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WATER FRAMEWORK DIRECTIVE ASSESSMENT

PROPOSED SUBSTATION, UNDERGROUND CABLING & ACCESS ROADS TO KNOCKNAMORK RENEWABLE ENERGY DEVELOPMENT

FINAL REPORT

Prepared for:

MKO IRELAND

Prepared by:

HYDRO-ENVIRONMENTAL SERVICES

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1. INTRODUCTION

1.1 BACKGROUND

Hydro-Environmental Services (HES) were requested by MKO to complete a Water Framework Directive (WFD) Compliance Assessment for the necessary planning applications for the Proposed Development.

The Proposed Development site is located in the Derrynasagart Mountains, on the Cork and Kerry border, approximately 3km to the north of Ballyvourney.

The Proposed Development comprises 33kV underground cabling (and access road) connecting the permitted Knocknamork Renewable Energy Development to the proposed 110kV substation and 110kV underground cabling (and access road) from the proposed 110kV substation to the existing 220kv substation at Ballyvouskill. The Proposed Development also includes Turbine Delivery Route (TDR) accommodation works, new access roads, access road upgrade works, temporary access road, proposed borrow pit, borrow pit extension, forestry felling and associated work. The permitted 38kV substation, 38kV underground cabling and battery storage compound has been omitted from the development. Refer to Chapter 4 for the full development description.

The purpose of this WFD assessment is to determine whether specific components or activities associated with the Proposed Development will compromise WFD objectives or result in a deterioration or prevent the improvement of the status of any waterbodies in the vicinity or downstream of the Proposed Development site. 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 Proposed Development 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 Michael Gill, David Broderick and Conor McGettigan.

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.

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.

Conor McGettigan (BSc, MSc) is a junior Environmental Scientist, holding an M.Sc. in Applied Environmental Science (2020) from University College Dublin. Conor has also completed a B.Sc. in Geology (2016) from University College Dublin. In recent times Conor has assisted in the preparation of hydrological and hydrogeological impact assessments for a variety of developments.

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, 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 3002).

The Directive 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 Directive 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.

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 Development site is located on the boundary between 3 no. surface water catchments in the South Western River Basin District; the Laune-Maine-Dingle Bay catchment (Hydrometric Area 22) in the north, the Lee, Cork Harbour and Youghal Bay catchment (Hydrometric Area 19) in the south and the Blackwater (Munster) catchment in the east (Hydrometric Area 18). However, there is no drainage from the Proposed Development footprint into the Blackwater catchment.

The majority of the TDR accommodation works, the 110kv substation, proposed borrow pit and the majority of the 33kV cabling along with associated access roads and forestry felling are located within the Laune-Maine-Dingle Bay catchment. Meanwhile, a small section in the east of the TDR accommodation works and a small section in the west of the 33kV cabling are mapped within the Lee, Cork Harbour and Youghal Bay catchment. Finally, the majority of the 110kV cabling to the 220kV Ballyvouskill substation along with the proposed borrow pit extension is located in the Lee, Cork Harbour and Youghal Bay catchment. The 220kV Ballyvouskill substation itself located in the Blackwater(Munster) catchment. The biodiversity enhancement area and associated felling is located in the Lee, Cork Harbour and Youghal Bay catchment.

Within the Laune-Maine-Dingle Bay catchment, the Proposed Development site is located within the Flesk[Kerry]_010 sub-catchment, with the Flesk River flowing in a westerly direction approximately 1.5km north of the Proposed Development site. On a more local scale, the Proposed Development site is mapped within 3 no. WFD River sub-basins. The proposed 110kV substation and 33kV cabling are located in the Flesk_010 river sub-basin.

Further to the west, the TDR accommodation works are located in the Flesk_020 and Flesk_030 river sub-basins. The Flesk River turns northwards approximately 5.25km west of the Proposed Development site and continues to flow to the northwest before the Flesk_060 waterbody discharges into Lough Leane near Killarney.

Within the Lee, Cork Harbour and Youghal Bay catchment, the Proposed Development site is located in the Sullane_010 sub-catchment in the west and the Fohernish_010 sub-catchment in the east. On a more local scale within the Sullane_010 sub-catchment, a small section in the east of the TDR and a small section of the 33kV cabling are located in the Sullane_020 river sub-basin. The Sullane River flows to the southeast approximately 4.5km south of the Proposed Development site. Within the Fohernish_010 sub-catchment, the underground electrical cable route is mapped in the Keel_010 river sub-basin in the east and the Garrane(Lee)_010 river sub-basin in the west. These river waterbodies discharge into the Foherish_020 waterbody to the south of the Proposed Development Site. The Foherlish River continues to flow to the south before the Foherish_040 discharges into the Sullane_050 river waterbody. The Sullane_060 waterbody discharges into Carrigdrohid Reservoir to the southeast of Macroom.

Figure A below presents a local hydrology map of the area, highlighting those SWBs downstream of the Proposed Development Site.

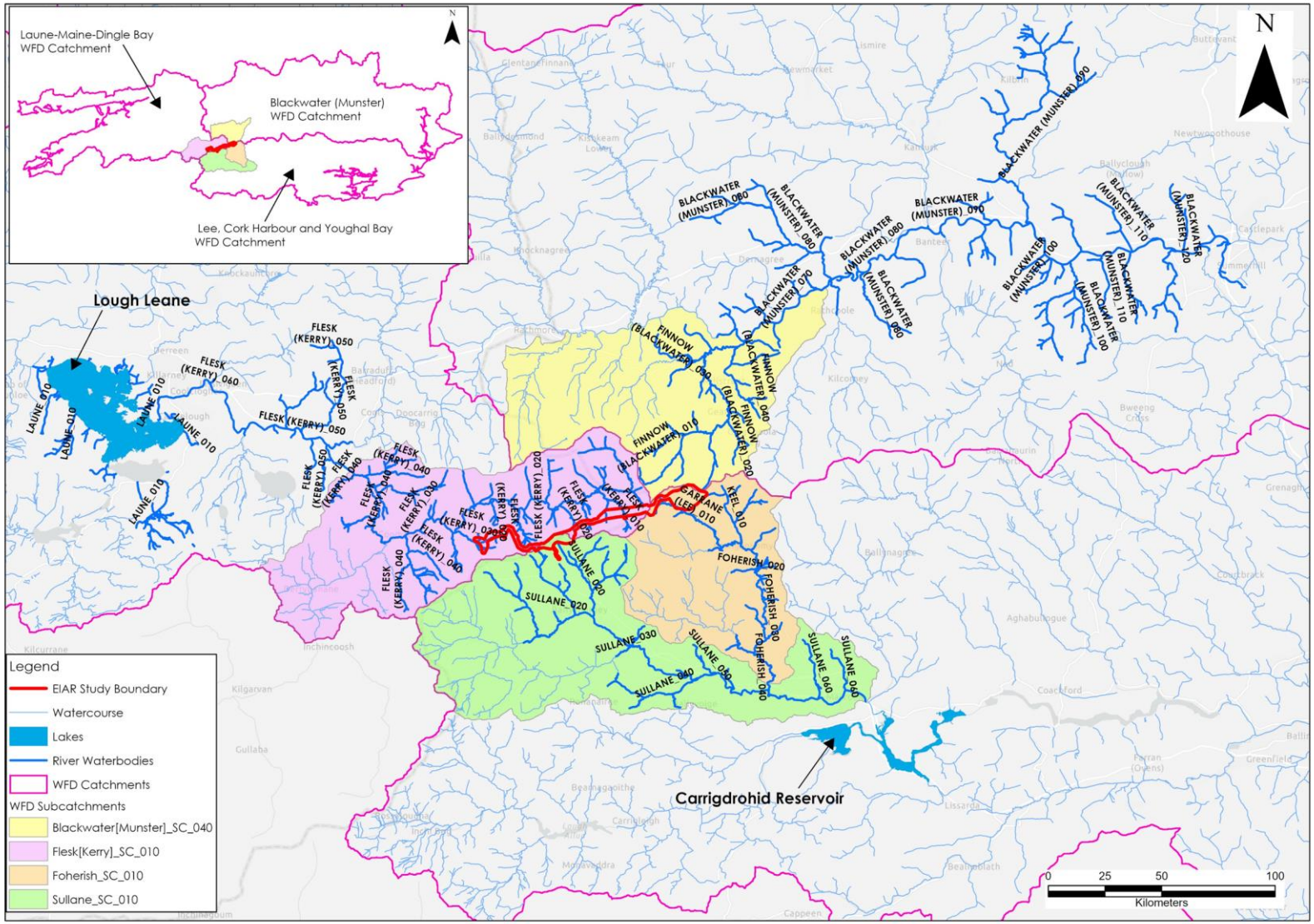

Figure A: Local Hydrology Map

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).

As stated above in Section 2.2, the north of the Proposed Development Site is located in the Laune-Maine-Dingle Bay Catchment and drains to the Flesk River. The Flesk River in the vicinity and downstream of the Proposed Development Site is predominantly of 'Good' status with the Flesk (Kerry)_030 SWB achieving 'High status in the latest WFD cycle (2013-2018). Prior to discharging into Lough Leane, the Flesk River enters the Laune_010 SWB which is unassigned with regards to WFD status. Meanwhile, Lough Leane itself achieved 'Good' status in the latest WFD cycle.

The risk status of these SWBs are largely 'not at risk', however, the Flesk (Kerry)_020 and the Flesk (Kerry)_040 have been deemed to be 'at risk' of failing to meet WFD objectives.

The 3rd Cycle Laune-Maine-Dingle Bay Catchment Draft Report states that the significant pressure affecting the greatest number of waterbodies in this catchment is agriculture, followed by hydromorphology. Hydromorphology has been identified as a significant pressure on the Flesk (Kerry)_020 and Flesk (Kerry)_040 SWBs. The draft catchment report states that overgrazing has caused morphological impacts on these SWBs.

The 3rd Cycle Laune-Maine-Dingle Bay Catchment Draft Report also states that there are 4 no. sections of the Flesk River (Flesk_020, _030, _040 and _050) between the Proposed Development site and Lough Leane which have the objective of achieving High Ecological Status. The draft report also lists Lough Leane as a Nutrient Sensitive Area due to its location downstream of the Killarney urban wastewater agglomeration.

Meanwhile, the south of the Proposed Development site is located in the Lee. Cork Harbour and Youghal Bay Catchment. The Sullane_020, Garrane(Lee)_010 and Keel_010 SWBs in the vicinity of the Proposed Development Site achieved 'Good' status in the latest WFD cycle. Further downstream the status of the Sullane and Foherish rivers ranges from 'Good' to 'High' status. Meanwhile, Carrigdrohid Reservoir achieved 'Moderate' status in the latest WFD cycle.

The risk status of the SWBs in the vicinity and downstream of the Proposed Development Site are largely "not at risk". However, the Sullane_020, Sullane_040, Foherish_020 river segments and Carrigdrohid Reservoir have been deemed to be at risk of not meeting their WFD objectives.

The 3rd Cycle Lee, Cork Harbour and Youghal Bay Catchment Draft Report states that the significant pressure affecting the greatest number of waterbodies in this catchment is hydromorphology. Hydromorphology is listed as a significant pressure on the Sullane_020 SWB. The Draft Report states that channelisation is the dominant issue within the catchment due to extensive modification associated with drainage schemes. Forestry is a significant pressure on the Forehish_020 SWB with issues arising from clearfelling and drainage. Other significant pressures impacting the Sullane_040 and the Foherish_020 SWBs are currently unknown.

The 3rd Cycle Lee, Cork Harbour and Youghal Bay Catchment Draft Report also states that there are 6 no. river waterbodies (Sullane_020, _030, _040, _050 and Foherish_020 and _040) between the Proposed Development Site and Carrigdrohid Reservoir which have the objective of achieving High Ecological Status.

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

Table A: Summary WFD Information for Surface Waterbodies

SWB	Overall Status 2010-2015	Risk Status 2010-2015	Overall Status 2013-2018	Risk Status 2013-2018	Pressures
Laune-Maine-Dingle Bay Catchment					
Flesk (Kerry)_010	Good	Not at risk	Good	Not at risk	-
Flesk (Kery)_020	High	Not at risk	Good	At risk	Hydromorphology
Flesk (Kerry)_030	High	Not at risk	High	Not at risk	-
Flesk (Kerry)_040	High	Not at risk	Good	At risk	Hydromorphology
Flesk (Kerry)_050	High	Not at risk	Good	Under review	-
Flesk (Kerry)_060	Good	Not at risk	Good	Not at risk	-
Laune_010	Unassigned	Not at risk	Unassigned	Not at risk	-
Leane (Lake waterbody))	Good	Not at risk	Good	Not at risk	-
Lee, Cork Harbour and Youghal Bay Catchment					
Sullane_020	High	Not at risk	Good	At risk	Hydromorphology
Sullane_030	High	Not at risk	High	Not at risk	-
Sullane_040	Good	At risk	Good	At risk	Other
Garrane(Lee)_010	Good	Not at risk	Good	Not at risk	-
Keel_010	Poor	At risk	Good	Under review	-
Foherish_020	Good	At risk	Good	At risk	Forestry & other
Foherish_030	Good	Not at risk	Good	Not at risk	-
Foherish_040	High	Not at risk	High	Not at risk	-
Sullane_050	High	Not at risk	High	Not at risk	-
Sullane_060	Good	Not at risk	Good	Not at risk	-
Carrigdrohid (Lake waterbody)	Poor	At risk	Moderate	At risk	

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 Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones, which consists of Devonian Old Red Sandstones.

The Proposed Development site is located on the boundary between 3 no. Groundwater Bodies (GWBs); the Cahersiveen GWB in the north, the Ballinhassig West GWB in the south and the Glenville GWB in the east.

The majority of the TDR accommodation works, the 110kv substation, proposed borrow pit and the majority of the 33kV cabling and associated access road are located within the Cahersiveen GWB. Meanwhile, a small section in the east of the TDR accommodation works and a small section in the west of the 33kV cabling are mapped to overlie the Ballinhassig West GWB. In addition, the majority of the 110kV cabling to the 220kV Ballyvouskill substation and associated access roads and proposed borrow pit extension overlies the Ballinhassig West GWB. The 220kV Ballyvouskill substation itself lies on the border between the Ballinhassig West GWB to the west and the Glenville GWB to the east.

2.5 GROUNDWATER BODY CLASSIFICATION

A summary of the WFD status and risk result for Groundwater Bodies (GWBs) underlying the Proposed Development are shown in **Table B**.

The Cahersiveen GWB (IE_SW_G_022), Ballinhassig West GWB (IE_SW_G_005) and the Glenville GWB (IE_SW_G_037) achieved 'Good' status in both the 1st and 2nd WFD cycles. This status is based on the quantitative status and chemical status of the GWB.

The Glenville GWB is deemed to be 'at risk' of failing to meet its WFD objectives. This GWB is under significant pressure from agricultural activities. The Ballinhassig West GWB is 'not at risk' while the risk status for the Cahersiveen GWB is currently under review.

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

Table B: Summary WFD Information for Groundwater Bodies

GWB	2010-2015 Status	2010-2015 Risk Status	2013-2018 Status	2013-2018 Risk Status	Pressures
Cahersiveen	Good	Not at risk	Good	Under review	-
Ballinhassig West	Good	Not at risk	Good	Not at risk	-
Glenville	Good	Under review	Good	At risk	Agriculture

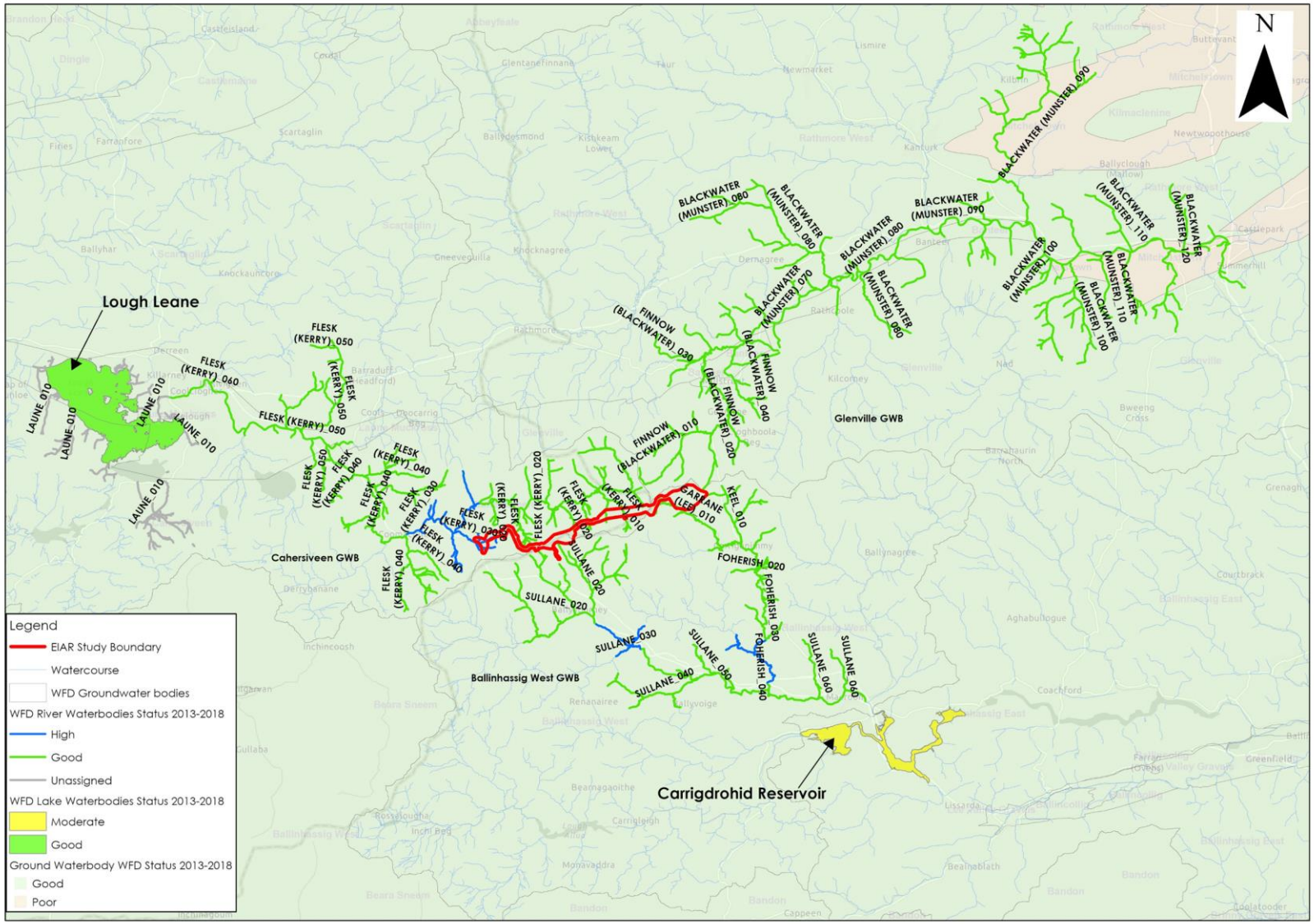

Figure B: WFD Groundwater and Surface Waterbody Status (2013-2018)

3. WFD SCRENING

As discussed in **Section 2**, there are a total of 7 no. river water bodies located between the Proposed Development Site and Lough Leane in the Laune-Maine-Dingle Bay Catchment. In the Lee, Cork Harbour and Youghal Bay Catchment there are a total of 10. no river waterbodies located between the Proposed Development Site and Carrigdrohid Reservoir. In addition, 3 no. groundwater bodies underlie the Proposed Development Site.

3.1 SURFACE WATER BODIES

Within the Laune-Maine-Dingle Bay Catchment and with consideration for the construction, operational and decommissioning phases of the Proposed Development, it is recommended that all sections of the Flesk (Kerry) River in the vicinity of the Proposed Development Site and downstream as far as the Flesk (Kerry)_050 SWB are carried through to the WFD Impact Assessment. These waterbodies are carried through to the assessment due to their proximity to the Proposed Development. The Proposed Development works must not in any way result in a deterioration in the status of these SWBS and/or prevent them from meeting the biological and chemical characteristics for good status in the future.

Further downstream, the Flesk (Kerry)_060, Laune_010 and Lough Leane SWBs have been screened out due their distal location from the Proposed Development and the increasing volumes of water within these SWBS. The Proposed Development has no potential to cause a deterioration in the status of these screened out SWBs and/or jeopardise their attainment of good surface water status in the future

Within the Lee, Cork Harbour and Youghal Bay Catchment and with consideration for the construction, operational and decommissioning phases of the Proposed Development, it is recommended that all sections of the Sullane_020, _030, the Garrane (Lee)_010, Keel_010 and the Foherish_020 SWBS are carried through to the WFD Impact Assessment. These waterbodies are carried through to the assessment due to their proximity to the Proposed Development with works proposed in the Sullane_020, Garrane (Lee)_010 and Keel_010 sub-basins. The Proposed Development works must not in any way result in a deterioration in the status of these SWBS and/or prevent them from meeting the biological and chemical characteristics for good status in the future.

Further downstream the Sullane_040, _050, _060, the Foherish_030, _040 and the Carrogdrohid Reservoir have been screened out due their distal location from the Proposed Development and the increasing volumes of water within these SWBS. The Proposed Development has no potential to cause a deterioration in the status of these screened out SWBs and/or jeopardise their attainment of good surface water status in the future.

The Blackwater River has been screened out as there is no drainage from the proposed footprint area into the Blackwater catchment. The Proposed Development has no potential to cause a deterioration in the status of these screened out SWBs and/or jeopardise their attainment of good surface water status in the future.

3.2 GROUNDWATER BODIES

With respect to groundwater bodies, the Cahersiveen GWB and Ballinhassig GWBs are carried through into the WFD Impact Assessment as they directly underlie the Proposed Development Site. The Glenville GWB is not carried through to the impact assessment as no aspects of the Proposed Development overlie this 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	**Laune-Maine-Dingle Bay Catchment**			
	River	Flesk (Kerry)_010	**Yes**	The 33kV cabling (and associated access roads), 110kV substation, proposed borrow pit and tree felling are located within the Flesk (Kerry)_010 sub-basin. An assessment is required to consider the potential impacts of the Proposed Development on this SWB.
	River	Flesk (Kery)_020	**Yes**	Approximately 1km of 33kV cabling and associated access road is located in the Flesk (Kerry)_020 sub-basin. Additionally approximately 3km of the TDR is located in the drainage catchment. An assessment is required to consider the potential impacts of the Proposed Development on this SWB.
	River	Flesk (Kerry)_030	**Yes**	Approximately 1.5km of the TDR and proposed site entrance road are located in the catchment to the Flesk (Kerry)_030 SWB and in close proximity to a mapped watercourse. An assessment is required to consider the potential impacts of the Proposed Development on this SWB.
	River	Flesk (Kerry)_040	**Yes**	The Flesk (Kerry)_040 SWB is located directly downstream of the Flesk (Kerry)_030 SWB and in close proximity to the Proposed Development Site (~4km). An assessment is required to consider the potential impacts of the Proposed Development on this SWB.
	River	Flesk (Kerry)_050	No	The Flesk (Kerry)_050 SWB has been screened out due to its distal location from the Proposed Development Site (~8km) and the increasing volumes of water within the Flesk River.
	River	Flesk (Kerry)_060	No	The Flesk (Kerry)_060 SWB has been screened out due to its distal location from the Proposed Development Site (~14.7km) and the increasing volumes of water within the Flesk River.
	River	Laune_010	No	The Laune_010 SWB has been screened out due to its distal location from the Proposed Development Site (~18.5km) and the large volumes of water within the Flesk River at this location. While the Laune_010 is unassigned with regards WFD status, the Proposed Development has no potential to cause a deterioration in the status of this SWB and/or jeopardise its attainment of good surface water status in the future.
	Lake	Lough Leane	No	Lough Leane has been screened out due to its distal location from the Proposed Development Site (~18km) and the large volumes of water within this lake waterbody.
	Lee, Cork Harbour and Youghal Bay Catchment			
	River	Sullane_020	**Yes**	Approximately 500m of 33kV cabling (and associated access road), 1.3km of TDR accommodation works, proposed borrow pit extension and tree felling are within the Sullane_020 sub-basin. An assessment is required to consider the potential impacts of the Proposed Development on this SWB.
	River	Sullane_030	**Yes**	The Sullane_030 SWB is located directly downstream of the Sullane_020 SWB and in close proximity to the Proposed Development Site (~4km). An assessment is required to consider the potential impacts of the Proposed Development on this SWB.

	River	Sullane_040	No	The Sullane_040 SWB has been screened out due to its distal location from the Proposed Development Site (~7km), the increasing volumes of water within the Sullane River and the minor nature of the Proposed Development works upstream of this SWB.
	River	Garrane(Lee)_010	**Yes**	Approximately 2.4km of110kV cabling (and associated access road) are proposed within the Garrane (Lee)_010 sub-basin. An assessment is required to consider the potential impacts of the Proposed Development on this SWB.
	River	Keel_010	**Yes**	Approximately 500m of110kV cabling and associated access roads are proposed within the Keel_010 sub-basin. An assessment is required to consider the potential impacts of the Proposed Development on this SWB.
	River	Foherish_020	**Yes**	The Foherish_020 SWB is located directly downstream of the Garrane (Lee)_010 and Keel_010 SWBs and in close proximity to the Proposed Development Site (~2.7km). An assessment is required to consider the potential impacts of the Proposed Development on this SWB.
	River	Foherish_030	No	The Foherish_030 SWB has been screened out due to its distal location from the Proposed Development Site (~5.5km), the increasing volumes of water within the Foherish River and the minor nature of the Proposed Development works upstream of this SWB.
	River	Foherish_040	No	The Foherish_040 SWB has been screened out due to its distal location from the Proposed Development Site (~8.4km), the increasing volumes of water within the Foherish River and the minor nature of the Proposed Development works upstream of this SWB.
	River	Sullane_050	No	The Sullane_050 SWB has been screened out due to its distal location from the Proposed Development Site (~9.2km), the increasing volumes of water within the Sullane River and the minor nature of the Proposed Development works upstream of this SWB.
	River	Sullane_060	No	The Sullane_060 SWB has been screened out due to its distal location from the Proposed Development Site (~12km), the increasing volumes of water within the Sullane River and the minor nature of the Proposed Development works upstream of this SWB.
	Lake	Carrigdrohid Reservoir	No	Carrigdrohid Reservoir has been screened out due to its distal location from the Proposed Development Site (~15km) and the large volumes of water within this lake waterbody.
	Blackwater (Munster) Catchment			
	River	Finnow_010	No	No drainage from development footprint works area enters into the Blackwater catchment.
	River	Finnow_020		
	River	Finnow_030		
	River	Finnow_040		
	River	Blackwater_070		
	River	Blackwater_080		
	River	Blackwater_090		

	River	Blackwater_100		
	River	Blackwater_110		
	River	Blackwater_120		
Groundwater Body	Groundwater	Cahersiveen	**Yes**	The majority of the TDR accommodation works, the 110kv substation, proposed borrow pit and the majority of the 33kV cabling and associated access roads are located within the Cahersiveen GWB. An assessment is required to consider potential impacts of the Proposed Development to this GWB.
	Groundwater	Ballinhassig West	**Yes**	A small section in the east of the TDR accommodation works and a small section in the west of the 33kV cabling are mapped to overlie the Ballinhassig West GWB. In addition, the majority of the 110kV cabling (and associated access roads) along with the proposed borrow pit extension are located in the Ballinhassig West GWB. An assessment is required to consider potential impacts of the Proposed Development to this GWB.
	Groundwater	Glenville	No	The Glenville GWB has been screened out due the fact that no aspects of the Proposed Development are mapped to overly this GWB.

4. WFD COMPLIANCE ASSESSMENT

4.1 PROPOSALS

The Proposed Development includes underground cabling (33kV & 110kV and associated access roads), an 110kV substation, Turbine Delivery Route (TDR) accommodation works, proposed borrow pit, proposed borrow pit extension, new access road, access road upgrades, temporary access road, forestry felling and associated works Co. Cork/Co. Kerry. The permitted 38kV substation, 38kV underground cabling and battery storage compound has been omitted from the Permitted Development.

Due to the presence of peat at the Proposed Development Site, combined with the sloping nature of the local topography, the local hydrological/hydrogeological regime is characterised by low rates of groundwater recharge with a high density of surface water courses draining to the north and south from a central ridgeline.

Due to the nature of the Proposed Development 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 Proposed Development includes works over and in close proximity to surface waterbodies.

The primary risks to groundwater at the site will be from cementitious materials and hydrocarbon spillage and leakages.

The primary risk to surface waters will be entrained suspended sediments (peat and soil particles) in runoff during earthworks and tree felling along with the accidental release of cement-based compounds and/or hydrocarbons.

4.2 POTENTIAL EFFECTS

4.2.1 Construction Phase (Unmitigated)

4.2.1.1 Potential Surface Water Quality Effects

Construction phase activities will require earthworks resulting in removal of vegetation cover (this will involve clear felling of forestry in certain areas of the Proposed Development) and excavation of mineral peat/subsoil (where present) and bedrock in certain areas.

The greatest earthworks will occur during the construction of the proposed 110kV substation, borrow pits and excavation for underground cabling and associated access roads. The works associated with the TDR are minor and involve alteration, typically widening, of existing forestry access roads, with a short section of new road proposed to connect the existing access road to the Permitted Development. The main risk will be from surface water runoff from spoil storage areas and excavation drainage/dewatering during construction works. These activities can result in the entrainment of suspended solids in surface waters.

Excavations along the underground cabling routes can result in the release of sediment to surface water courses. No in-stream works are required at any of these watercourse crossings, however due to the close proximity of local waterbodies to the underground electrical cabling routes construction work at the crossing locations, there is a potential for surface water quality impacts during ground excavation work due to surface water runoff. This runoff may contain elevated concentrations of suspended sediment, cementitious runoff and/or hydrocarbons.

Hydrocarbons and cement-based compounds will also be used during the construction phase. Accidental spillage during refuelling of construction plant with petroleum hydrocarbons is a significant pollution risk to surface waters at all construction. The accumulation of small spills of fuels and lubricants during routine plant use can also be a pollution risk. Hydrocarbon has a high toxicity to humans, and all flora and fauna, including fish, and is persistent in the environment. It is also a nutrient supply for adapted micro-organisms, which can rapidly deplete dissolved oxygen in waters, resulting in the death of aquatic organisms.

As described above, surface water draining from an active construction site can contain elevated levels of suspended sediment, cementitious runoff and/or hydrocarbons depending on the nature of the construction activity. Additionally, any alteration of the drainage regime within a site can impact on the volume of runoff which leaves the site. These impacts can affect the quantity and quality of downstream surface waterbodies (where a flow path exists between the site and the waterbody).

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 Flesk (Kerry), Sullane, Foherlish and Finnow SWBs.

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

Table D: Potential Surface Water Quality Effects from Works during Construction Phase (Unmitigated)

WFD Element	WFD Code	Current Status	Assessed Potential Status Change
Laune-Maine-Dingle Bay Catchment			
Flesk (Kerry)_010	IE_SW_22F020010	Good	Moderate
Flesk (Kery)_020	IE_SW_22F020040	Good	Moderate
Flesk (Kerry)_030	IE_SW_22F020060	High	Good
Flesk (Kerry)_040	IE_SW_22F020100	Good	Good
Lee, Cork Harbour and Youghal Bay Catchment			
Sullane_020	IE_SW_19S020170	Good	Moderate
Sullane_030	IE_SW_19S020200	High	High
Garrane(Lee)_010	IE_SW_19G030200	Good	Moderate
Keel_010	IE_SW_19K020200	Good	Moderate
Foherish_020	IE_SW_19F020300	Good	Good
Finnow_010	IE_SW_18F030060	Good	Moderate
Finnow_020	IE_SW_18F030200	Good	Good

4.2.1.2 Potential Effects on Groundwater Quality/Quantity

As described in **Section 4.2.1.1** accidental spillage of hydrocarbons and the release of cement-based products have the potential to negatively impact groundwater quality at the Proposed Development Site. However, due to the local hydrogeological regime characterized by low rates of groundwater recharge, the underlying GWBs are less susceptible to pollution than the downstream SWBs.

Due the shallow nature of the underground electrical cabling excavation no dewatering will be required.

Similarly, any excavations required for the 110kV substation, borrow pits, new access roads or TDR works will be relatively shallow and therefore have no potential to impact on groundwater quantity or local groundwater levels.

A summary of potential status change to GWBs arising from the Proposed Development during the unmitigated construction phase are outlined in **Table E**.

Table E: Potential Effects on Groundwater Quality/Quantity during Construction Phase (Unmitigated)

WFD Element	WFD Code	Current Status	Assessed Potential Status Change
Cahersiveen	IE_SW_G_022	Good	Moderate
Ballinhassig West	IE_SW_G_005	Good	Moderate

4.2.2 Operational Phase (Unmitigated)

4.2.2.1 Increased Runoff due to Replacement of Natural Surfaces with Lower Permeability Surfaces

Progressive replacement of the soil, subsoil 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 Proposed Development.

Due to the local hydrological/hydrogeological regime the most sensitive receptor to changes in runoff volumes are the nearby surface waterbodies. However, given the small scale of the Proposed Development footprint (<1%) in comparison to the total catchment area to each surface waterbody, there will be no significant effect. Runoff from emplaced access tracks and substation hardstand will enter the surface water drainage network.

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 Effect of Increased Runoff during Operational Phase (Unmitigated)

WFD Element	WFD Code	Current Status	Assessed Potential Status Change
Laune-Maine-Dingle Bay Catchment			
Flesk (Kerry)_010	IE_SW_22F020010	Good	Good
Flesk (Kery)_020	IE_SW_22F020040	Good	Good
Flesk (Kerry)_030	IE_SW_22F020060	High	High
Flesk (Kerry)_040	IE_SW_22F020100	Good	Good
Lee, Cork Harbour and Youghal Bay Catchment			
Sullane_020	IE_SW_19S020170	Good	Good
Sullane_030	IE_SW_19S020200	High	High
Garrane(Lee)_010	IE_SW_19G030200	Good	Good
Keel_010	IE_SW_19K020200	Good	Good
Foherish_020	IE_SW_19F020300	Good	Good
Finnow_010	IE_SW_18F030060	Good	Good
Finnow_020	IE_SW_18F030200	Good	Good

4.2.2.2 Surface Water Quality Impacts from Site Maintenance

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 from Site Maintenance during Operational Phase (Unmitigated)

WFD Element	WFD Code	Current Status	Assessed Potential Status Change
Laune-Maine-Dingle Bay Catchment			
Flesk (Kerry)_010	IE_SW_22F020010	Good	Good
Flesk (Kery)_020	IE_SW_22F020040	Good	Good
Flesk (Kerry)_030	IE_SW_22F020060	High	High
Flesk (Kerry)_040	IE_SW_22F020100	Good	Good
Lee, Cork Harbour and Youghal Bay Catchment			
Sullane_020	IE_SW_19S020170	Good	Good
Sullane_030	IE_SW_19S020200	High	High
Garrane(Lee)_010	IE_SW_19G030200	Good	Good
Keel_010	IE_SW_19K020200	Good	Good
Foherish_020	IE_SW_19F020300	Good	Good
Finnow_010	IE_SW_18F030060	Good	Good
Finnow_020	IE_SW_18F030200	Good	Good

4.2.2.3 Groundwater Quality Impacts from Site Maintenance

The risks to groundwater quality are the same as those described in **Section 4.2.1.2** but of a lesser extent than during the construction phase due to the limited activity at the site with only minor maintenance required during the operational phase.

A summary of potential status change to GWBs arising from groundwater quality impacts during the operation stage of the Proposed Development in the unmitigated scenario are outlined in **Table H**.

Table H: Groundwater Quality Impacts During Operational Phase (Unmitigated)

WFD Element	WFD Code	Current Status	Assessed Potential Status Change
Cahersiveen	IE_SW_G_022	Good	Good
Ballinhassig West	IE_SW_G_005	Good	Good

4.2.2.4 Surface and Groundwater Quality Effects at the Proposed 110kV Substation

Oil will be used to cool the transformers at the proposed 110kV substation. Storage of oils in tanks at the substation during the operational phase could result in oil leakages which would have a negative effect on surface and groundwater quality.

In addition an on-site wastewater system will be required during the operation of the substation. Without adequate maintenance, effluent from this system could leak to ground or overflow and enter the local surface water drainage network and negatively impact local waterbodies.

The proposed 110kV substation is located in the Flesk_010 river sub-basin and overlies the Cahersiveen GWB making these waterbodies most susceptible to any significant effects.

Table I: Impacts from activities at the Proposed 110kV Substation (Unmitigated)

WFD Element	WFD Code	Current Status	Assessed Potential Status Change
SWBs: Laune-Maine-Dingle Bay Catchment			
Flesk (Kerry)_010	IE_SW_22F020010	Good	Moderate
Flesk (Kery)_020	IE_SW_22F020040	Good	Moderate
Flesk (Kerry)_030	IE_SW_22F020060	High	High
Flesk (Kerry)_040	IE_SW_22F020100	Good	Good
GWB			
Cahersiveen	IE_SW_G_022	Good	Moderate

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, operational and decommissioning phases of the Proposed Development. These are outlined below.

4.3.1 Construction Phase

4.3.1.1 Mitigation Measures for Suspended Solids Entrainment in Drainage Recharge

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

Table J: 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 Proposed Development (underground cabling (33kV & 110kV and associated access roads), an 110kV substation, Turbine Delivery Route (TDR) accommodation works, proposed borrow pit, proposed borrow pit extension, new access road, access road upgrades, temporary access road, forestry felling and associated works) will have an array of drainage control measures to ensure protection of downstream watercourses.

4.3.1.2 Mitigation Measures to Protect Surface Water Quality along Underground Electrical Cabling Routes

Silt Fences/Roadside Drain Blocking:

Silt fences will be placed down-gradient of the proposed underground electrical cabling route during construction work. Silt fences are effective at removing larger particle sized solids. This will act to prevent entry to water courses of sand and gravel sized sediment released from excavation of mineral sub-soils of glacial and glacio-fluvial origin and entrained in surface water runoff. Inspection and maintenance of these structures during the construction phase is critical to their functioning to stated purpose. They will remain in place throughout the entire construction phase. Double silt fences will be placed down-gradient of all construction areas inside the hydrological buffer zones (i.e., near stream crossings). Any roadside drains will be temporarily blocked using sandbags in the area where trenching works is taking place.

Surplus Excavated Spoil:

Excavated spoil emanating from the cut for the underground cabling, where appropriate will be used to backfill the trenches and landscaping. Any excess material will be used to reinstate the borrow pits.

4.3.1.3 Mitigation Measures to Protect Surface Water Quality along TDR Upgrades and New Access Roads

No significant effects will occur for the following reasons:

- All works are relatively minor and localised and cover very small areas;
- Excavation/earthworks will all be small scale;
- These works are distributed over a wide area; and,
- All works are temporary in nature.

Nevertheless, the mitigation measures described in **Sections 4.3.1.1** and **4.3.1.4** will be employed at all the TDR works areas.

4.3.1.4 Mitigation Measures to Protect Against the Release of Hydrocarbons

Mitigation measures proposed to avoid the release of hydrocarbons at Proposed Development site include:

- Minimal refuelling or maintenance of vehicles or plant will take place on-site. Off-site refuelling will occur where possible;
- 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;
- Fuels stored on site will be minimized and will be appropriately bunded;
- 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.

4.3.1.5 Mitigation Measures to Prevent the Release of Cement-Based Products

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.

4.3.1.6 Mitigation Measures to Prevent the Release of Wastewater

- During the construction phase, a self-contained port-a-loo with an integrated waste holding tank will be used at the substation compound and at the permitted construction compound, 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.

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 the 110kV substation and borrow pits, 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 Groundwater and Surface Water Quality

During the operational phase, the only plant which will be required on site will be maintenance/inspection vehicles (jeeps/vans/quads). These will be refuelled off site, thus reducing the potential for effects due to hydrocarbon spills. There will be no discharge of wastewater during the operational phase.

The mitigation measures to protect against poor runoff quality during the operational phase of the Proposed Development are the same as those outlined in **Section 4.3.1.1** above.

Mitigation measures relating to hydrocarbons and cementitious materials, as outlined in **Sections 4.3.1.4** and **4.3.1.5** will continue to provide adequate protection to groundwater and surface water quality during the operational phase.

It is proposed to manage wastewater at the proposed 110kV substation by installing a sealed underground effluent tank which will be routinely emptied by a licenced contractor. There will be no discharge of wastewater to ground at the 110kV substation and therefore there is no potential to impact groundwater or surface water quality. In addition the transformers at the substation will be stored in a concrete bunded area capable of holding 100% of the stored oil volume. The bunded area will be fitted with a storm drainage system and an appropriate oil interceptor. These mitigation measures are considered sufficient to eliminate potential risks to surface and groundwaters at the proposed 110kV substation.

4.3.3 Decommissioning Phase

The potential impacts associated with the decommissioning phase 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 and hard standing areas. This will be done by covering with vegetation to encourage vegetation growth.

It is intended that the proposed 110kV substation and underground electrical cabling (110kV) will be retained as a permanent structure and will not be decommissioned.

The underground electrical cabling (33kV) connecting the Permitted Development to the proposed 110kV electrical substation will be removed from the underground cable ducting at the end of the useful life of the renewable energy development. The cable ducting will be left in-situ as it is considered the most environmentally prudent option, avoiding unnecessary excavation and soil disturbance for an underground element that is not visible.

Site roadways could be in use for purposes other than the operation of the development by the time the decommissioning of the Permitted Development is to be considered, and therefore it may be more appropriate to leave the site roads in situ for future use. It is envisaged that the roads will provide a useful means of extracting the commercial forestry crop which exists on the site and general agricultural use.

Impacts such as possible suspended sediments 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 for the construction stage will be implemented during the decommissioning phase to ensure no impacts of receiving waters.

Mitigation measures to avoid contamination by accidental fuel leakage and suspended sediments 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

4.3.4 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 K** below.

Table K: Summary WFD Status of Unmitigated and Mitigated Scenarios

SWB	WFD Code	Current Status	Assessed Status - Unmitigated	Assessed Status – with Mitigation Measures
Laune-Maine-Dingle Bay Catchment				
Flesk (Kerry)_010	IE_SW_22F020010	Good	Moderate	Good
Flesk (Kery)_020	IE_SW_22F020040	Good	Moderate	Good
Flesk (Kerry)_030	IE_SW_22F020060	High	Good	High
Flesk (Kerry)_040	IE_SW_22F020100	Good	Good	Good
Lee, Cork Harbour and Youghal Bay Catchment				
Sullane_020	IE_SW_19S020170	Good	Moderate	Good
Sullane_030	IE_SW_19S020200	High	High	High
Garrane(Lee)_010	IE_SW_19G030200	Good	Moderate	Good
Keel_010	IE_SW_19K020200	Good	Moderate	Good
Foherish_020	IE_SW_19F020300	Good	Good	Good
Finnow_010	IE_SW_18F030060	Good	Moderate	Good
Finnow_020	IE_SW_18F030200	Good	Good	Good
Groundwater Bodies				
Cahersiveen	IE_SW_G_022	Good	Moderate	Good
Ballinhassig West	IE_SW_G_005	Good	Moderate	Good

5. WFD ASSESSMENT CONCLUSION

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 Proposed Development site to downstream receiving waters. Mitigation for the protection of surface water during the construction, operation and decommissioning phases of the Proposed 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 Proposed 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.

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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