



Cush Wind Farm
Phase II

Environmental Impact
Assessment Report

**Annex 7.3: Water
Framework Directive
Compliance Assessment
Report**

Cush Wind Limited

**WATER FRAMEWORK DIRECTIVE COMPLIANCE ASSESSMENT
CUSH WIND FARM PHASE II, CO. OFFALY****REPORT**

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CUSH WIND LIMITED

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DOCUMENT INFORMATION

Document Title:	WATER FRAMEWORK DIRECTIVE COMPLIANCE ASSESSMENT CUSH WIND FARM – PHASE II, CO. OFFALY
Issue Date:	23 rd October 2026
Project Number:	P1537-3
Project Reporting History:	P1537-0 P1537-1 P1537-2
Current revision no:	P1537-3_WFD_ISSUED
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1. INTRODUCTION

1.1 BACKGROUND

Hydro-Environmental Services (HES) were requested by Galetech Energy Services (GES) on behalf of Cush Wind Limited to complete a Water Framework Directive (WFD) Compliance Assessment for the Cush Wind Farm Phase II, Co. Offaly.

The project comprises a 3 no. wind turbine extension to the permitted Cush Wind Farm Phase I, together with all associated and ancillary infrastructure and works. A proposed electrical switch room building, and a c. 5km underground electricity line is required to facilitate connection of the project site to the national electricity network.

The purpose of this WFD assessment is to determine if any specific components or activities associated with the proposed project 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 affected, 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 project planning application.

1.2 STATEMENT OF AUTHORITY

Hydro-Environmental Services (HES) are a specialist geological, 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 and grid connections.

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

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David Broderick P. Geo. (BSc, H.Dip Env Eng, MSc) is a Hydrogeologist with over 19 years' experience in both the public and private sectors. 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 Environmental Impact Assessment Reports/Environmental Impact Statements (EIAR/EIS) for a range of commercial developments.

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1.3 WATER FRAMEWORK DIRECTIVE

The EU Water Framework Directive (2000/60/EC), as amended by Directives 2008/105/EC, (EU)2013/39, (EU)2014/101 and (EU)2026/805 ("**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. I

We are currently in the 3rd cycle River Basin Management Plan 2022 – 2027. The overall aim of the plan is to ensure that our natural waters are sustainably managed and that freshwater resources are protected so as to maintain and improve Ireland's water environment.

The Water Action Plan 2024 is Ireland's 3rd River Basin Management Plan (2022 - 2027). The objectives of the Water Action Plan 2024 have been integrated into the design of the Proposed Development and include:

- Ensure full compliance with relevant EU legislation;
- Prevent deterioration;
- Meet the water standards and objectives for designated protected areas;
- Protect high-status waters; and,
- Implement targeted action and pilot schemes in focus sub-catchments aimed at (i) targeting water bodies close to meeting their objective and (ii) addressing more complex issues that will build knowledge for future cycles.

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 bodies, groundwater bodies and protected areas with potential to be affected by the project and reviews any available WFD information.

2.2 SURFACE WATERBODY IDENTIFICATION

On a regional scale, the project site is located within Hydrometric Area 25B (Lower Shannon Catchment) and locally situated inside the Shannon[lower]_SC_040 sub-catchment which is the Rapemills River catchment.

The Rapemills River (Rapemills_010) rises approximately 8km to the east of the wind farm site and then flows in westerly direction approximately 0.6km to the south of the wind farm site. East of the wind farm site, the Rapemills River runs adjacent to the underground electricity line route for approximately for 2.5km. The Rapemills River then flows into the River Shannon approximately 12km downstream of the project site. Figure A below shows a local hydrology map of the area.

Table A presents the catchment area of each waterbody downstream of the project site as far as the Shannon (Lower) River. The catchment area for the waterbodies increases progressively downstream. Therefore, those waterbodies which are located in close proximity to the project site are more susceptible to water quality impacts as a result of activities associated with the proposed project.

The potential for the proposed project to impact a waterbody decreases further downstream due to the increasing catchment area to the surface waterbody and resulting increase in flow volumes.

The Rapemills River catchment (~95km²) only accounts for 1.4% of the River Shannon catchment upstream of the Rapemills/Shannon confluence. The potential for dilution/assimilation is very high.

Table A: Catchment Area Downstream of Project

WFD River Sub-Basin	Total Upstream Catchment Area (km ²)
Shannon[Lower] sub-catchment (Shannon[Lower]_SC_040)	
Rapemills_010	~57
Rapemills_020	~95
Shannon (Lower)_020	~6,700

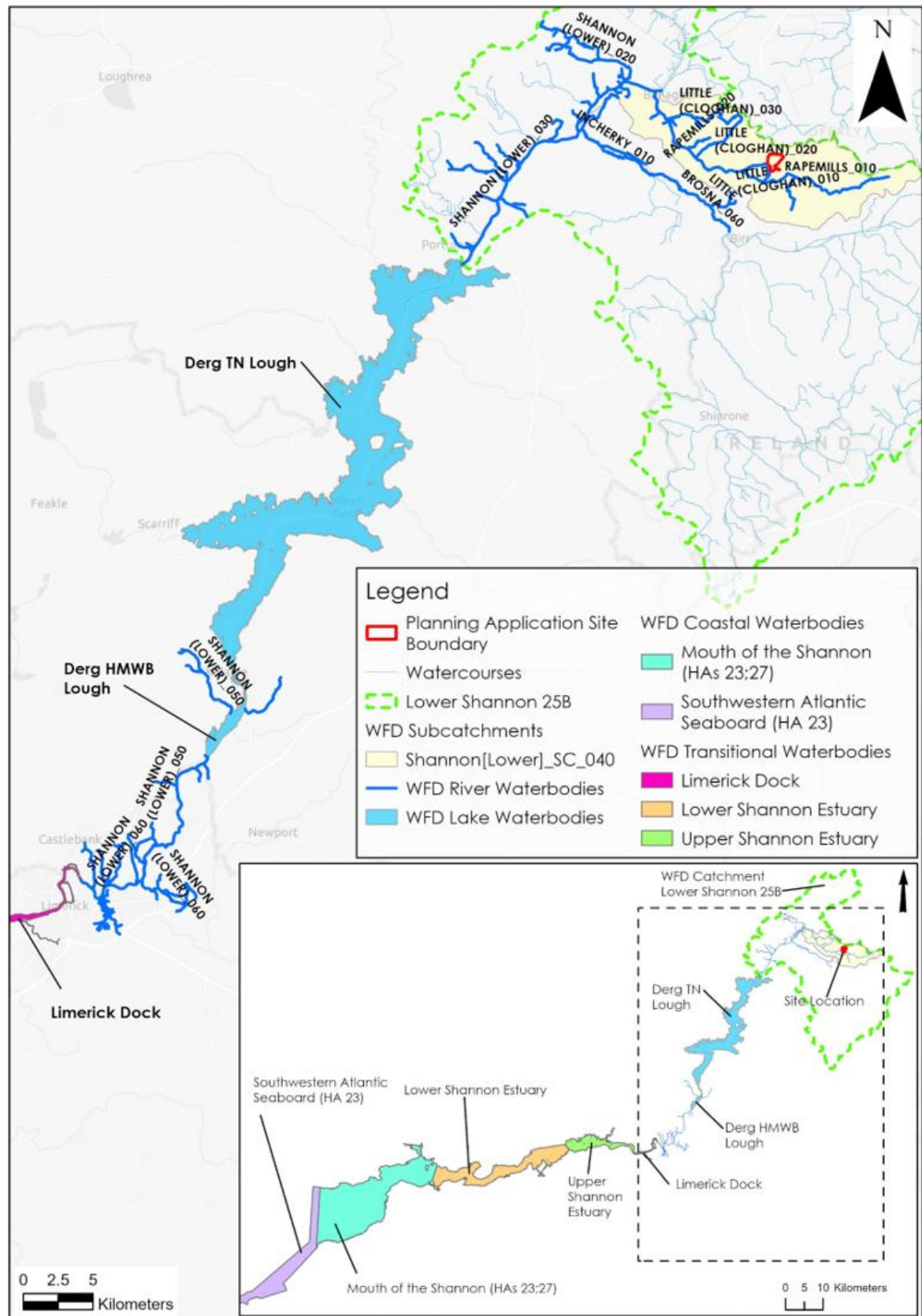


Figure A: Local Hydrology Map

2.3 SURFACE WATER BODY CLASSIFICATION

A summary of the WFD status and risk result for Surface Water Bodies (SWBs) downstream of the project site are shown in Table B. The overall status is based on the ecological, chemical and quantitative status of each SWB.

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

As described in **Section 2.2** above, the project site including the wind farm site and the underground electricity line route is drained locally by the Rapemills River.

The latest 2019-2024 WFD cycle status of the Rapemills River in the vicinity and downstream of the project site is "Moderate" (Rapemills_010 and _020 river segments). Both segments of the Rapemills River (Rapemills_010 and _020) have been deemed to be "At risk" of failing to meet their WFD objectives by 2027. Agricultural activities have been found to be significantly impacting each of the waterbodies. Peat harvesting and drainage is additionally impacting the Rapemills_020 river waterbody.

The Rapemills River feeds into the Shannon (Lower) River. The Shannon (Lower)_020 and Shannon (Lower)_030 SWB's downstream of the site achieved "Moderate" status in the latest WFD cycle. The Shannon (Lower)_020 is classified as being "At risk", whereas the risk status of the Shannon (Lower)_030 SWB is currently "Under review". Diffuse urban pressures, caused by misconnections, leaking sewers and runoff from paved and unpaved areas, have been identified as a significant pressure on the Shannon (Lower)_020 SWB.

Further downstream, the Shannon (Lower)_030 river waterbody drains into Lough Derg or the 'Derg TN' lake waterbody as per its WFD name, which achieved "Moderate" status. Further south, between Killaloe and Ballina town, the Derg TN lake waterbody flows into the Derg HMWB lake waterbody, which was found to be of "Good" status for the 2019-2024 WFD cycle. The Derg TN lake waterbody is "At risk" with agricultural activities and hydromorphology acting as significant pressures on the SWB. Dams, Barriers, Locks and Weirs is the hydromorphological sub-pressures category attributed to the Derg TN waterbody creating barriers for fish migration. Additionally, the Derg TN Lake waterbody has zebra mussels present, which have been identified as a significant pressure. Furthermore, Lough Derg has Asian clams and up to 14 other alien species according to IFI and the Lough Derg Science Group. The Derg HMWB lake waterbody's risk status is "Under review".

The Shannon (Lower)_050 SWB outflows from the Derg HMWB lake waterbody, which in turn flows into the Shannon (Lower)_060 SWB. The Shannon (Lower)_050 and the Shannon (Lower)_060 SWB's achieved "Poor" and "Moderate" Status, respectively. Hydromorphological pressures have been attributed to the Shannon (Lower)_050 waterbody which is "At risk", whilst the Shannon (Lower)_060 SWB is currently "Under review".

Transitional waterbodies downstream of the project site include the Limerick Dock, Upper Shannon Estuary and the Lower Shannon Estuary. Both the Limerick Dock and Upper Shannon Estuary waterbodies have "Poor" status and are "At risk", whereas the Lower Shannon Estuary achieved "Good" status and is "Not at risk". Hydromorphology is the identified significant pressure on the Limerick Dock transitional waterbody and Agriculture is the identified significant pressure on the Upper Shannon Estuary transitional waterbody. The coastal waterbodies downstream of the development consist of the Mouth of the Shannon (HAs 23;27) and the Southwestern Atlantic Seaboard (HA 23) which achieved "Good" and "High" status respectively and are both "Not at risk" of failing to meet their WFD objectives in the future.

The SWB status for the 2019-2024 WFD cycle are shown on **Figure B**.

Table B: Summary WFD Information for Water Bodies

SWB	Overall Status 2010-2015	Overall Status 2013-2018	Overall Status 2016-2021	Overall Status 2019-2024	Risk Status 3 rd Cycle	Pressures
Lower Shannon Catchment						
Rapemills_010	Good	Moderate	Moderate	Moderate	At risk	Agriculture
Rapemills_020	Unassigned	Moderate	Moderate	Moderate	At risk	Agriculture & peat
Shannon (Lower)_020	Good	Moderate	Moderate	Moderate	At risk	Urban run-off
Shannon (Lower)_030	Unassigned	Moderate	Moderate	Moderate	Under review	-
Derg TN	Poor	Moderate	Moderate	Moderate	At risk	Agriculture, hydromorphology & Invasive Species
Derg HMWB	Good	Good	Good	Good	Under Review	-
Shannon (Lower)_050	Moderate	Moderate	Poor	Poor	At risk	Hydromorphology
Shannon (Lower)_060	Unassigned	Moderate	Moderate	Moderate	Under Review	-
Limerick Dock	Moderate	Good	Poor	Poor	At Risk	Hydromorphology
Upper Shannon Estuary	Poor	Poor	Poor	Poor	At Risk	Agriculture
Lower Shannon Estuary	Moderate	Good	Good	Good	Not at Risk	-
Mouth of the Shannon (HAs 23;27)	Moderate	Good	Good	Good	Not at Risk	-
Southwestern Atlantic Seaboard (HA 23)	Unassigned	High	High	High	Not at Risk	-

2.4 GROUNDWATER BODY IDENTIFICATION

Based on the GSI bedrock mapping (www.gsi.ie), Waulsortian Limestones (Dinantian Pure Unbedded Limestones) are mapped to underlie the majority of the wind farm site including the 3 no. proposed turbine locations.

The eastern portion of the wind farm site along with the majority of the underground electricity line route are mapped to be underlain by Visean Limestones which are also Pure Bedded Limestones. The eastern end of the underground electricity line route, close to the proposed Mullanafawnia 110kV substation, is mapped to be underlain by the Lucan Formation (Dinantian Impure Limestone).

The Waulsortian Limestone is described as dominantly grey, crudely bedded or massive limestones. The Lucan Formation, known as 'calp limestone', is described as dark limestone and shale. The Visean Limestones are undifferentiated. The Waulsortian Limestones and the Lucan Formation is classified as Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones (LI) and the Visean Limestones is classified as Regionally Important Aquifer - Karstified (diffuse) (Rkd).

In terms of local Groundwater Bodies (GWBs), the project site straddles the Banagher GWB (IE_SH_G_040), Birr GWB (IE_SH_G_041), Birr Gravels GWB (IE_SH_G_244) and Shinrone GWB (IE_SH_G_205).

The majority of the wind farm site itself is located in the Banagher GWB with the eastern part located in the Birr GWB. Sand and gravels are mapped to overlie the bedrock along the majority of the underground electricity line route (i.e. Birr Gravels GWB) and the southeastern part of the wind farm site. These gravels deposits are classified as a Locally Important Gravel Aquifer (Lg) by the GSI.

The GWB status for the 2019-2024 WFD cycle are shown on **Figure B**.

2.5 GROUNDWATER BODY CLASSIFICATION

The GWBs are assigned a status based on the assessment of groundwater chemical and quantitative figures. Summary WFD information for GWBs underlying the Site is presented in Table C.

All GWBs that underly the project site have been assigned 'Good' status in all WFD cycles and have been deemed to be 'Not at Risk'.

Table C: Summary WFD Information for Groundwater Bodies

GWB	Overall Status 2010-2015	Overall Status 2013-2018	Overall Status 2016-2021	Overall Status 2019-2024	Risk Status 3 rd Cycle	Pressures
Banagher	Good	Good	Good	Good	Not at risk	-
Birr	Good	Good	Good	Good	Not at risk	-
Birr Gravels	Good	Good	Good	Good	Not at risk	-
Shinrone	Good	Good	Good	Good	Not at risk	-

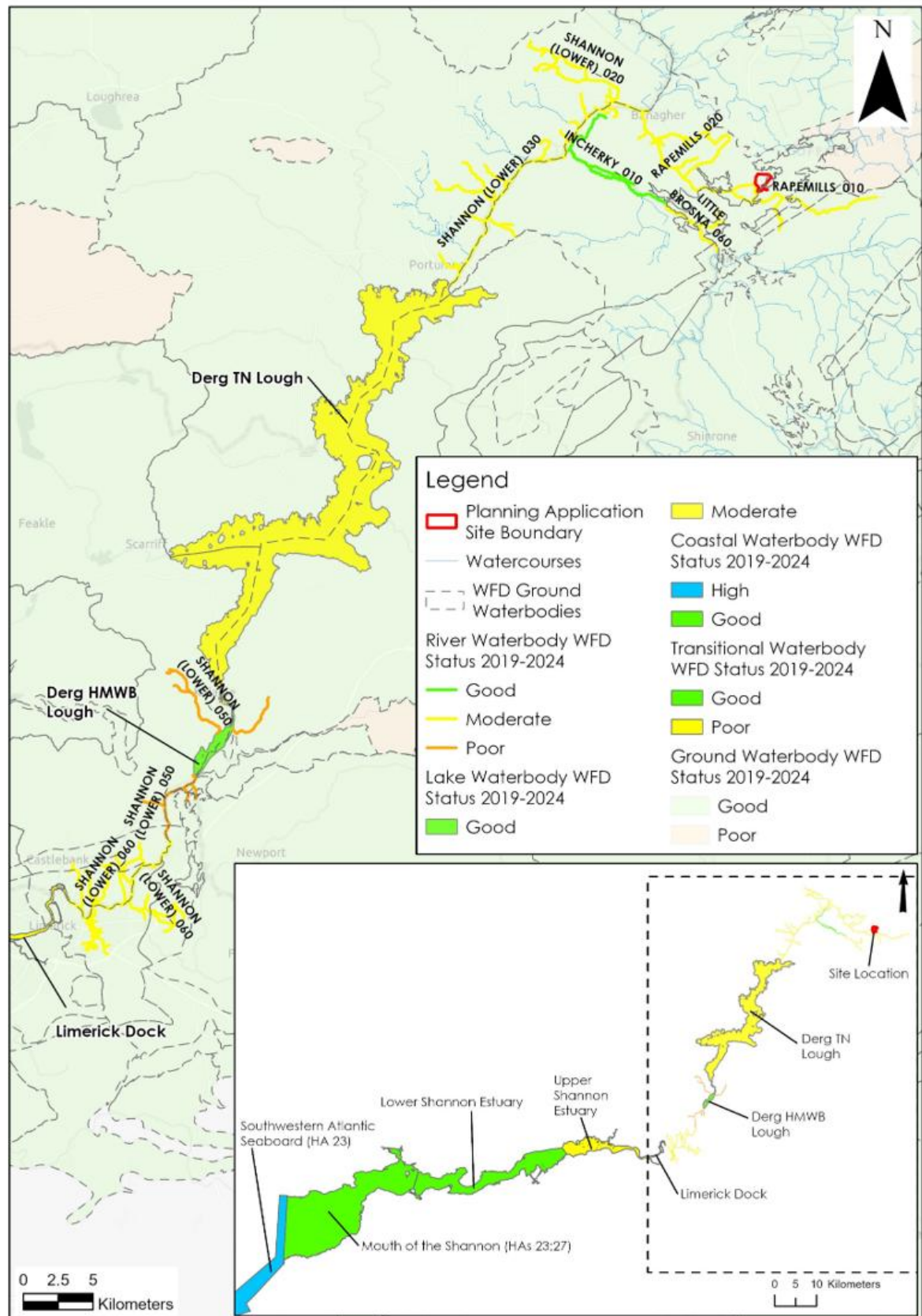


Figure B: WFD Groundwater and Surface Waterbody Status (2019-2024)

2.6 ZONE OF INFLUENCE

The potential Zone of Influence (Zoi) extends to the following SWBs and GWBs:

- River waterbodies (6 no.): Rapemills (Rapemills_010 and 020) and Shannon (Lower) (Shannon (Lower)_020, 030, 050 and 060);
- Lake Waterbodies (2 no.): Derg TN and Derg HMWB;
- GWBs (4 no.): Banagher, Birr, Shinrone and Birr Gravels GWBs; and,
- Transitional (3 no.) and Coastal waterbodies (2 no.): Limerick Dock, Upper Shannon Estuary, Lower Shannon Estuary, Mouth of Shannon (Has 23;27) and Southwestern Atlantic Seaboard (HA 23).

2.7 PROTECTED AREA IDENTIFICATION

The WFD requires that activities are also in compliance with other relevant legislation, as considered below. Nature conservation designations, bathing waters, nutrient Sensitive areas (NSA), shellfish areas and drinking water protected area's (DWPA) are looked at as part of the assessment.

2.7.1 Nature Conservation Designations

Within the Republic of Ireland, designated sites include Natural Heritage Areas (NHAs), proposed Natural Heritage Areas (pNHAs), candidate Special Areas of Conservation (cSAC), Special Areas of Conservation (SAC) and Special Protection Areas (SPAs).

The project is not located within any designated conservation site. Designated sites in close proximity to the project include Lough Coura pNHA (Site Code: 000909). Lough Coura is located approximately 0.9km to the north of the wind farm site. The project site does not drain into Lough Coura.

The project site drains to the Rapemills River, which passes the All Saints Bog and Esker SAC and pNHA (Site Code: 000566) and the All Saints Bog SPA (Site Code:004103) c.5.5km downstream of the project site.

The hydrologically connected designated sites located downstream of the project site are:

- The River Shannon Callows SAC and pNHA (Site Code: 000216) and the Middle Shannon Callows SPA (Site Code: 004096) is mapped approximately 7.8km northwest of the project site and is hydrologically connected via Rapemills river;
- The Lough Derg, North-east Shore SAC (Site Code: 002241), the Lough Derg (Shannon) SPA (Site Code: 004058) and the Lough Derg pNHA (Site Code: 000011) is mapped approximately 20km southwest of the project site and is hydrologically connected via Rapemills and Lower (Shannon) river; and,
- The Lower River Shannon (SAC) (Site Code: 002165) is mapped approximately 53km southwest of the project site and is hydrologically connected via Rapemills and Lower (Shannon) river and the Derg TN and HMWB lake waterbodies.

Other designated site within 10km of the project site and not connected hydrologically include:

- The Woodville Woods pNHA (Site Code: 000927) is mapped approximately 2.11km southwest of the project site;
- The Ross And Glenns Eskers pNHA (Site Code: 000920) is mapped approximately 3.3km southwest of the project site;
- The Dovegrove Callows SPA (Site Code: 004137) is mapped approximately 3.84km southwest of the project site;
- The Dovegrove Callows pNHA (Site Code: 000010) is mapped approximately 4.04km southwest of the project site;
- The Killeen Bog NHA (Site Code: 000648) is mapped approximately 7.7km southwest of the project site;
- The Ballyduff/Clonfinane Bog SAC and pNHA (Site Code: 000641) is mapped approximately 9.4km southwest of the project site;

- The Ridge Road, SW of Rapemills SAC and pNHA (Site Code: 000919) is mapped approximately 4.7km west of the project site;
- The River Little Brosna Callows SPA and NHA (Site Code: 000564 and 004086) is mapped approximately 6.4km west of the project site;
- The Derrykeel Meadows pNHA (Site Code: 000897) is mapped approximately 5.1km southeast of the project site;
- The Lisduff Fen SAC (Site Code: 002147) is mapped approximately 9km south of the project site;
- The Island Fen SAC (Site Code: 002236) is mapped approximately 7km south of the project site;
- The Slieve Bloom Mountains SPA (Site Code: 004160) is mapped approximately 8.5km southeast of the project site;
- The Lough Boora pNHA (Site Code: 001365) is mapped approximately 9.1km northeast of the project site; and,
- The Grand Canal pNHA (Site Code: 002104) is mapped approximately 9.2km northwest of the project site.

2.7.2 Bathing Waters

Bathing waters are those designated under the Bathing Water Directive (76/160/EEC) or the later revised Bathing Water Directive (2006/7/EC).

There are no bathing water sites located in the vicinity of the project site. The project site is ~23km northeast of the Bathing Place at Portumna (IESHBWL25_191a_0100), the nearest bathing water site (as the crow flies).

2.7.3 Nutrient Sensitive Areas

Nutrient Sensitive Areas (NSA) comprise Nitrate Vulnerable Zones and polluted waters designated under the Nitrates Directive (91/676/EEC) and areas designated as sensitive areas under the Urban Wastewater Treatment Directive (UWWTD)(91/271/EEC). Sensitive areas under the UWWTD are water bodies affected by eutrophication associated with elevated nitrate concentrations and act as an indication that action is required to prevent further pollution caused by nutrients.

The Derg TN NSA (IELK_SH_1994_0007) is the only NSA downstream of the project site. The NSA objective for Derg TN NSA is being met.

2.7.4 Shellfish Areas

The Shellfish Waters Directive (2006/113/EC) (replaced by 2006/7/EC) aims to protect or improve shellfish waters in order to support shellfish life and growth.

There are no Shellfish areas located in the vicinity of the project site. The project site is ~70km east of Clarinbridge/Kinvara Bay (IEPA2_0005), the nearest shellfish area site (as the crow flies).

2.7.5 Drinking Water

There are 2 no. surface water DWPA's downstream of the proposed project, the Derg TN DWPA (IEPA1_SH_25_191a) and the Shannon (Lower)_060 DWPA (IEPA1_SH_25S012600). Meanwhile, all GWBs within the catchment are listed as DWPAs.

Rath Group Water Scheme (GWS) groundwater source protection area is mapped at the eastern end of the underground electricity line route, with approximately 400m of the proposed route located within the source protection area. The section of the proposed route within the

source protection area is on private lands (grassland). The proposed route is set back at least 300m from the source wells and springs.

3. WFD SCREENING

As discussed in **Section 2**, there are a total of 6 no. surface water waterbodies which are located in the vicinity or downstream of the proposed project site.

There are also 2 no. lake waterbodies, 3 no. transitional waterbodies and 2 no. coastal waterbodies downstream of the proposed project site. In addition, 3 no. groundwater bodies underlie the proposed project site.

Furthermore, there are protected areas in downstream of the project site, namely the nature designation areas including the River Shannon Callows SAC and the Middle Shannon Callows SPA.

3.1 SURFACE WATER BODIES

The river waterbodies in the immediate vicinity and downstream of the project site are shown in Figure A and described in **Section 2.2** above.

With consideration for the construction, operational and decommissioning phases of the project site, it is considered that all sections of the Rapemills River (Rapemills_010 & Rapemills_020) within the vicinity and downstream of the project site are carried through into the WFD Impact Assessment. These SWBs have been included for further assessment due to their proximal location to the proposed project works. The project site 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.

The Shannon (Lower) River (Shannon (Lower)_020, 030, 050 and 060) and 2 no. lake waterbodies downstream of the project site, Derg TN and Derg HMWB, have been screened out due to their distal location from the proposed works and the large volumes of water within these SWBs. The proposed project has no potential to cause a deterioration in status of these SWBs and/or jeopardise the attainment of good surface water status in the future.

All transitional waterbodies downstream of the project site, including the Limerick Dock, Upper Shannon Estuary and the Lower Shannon Estuary, have been screened out due to the large volumes of water within these SWBs and the saline nature of these waters. The proposed project has no potential to cause a deterioration in status of these SWBs and/or jeopardise the attainment of good surface water status in the future.

The same reasoning applies to the coastal waterbodies downstream of the project site (Mouth of the Shannon (HAs 23;27) and the Southwestern Atlantic Seaboard (HA 23)), hence they too have been screened out of the WFD Impact Assessment.

3.2 GROUNDWATER BODIES

With respect to groundwater bodies, the Banagher GWB, Birr GWB, Shinrone and Birr Gravels GWB are carried through to the WFD Impact Assessment due to their location directly underlying the project site.

3.3 PROTECTED AREAS

The project site has hydrological connections with downstream designated sites including the River Shannon Callows SAC and the Middle Shannon Callows SPA (within the Shannon (Lower) River where the Rapemills River and Little Brosna Rivers drains to). With consideration for the construction, operational and decommissioning phases of the proposed development, it is considered that the River Shannon Callows SAC and the Middle Shannon Callows SPA all

screened out due to distant location and increased volume of water within the Shannon (Lower) river. The proposed project has no potential to cause a deterioration in status of these designated sites.

The project site drains to the Rapemills River, which passes the All Saints Bog and Esker SAC and pNHA. However, there is no surface water connection between the project site and All Saints Bog and Esker SAC as All Saints Bog discharges into Rapemills River and not vice versa. Groundwater flow in the area of the project site is likely to be westerly towards All Saints Bog and Esker SAC. However, groundwater flow below Saints Bog will be limited to the deeper glacial deposits which are separated from the overlying bog by very low permeability marl and lacustrine clay deposits which underlies the basin peat in this area. Therefore, All Saints Bog and Esker SAC and pNHA is screened out.

Any other designated sites mapped within or beyond Shannon (Lower) River, as listed above in **Section 2.7.1**, have been screened out due to their distal locations from the proposed works and the large volumes of water within the associated SWBs. The proposed project has no potential to cause a deterioration in status of these designated sites.

All other designated sites have been screened out due to lack of hydrological connection between the designated site and the project site. The proposed project has no potential to cause a deterioration in status of these designated sites.

The Derg TN NSA and DWPA downstream of the project site, has been screened out due to its distal location from the proposed works and the large volumes of water within the lake waterbody. The proposed project has no potential to cause a deterioration in status of this NSA and DWPA.

The Shannon (Lower)_060 DWPA has also been screened out due to its distal location from the project site and due to its increased catchment area and flow volumes, which decreases the potential for the proposed project to impact the DWPA. The proposed works have no potential to cause a deterioration in the status of the DWPA.

Rath Group Water Scheme (GWS) is screened in due to proposed works within the drinking water protected area.

3.4 WFD SCREENING SUMMARY

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

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

Type	WFD Classification	Waterbody Name/ID	Inclusion in Assessment	Justification
Surface Water Body	Lower Shannon Catchment			
	River	Rapemills_010	Yes	The project site is mapped within the Rapemills_010 river sub-basin. An assessment is required to consider the potential impacts of the proposed project on this SWB.
	River	Rapemills_020	Yes	The Rapemills_020 is located proximally to the project site and directly downstream of the Rapemills_010 SWB. An assessment is required to consider the potential impacts of the proposed project on this SWB.
	River	Shannon (Lower)_020	No	The Shannon (Lower)_020 has been screened out due to distant location and increased volume of water associated with increased upstream catchment area. The Proposed project has no potential to impact the status of this SWB.
	River	Shannon (Lower)_030	No	The Shannon (Lower)_030 has been screened out due to distant location and increased volume of water associated with increased upstream catchment area. The Proposed project has no potential to impact the status of this SWB.
	Lake	Derg TN	No	Derg TN lake waterbody has been screened out due to its distal location from the project site and the large volume of water within the Lake. The proposed project has no potential to impact the status of this SWB.
	Lake	Derg HMWB	No	Derg HMWB lake waterbody has been screened out due to its distal location from the project site and the large volume of water within the Lake. The proposed project has no potential to impact the status of this SWB.
	River	Shannon (Lower)_050	No	The Shannon (Lower)_050 has been screened out due to distant location and increased volume of water associated with increased upstream catchment area. The Proposed project has no potential to impact the status of this SWB.
	River	Shannon (Lower)_060	No	The Shannon (Lower)_060 has been screened out due to distant location and increased volume of water associated with increased upstream catchment area. The Proposed project has no potential to impact the status of this SWB.
	Transitional	Limerick Dock	No	The Limerick Dock SWB has been screened out due to the saline nature of its waters and the large volumes of water within the transitional waterbody. The Proposed project has no potential to impact the status of this SWB.
	Transitional	Upper Shannon Estuary	No	The Upper Shannon Estuary SWB has been screened out due to the saline nature of its waters and the large volumes of water within the Estuary. The Proposed project has no potential to impact the status of this SWB.
	Transitional	Lower Shannon Estuary	No	The Lower Shannon Estuary SWB has been screened out due to the saline nature of its waters and the large volumes of water within the Bay. The Proposed project has no potential to impact the status of this SWB.
	Coastal	Mouth of the Shannon (HAs 23;27)	No	The Mouth of the Shannon (HAs 23;27) SWB has been screened out due to the saline nature of its waters and the large volumes of water within the SWB. The proposed project has no potential to impact the status of this SWB.

	Coastal	Southwestern Atlantic Seaboard (HA 23)	No	The Southwestern Atlantic Seaboard (HA 23) SWB has been screened out due to the saline nature of its waters and the large volumes of water within the Bay. The proposed project has no potential to impact the status of this SWB.
	Groundwater Bodies			
Groundwater Body	Groundwater Groundwater Groundwater	Banagher	Yes	The majority of the wind farm site is mapped to overlie the Banagher GWB. An assessment is required to consider the potential impacts of the proposed project on this GWB.
		Birr	Yes	The eastern part of the wind farm site and the underground electricity line route is mapped to overlie the Birr GWB. An assessment is required to consider the potential impacts of the proposed project on this GWB.
		Birr Gravels	Yes	The southeastern part of the wind farm site and the majority of the underground electricity line route is mapped to overlie the Birr Gravels GWB. An assessment is required to consider the potential impacts of the proposed project on this GWB.
		Shinrone	Yes	The eastern end of the underground electricity line route is mapped to overlie the Shinrone GWB. An assessment is required to consider the potential impacts of the proposed project on this GWB.
	Protected Areas			
Protected Areas	Nature Conservation Designations	Lough Coura pNHA	No	The Lough Coura pNHA has been screened out due to lack of hydrological connection between the project site and the Lough Coura pNHA. The proposed project has no potential to impact this pNHA.
		All Saints Bog and Esker SAC and pNHA and All Saints Bog SPA	No	The All Saints Bog and Esker SAC and pNHA and All Saints Bog SPA has been screened out due to lack of hydrological connection between the project site and the All Saints Bog and Esker SAC and pNHA and All Saints Bog SPA. The proposed project has no potential to impact this SAC, SPA and pNHA.
		River Shannon Callows SAC and pNHA	No	The River Shannon Callows SAC and pNHA has been screened out due to distant location and increase volume of water within the Shannon (Lower) river. The proposed project has no potential to impact this SAC and pNHA.
		Middle Shannon Callows SPA	No	The Middle Shannon Callows SPA has been screened out due to distant location and increase volume of water within the Shannon (Lower) river. The proposed project has no potential to impact this SPA.
		Lough Derg northeast Shore SAC	No	The Lough Derg northeast Shore SAC has been screened out due to distant location and increase volume of water within the Shannon (Lower) river and Lough Derg TN. The proposed project has no potential to impact this SAC.
		Lough Derg pNHA	No	The Lough Derg pNHA has been screened out due to distant location and increase volume of water within the Shannon (Lower) river and Lough Derg TN. The proposed project has no potential to impact this pNHA.
		Lough Derg (Shannon) SPA	No	The Lough Derg (Shannon) SPA has been screened out due to distant location and increase volume of water within the Shannon (Lower) river and Lough Derg TN. The proposed project has no potential to impact this SPA.

		Lower River Shannon SAC	No	The Lower River Shannon SAC has been screened out due to distant location and increase volume of water within the Shannon (Lower) river and Limerick Dock and Uppern Shannon Estuary transitional waterbodies. The proposed project has no potential to impact this SAC.
		Woodville Woods pNHA	No	The Woodville Woods pNHA has been screened out due to lack of hydrological connection between the project site and the Woodville Woods pNHA. The proposed project has no potential to impact this pNHA.
		Ross And Glenns Eskers pNHA	No	The Ross And Glenns Eskers pNHA has been screened out due to lack of hydrological connection between the project site and the Ross And Glenns Eskers pNHA. The proposed project has no potential to impact this pNHA.
		Dovegrove Callows SPA	No	The Dovegrove Callows SPA has been screened out due to lack of hydrological connection between the project site and the Dovegrove Callows SPA. The proposed project has no potential to impact this SPA.
		Dovegrove Callows pNHA	No	The Dovegrove Callows pNHA has been screened out due to lack of hydrological connection between the project site and the Dovegrove Callows pNHA. The proposed project has no potential to impact this pNHA.
		Killeen Bog NHA	No	The Killeen Bog NHA has been screened out due to lack of hydrological connection between the project site and the Killeen Bog NHA. The proposed project has no potential to impact this NHA.
		Ballyduff/Clonfinane Bog SAC and pNHA	No	The Ballyduff/Clonfinane Bog SAC and pNHA has been screened out due to lack of hydrological connection between the project site and the Ballyduff/Clonfinane Bog SAC and pNHA. The proposed project has no potential to impact this SAC and pNHA.
		Ridge Road, SW of Rapemills SAC and pNHA	No	The Ridge Road, SW of Rapemills SAC and pNHA has been screened out due to lack of hydrological connection between the project site and the Ridge Road, SW of Rapemills SAC and pNHA. The proposed project has no potential to impact this SAC and pNHA.
		River Little Brosna Callows SPA and NHA	No	The River Little Brosna Callows SPA and NHA has been screened out due to lack of hydrological connection between the project site and the River Little Brosna Callows SPA and NHA. The proposed project has no potential to impact this SPA and NHA.
		Derrykeel Meadows pNHA	No	The Derrykeel Meadows pNHA has been screened out due to lack of hydrological connection between the project site and the Derrykeel Meadows pNHA. The proposed project has no potential to impact this pNHA.
		Lisduff Fen SAC	No	The Lisduff Fen SAC has been screened out due to lack of hydrological connection between the project site and the Lisduff Fen SAC. The proposed project has no potential to impact this SAC.
		Island Fen SAC	No	The Island Fen SAC has been screened out due to lack of hydrological connection between the project site and the Island Fen SAC. The proposed project has no potential to impact this SAC.
		Slieve Bloom Mountains SPA	No	The Slieve Bloom Mountains SPA has been screened out due to lack of hydrological connection between the project site and the Slieve Bloom Mountains SPA. The proposed project has no potential to impact this SPA.
		Lough Boora pNHA	No	The Lough Boora pNHA has been screened out due to lack of hydrological connection between the project site and the Lough Boora pNHA. The proposed project has no potential to impact this pNHA.

		Grand Canal pNHA	No	The Grand Canal pNHA has been screened out due to lack of hydrological connection between the project site and the Grand Canal pNHA. The proposed project has no potential to impact this pNHA.
	Bathing Waters	Bathing Place at Portumna	No	The Bathing Place at Portumna has been screened out due to its distal location from the project site. The proposed project has no potential to impact these bathing waters.
	Nutrient Sensitive Areas			
	Shellfish Area	Clarinbridge/Kinvara Bay	No	Clarinbridge/Kinvara Bay Shellfish waters have been screened out due to its distal location from the project site. The proposed project has no potential to impact this designated shellfish area.
	Drinking Water	Derg TN	No	Derg TN DWPA has been screened out due to its distal location from the project site and the large volume of water within the Lake. The proposed project has no potential to impact the DWPA.
		Shannon (Lower)_060	No	The Shannon (Lower)_060 DWPA has been screened out due to its distal location from the project site and the increasing volumes of water within the Shannon (Lower) River.
		Rath GWS	Yes	Rath Group Water Scheme (GWS) is screened in due to proposed works within the drinking water protected area.
		Derg TN NSA	No	Derg TN NSA has been screened out due to its distal location from the project site and the large volume of water within the Lake. The proposed project has no potential to impact the status of this NSA.

4. SCOPING OF WATERBODY ELEMENTS

4.1 SWB SCOPING

The project site has the potential to interact with nearby and downstream surface water bodies through:

- Earthworks and the entrainment of suspended solids in surface water runoff;
- Potential contamination from hydrocarbons and cement-based products during refuelling and minor maintenance works;
- Potential contamination from wastewater; and,
- Changes in downstream surface water flow volumes due to the Proposed Development footprint.

Accordingly, the WFD quality elements scoped into the assessment are summarised in Table E.

Table E: SWB Quality Element Scoping

WFD Quality Element	Scoped In / Out	Justification
Hydromorphology	Scoped In	Changes to site drainage and surface water runoff associated with the project have the potential to alter local flow conditions within receiving surface waters.
Physico-Chemical Quality	Scoped In	Construction and operational activities have the potential to affect suspended solids, nutrients, hydrocarbons and other water quality parameters in receiving surface waters.
Biological Quality Elements	Scoped In	Biological receptors are dependent upon the maintenance of suitable hydromorphological and physico-chemical conditions within receiving surface waters.
Priority Substances / Specific Pollutants	Scoped In	Accidental releases of hydrocarbons or other potentially polluting substances during the construction and operational phases have the potential to affect downstream surface water quality.
Protected Areas	Scoped In	Project located in groundwater source protection area.
Fish Migration / Fish Passage	Scoped In	Construction activities have the potential to affect aquatic habitat and conditions for migratory fish through sediment-laden runoff and accidental pollution.
Estuarine Processes	Scoped Out	The project site is inland and the estuarine waterbodies are sufficiently distant downstream that no potential effect on estuarine processes is identified.
Coastal Waterbody Processes	Scoped Out	The project site is inland and a significant distance from any coastal waterbody.

4.2 GWB SCOPING

Those groundwater body quality elements taken forward into the WFD Compliance Assessment for the project site are included in **Table F**. These have been identified using professional expertise as those WFD quality elements with the potential to be affected by project.

Table F: Scoping of Groundwater Quality Elements

WFD Quality Element	Scoped in/Out	Justification
Saline (or Other) Intrusions Test Quantitative Test	Scoped out	The project site is inland and a significant distance from any coastal waterbody. The project does not include any significant groundwater abstraction or permanent dewatering.
Impact of Groundwater on Surface Water Ecological/Quantitative Status Test	Scoped out	The project site does not include any significant groundwater abstraction or permanent dewatering and therefore is not expected to result in a significant alteration of groundwater contributions to surface water flow.
Groundwater Dependent Ecosystems Quantitative Test	Scoped out	No Groundwater Dependent Terrestrial Ecosystems are currently identified within the project site.
Water Balance Test	Scoped out	The project site does not include any significant groundwater abstraction or permanent dewatering and therefore will not result in a significant alteration of the groundwater balance.
Saline (or Other) Intrusions Test Chemical Test	Scoped out	The project site is inland and a significant distance from any coastal waterbody and the Proposed Development does not include any significant groundwater abstraction or dewatering.
Impact of Groundwater on Surface Water Ecological/Chemical Status Test	Scoped in	Construction activities have the potential to introduce pollutants to groundwater, with potential indirect effects on hydrologically connected surface water bodies.
Groundwater Dependent Ecosystems Ecological/Chemical Status test	Scoped out	No Groundwater Dependent Terrestrial Ecosystems are currently identified within or in the immediate vicinity of the project site.
Drinking Water Protected Area Test	Scoped In	Rath Group Water Scheme (GWS) groundwater source protection area.
General Chemical Assessment Test	Scoped In	Construction activities have the potential to affect groundwater quality through accidental releases of hydrocarbons, cement-based products and wastewater.

5. WFD COMPLIANCE ASSESSMENT

5.1 PROPOSALS

The project includes the following:

- 3 no. wind turbines with the following dimension range:
 - An overall turbine tip height of 199.1m to 200m;
 - A rotor diameter of 158m to 175m; and
 - A hub height of 111.6m to 120.9m.
- All associated turbine foundations and crane hardstanding areas;
- All associated internal underground electrical and communications cabling;
- Construction of approximately 1.7km of wind farm access tracks;
- Use of 1 no. permitted construction phase site entrance from the N62 national road and use of 1 no. permitted operation phase site entrance from the L300321 local road;
- The storage, as required, of excavated material at dedicated spoil deposition areas;
- 1 no. proposed electrical switch room building, enclosed within a switch room compound and including 1 no. new site entrance onto the L300321 local road;
- Approximately 5km of underground electricity line to connect the proposed switch room to the Mullanafawnia 110kV substation; and
- All associated and ancillary site development, excavation, construction, landscaping and reinstatement works, including provision of site drainage infrastructure, rehabilitation works, and environmental mitigation measures.

Off-site or secondary elements of the project which are included for assessment in the EIAR, include:

- Upgrade works to public roads along the turbine component haul route.

5.2 POTENTIAL EFFECTS

5.2.1 Construction Phase (Unmitigated)

5.2.1.1 Earthworks (Removal of Vegetation Cover, Excavations and Stock Piling) Resulting in Suspended Solids Entrainment in Surface Water

Construction phase activities including site levelling/construction and building turbine foundations 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 dewatering during construction works.

Hydrocarbons and cement-based compounds will 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 sites. 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.

Release of effluent from wastewater treatment systems also has the potential to impact on surface waters if site conditions are not suitable for an on-site percolation unit.

Therefore, construction phase activities creating poor quality runoff could result in an increase in the suspended sediment load, resulting in increased turbidity, increased pH (if cement present) and contamination which could affect the water quality and fish stocks in surface waterbodies downstream of the wind farm site including the Rapemills River.

The Rapemills River ultimately discharges into the River Shannon. The Rapemills catchment is approximately 95km², compared with approximately 6,700km² upstream of its confluence with the Shannon. The substantially greater receiving flows provide increased dilution and assimilation capacity downstream.

A summary of potential status change to SWBs arising from surface water quality impacts from earthworks during the construction phase of the project site in the unmitigated scenario are outlined in Table G.

Table G: Surface Water Quality Impacts (WF Site) during Construction Phase (Unmitigated)

SWB	WFD Code	Current Status	Assessed Status Change	Potential Status Change
Rapemills_010	IE_SH_25R010300	Moderate	Poor	
Rapemills_020	IE_SH_25R010500	Moderate	Poor	

5.2.1.2 Potential Surface Water Quality Effects along the Underground Electricity Line Route

The underground electricity line route is mapped within the Rapemills_010 river sub-basin. The underground electricity line will cross the N52 national road and the L7006 local road using horizontal directional drilling ('HDD'), thereby avoiding open trenching within the public road.

The underground electricity line route runs adjacent to the Rapemills River channel for approximately 2.5km and will also cross beneath the Rapemills River at two locations using HDD. Accordingly, four HDD crossings are proposed in total.

The underground electricity line will cross beneath the Rapemills River at two locations using HDD, thereby avoiding open trenching or works within the riverbed or channel. Subject to implementation of the HDD and inadvertent-return controls as per the project design, no likely significant hydromorphological effect will arise.

A summary of potential status change to SWBs arising from surface water quality impacts from earthworks during the construction phase of the underground electricity line route in the unmitigated scenario are outlined in Table H.

Table H: Surface Water Quality Impacts (Underground Electricity Line Route) during Construction Phase (Unmitigated)

SWB	WFD Code	Current Status	Assessed Status Change	Potential Status Change
Rapemills_010	IE_SH_25R010300	Moderate	Moderate	
Rapemills_020	IE_SH_25R010500	Moderate	Moderate	

5.2.1.3 Morphological Changes to Surface Water Courses & Drainage Patterns

Diversion, culverting and bridge crossing of natural surface watercourses can result in morphological changes, changes to drainage patterns and alteration of aquatic habitats. The construction of structures over natural water courses also has the potential to significantly interfere with water quality and flows during the construction phase.

No access-track crossings of natural or EPA-designated watercourses are proposed within the wind farm site. Where access tracks cross artificial bog drainage ditches, appropriately sized culverts or cross-drains will be installed to maintain the existing drainage pathways. The

underground electricity line will cross beneath the Rapemills River at two locations using HDD, therefore no instream works are required.

A summary of potential status change to SWBs arising from morphological impacts from earthworks during the construction phase of the project site in the unmitigated scenario are outlined in Table I.

Table I: Morphological Changes to surface waters during Construction Phase (Unmitigated)

SWB	WFD Code	Current Status	Assessed Status Change	Potential
Rapemills_010	IE_SH_25R010300	Moderate	Moderate	
Rapemills_020	IE_SH_25R010500	Moderate	Moderate	

5.2.1.4 Potential Groundwater Quality Impacts

In terms of local Groundwater Bodies (GWBs), the project site straddles the Banagher GWB, Birr GWB, Birr Gravels GWB and Shinrone GWB.

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. Release of effluent from site welfare wastewater treatment systems has the potential to impact on groundwater and surface waters.

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

However, due to the nature of wind farm developments and underground electricity lines (grid connection), being near surface construction activities, impacts on groundwater are generally negligible and surface water is generally the main sensitive receptor assessed during impact assessments, especially in peatland environments.

The bedrock aquifers are not likely to be sensitive to pollution due to moderate groundwater vulnerability at the wind farm site. This is because the majority of the wind farm site is covered in basin peat which in turn is underlain by marl, clays and glacial tills and these layers act as a protective cover to the underlying bedrock aquifer. Along the underground electricity line the vulnerability rating varies, but due to the shallow and transient nature of the trench works, no significant effects on groundwater will occur.

A summary of potential status change to GWBs arising from potential groundwater quality impacts during the construction phase of the project site in the unmitigated scenario are outlined in Table J.

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

GWB	WFD Code	Current Status	Assessed Status Change	Potential
Banagher	IE_SH_G_040	Good	Good	
Birr Gravels	IE_SH_G_244	Good	Good	
Birr	IE_SH_G_041	Good	Good	

Shinrone	IE_SH_G_205	Good	Good
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5.2.1.5 Potential Impacts on Protected Areas

River Shannon Callows SAC/ Middle Shannon Callows SPA:

The Rapemills River ultimately drains into the River Shannon which flows through the River Shannon Callows SAC and Middle Shannon Callows SPA. Downstream, surface water quality effects are unlikely to be significant at the location of the SAC/SPA due to dilution/assimilation capacity effects over such distances, particularly in the River Shannon itself. It can be concluded that the project site has reduced potential to affect the River SAC/SPA even in an unmitigated scenario throughout the construction phase.

No deterioration attributable to the Project is predicted for the connected receiving waterbodies supporting these designated sites. The screening of other designated sites is set out in Section 3.3 and Table D. Sites without a hydrological or hydrogeological pathway are excluded on that basis. Hydrologically connected downstream sites are screened out of further WFD assessment for the reasons set out in those sections. This does not imply an absence of hydrological connectivity to those downstream sites and does not replace the separate assessment undertaken in the NIS.

Rath Group Water Scheme (GWS) groundwater source protection area.

Rath Group Water Scheme (GWS) groundwater source protection area is mapped at the eastern end of the underground electricity line route, with approximately 400m of the proposed route located within the source protection area. Due to the shallow nature of the trench works and the setback distance of the works area from the source (300m), significant effects are not likely.

5.2.2 Operation Phase (Unmitigated)

Potential effects associated with the operational phase of the project site will be much reduced in comparison to the construction phase. Any effects will occur at the wind farm site and will be associated with minor maintenance works.

Little maintenance work will be required along the underground electricity line route and therefore there is no potential to impact on the status of downstream SWBs or underlying GWBs.

5.2.2.1 Increased Wind Farm Site Runoff and Potential Hydromorphology Effects

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 project site and increase flood risk downstream of the development.

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.

The emplacement of the project site footprint could result in an average total site increase in surface water runoff of 85m³/month, for the month of highest average recorded rainfall. This equates to an average increase of 2.7m³/day.

This represents a 0.11% increase in the average daily/monthly volume of runoff from the project site in comparison to the baseline pre-development site runoff conditions. This is a very small increase in average runoff and results from a relatively small area of the overall project site being developed. Specifically, the proposed permanent hardstand area is approximately 2.33ha, representing 2.7% of the application site of 87ha.

A summary of potential status change to SWBs arising from increased runoff during the operation stage of the project site in the unmitigated scenario are outlined in Table K.

Table K: Potential Impact on Surface Water Flows (Wind Farm) during Operational Phase (Unmitigated)

SWB	WFD Code	Current Status	Assessed Status Change	Potential
Rapemills_010	IE_SH_25R010300	Moderate	Moderate	
Rapemills_020	IE_SH_25R010500	Moderate	Moderate	

5.2.2.2 Surface Water Quality Impacts from Operation Wind Farm 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 project site in the unmitigated scenario are outlined in Table L.

Table L: Surface Water Quality Impacts (WF Site) during Operational Phase (Unmitigated)

SWB	WFD Code	Current Status	Assessed Status Change	Potential
Rapemills_010	IE_SH_25R010300	Moderate	Moderate	
Rapemills_020	IE_SH_25R010500	Moderate	Moderate	

5.2.2.3 Groundwater Quality Impacts at the Wind Farm Site

The risks to groundwater quality are the same as those described in **Section 5.2.1.4** but of a lesser extent than during the construction phase due to the limited activity at the wind farm 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 project site in the unmitigated scenario are outlined in Table M.

Table M: Groundwater Quality Impacts (WF Site) During Operation Phase (Unmitigated)

GWB	WFD Code	Current Status	Assessed Status Change	Potential
Banagher	IE_SH_G_040	Good	Good	
Birr Gravels	IE_SH_G_244	Good	Good	
Birr	IE_SH_G_041	Good	Good	
Shinrone	IE_SH_G_205	Good	Good	

5.2.2.4 Rath Group Water Scheme

There is no potential for underground electricity line to affect the Rath GWS during the operation phase.

5.3 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 project site. These are outlined below.

5.3.1 Construction Phase

5.3.1.1 Earthworks (Removal of Vegetation Cover, Excavations and Stock Piling) Resulting in Suspended Solids Entrainment in Surface Water

Mitigation by Avoidance

The generally large setback distance from sensitive hydrological features at the project site ensures that sufficient space is provided for the installation of drainage mitigation measures (discussed below) and to ensure their effective operation. The proposed buffer zone will ensure:

- Avoidance of physical damage to watercourses, and associated release of sediment;
- Avoidance of excavations within close proximity to surface water courses;
- Avoidance of the entry of suspended sediment from earthworks into watercourses; and,
- Avoidance of the entry of suspended sediment from the construction phase drainage system into watercourses, achieved in part by ending drain discharge outside the buffer zone and allowing percolation across the vegetation of the buffer zone.

Mitigation by Prevention

The following section details the measures which will be put in place during the construction phase to ensure that surface water features are protected from the release of silt or sediment and to ensure that all surface water runoff is fully attenuated to avoid the discharge of dirty water.

- Source controls to limit the likelihood for 'dirty water' to occur include:
 - Interceptor drains, vee-drains, diversion drains, flume pipes, erosion and velocity control measures such as use of sand bags, oyster bags filled with clean washed gravel, filter fabrics, and other similar/equivalent or appropriate systems;
 - Small working areas, covering stockpiles, weathering off stockpiles, cessation of works in certain areas or other similar/equivalent or appropriate measures.
- In-Line controls to ensure appropriate management of silt laden water:-
 - Interceptor drains, vee-drains, oversized swales, erosion and velocity control measures such as check dams, sand bags, oyster bags, straw bales, flow limiters, weirs, baffles, silt bags, silt fences, sedimats, filter fabrics, and collection sumps, temporary sumps/attenuation lagoons, sediment traps, pumping systems, settlement ponds, temporary pumping chambers, or other similar/equivalent or appropriate systems.
- Treatment systems to fully attenuate silt laden waters prior to discharge:
 - Temporary sumps and attenuation ponds, temporary storage lagoons, sediment traps, and settlement ponds, and proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems.
 - Final Tertiary treatment lagoons

It should be noted for this site that an extensive network of bog and forestry drains already exists, and these will be integrated and enhanced as required and used within the wind farm development drainage system. The integration of the existing land drainage network and the proposed wind farm network is common practice in wind energy developments and will also result in benefits to surrounding agricultural lands.

The main elements of interaction with existing drains will be as follows:-

- Apart from interceptor drains, which will convey clean runoff water to the downstream drainage system, there will be no direct discharge (without treatment for sediment reduction, and attenuation for flow management) of runoff from the proposed wind farm drainage into the existing site drainage network. This will reduce the likelihood for any increased risk of downstream flooding or sediment transport/erosion;
- Silt traps will be placed in the existing drains upstream of any streams where construction works is taking place, and these will be diverted into proposed interceptor drains, or culverted under/across the works area;
- During the operational phase of the wind farm, runoff from individual turbine hardstanding areas will be not discharged into the existing drain network but discharged locally at each turbine location through stilling ponds and buffered outfalls onto vegetated surfaces;
- Buffered outfalls which will be numerous over the site will promote percolation of drainage waters across vegetation and close to the point at which the additional runoff is generated, rather than direct discharge to the existing drains of the site;
- Drains running parallel to the existing roads that requiring widening will be upgraded. Velocity and silt control measures such as check dams, sand bags, oyster bags, straw bales, flow limiters, weirs, baffles and silt fences will be used during the upgrade works. Regular buffered outfalls will also be added to these drains to protect downstream surface waters.

Water Treatment Train

While the proposed settlement ponds are assessed as providing a sufficient level of protection to avoid any deterioration in downstream water quality; a final line of defence can be provided by a water treatment train such as a "Siltbuster", if required. If the discharge water from construction areas fails to be of a high quality, then a filtration treatment system (such as a 'Siltbuster' or similar equivalent treatment train (sequence of water treatment processes) will be used to filter and treat all surface discharge water collected in the dirty water drainage system. This water treatment train will apply for the entirety of the construction phase.

Silt Fences

Silt fences will be emplaced within drains down-gradient of all construction areas. Silt fences are effective at removing heavy settleable solids. This will act to prevent entry to watercourses 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 of these structures during 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 emplaced within drains down-gradient of all construction areas inside the hydrological buffer zones to provide an additional layer of protection in these areas.

Silt Bags

Silt bags will be used where small to medium volumes of water need to be pumped from excavations. As water is pumped through the bag, most of the sediment is retained by the geotextile fabric allowing filtered water to pass through. Silt bags will be used with natural vegetation filters or sedimats (sediment entrapment mats, consisting of coir or jute matting) placed at the silt bag location to provide further treatment of the water outfall from the silt bag. Sedimats will be secured to the ground surface using stakes/pegs. The sedimat will extend to the full width of the outfall to ensure all water passes through this additional treatment measure.

Existing BnM/Galros Bog Settlement Ponds/Lagoons

The project infrastructure on the BnM lands (i.e. turbines T9 – T11 and spoil deposition areas) have the added benefit of the existing settlement ponds/lagoon providing additional attenuation and any future measures introduced as part of the rehabilitation plan. However, the project does not rely on these existing ponds as the wind farm has its own drainage and treatment controls.

Management of Runoff from Soil Deposition Areas

It is proposed that excavated overburden/spoil will be utilised for reinstatement of excavated areas etc. and for landscaping purposes. Excess material, or material which is unsuitable for this purpose, will be stored, permanently, at 1 no. dedicated spoil deposition area located southeast of proposed turbine T11 as well as smaller deposition areas at each of the 3 no. turbine locations. All proposed spoil deposition areas are located outside the 50m stream buffer zone.

During the initial placement of spoil in the deposition areas, silt fences, straw bales and biodegradable matting will be used to control surface water runoff. Double silt fencing will be placed along the edge of each bog drain that intercepts the deposition areas.

Drainage from overburden deposition areas will ultimately be into to the existing bog drain network where it is proposed that check dams will be installed every 20m or so to create a series of settlement ponds, before being discharged.

The spoil deposition area drainage on the BnM lands have the added benefit of the existing settlement ponds/lagoons.

Spoil deposition areas will be sealed with a digger bucket and vegetated as soon possible to reduce sediment entrainment in runoff. Once re-vegetated and stabilised, spoil deposition areas will no longer be a likely source of silt laden runoff. Surface water protection infrastructure will be left in place until the areas have stabilised.

Underground Electricity Line Installation Works

Mitigation measures which are outlined below will be implemented to ensure that silt laden or contaminated surface water runoff from the trenching work does not discharge directly to the Rapemills River:

- All existing dry drains that intercept the works area will be temporarily blocked down-gradient of the works using temporary check dams/silt traps (e.g. straw bales);
- Clean water diversion drains will be installed upgradient of the works areas, as required;
- Check dams/silt fence arrangements (silt traps or straw bales) will be placed in all existing drains that have surface water flows and also along existing roadside drains;
- A double silt fence perimeter will be placed down-slope of works areas that are located inside the watercourse 50m buffer zones;
- At drain crossing locations, where open trenching is required, damming and over pumping method will be used to manage flows in the drain.

Specific mitigation measures relating to the directional drilling at the crossing location are detailed below.

Horizontal Directional Drilling (HDD)

The following mitigation will be carried out during directional drilling works:

- Firstly, the crossing works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance of vegetation;
- A minimum 10m vegetated buffer will be maintained between the HDD working areas, including launch and receiving pits, and the riverbank. Plant entry into this buffer will be avoided. Where limited access within the buffer is demonstrably unavoidable, ground-protection mats will be used and the duration and extent of access will be minimised;
- Double silt fencing will be placed upslope of the buffer zone on each side of the watercourse.

- Mats will be used underneath the excavator, inside the 10 metre vegetative buffer zone, to prevent soil erosion/rutting and potential surface water quality impacts from localised surface water runoff;
- Temporary storage of excavated material will be undertaken outside of the 10m buffer on flat ground or within a local hollow area. A containment berm will be placed downslope of the excavated material which in turn will be surrounded by secondary silt fence protection to prevent saturated soil from flowing back into the watercourse;
- Operation of machinery and use of equipment within the 10m buffer will be kept to a minimum to avoid any unnecessary disturbance;
- There will be no refuelling allowed within 50m of the watercourse crossing;
- All plant will be checked for purpose of use prior to mobilisation at the watercourse crossing; and,
- Works shall not take place during periods of heavy rainfall and will be scaled back or suspended if heavy rain is forecasted.

Mitigation Measures relating to the use of a mixture of a natural, inert and fully biodegradable drilling fluid such as Clear Bore™ and water for directional drilling include:

- The area around the Clear Bore™ batching, pumping and recycling plants will be bunded using terram and sandbags in order to contain any spillages;
- One or more lines of silt fences will be placed between the works area and adjacent rivers and streams on both banks;
- Accidental spillage of fluids will be cleaned up immediately and transported off site for disposal at a licensed facility; and,
- Adequately sized skips will be used for temporary storage of drilling arisings during directional drilling works. This will ensure containment of drilling arisings and drilling flush.

A Fracture Blow-out (Frac-out) Prevention and Contingency Plan will be prepared by the drilling contractor prior to construction and will include the following measures:

- The drilling fluid/bentonite will be non-toxic and naturally biodegradable (i.e., Clear Bore Drilling Fluid or similar will be used);
- The area around the drilling fluid batching, pumping and recycling plants will be bunded using terram and/or sandbags to contain any potential spillage;
- A double row of silt fencing will be placed between the works area and the adjacent river;
- Spills of drilling fluid will be cleaned up immediately and transported off-site for disposal at a licensed facility;
- Adequately sized skips will be used where temporary storage of arisings are required;
- The drilling process/pressure will be constantly monitored to detect any possible leaks or breakouts into the surrounding geology or local watercourse;
- This will be gauged by observation and by monitoring the pumping rates and pressures. If any signs of breakout occur then drilling will be immediately stopped;
- Any frac-out material will be contained and removed off-site;
- The drilling location will be reviewed, before re-commencing with a higher viscosity drilling fluid mix; and,
- If the risk of a further inadvertent return remains high, the drilling methodology and alignment will be reviewed within the assessed works corridor before drilling recommences.

Pre-emptive Site Drainage Management

The works programme for the initial construction stage of the development will also take account of weather forecasts, and predicted rainfall in particular. Large excavations and movements of soil/subsoil or vegetation stripping will be suspended or scaled back if prolonged or intense rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast.

The following forecasting systems are available and will be used on a daily basis at the site to direct proposed construction activities:-

- General Forecasts: Available on a national, regional and county level from the Met Eireann website (www.met.ie/forecasts). These provide general information on weather patterns including rainfall, wind speed and direction but do not provide any quantitative rainfall estimates;
- Meteo Alarm: Alerts to the possible occurrence of severe weather for the next 2 days. Less useful than general forecasts as only available on a provincial scale;
- 3 hour Rainfall Maps: Forecast quantitative rainfall amounts for the next 3 hours but does not account for possible heavy localised events;
- Rainfall Radar Images: Images covering the entire country are freely available from the Met Eireann website (www.met.ie/latest/rainfall_radar.asp). The images are a composite of radar data from Shannon and Dublin airports and give a picture of current rainfall extent and intensity. Images show a quantitative measure of recent rainfall. A 3 hour record is given and is updated every 15 minutes. Radar images are not predictive; and,
- Consultancy Service: Met Eireann provide a 24 hour telephone consultancy service. The forecaster will provide interpretation of weather data and give the best available forecast for the area of interest.

Using the safe threshold rainfall values will allow work to be safely controlled (from a water quality perspective) in the event of an impending high rainfall intensity event.

Works will be suspended if forecasting suggests either of the following is likely to occur:

- >10 mm/hr (i.e. high intensity local rainfall events);
- >25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or,
- >half monthly average rainfall in any 7 days.

Prior to works being suspended the following control measures will be completed:

- Secure all open excavations;
- Provide temporary or emergency drainage to prevent back-up of surface runoff; and,
- Avoid working during heavy rainfall and for up to 24-hours after heavy events to ensure drainage systems are not overloaded.

Timing of Site Construction Works

The construction of the site drainage system will be carried out, at the respective location, prior to other activities being commenced. The construction of the drainage system will only be carried out during periods of low rainfall, and therefore minimum runoff rates. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses. Construction of the drainage system during this period will also ensure that attenuation features associated with the drainage system will be in place and functional for all subsequent construction works.

Monitoring

Prior to the commencement of development, a detailed Site Drainage Plan and SWMP will be prepared to detail the siting and composition of the surface water management measures. The respective plans, which will form part of a detailed Construction Environmental Management Plan (CEMP), will be prepared prior to the commencement of development.

The CEMP will also include a detailed Water Quality Monitoring Plan for the monitoring of surface waters in the vicinity of the construction site by a designated Environmental Manager. The monitoring programme will comprise field testing and laboratory analysis of a range of agreed parameters. The civil works contractor, who will be responsible for the construction of the site drainage system, and Environmental Manager will undertake regular inspections of the drainage system to ensure that all measures are functioning effectively. The surface water sampling locations used in this EIAR (i.e. SW1 – SW4) will be used during construction activities. Regular inspections of all installed drainage systems will be undertaken, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water in parts of the systems where it is not intended.

Any excess build-up of silt levels that may decrease the effectiveness of the drainage feature,

will be removed and disposed of in an appropriate manner.

5.3.1.2 Excavation Dewatering and Effects in Surface Water Quality

The management of excavation dewatering (pumping), particularly in relation to any accumulation of water in foundations or underground electricity line trenches, and subsequent treatment prior to discharge into the drainage network will be undertaken as follows:

- Appropriate interceptor drainage, to prevent upslope surface runoff from entering excavations, will be put in place;
- The interceptor drainage will be discharged to the site constructed drainage system or onto natural vegetated surfaces and not directly to surface waters to ensure that Greenfield runoff rates are mimicked;
- If required, pumping of excavation inflows will prevent build-up of water in the excavation;
- The pumped water volumes will be discharged via volume and silt/sediment ponds and settlement lagoons adjacent to excavation areas, or via specialist treatment systems such as a Siltbuster unit;
- There will be no direct discharge to surface watercourses, and therefore no risk of hydraulic loading or contamination will occur;
- Daily monitoring of wind farm excavations by the Environmental Manager will occur during the construction phase. If high levels of seepage inflow occur, excavation work at this location will cease immediately and a geotechnical assessment undertaken; and,
- A mobile 'Siltbuster' or similar equivalent specialist treatment system will be available on-site for emergencies. Siltbusters are mobile silt traps that can remove fine particles from water using a proven technology and hydraulic design in a rugged unit. The mobile units are specifically designed for use on construction-sites. They will be used as final line of defence if needed.

5.3.1.3 Release of Hydrocarbons during Construction and Storage

Mitigation measures proposed to avoid release of hydrocarbons at the site are as follows:

- The volume of fuels or oils stored on site will be minimised. All fuel and oil will be stored in an appropriately bunded area within the temporary construction compound. Only an appropriate volume of fuel will be stored at any given time. The bunded area will be roofed to avoid the ingress of rainfall and will be fitted with a storm drainage system and an appropriate oil interceptor;
- All bunded areas will have 110% capacity of the volume to be stored;
- On site refuelling 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 at the temporary compound and will be towed around the site by a 4x4 jeep to where plant and machinery is located. No refuelling will be permitted at works locations within the 50m hydrological buffer. The 4x4 jeep will also be fully stocked with 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 to avoid any accidental leakages;
- All plant and machinery used during construction will be regularly inspected for leaks and fitness for purpose;
- Spill kits will be readily available to deal with and accidental spillages;
- All waste tar material arising from road cuttings (from trenching or other works in public roads) will be removed off-site and taken to a licensed waste facility. Due to the potential for contamination of soils and subsoils, it is not proposed to utilise this material for any reinstatement works; and
- An outline emergency plan for the construction phase to deal with accidental spillages is contained within the Planning-Stage CEMP (Annex 3.4 of EIAR). This emergency plan will be

further developed prior to the commencement of development and will be agreed with the Planning Authority as part of the detailed CEMP.

5.3.1.4 Release of Cement-Based Products

The following mitigation measures are proposed to ensure that the release of cement-based products is avoided:

- No batching of wet-cement products will occur on site. Ready-mixed concrete will be brought to site as required and, where possible, emplacement of pre-cast products, will take utilised;
- All drain crossings will utilise pre-cast products and the use of wet-cement products within the hydrological buffer will be avoided;
- Where concrete is delivered on site, only the chute will be cleaned, using the smallest volume of water practicable. Chute cleaning will be undertaken at lined cement washout ponds with waters being stored in the temporary construction compound, removed off site and disposed of at an approved licensed facility. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed;
- Weather forecasting will be used to ensure that prolonged or intense rainfall is not predicted during concrete pouring activities; and,
- The concrete pour site will be kept free of standing water and plastic covers will be ready in case of sudden rainfall event.

5.3.1.5 Hydrological Impacts on Designated Sites

The proposed mitigation measures for protection of surface water quality, which will include buffer zones and robust drainage control measures (i.e. interceptor drains, swales, silt/settlement ponds, settlement lagoons), will ensure that the quality of runoff from development areas will be very high. Accordingly, no further mitigation measures are assessed as being required.

5.3.1.6 Effects in the WFD Status

No additional targeted measures are required or proposed in respect of the WFD assessment. The strict implementation of the measures set out in the preceding sections will ensure that the status of both surface water and groundwater bodies in the vicinity of the site will be maintained.

With regard to treatment standards, the drainage system has been designed to achieve compliance with surface water Environmental Quality Standards (EQS) in the downstream receiving waters. Details of monitoring proposals, to ensure this compliance, is described in the Planning-Stage SWMP (Annex 3.4 of the EIAR).

The application of the drainage management as outlined will ensure compliance with EU Surface Water Regulations and WFD requirements while also maintaining the baseline hydrology of the site.

As such, the project is compliant with the requirements of the Water Framework Directive (2000/60/EC) and the Groundwater Directive (2006/118/EC).

5.3.1.7 Effects in Rath GWS Source

The below mitigation only applies to the underground electricity line.

No refuelling or handling of fuels/oil/lubricants/chemicals will be permitted within 100m of the mapped source protection area boundary.

In addition, to prevent potential leaching of cement from the electricity cable trenching, a geotextile liner will be placed around the founding layer (lean mix concrete) where concrete is to be poured.

Also, there will be clear signage in place inside the source protection area to remind construction workers that the area is inside a drinking water protection area and that there are restrictions around the use of fuels/oil/lubricants/chemicals.

5.3.1.8 Risk of Flooding during the Underground Electricity Line Construction

The first point of mitigation is ongoing monitoring of weather forecasts and weather warnings. The project Environmental Manager (EM) or the site Ecological Clerk of Works (ECOW) will be responsible for monitoring weather forecasts during the construction phase.

When the forecast indicates rainfall exceeding any of the works-suspension thresholds set out above, or where a Met Éireann Status Yellow or higher rainfall warning is issued, the planned responses detailed below will be implemented.

A potential high intensity rainfall event would likely be identified 3-5 days in advance, with more accurate forecasts of severity within 24-48 hours of occurrence. Preparations for a flood event would begin from the initial indications that there may be a high rainfall event. This would allow time for the preparation and the implementation of additional emergency mitigation measures.

A managed retreat from the fluvial flood zone will be implemented in the event of a forecasted high intensity rainfall event and/or weather warning related to rainfall. This will include the following:

- Any areas where soil/subsoil is exposed at the surface will be compacted firmly with a digger bucket of a suitably sized excavator.
- Open trenches will be backfilled and compacted.
- Existing sediment control measures will be removed, as these may be washed away and deposited elsewhere by the floodwaters.
- All plant, machinery and equipment will be removed from the flood zones.
- Works will be postponed in the event of flood or high flows in the river.

Exposed soils/peat (exposed temporary stockpiles) will be covered with plastic sheeting during all relatively heavy rainfall events and during periods where works have temporarily ceased before completion at a particular area (e.g., overnight and weekends).

Cessation of all construction works until the storm event, including the storm runoff has passed. All construction works will cease during storm events such as yellow warning rainfall events. Following heavy rainfall events, and before construction works recommence, the project site will be inspected and corrective measures implemented to ensure safe working conditions e.g. dewatering of standing water in open excavations, etc.

5.3.2 Operational Phase

5.3.2.1 Groundwater and Surface Water Contamination from Wastewater Disposal

The sealed foul-water holding tank will be inspected and emptied as required by an appropriately authorised waste collector. No foul wastewater will be discharged to ground, surface water or the site drainage network.

5.3.2.2 Progressive Replacement of Natural Surface with Lower Permeability Surfaces

The operation phase drainage system of the project is described below:

- Interceptor drains will be installed up-gradient of all 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 tracks, turbine hardstanding areas and switch room compound areas which may contain entrained suspended sediment, and channel it to settlement ponds for sediment settling;
- Transverse drains ('grips') will be constructed, where appropriate, in the surface layer of access tracks to divert any runoff into swales/track side drains;
- Check dams will be used along sections of access tracks drains to intercept silts at source. Check dams will be constructed from a 40mm non-friable crushed rock or similar;
- Swales and check dams 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 will be designed in accordance the greenfield runoff rate requirements; and,
- Imported rock for construction purposes and road surfacing will be strong, well-graded limestone which will be resistant to erosion and have a low likelihood to generate fines in hardstand runoff.

The operation of the underground electricity line will not result in any likely hydrological or water quality effects and therefore do not require mitigation measures.

5.3.2.3 Hydrocarbons Spillages/Leakages

Mitigation measures relating to oils and fuels are as follows:

- Fuels stored on site will be minimised. Any storage areas will be bunded appropriately for the fuel storage volume during the construction phase;
- Any oil storage tanks will be located in a concrete bund, impervious to rainwater ingress, capable of holding 110% of the stored oil volume;
- Turbine transformers will be located within the turbines, and any leaks will be fully contained within the turbine thus eliminating any pathway for leakages to affect land and soil;
- Maintenance vehicles will be regularly inspected for leaks and fitness for purpose; and
- An emergency plan for the operation phase to deal with accidental spillages will be contained within Environmental Management Plan. Spill kits will be available to deal with accidental spillages.

5.3.3 Decommissioning Phase

As in the construction phase, temporary surface runoff control measures will again be put in place during decommissioning works. The drainage system will remain operational during the decommissioning phase and will serve to treat any sediment laden surface water run-off due to a renewed disturbance of soils. Following decommissioning, re-vegetation will be implemented as soon as practicable and monitored to ensure vegetation is established.

Likely effects would be similar to the construction phase but to a lesser degree. There would be increased trafficking and an increased risk of disturbance to underlying soils at the project site. Any such effects would be less than during the construction phase as the drainage system would be fully mature and would provide additional filtration of runoff. Any diesel or fuel oils stored on site would be bunded.

Following decommissioning, turbine foundations, hardstanding areas and access tracks will be rehabilitated in accordance with the methods outlined at Chapter 3. The access tracks may be left in place, subject to agreement with the Planning Authority and the landowner. It is considered that this approach will result in lesser effects that would their removal.

5.4 POTENTIAL EFFECTS ON QUALITY/QUANTITY ELEMENTS WITH THE IMPLEMENTATION OF MITIGATION

A summary of potential effects on SWB quality elements is provided in Table N, and a summary of potential status change to SWBs arising from potential surface water quality element impacts of the project site are presented in Table P.

Table N: Potential Effects on receiving SWB Quality Elements

SWB Quality Element	Post Mitigation Potential Risk To Downstream Receptors	Reasoning	Mitigation
Hydromorphology	No	Avoidance of instream works and watercourse crossings. Application of surface water drainage controls (SuDs)	Refer to the section 5.3.1.1, 5.3.1.2, 5.3.1.5, 5.3.1.8 and 5.3.2.2
Physico-Chemical Quality	No	Proven and effective measures to mitigate the risk of releases of sediment and other contaminants have been proposed and will break the pathway between the potential containment and the receptor.	Refer to the section 5.3.1.1, 5.3.1.2, 5.3.1.3, 5.3.1.4, 5.3.1.6, 5.3.1.7, 5.3.2.1 and 5.3.2.2
Biological Quality Elements	No		Refer to the section 5.3.1.1, 5.3.1.2, 5.3.1.3, 5.3.1.4, 5.3.1.5, 5.3.1.6, 5.3.2.1 and 5.3.2.3
Priority Substances / Specific Pollutants	No		Refer to the section 5.3.1.3, 5.3.1.4, 5.3.1.6, 5.3.1.7, 5.3.2.1 and 5.3.2.3
Protected Areas	No		Refer to the section 5.3.1.5, 5.3.1.6, and 5.3.1.7
Fish Migration Passage	No	Avoidance of instream works and proven and effective measures to mitigate the risk of releases of sediment and contaminants have been proposed and will break the pathway between the potential containment and the receptor.	Refer to the section 5.3.1.1, 5.3.1.2, 5.3.1.5, 5.3.1.8 and 5.3.2.2

A summary of potential effects on GWB quality elements is provided in **Table O**, and a summary of potential status change to GWB Status arising from potential groundwater quality element impacts of the project site is presented in Table P.

Table O: Potential Effects on receiving GWB Quality Elements

GWB Quality Element	Post Mitigation Potential Risk To Downstream Receptors	Reasoning	Mitigation
Impact of GW on SW Ecological/Chemical Status	No	Proven and effective measures to mitigate the risk of releases of sediment and contaminants have been proposed and will break the pathway between the potential containment and the receptor.	Refer to the section 5.3.1.1, 5.3.1.2, 5.3.1.3, 5.3.1.4, 5.3.1.5, 5.3.1.6, 5.3.2.1, 5.3.2.2 and 5.3.2.3
DWPAs	No	No effects will occur on the quantitative status (i.e. groundwater levels and flows will not be affected). Proven and effective measures to mitigate the risk of releases of sediment and contaminants have been proposed above will break the pathway between the potential containment and the source.	Refer to the section 5.3.1.3, 5.3.1.4, 5.3.1.5, 5.3.1.6, 5.3.1.7, 5.3.2.1 and 5.3.2.3
General Chemical Assessment Tests	No	Proven and effective measures to mitigate the risk of releases of contaminants have been proposed and will break the pathway between the potential containment and the receptor.	Refer to the section 5.3.1.2, 5.3.1.3, 5.3.1.4, 5.3.1.6, 5.3.1.7, 5.3.2.1 and 5.3.2.3

5.5 FINAL EFFECTS ON OVERALL WFD STATUS WITH THE IMPLEMENTATION OF MITIGATION

In all instances, the mitigation measures described in **Section 5.35.3** are sufficient to meet the WFD Objectives. The assessment of WFD elements for the WFD waterbodies is summarised in Table P below.

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

SWB	WFD Code	Current Status	Assessed Status - Unmitigated	Assessed Status with Mitigation Measures
Surface Water Bodies				
Rapemills_010	IE_SH_25R010300	Moderate	Poor	Moderate
Rapemills_020	IE_SH_25R010500	Moderate	Poor	Moderate
Groundwater Bodies				
Banagher	IE_SH_G_040	Good	Good	Good

Birr Gravels	IE_SH_G_244	Good	Good	Good
Birr	IE_SH_G_041	Good	Good	Good
Shinrone	IE_SH_G_205	Good	Good	Good

5.6 CUMULATIVE EFFECTS

A hydrological and hydrogeological cumulative assessment is presented in Section 7.4.7 of the EIAR (Chapter 7).

In addition to other wind farm developments in the Rapemills River catchment, the assessment also takes account of the Section 146B alteration request for Cush Wind Farm Phase I. The Phase I water assessment was based on the turbine dimension range permutation, which provides the basis for the maximum physical footprint relevant to this assessment. The proposed turbine dimension alterations do not increase that assessed footprint and therefore do not alter the conclusions regarding cumulative hydrological or hydrogeological effects.

Also, the proposed Mullanafawnia 110kV substation, which is proposed by a separate developer and subject to a separate planning application, has also been considered in the cumulative assessment. Having regard to the localised nature of the works and the surface water management and pollution prevention measures proposed for the project, no likely significant cumulative hydrological or hydrogeological effects are anticipated.

In relation to non-wind farm, smaller commercial and private development in the Rapemills catchment, the majority of the local developments relate to the provision and/or alteration of one-off housing and agricultural developments.

These developments are typically small scale and localised in nature and impacts on water quality or flows (surface water or groundwater) are not expected. Therefore, hydrological cumulative impacts with respect to the project will not occur.

6. SUMMARY AND CONCLUSION

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

The Project does not involve the abstraction of groundwater. Therefore, the quantitative status (i.e., the available quantity (volume) of groundwater locally) of the receiving GWBs will remain unaltered by the project.

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

The design of the project combined with the drainage measures will ensure that there is no significant alteration of the existing hydrological regime. These measures will ensure that the quantitative status of the receiving SWB will remain unaltered.

There is also mitigation proposed to protect groundwater quality. These mitigation measures will ensure the qualitative status of the underlying GWB will not be altered during the construction, operation or decommissioning phases of the project.

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

As such, the project 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.

As such, the project, alone or in combination with other developments:

- will not cause a deterioration in the status of any surface and groundwater bodies;
- will not jeopardise the achievement of 'Good' quality surface water/groundwater status;
- does not jeopardise the attainment of 'Good' surface water/groundwater chemical status;
- does not jeopardise the attainment of 'Good' surface water/groundwater ecological potential;
- does not permanently exclude or compromise the achievement of the objectives of the WFD in other waterbodies within the same river basin district;
- is compliant with the requirements of and not likely to compromise the ability of any water bodies to meet the objectives of the Water Framework Directive (2000/60/EC) as amended and its transposing legislation;
- does not degrade the ecological quality of the protected sites associated with connected waterbodies nor jeopardise the goals and/or targets set out for these protected sites: and,
- is consistent with other Community Environmental Legislation including the EIA Directive (2014/52/EU), the Habitats Directive (92/43/EEC) and the Birds Directive (2009/147/EC) (Note that a full list of legislation complied with in relation to hydrology and hydrogeology is included in Section 7.1.4 of the EIAR).

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