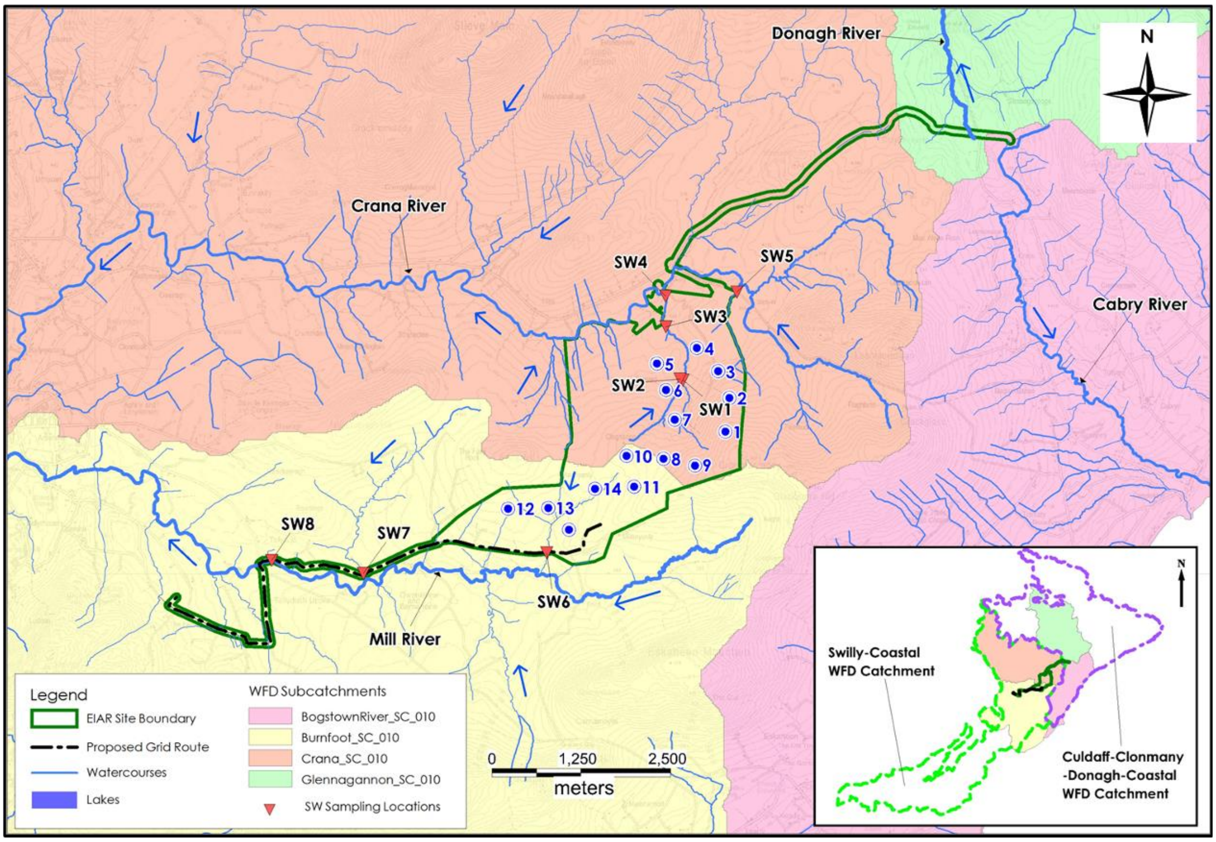

Figure A: Local Hydrology Map

2.3 SURFACE WATER BODY CLASSIFICATION

A summary of the WFD status and risk result for Surface Water Bodies (SWBs) downstream of the proposed development are shown in **Table A**.

Local Groundwater Body (GWB) and Surface water Body (SWB) status information is available from (www.catchments.ie).

The southern section of the Proposed Development site, including the grid connection, drains to the Mill(Donegal)_010 surface water body (includes the Pollandoo Burn and the Owenkillew River) which achieved 'High' status under the WFD 2013-2018. The middle and lower reaches of the Owenkillew River and the Mill River (referred to as the Mill(Donegal)_020) only achieved 'Poor' status.

The entire Crana River catchment and the Donagh River catchment only achieved 'Poor' status under the WFD 2013-2018 while the Cabry River catchment achieved "Moderate" status.

In terms of the WFD Risk third cycle, the only watercourse to be assigned "Not At Risk" are the upper reaches of the Owenkillew/Mill River and the Pollandoo Burn which are collectively referred to as Mill(Donegal)_010). All other rivers (including the Mill River, Crana River, Cabry River and Donagh River are assigned "At Risk".

Transitional waterbodies downstream of the Proposed Development include the Crana Estuary (IE_NW_220_0400) and this is currently unassigned (i.e., has no current WFD status).

The SWB status for the 2013-2018 WFD cycle are shown on **Figure B.**

Table A: Summery WFD Information for River Water Bodies

SWB	Overall Status	Risk Status	Pressures
Mill(Donegal)_010	High	Not At Risk	-
Mill(Donegal)_020	Poor	At Risk	Hydromorphology
Crana_010	Poor	At Risk	Extractive Industry
Crana_020	Poor	At Risk	Extractive Industry
Crana_030	Poor	At Risk	Extractive Industry
Cabry_010	Moderate	At Risk	River Waste Pressures
Donagh_010	Poor	At Risk	Agriculture
Donagh_020	Poor	At Risk	Agriculture
Donagh_030	Poor	At Risk	Agriculture

2.4 GROUNDWATER BODY IDENTIFICATION

According to data from the GSI database and bedrock geology series (www.gsi.ie), the Proposed Development site is underlain by a Poor Aquifer (Bedrock which is Generally Unproductive except for Local Zones), which consists of Precambrian Quartzites, Gneisses & Schist bedrock.

The Lough Swilly GWB (IE_NW_G_059) underlies most (~98.5%) of the Proposed Development site (including the wind farm site and grid connection). A section of the TDR works on the far northeast of the Proposed Development site is located in the East Inishowen GWB (IEGBNI_NW_G_050) (~1.5%). These GWBs comprise mainly of Precambrian Quartzites, Gneisses & Schist bedrock.

The GWB status for the 2013-2018 WFD cycle are shown on **Figure B.**

2.5 GROUNDWATER BODY CLASSIFICATION

Both the Lough Swilly GWB (IE_NW_G_059) and East Inishowen GWB (IEGBNI_NW_G_050) are assigned 'Good Status', which is defined based on the quantitative status and chemical status of the GWB.

Both GWBs are "not at risk" of failing to meet "Good" status in the next WFD cycle. No significant pressures have been identified to be impacting on these GWBs.

Table B: Summary WFD Information for Groundwater Bodies

GWB	Overall Status	Risk Status	Pressures
Lough Swilly	Good	Not at risk	-
East Inishowen GWB	Good	Not at risk	-

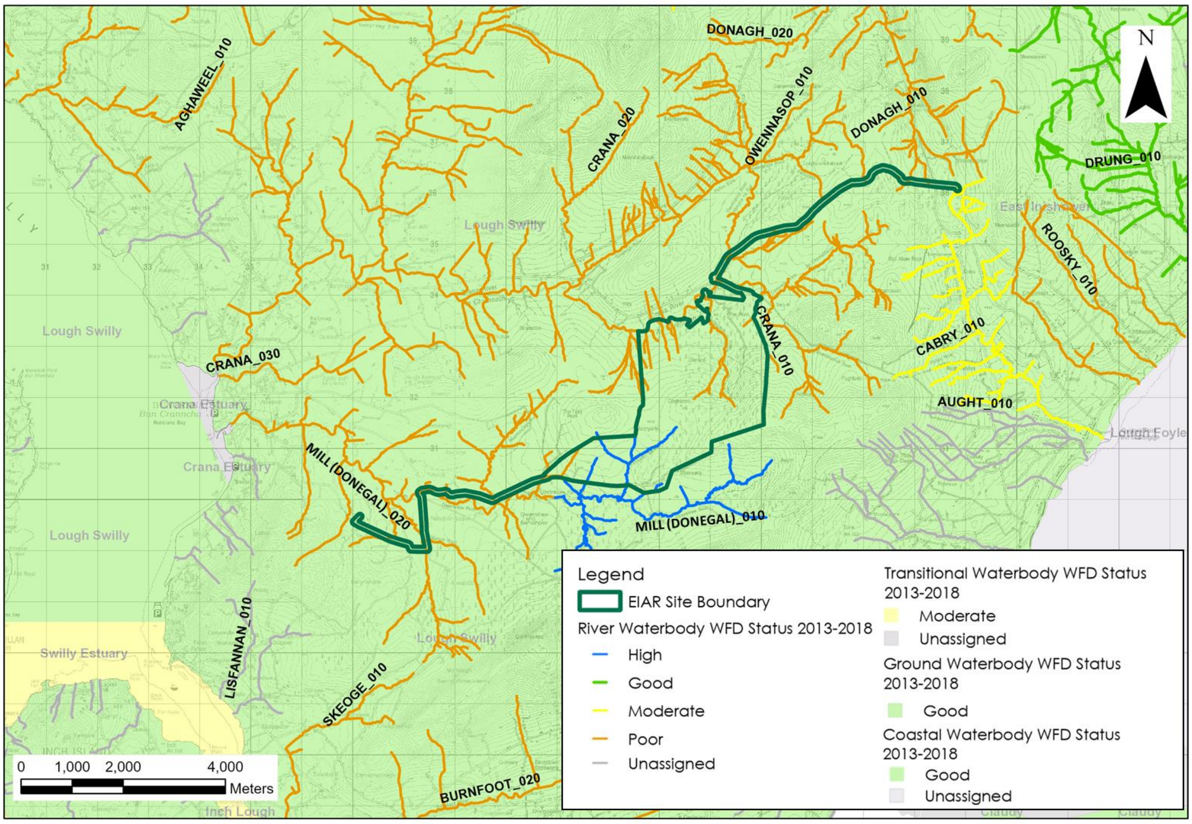

Figure B: WFD Groundwater and Surface Waterbody Status (2013-2018)

3. WFD SCREENING

As discussed in **Section 2**, there are a total of 9 no. river water bodies that are located in the vicinity or downstream of the proposed development site. In addition, 2 no. groundwater bodies underlie the proposed development site and 1 no. transitional waterbody is located downstream.

3.1 SURFACE WATER BODIES

As shown in **Figure A** above, there are 9 no. river water bodies located in the vicinity or downstream of the proposed development site.

With consideration for the construction, operational and decommissioning phases of the proposed development, it is considered that all sections of the Owenkillew (Mill) and Crana Rivers in the vicinity and downstream of the site are carried through into the WFD Impact Assessment.

Due to proposed development works within the Cabry and Donagh river sub-catchments being limited to relatively minor TDR works (i.e., largely along existing public roads), all identified river water bodies (4 no.) within these sub-catchments have been scoped out for further assessment as the proposed development has no potential to cause a deterioration in status of any surface water or groundwater body and/or jeopardise the attainment of good surface water or groundwater status.

The Crana Estuary transitional waterbody has been screened out due to its distal location from the proposed development site, the large volumes of water within these surface waterbodies and the saline nature of these waters. The Crana Estuary is also unassigned with regard status. Irrespective of the condition of the waterbody if it was categorised, the proposed development will not cause it to deteriorate and will not in any way prevent it meeting the biological and chemical characteristics for good status.

3.2 GROUNDWATER BODIES

With respect to groundwater bodies, The East Inishowen GWB (IEGBNI_NW_G_050) has been scoped out due to the fact that a negligible area of the proposed development site (1.5%) is located inside the GWB, and the works over this GWB are limited to relatively minor TDR works and those occur largely along existing public roads. Therefore, these works have no potential to cause a deterioration in status of the groundwater body and/or jeopardise the attainment of good groundwater status.

The majority of the proposed development site (98.5%) is located in the Lough Swilly GWB (IE_NW_G_059) and is therefore carried through into the WFD Impact Assessment. All the proposed 15 no. turbines and grid connection are located over the Lough Swilly GWB.

3.3 WFD SCREENING SUMMARY

A summary of WFD Screening discussed above is shown in **Table C**.

Table C: Screening of WFD water bodies located within the study area

Type	WFD Classification	Waterbody Name/ID	Inclusion in Assessment	Justification
Surface Water Body	River	Mill(Donegal)_010 & Mill(Donegal)_020	**Yes**	The proposed development is located within the catchment of the Owenkillew (Mill) River. An assessment is required to consider potential impacts of the proposed development on this waterbody.
	River	Crana_010, Crana_020 and Crana_030	**Yes**	The proposed development is located within the catchment of the Crana River. An assessment is required to consider potential impacts of the proposed development on this waterbody
	River	Cabry_010	No	The Cabry_010 waterbody has been screened out due to the fact that works within the river water body are limited to relatively minor TDR works that are largely along existing public roads.
	River	Donagh_010, Donagh_020 & Donagh_030	No	The Donagh waterbodies have been screened out due to the fact that works within the river water body are limited to relatively minor TDR works that are largely along existing public roads.
	Transitional	Crana Estuary	No	Screened out due to distal location, saline nature and large area of this coastal waterbody.
Groundwater Body	Groundwater	Lough Swilly GWB	**Yes**	All of the 15 no. turbines and grid connection immediately overlies this groundwater body. An assessment is required to consider potential impacts of the proposed development to this GWB.
	Groundwater	The East Inishowen GWB	No	Groundwater body has been screened out due to the fact that works within the water body are limited to relatively minor TDR works, that are largely along existing public roads.

4. WFD COMPLIANCE ASSESSMENT

4.1 PROPOSALS

The proposed development includes 15 no. turbines, underground grid connection (8.4km), borrow pit, 110kv substation, temporary construction compounds (2 no.), met mast, spoil repository, new and upgraded access roads, TDR works and all associated site development works including tree felling, drainage infrastructure and landscaping.

Due to the nature of wind farm developments (and associated grid connections and TDR works), being near surface construction activities, impacts on groundwater are generally negligible and surface water is generally the main sensitive receptor assessed during impact assessments. The primary risks to groundwater at the site will be from cementitious materials, hydrocarbon spillage and leakages, and potential piling works.

The primary risk to surface waters will be entrained suspended sediments (peat and soil particles) in site runoff during earthworks and tree felling along with cement-based compounds.

The proposed development includes works over and in close proximity to waterbodies. There are a number of potential adverse effects to both surface and groundwater.

The primary risks of degradation of surface water bodies include:
- Changes in surface runoff flow volumes and flow patterns;
- Entrainment of suspended solids in surface waters; and,
- Chemical pollution of surface waters by concrete, oil and or fuels.

The primary risks of degradation of groundwaters include:
- Chemical pollution of groundwaters by concrete, oils and fuels.

4.2 POTENTIAL EFFECTS

4.2.1 Construction Phase (Unmitigated)

4.2.1.1 Potential Surface Water Quality Impacts during Earthworks and Tree Felling

Construction phase activities including tree felling, site levelling/construction and building turbine foundation excavation and the borrow pit will require earthworks resulting in removal of vegetation cover and excavation of peat, soil and subsoils. The main risk will be from surface water runoff from bare soil/peat, spoil storage areas and borrow pit drainage/dewatering during construction works.

Hydrocarbons and cement-based compounds will also be used during the construction phase.

These activities can result in the release of suspended solids and pollutants in runoff water and could result in an increase in the suspended sediment load, resulting in increased turbidity, increased pH and contamination which in turn could affect the water quality and fish stocks of downstream water bodies such as the Owenkillew (Mill) and Crana River.

A summary of potential status change to SWBs arising from surface water quality impacts from earthworks during the construction phase of the proposed development in the unmitigated scenario are outlined in **Table D**.

Table D: Surface Water Quality Impacts during Construction Phase (Unmitigated)

SWB	WFD Code	Current Status	Assessed Potential Status Change
Mill(Donegal)_010	IE_NW_39M020050	High	Moderate
Mill(Donegal)_020	IE_NW_39M020300	Poor	Poor
Crana_010	IE_NW_39C020100	Poor	Poor
Crana_020	IE_NW_39C020300	Poor	Poor
Crana_030	IE_NW_39C020500	Poor	Poor

4.2.1.2 Groundwater Quality Impacts

Accidental spillage during refuelling of construction plant with petroleum hydrocarbons is a major pollution risk to groundwater. The accumulation of small spills of fuels and lubricants during routine plant use can also be a pollution risk. Chemicals such as cement-based compounds also pose a threat to the groundwater environment. Runoff from concrete works can impact on groundwater quality.

These sources of contamination have the potential to impact on groundwater quality in the underlying groundwater body.

A summary of potential status change to GWBs arising from potential groundwater quality impacts during the construction phase of the proposed development in the unmitigated scenario are outlined in **Table E**.

Table E: Groundwater Quality Impacts during Construction Phase (Unmitigated)

GWB	WFD Code	Current Status	Assessed Potential Status Change
Lough Swilly GWB	IE_NW_G_059	Good	Moderate

4.2.2 Operational Phase (Unmitigated)

4.2.2.1 Increased Site Runoff and Hydromorphology Effects on River Water Bodies

Progressive replacement of the soil, peat or vegetated surface with impermeable surfaces could potentially result in an increase in the proportion of surface water runoff reaching the surface water drainage network. This could potentially increase runoff from the site and increase flood risk downstream of the development. In reality, the access roads will have a higher permeability than the underlying peat.

During storm rainfall events, additional runoff coupled with increased velocity of flow could increase hydraulic loading, resulting in erosion of watercourses and causing hydromorphological effects.

A summary of potential status change to SWBs arising from increased runoff during the operation stage of the proposed development in the unmitigated scenario are outlined in **Table F**.

Table F: Potential Impact on Surface Water Flows during Operational Phase (Unmitigated)

SWB	WFD Code	Current Status	Assessed Potential Status Change
Mill(Donegal)_010	IE_NW_39M020050	High	Moderate
Mill(Donegal)_020	IE_NW_39M020300	Poor	Poor
Crana_010	IE_NW_39C020100	Poor	Poor
Crana_020	IE_NW_39C020300	Poor	Poor
Crana_030	IE_NW_39C020500	Poor	Poor

4.2.2.2 Surface Water Quality Impacts from Operational Site Drainage

During the operational phase, the potential for silt-laden runoff is much reduced compared to the construction phase. In addition, all permanent drainage controls will be in place and the disturbance of ground and excavation works will be complete. Some minor maintenance works may be completed, such as maintenance of site entrances, internal roads and hardstand areas. These works would be of a very minor scale and would be very infrequent. Potential sources of sediment laden water would only arise from surface water runoff from small areas where new material is added during maintenance works

A summary of potential status change to SWBs arising from surface water quality impacts during the operation stage of the proposed development in the unmitigated scenario are outlined in **Table G**.

Table G: Surface Water Quality Impacts during Operational Phase (Unmitigated)

SWB	WFD Code	Current Status	Assessed Potential Status Change
Mill(Donegal)_010	IE_NW_39M020050	High	High
Mill(Donegal)_020	IE_NW_39M020300	Poor	Poor
Crana_010	IE_NW_39C020100	Poor	Poor
Crana_020	IE_NW_39C020300	Poor	Poor
Crana_030	IE_NW_39C020500	Poor	Poor

4.3 MITIGATION MEASURES

In order to mitigate against the potential negative effects on surface and groundwater quality, quantity and flow patterns, mitigation measures will be implemented during the construction and operational phases of the proposed development. These are outlined below.

4.3.1 Construction Phase

4.3.1.1 Mitigation Measures to Protect Surface Water Quality

A suite of general SuDs drainage controls available for surface water management are summarised (along with their application) in **Table H** below. These include avoidance controls, source controls, in-line controls, water treatment controls, and outfall controls.

Table H: Summary of Drainage Mitigation & their Application

Management Type	Description of SuDs drainage control method	Applicable Works Area
Avoidance Controls:	• Application of 50m 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, vee-drains, diversion drains, flumes and culvert pipes.	Construction work areas where sediment is being generated.
	• Using small working areas; • Covering stockpiles; • Weathering off / sealing stockpiles and promoting vegetation growth.	Stockpiles areas
In-Line Controls:	• Interceptor drains, vee-drains, oversized swales/collector drains; • Erosion and velocity control measures such as: o sand bags; o oyster bags filled with gravel; o filter fabrics; o straw bales; o flow limiters; o weirs or baffles; o and/or other similar/equivalent or appropriate systems. • Silt fences, filter fabrics; • Collection sumps, temporary sumps, pumping systems; • Attenuation lagoons; • Sediment traps, stilling / settlement ponds.	Interceptor and collection drainage systems
Water Treatment Controls:	• Temporary sumps; • Attenuation ponds; • Temporary storage lagoons; • Sediment traps, Stilling / Settlement ponds, silt bags; • Proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems.	Surface water treatment locations
Outfall Controls:	• Levelspreaders; • Buffered outfalls; • Vegetation filters; • Silt bags; • Flow limiters and weirs.	Drainage run outfalls and overland discharge points

Each element of the wind farm development (*i.e.*, access roads, turbines, borrow pit and peat repository) will have an array of drainage control measures to ensure protection of downstream watercourses. To summarise the proposed wind farm drainage proposals, process flow diagrams showing each element of system are attached in **Appendix I.**

What the diagrams show is that surface water quality protection is not reliant on just one element of the proposed drainage management system. Each drainage control element is not stand alone but occurs as part of a treatment train of control systems (i.e., check dams, silt traps, settlement ponds etc).

4.3.1.2 Mitigation Measures to Protect Groundwater Quality

The potential pollution of groundwater during the construction phase will be mitigated by the provision of appropriate controls and working methods. These include best practice methods for storage and handling of fuels and chemicals and include:

- On site re-fuelling of machinery will be carried out using a mobile double skinned fuel bowser.
- The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled off site, and will be towed around the site by a 4x4 jeep to where machinery is located.
- The 4x4 jeep will also carry fuel absorbent material and pads in the event of any accidental spillages.
- The fuel bowser will be parked on a level area in the construction compound when not in use and only designated trained and competent operatives will be authorised to refuel plant on site.
- Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations;
- Onsite refuelling will be carried out by trained personnel only;
- A permit to fuel system will be put in place;
- Taps, nozzles or valves associated with refuelling equipment will be fitted with a lock system;
- All fuel storage areas will be bunded appropriately for the duration of the construction phase. All bunded areas will be fitted with a storm drainage system and an appropriate oil interceptor. Ancillary equipment such as hoses, pipes will be contained within the bunded area;
- Fuel and oil stores including tanks and drums will be regularly inspected for leaks and signs of damage;
- The electrical control building (at the substation) will be bunded appropriately to the volume of oils likely to be stored and to prevent leakage of any associated chemicals to groundwater or surface water. The bunded area will be fitted with a storm drainage system and an appropriate oil interceptor;
- The plant used during construction will be regularly inspected for leaks and fitness for purpose; and,
- An emergency plan for the construction phase to deal with accidental spillages is included within the Construction and Environmental Management Plan;
- Spill kits will be available to deal with any accidental spillage in and outside the re-fuelling area.

Wastewater

- During the construction phase, a self-contained port-a-loo with an integrated waste holding tank will be used at each of the site construction compounds, maintained by the providing contractor, and removed from site on completion of the construction works;

- Water supply for the site office and other sanitation will be brought to site and removed after use from the site to be discharged at a suitable off-site treatment location; and,
- No water or wastewater will be sourced on the site, nor discharged to the site.

Best practice methods for cement-based compounds:

- No batching of wet-concrete products will occur on site. Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place;
- Where possible pre-cast elements for culverts and concrete works will be used;
- Where concrete is delivered on site, only the chute will be cleaned, using the smallest volume of water practicable. No discharge of concrete contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed. Chute cleaning water will be undertaken at lined concrete washout ponds;
- Weather forecasting will be used to plan dry days for pouring concrete; and,
- The pour site will be kept free of standing water and plastic covers will be ready in case of sudden rainfall event.

4.3.2 Operational Phase

4.3.2.1 Increased Site Runoff and Hydromorphology Effects

The operational phase drainage system of the Proposed Development will be installed and constructed in conjunction with the road and hardstanding construction work as described below:

- 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. It will then be directed to areas where it can be re-distributed over the ground by means of a level spreader;
- Swales/road-side drains will be used to collect runoff from access roads and turbine hardstanding areas of the site, likely to have entrained suspended sediment, and channel it to settlement ponds for sediment settling;
- On steep sections of access road transverse drains (‘grips’) will be constructed in the surface layer of the road to divert any runoff off the road into swales/road side drains;
- Check dams will be used along sections of access road drains to intercept silts at source. Check dams will be constructed from a 4/40mm non-friable crushed rock;
- Settlement ponds, emplaced downstream of road swale sections and at turbine locations, will buffer volumes of runoff discharging from the drainage system during periods of high rainfall, by retaining water until the storm hydrograph has receded, thus reducing the hydraulic loading to watercourses; and,
- Settlement ponds have been designed in consideration of the greenfield runoff rate.

4.3.2.2 Mitigation Measures to Protect Surface Water Quality

The mitigation measures to protect against poor quality runoff during the operational phase of the proposed development are the same as those outlines in **Section 4.3.2.1** above.

Mitigation measures for oils and fuels during the operational phase of the proposed development are the same as those outlines in **Section 4.3.1.2** above.

4.3.2.3 Mitigation Measures to Protect Groundwater Quality

It is proposed to manage wastewater from the staff welfare facilities in the control buildings by means of a sealed storage tank, with all wastewater being tankered off site by permitted waste collector to wastewater treatment plants.

4.3.1 Decommissioning Phase

The potential impacts associated with decommissioning of the proposed development will be similar to those associated with construction but of a reduced magnitude, due to the reduced scale of the proposed decommissioning works in comparison to construction phase works.

During decommissioning, it will be possible to reverse or at least reduce some of the potential effects caused during construction, and to a lesser extent operation, by rehabilitating constructed areas such as turbine bases and hard standing areas. This will be done by covering with vegetation to encourage vegetation growth and reduce run-off and sedimentation.

The wind farm site roadways will be kept and maintained following decommissioning of the wind farm infrastructure, as these will be utilised by ongoing forestry works and by other participating landowners.

The electrical cabling connecting the site infrastructure to the on-site substation will be removed, while the ducting itself will remain in-situ rather than excavating and removing it, as this is considered to have less of a potential environmental impact, in terms of soil exposure, and thus on the possibility of the generation of suspended sediment which could enter nearby watercourses.

The turbines will be removed by disassembling them in a reverse order to their erection. This will be completed using the same model cranes as used in their construction. They will then be transported off-site along their original delivery route. The disassembly and removal of the turbines will not have an impact on the hydrological/hydrogeological environment at the wind farm site.

Other impacts such as possible soil compaction and contamination by fuel leaks will remain but will be of reduced magnitude than the construction phase because of the smaller scale of the works and reduced volumes on-site. Similar mitigation as outlined in Sections 4.3.1.1 and 4.3.1.2 for the construction stage will be implemented during the decommissioning phase to ensure no impacts of receiving waters.

Some of the potential impacts of water bodies will be avoided by leaving elements of the proposed development in place where appropriate. The substation will be retained by EirGrid as a permanent part of the national grid. The turbine bases will be rehabilitated by covering with local topsoil/peat in order to regenerate vegetation which will reduce runoff and sedimentation effects. Mitigation measures to avoid contamination by accidental fuel leakage and compaction of soil by on-site plant will be implemented as per the construction phase mitigation measures.

With the implementation of the mitigation measures outlined above no significant effects on the hydrological and hydrogeological environment will occur during the decommissioning stage of the proposed development

4.3.2 Potential Effects with the Implementation of Mitigation

In all instances, the mitigation measures described in **Section 4.3** are sufficient to meet the WFD Objectives. The assessment of WFD elements for the WFD waterbodies is summarised in **Table I** below.

Table I: Summary of WFD Status for Unmitigated and Mitigated Scenarios

WFD Element	WFD Code	Current Status	Assessed Status – Unmitigated	Assessed Status – with Mitigation Measures
Mill(Donegal)_010	IE_NW_39M020050	High	Moderate	High
Mill(Donegal)_020	IE_NW_39M020300	Poor	Poor	Poor
Crana_010	IE_NW_39C020100	Poor	Poor	Poor
Crana_020	IE_NW_39C020300	Poor	Poor	Poor
Crana_030	IE_NW_39C020500	Poor	Poor	Poor
Lough Swilly GWB	IE_NW_G_059	Good	Moderate	Good

5. SUMMARY AND CONCLUSION

5.1 SUMMARY

WFD status for SWBs (Surface Water Bodies) and GWBs (Groundwater Bodies) hydraulically linked to the proposed development site are defined in **Section 2** above.

The proposed development does not involve any abstraction of groundwater or alteration of drainage patterns. Therefore, the quantitative status (i.e., the available quantity (volume) of groundwater and surface water locally) to the receiving waters will remain unaltered during the construction and operational phase of the proposed development.

There is no direct discharge from the development site to downstream receiving waters. Mitigation for the protection of surface water during the construction, operation and decommissioning phases of the development will ensure the qualitative status of the receiving waters will not be altered by the proposed development.

There is also mitigation proposed to protect groundwater quality within the proposed development scheme during the construction, operational and decommissioning phases of the development. These mitigation measures will ensure the qualitative status of the underlying GWBs will not be altered by the proposed development.

There will be no change in GWB or SWB status in the underlying GWBs or downstream SWBs resulting from the proposed development. There will be no change in quantitative (volume) or qualitative (chemical) status, and the underlying GWBs are protected from any potential deterioration from chemical pollution.

In the event where the current status of the waterbody is Poor (i.e. Crana River and Mill River) the proposed development will not prevent them from achieving Good Status in the future.

As such, the proposed development will not impact upon any surface water or groundwater body as it will not cause a deterioration of the status of the body and/or it will not jeopardise the attainment of good status.

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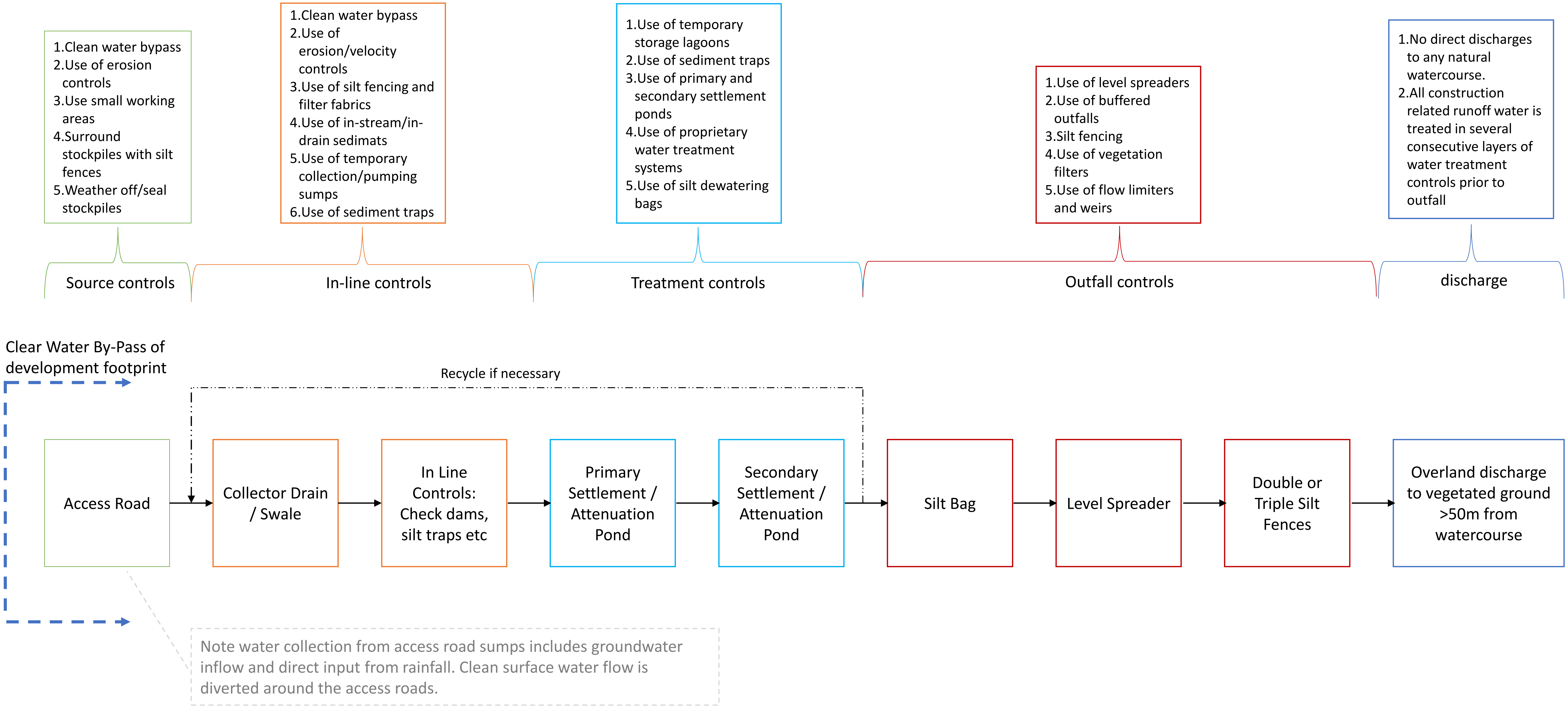
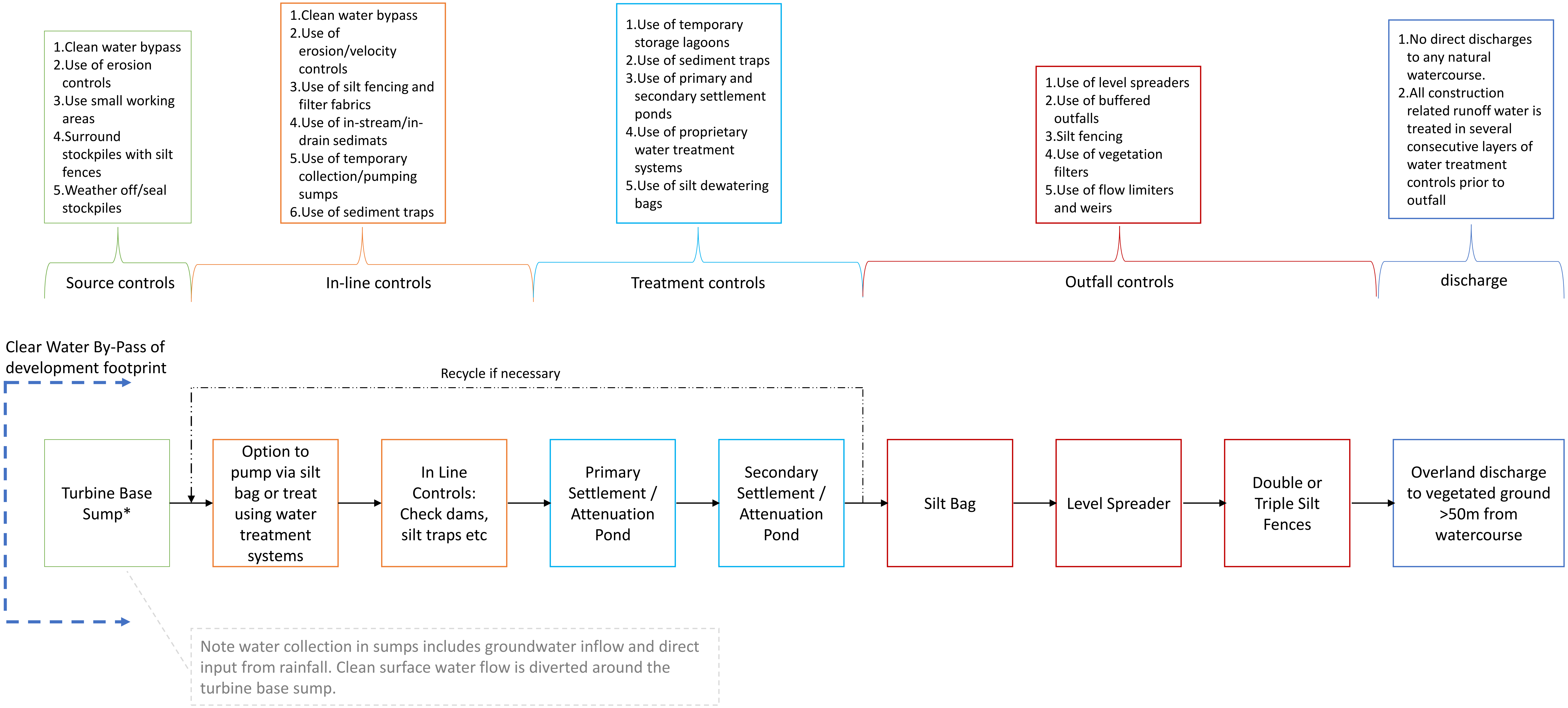
Appendix I

Windfarm Drainage Flow Diagrams

Water Management at Proposed Access Roads



Water Management at Proposed Hardstand/Turbine Bases



Water Management at Proposed Borrow Pits