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WATER FRAMEWORK DIRECTIVE COMPLIANCE ASSESSMENT
SESKIN RENEWABLES WIND FARM, CO. KILKENNY AND CO. LAOIS

FINAL REPORT

Prepared for:

MKO

Prepared by:

HYDRO-ENVIRONMENTAL SERVICES

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1. INTRODUCTION

1.1 BACKGROUND

Hydro-Environmental Services (HES) were requested by MKO on behalf of Seskin Renewable Energy Ltd. to complete a Water Framework Directive (WFD) Compliance Assessment for the Proposed Seskin Renewables Wind Farm and Proposed Grid Connection Route, Co. Kilkenny and Co. Laois.

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

This WFD Compliance Assessment is written to accompany Chapter 9 of the Environmental Impact Assessment Report (EIAR) for the Proposed Wind Farm site and the Proposed Grid Connection Route. The Proposed Project is described in full in Chapter 4 of the EIAR. For the purposes of this WFD, and consistent with the EIAR, the various components are described and assessed using the following references: 'Proposed Development, 'Proposed Wind Farm', 'Proposed Grid Connection Route' and the 'Site' (as defined in Chapter 1, Section 1.1.1, of the EIAR).

This report has been complied using the following data sources:

- Environmental Protection Agency database (www.epa.ie)
- Observations recorded during various site visits as described in Section 9.2.2 and 9.3 of EIAR
- Drainage mapping as described in Section 9.2.2 and 9.3.3.2 of EIAR
- Surface Water Quality sampling as described in Section 9.3.5 of EIAR
- Groundwater Quality sampling as described in Section 9.3.8 of EIAR

1.2 STATEMENT OF AUTHORITY

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

This WFD assessment was prepared by Michael Gill, Adam Keegan and Nitesh Dalal.

Michael Gill P.Geo (BA, BAI, Dip Geol., MSc, MIEI) is an Environmental Engineer and Hydrogeologist with over 22 years' environmental consultancy experience in Ireland. Michael has completed numerous hydrological and hydrogeological impact assessments of wind farms and renewable projects in Ireland. He has substantial experience in karst hydrogeology and also in surface water drainage design and SUDs design and surface water/groundwater interactions. For example, Michael has worked on the EIS/EIAR for Oweninny WF, Cloncreen WF, Derrinlough WF and Yellow River WF, and over 100 other wind farm-related projects, as well as Seven Hills WF which is situated within a mapped karst area. Michael has also worked on karst related projects in South and Mid Galway, Roscommon, Tipperary, Laois, Kilkenny, Limerick, Clare, Cork and Waterford.

Adam Keegan PGeo (B.Sc., M.Sc.) is a hydrogeologist with 7 years environmental consultancy experience in Ireland. Adam has worked on numerous Environmental Impact Assessments,

Flood Risk Assessment Reports for infrastructure projects, such as wind farms, strategic housing developments and quarries. Adam has experience in intrusive site investigation works within mapped karst environments and experience in trial and production well drilling within areas mapped as Regionally Karstified Aquifers. Adam has worked on several wind farm EIAR projects, including Seven Hills WF, Croagh WF, Lyrenacarriga WF (SID), Cleanrath WF, Carrownagowan WF (SID), and Coole WF.

Nitesh Dalal (B.Tech, PG Dip., MSc) is an Environmental Scientist with over 7 years' experience in environmental consultancy and environmental management in India. Nitesh holds a M.Sc. in Environmental Science from University College Dublin (2024), a PG Diploma in Health, Safety and Environment from Annamalai University, India (2021) and B.Tech. in Environmental Engineering (2016) from Guru Gobind Singh Indraprastha University, India (2016).

1.3 WATER FRAMEWORK DIRECTIVE

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

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

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

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

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

Furthermore, the Department of Housing, Local Government and Heritage are currently reviewing the submissions made on the Draft 3rd Cycle River Basin Management Plan (2022 - 2027) which was out for public consultation in Q4 of 2021 and Q1 of 2022. As of June 2024, the plan has not been published while the draft plan is available to view at https://www.gov.ie/en/consultation/2bda0-public-consultation-on-the-draft-river-basin-management-plan-for-ireland-2022-2027/.

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, groundwater bodies and protected areas with potential to be affected by the Proposed Wind Farm site and the Proposed Grid Connection Route and reviews any available WFD information.

2.2 SURFACE WATERBODY IDENTIFICATION

The Proposed Wind Farm site and the Proposed Grid Connection Route are located in the regional River Nore surface water catchment within Hydrometric Area 15 of the Southeastern River Basin District (SERBD).

On a more local scale the majority of the Proposed Wind Farm site is located within the Nore_SC_070 sub-catchment while small area in the north of the Proposed Wind Farm site is located within the Nore_SC_050 sub-catchment. Within the Nore_SC_050 sub-catchment, the Proposed Wind Farm site is located within the Nore_110 river sub-basin while within the Nore_SC_070 sub-catchment, the Proposed Wind Farm site is located within the Nore_120 river sub-basin, the Lisdowney_010 river sub-basin and the Nore_140 river sub-basin.

Within the Nore_110 river sub-basin, the Durrow Townspark stream exists 700m north of T1, and flows northeast discharging to the River Nore (Nore_110 section of the River Nore). The River Nore then flows south and drains out into Nore_120 section of the River Nore.

Within the Lisdowney_010 river sub-basin, the Archerstown stream flows south, discharging to the Lisdowney stream which drains out into the River Nore (Nore_140). The Archerstown stream is not located within the Wind Farm, with the origin point situated ~30m from the site boundary and ~380m southwest of turbine T4. Within the Nore_140 river sub-basin, the Ballyconra stream, which is mapped 480m southeast of turbine T8, flows south, discharging to the Lisdowney stream and ultimately discharges to the River Nore.

The Proposed Grid Connection route exists within the Nore_120 river sub-basin and varies in distance between 0-850m from the River Nore (Nore_120 section of the river). The Proposed Grid Connection crosses the Nore_120 river section at the proposed watercourse crossing in the townland of Moatpark, Co. Kilkenny.

On a broad scale the majority of the Proposed Grid Connection Route is located within the Nore_SC_070 sub-catchment while a small area is located within the Nore_SC_060 sub-catchment, where the grid route crosses to the eastern side of the River Nore. Within the Nore_SC_070 sub-catchment, the Proposed Grid Connection Route is mapped within the Nore_120 river sub-basin while within the Nore_SC_060 sub-catchment the Proposed Grid Connection Route is also mapped within within the Nore_120 river sub-basin.

Error! Reference source not found. Presents the total upstream sub-catchment area that drains the Proposed Wind Farm site and the Proposed Grid Connection Route, and the total sub-catchment area of the rivers downstream from the site as far as the River Nore. The total upstream sub catchment area is ~2,446km^2. Therefore, the river waterbodies which are in close proximity to the Site that have relatively smaller catchment areas (Lisdowney_010) will be more susceptible to water quality impacts as a result of the Proposed Wind Farm site and the Proposed Grid Connection Route in comparison to the downstream river bodies, located downstream of the Site.

A local hydrology map of the area is shown below in **Figure** A.

Table A: Upstream Catchment Size for River Waterbodies

WFD River Sub-Basin	Total Upstream Catchment Area (km²)
Lisdowney_010	~9.3
Nore_110	~945
Nore_120	~1059
Nore_130	~1070
Nore_140	~1105
Nore_150	~1233
Nore_160	~1562
Nore_170	~1649
Nore_180	~1690
Nore_190	~1747
Nore_200	~1772
Nore_210	~1777
Nore_220	~2239
Nore_230	~2309
Nore_240	~2369
Nore_250	~2446

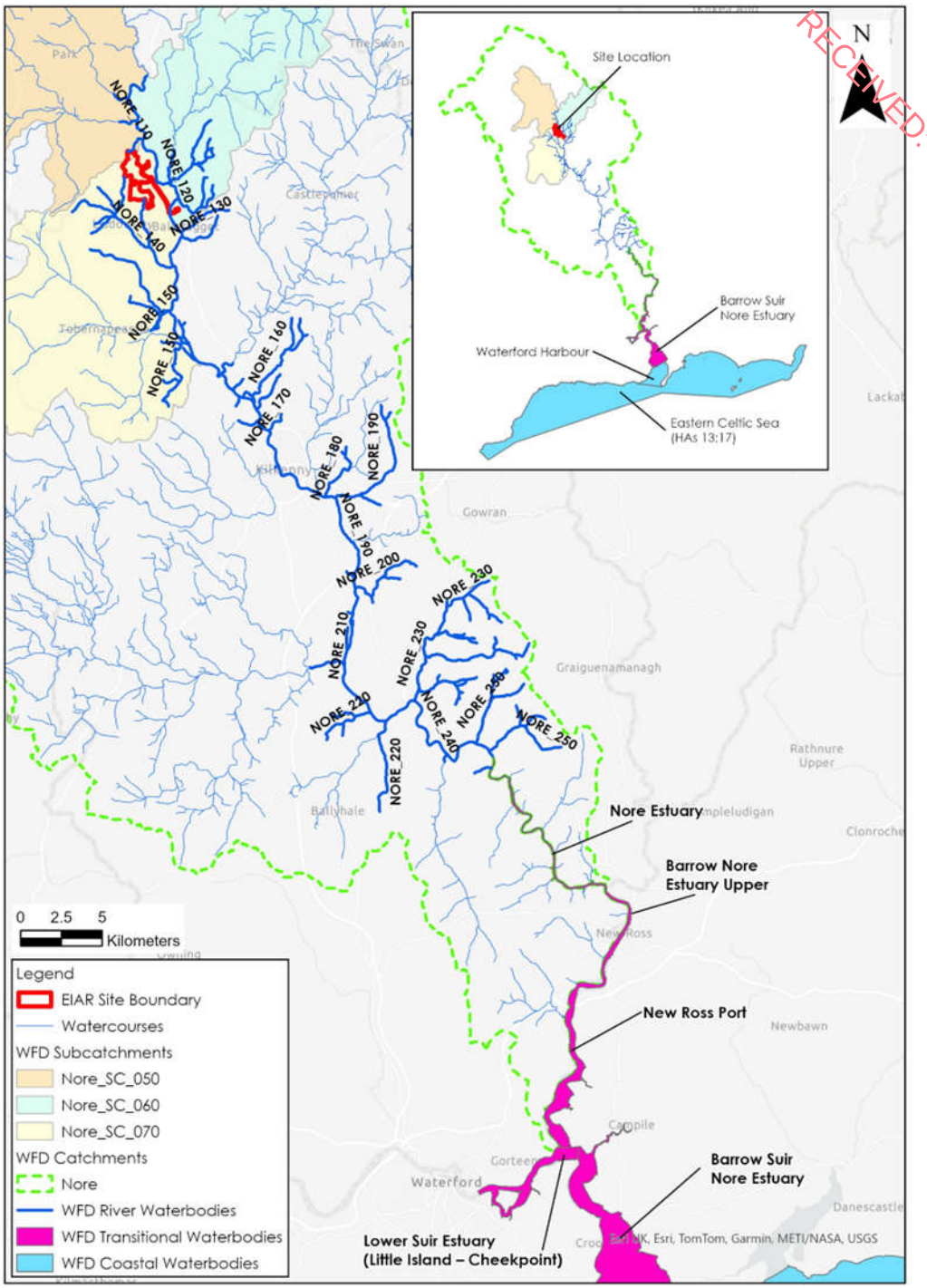

Figure A: Local Hydrology Map

2.3 SURFACE WATER BODY CLASSIFICATION

A summary of the WFD status and risk result for Surface Water Bodies (SWBs) downstream of the Proposed Project site are shown in **Table B**. The overall status of SWBs 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).

The Site is primarily drained by the Lisdowney_010 stream waterbody which is assigned a 2016-2021 Status of "Moderate" and is deemed to be "At risk" of missing out on the WFDs 2027 objectives, with agriculture listed as the significant pressure. The Lisdowney_010 stream waterbody feeds into the River Nore (Nore_140).

The very northern portion of the Site is drained by the Nore_110 river waterbody which achieved a "Good" Status and is deemed to be "Not at risk" of failing to achieve its WFDs 2027 objectives. The Nore_110 flows down into the Nore_120 river water body.

The River Nore (Nore_120 to Nore_250) achieved a "Good" status in the latest WFD cycle except for Nore_120, Nore_190 and Nore_230 which have achieved "Moderate" status in the latest WFD cycle. The Nore_130 to Nore_180 and the Nore_250 are "not at risk" of failing to achieve its WFDs 2027 objectives while the Nore_190 to Nore_220 and the Nore_240 are "under review" and the Nore_120 and the Nore_230 is "at risk" of failing to achieve its WFDs 2027 objectives. There is no significant pressure identified on any of the section of Nore River (Nore_120 to Nore_250), apart from Agriculture as an identified significant pressure on the Nore_120 and Urban run-off identified as a significant pressure on the Nore_230.

The transitional waterbodies downstream of the Nore river are Nore Estuary, Barrow Nore Estuary Upper, New Ross Port, Lower Suir Estuary (Little Island – Cheekpoint) and the Barrow Suir Nore Estuary. All the transitional bodies have achieved a "Moderate" status and are "at risk" of failing to achieve its WFDs 2027 objectives. Agriculture is the significant pressure identified on these transitional waterbodies with additional urban run-off as identified significant pressure on Barrow Nore Estuary Upper.

The Waterford Harbour and the Eastern Celtic Sea (HAs 13;17) are the coastal water bodies downstream. The Waterford Harbour achieved "Moderate" status in the latest WFD cycle and is "at risk" of failing to achieve its WFDs 2027 objectives with agriculture and urban run-off identified as significant pressure while the Eastern Celtic Sea (HAs 13;17) have achieved "High" status in the latest WFD cycle and is "not at risk" of failing to achieve its WFDs 2027 objectives. There is no significant pressure identified on the Eastern Celtic Sea (HAs 13;17).

The SWB status for the 2016-2021 WFD cycle are shown on Error! Reference source not found..

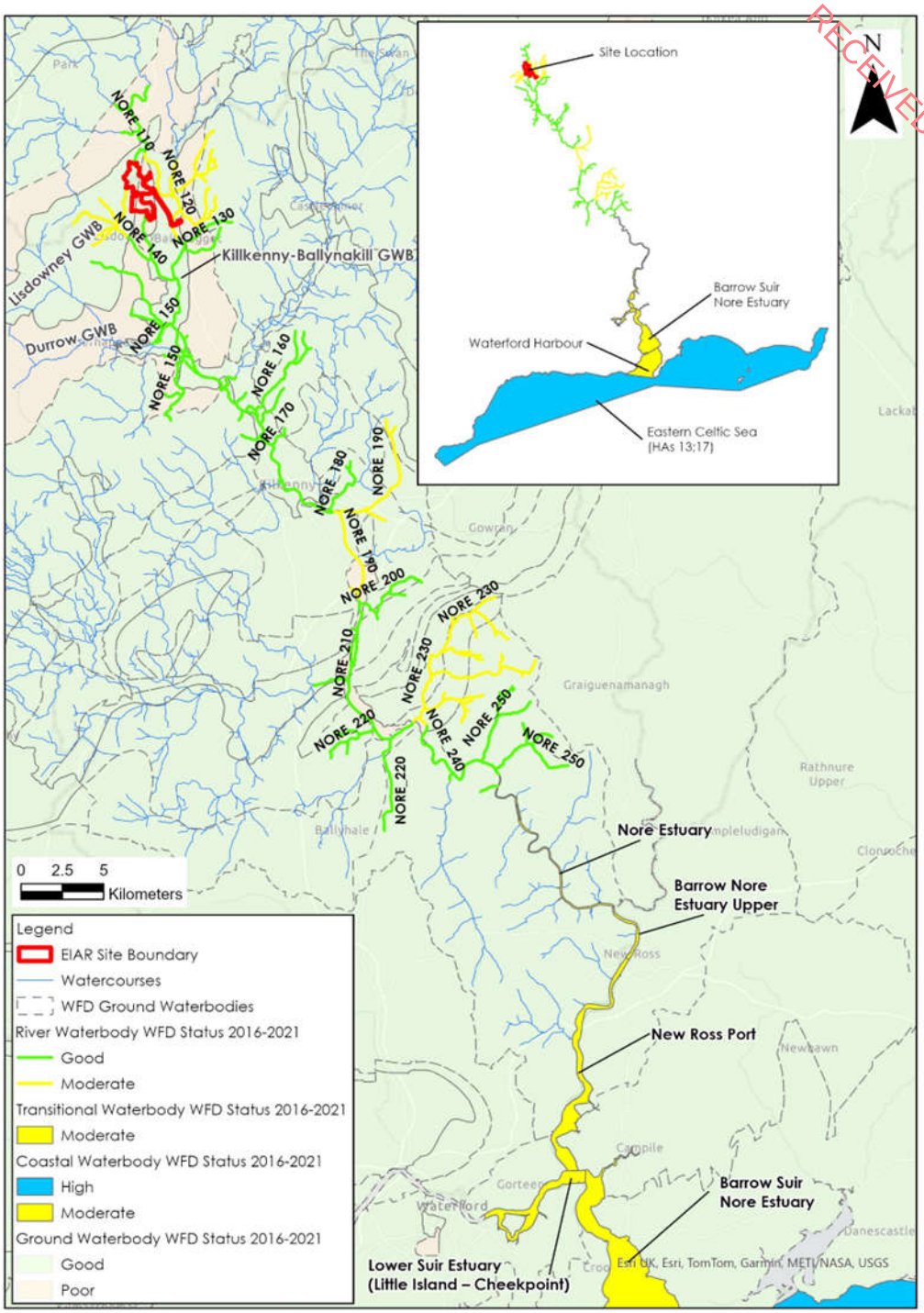

Figure B: WFD Surface Waterbody and Groundwater Body Status (2016-2021)

Table B: Summary WFD Information for Surface Water Bodies

SWB	Overall Status (2010-2015)	Overall Status (2013-2018)	Overall Status (2016-2021)	Risk 3rd Cycle	Pressures
Lisdowney_010	Moderate	Good	Moderate	At risk	Agriculture
Nore_110	Good	Good	Good	Not at risk	-
Nore_120	Unassigned	Good	Moderate	At Risk	Agriculture
Nore_130	Good	Good	Good	Not at risk	-
Nore_140	Unassigned	Good	Good	Not at risk	-
Nore_150	Good	Good	Good	Not at risk	-
Nore_160	Unassigned	Good	Good	Not at risk	-
Nore_170	Good	Good	Good	Not at risk	-
Nore_180	Good	Good	Good	Not at risk	-
Nore_190	Unassigned	Moderate	Moderate	Review	-
Nore_200	Unassigned	Moderate	Good	Review	-
Nore_210	Moderate	Good	Good	Review	-
Nore_220	Good	Moderate	Good	Review	-
Nore_230	Good	Moderate	Moderate	At risk	Urban Run-off
Nore_240	Good	Moderate	Good	Review	-
Nore_250	Good	Good	Good	Not at risk	-
Nore Estuary	Moderate	Good	Moderate	At risk	Agriculture
Barrow Nore Estuary Upper	Good	Moderate	Moderate	At risk	Agriculture and Urban run-off
New Ross Port	Moderate	Moderate	Moderate	At risk	Agriculture
Lower Suir Estuary (Little Island – Cheekpoint)	Moderate	Good	Moderate	At risk	Agriculture
Barrow Suir Nore Estuary	Good	Moderate	Moderate	At risk	Agriculture

Waterford Harbour	Good	Moderate	Moderate	At risk	Agriculture and Urban run-off
Eastern Celtic Sea (HAs 13;17)	Unassigned	Good	High	Not at risk	-

2.4 GROUNDWATER BODY IDENTIFICATION

The Proposed Wind Farm site is underlain by 5 no. bedrock formations. The northern most section is underlain by Moyadd Coal Formation classified as Poor Aquifer - Bedrock which is Generally Unproductive (Pu) which is adjacent to the Bregaun Flagstone Formation classified as Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones (Pi). The east of the Proposed Wind Farm site is underlain by the Clogrenan Formation and the southeast of the Proposed Wind Farm site is underlain by the Ballyadams Formation Limestone, both classified as Regionally Important Aquifer - Karstified (diffuse) (Rkd). The southwestern part of the Proposed Wind Farm site is underlain by Killeshin Siltstone Formation which is classified as a Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones (Pi).

In terms of bedrock Groundwater Bodies (GWBs), the Proposed Wind Farm site is underlain by the Lisdowney GWB and the Durrow GWB.

The Proposed Grid Connection Route is underlain by Clogrenan Formation, classified as Regionally Important Aquifer - Karstified (diffuse) (Rkd), Ballyadams Formation classified as Regionally Important Aquifer - Karstified (diffuse) and Regionally important gravel aquifer (Rg) and Durrow Formation classified as Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones (Ll).

In terms of GWBs, the Proposed Grid Connection is underlain by Killkenny-Ballynakill Gravels GWB and Durrow GWB.

2.5 GROUNDWATER BODY CLASSIFICATION

The Lisdowney (IE_SE_G_088) and Durrow (IE_SE_G_156) Groundwater Bodies (GWB) underlie the Proposed Wind Farm site. The Killkenny-Ballynakill Gravels (IE_SE_G_163) and Durrow (IE_SE_G_156) Groundwater Bodies underlie the Proposed Grid Connection Route. The Lisdowney and Killkenny-Ballynakill GWBs has achieved "Good" status in the latest WFD cycle and is "not at risk" of failing to meet its WFD objectives with no significant pressure on these GWBs. The Durrow GWB is currently assigned a 'Poor Status' and is "At risk" of failing to meet its WFD objectives, with agriculture listed as the significant pressure.

The GWB status for the 2016-2021 WFD cycles are shown on **Figure** B.

Table C: Summary WFD Information for Groundwater Bodies

GWB	Overall Status (2010-2015)	Overall Status (2013-2018)	Overall Status (2016-2021)	Risk 3rd Cycle	Pressures
Lisdowney	Good	Good	Good	Not at risk	-
Durrow	Good	Poor	Poor	At risk	Agriculture
Killkenny-Ballynakill	Good	Good	Good	Not at risk	-

2.6 ZONE OF INFLUENCE

The potential zone of influence of the Proposed Wind Farm site and the Proposed Grid Connection Route extend to the following SWBs, GWBS, and Transitional and Coastal water bodies:

- SWBs – Lisdowney_010, Nore River (Nore_110 to Nore_250).
- GWBs – Lisdowney GWB, Durrow GWB and Killkenny-Ballynakill GWB.
- Transitional and Coastal waterbodies – Nore Estuary, Barrow Nore Estuary Upper, New Ross Port, Lower Suir Estuary (Little Island – Cheekpoint), Barrow Suir Nore Estuary, Waterford Harbour and Eastern Celtic Sea (HAs 13;17).

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's), shellfish protected areas and Drinking Water Protected Area's (DWPA) within the vicinity of the Site are considered 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), Special Areas of Conservation (SACs), candidate Special Areas of Conservation (cSAC) and Special Protection Areas (SPAs).

Ramsar sites are wetlands of international importance designated under the Ramsar Convention (adopted in 1971 and came into force in 1975), providing a framework for the conservation and wise use of wetlands and their resources.

The closest designated site to the Proposed Wind Farm site is the River Barrow and River Nore SAC (Site Code: 002162), which is situated 0.33km from the Proposed Wind Farm site and overlaps with the Proposed Grid Connection route along the N77. The proposed Grid Connection runs adjacent to the River Barrow and River Nore SAC along the N77 national road and briefly intercepts it at the proposed watercourse crossing. Rivers and streams that drain the Proposed Wind Farm site or the Proposed Grid Connection Route ultimately drain towards the River Barrow and River Nore SAC.

The River Nore/Abbeyleix Woods Complex pNHA (Site Code: 002076) and the River Nore SPA (Site Code: 004233) exist 0.33km from the Proposed Wind Farm site and overlap with the Proposed Grid Connection route along the N77.

Lisbigney Bog SAC/pNHA (Site Code: 000869) is located ~4.3km northeast of the Proposed Wind Farm site. There is no surface water connection between the Proposed Wind Farm site and Lisbigney Bog.

Cullahill Mountain SAC/pNHA (Site Code: 000831) is located ~6.7km to the west of the Proposed Wind Farm site and there is no hydrological connection between the this desginated site and the Proposed Wind Farm site.

The Spahill and Clomantagh Hill SAC/pNHA (Site Code: 000849) is located ~10.3km southwest of the Proposed Wind Farm site. There is no surface water connection between the Proposed Wind Farm site and this SAC/pNHA.

Waterford Harbour pNHA (Site Code: 000787) is located downstream of the Proposed Project site within Waterford Harbour.

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 waters in or directly adjacent to the catchment identified under the Bathing Water Regulations 2008.

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.

There are various section of the Nore River (Nore_190 to Nore_250) downstream of the Proposed Wind Farm site that are listed as NSAs. The Nore Estuary, Barrow Nore Estuary Upper, New Ross Port and Lower Suir Estuary (Little Island – Cheekpoint) transitional waterbodies downstream of the Proposed Wind Farm site are listed as NSAs.

2.7.4 Shellfish Waters

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

Downstream of the site, Waterford Harbour (Cheekpoint/Arthurstown/Creadan) is listed as a Shellfish Water Protection Area.

2.7.5 Salmonid Waters

The Salmonid Regulations (S.I. 293 / 1988) identifies the protected river that are designated as Designated Salmonid Waters under S.I. No. 293/1988 - European Communities (Quality of Salmonid Waters) Regulations 1988, 14th August 1988. The Council Directive 78/659/EEC of 18th July 1978 on the quality of fresh waters needing protection or improvement in order to support fish life and the Council Directive 92/42/EEC of 21st May 1992 on the conservation of natural habitats and of wild fauna and flora was transposed into Irish law under the Fish Directive S.I. 293/1988 and Habitats Directive S.I. 477/2011.

The Nore River (Nore_110 to Nore_250) are identified as designated Salmonid Waters and are located downstream of the Proposed Wind Farm site.

2.7.6 Drinking Water

The Nore_120 DWPA, the Nore_160 DWPA and the Nore_220 DWPA downstream of the Proposed Wind Farm site are listed as Drinking Water Protected Areas (DWPA's). All GWB's in Ireland are considered as DWPAs. The southern portion of the Proposed Wind Farm site is mapped within Ballyconra PWS Public Water Supply Source Protection Area. The eastern side of the central portion of the Proposed Wind Farm site is mapped in the Seskin Group Water Scheme Preliminary Source Protection Area.

3. WFD SCREENING

As discussed in **Section 2**, there are a total of 23 no. surface waterbodies which are located in the vicinity and downstream of the Proposed Wind Farm site and the Proposed Grid Connection Route. These include 16 no. river waterbodies, 5 no. transitional waterbodies and 2 no. coastal waterbodies. In addition, 3 no. groundwater bodies underlie the Proposed Wind Farm site and the Proposed Grid Connection Route. Furthermore, there are a number of protected areas in the vicinity and downstream of the Proposed Wind Farm site and the Proposed Grid Connection Route.

3.1 SURFACE WATER BODIES

As shown in **Figure** A above, there are 23 no. SWBs are located in the vicinity or downstream of the Proposed Wind Farm site and the Proposed Grid Connection Route.

With consideration for the construction, operational and decommissioning phases of the Proposed Wind Farm site, it is considered that the Lisdowney_010, Nore_110, Nore_120 and Nore_140 river sub basins will be brought through to the WFD Impact Assessment as elements of the Proposed Wind Farm site and the Proposed Grid Connection Route are located within these river sub basins. The Nore_130 river sub-basin is brought forward also due to its proximity to the Nore_120 and Nore_140 sub-basins.

Further downstream, the Nore River (Nore_150 to Nore_250), the transitional waterbodies and the coastal waterbodies have been screened out due to their distant location (>6km) and increased volume of water within the SWB.

3.2 GROUNDWATER BODIES

With respect to groundwater bodies, the Lisdowney, Durrow and Killkenny-Ballynakill GWBs have been screened in due to their location directly underlying the Proposed Wind Farm site and the Proposed Grid Connection Route. The site works must not in any way result in a deterioration in the status of these GWBs and/or prevent them from meeting the biological and chemical characteristics for good status in the future.

3.3 PROTECTED AREAS

The River Barrow and River Nore SAC (002162) has been screened into the assessment as it includes the River Nore which flows adjacent to and immediately downstream of the Proposed Wind Farm site and the Proposed Grid Connection Route.

The River Nore SPA (004233) and the River Nore/Abbeyleix Woods Complex pNHA (002076) will also be brought through to the WFD Impact Assessment as it includes the River Nore which flows adjacent to and immediately downstream of the Proposed Wind Farm site and the Proposed Grid Connection Route.

Lisbigney Bog SAC/pNHA is located upstream and there is no surface water connection between the Proposed Wind Farm site and Lisbigney Bog SAC/pNHA, therefore the SAC has been screened out of the WFD Impact Assessment.

The Cullahill Mountain SAC/pNHA and Spahill and Clomantagh Hill SAC/pNHA have been screened out as there are no hydrological or hydrogeological connections between the Proposed Wind Farm site and the SAC/pNHA.

Waterford Harbour pNHA has been screened out as the area is distant location from the Proposed Development and there is increase volume of water within transitional and coastal waters.

The Nore_120 DWPA has been screened in as the Proposed Wind Farm site and the Proposed Grid Connection Route is mapped within the Nore_120 river sub-basin. The Nore_160 DWPA and the Nore_220 has been screened out due to their distant location and increase volume of water within Nore River.

The Seskin Group Water Scheme SPA and Ballyconra PWS will be brought into the WFD Impact Assessment as the parts of the Proposed Wind Farm site is mapped within these Public Water Supply Scheme.

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	River	Lisdowney_010	**Yes**	The west side of the Proposed Wind Farm site is mapped within the Lisdowney_010 river sub-basin. An assessment is required to consider the potential impacts of the Proposed Wind Farm site on this SWB.
	River	Nore_110	**Yes**	The north side of the Proposed Wind Farm site is mapped within the Nore_110 river sub-basin. An assessment is required to consider the potential impacts of the Proposed Wind Farm site on this SWB.
	River	Nore_120	**Yes**	The Proposed Wind Farm site and the Proposed Grid Connection Route is mapped within the Nore_120 river sub-basin. An assessment is required to consider the potential impacts of the Proposed Wind Farm site and the Proposed Grid Connection Route on this SWB.
	River	Nore_130	**Yes**	The Nore_130 is situated between the Nore_120 and Nore_140 river sub-basins, which contain elements of the Proposed Wind Farm and Proposed Grid Connection. An assessment is required to consider the potential impacts of the Proposed Development on this SWB.
	River	Nore_140	**Yes**	The southern area of the Proposed Wind Farm site is mapped within the Nore_140 river sub-basin. An assessment is required to consider the potential impacts of the Proposed Wind Farm site on this SWB.
	River	Nore_150	No	The Nore_150 SWB has been screened out due to its distant location from the Proposed Wind Farm site and the increasing volumes of water within the River Nore. This SWB has an upstream catchment area of ~1,233km^2. Therefore, the Proposed Wind Farm site has no potential to impact the status of this SWB.
	River	Nore_160	No	The Nore_160 SWB has been screened out due to its distant location from the Proposed Wind Farm site and the increasing volumes of water within the River Nore. This SWB has an upstream catchment area of ~1,562km^2. Therefore, the Proposed Wind Farm site has no potential to impact the status of this SWB.
	River	Nore_170	No	The Nore_170 SWB has been screened out due to its distant location from the Proposed Wind Farm site and the increasing volumes of water within the River Nore. This SWB has an upstream catchment area of ~1,649km^2. Therefore, the Proposed Wind Farm site has no potential to impact the status of this SWB.
	River	Nore_180	No	The Nore_180 SWB has been screened out due to its distant location from the Proposed Wind Farm site and the increasing volumes of water within the River Nore. This SWB has an upstream catchment area of ~1,690km^2. Therefore, the Proposed Wind Farm site has no potential to impact the status of this SWB.
	River	Nore_190	No	The Nore_190 SWB has been screened out due to its distant location from the Proposed Wind Farm site and the increasing volumes of water within the River Nore. This SWB has an upstream catchment area of ~1,747km^2. Therefore, the Proposed

				Wind Farm site has no potential to impact the status of this SWB.
	River	Nore_200	No	The Nore_200 SWB has been screened out due to its distant location from the Proposed Wind Farm site and the increasing volumes of water within the River Nore. This SWB has an upstream catchment area of ~1,772km^2. Therefore, the Proposed Wind Farm site has no potential to impact the status of this SWB.
	River	Nore_210	No	The Nore_210 SWB has been screened out due to its distant location from the Proposed Wind Farm site and the increasing volumes of water within the River Nore. This SWB has an upstream catchment area of ~1,777km^2. Therefore, the Proposed Wind Farm site has no potential to impact the status of this SWB.
	River	Nore_220	No	The Nore_220 SWB has been screened out due to its distant location from the Proposed Wind Farm site and the increasing volumes of water within the River Nore. This SWB has an upstream catchment area of ~2,239km^2. Therefore, the Proposed Wind Farm site has no potential to impact the status of this SWB.
	River	Nore_230	No	The Nore_230 SWB has been screened out due to its distant location from the Proposed Wind Farm site and the increasing volumes of water within the River Nore. This SWB has an upstream catchment area of ~2,309km^2. Therefore, the Proposed Wind Farm site has no potential to impact the status of this SWB.
	River	Nore_240	No	The Nore_240 SWB has been screened out due to its distant location from the Proposed Wind Farm site and the increasing volumes of water within the River Nore. This SWB has an upstream catchment area of ~2,369km^2. Therefore, the Proposed Wind Farm site has no potential to impact the status of this SWB.
	River	Nore_250	No	The Nore_250 SWB has been screened out due to its distant location from the Proposed Wind Farm site and the increasing volumes of water within the River Nore. This SWB has an upstream catchment area of ~2,446km^2. Therefore, the Proposed Wind Farm site has no potential to impact the status of this SWB.
	Transitional	Nore Estuary	No	The Nore Estuary SWB has been screened out due to its distant location from the Proposed Wind Farm site and the increasing volumes of water. Therefore, the Proposed Wind Farm site has no potential to impact the status of this SWB.
	Transitional	Barrow Nore Estuary Upper	No	The Barrow Nore Estuary Upper SWB has been screened out due to its distant location from the Proposed Wind Farm site and the increasing volumes of water. Therefore, the Proposed Wind Farm site has no potential to impact the status of this SWB.
	Transitional	New Ross Port	No	The New Ross Port SWB has been screened out due to its distant location from the Proposed Wind Farm site and the increasing volumes of water. Therefore, the Proposed Wind Farm site has no potential to impact the status of this SWB.
	Transitional	Lower Suir Estuary (Little Island – Cheekpoint)	No	The Lower Suir Estuary (Little Island – Cheekpoint) SWB has been screened out due to its distant location from the Proposed Wind Farm site and the increasing volumes of water. Therefore, the Proposed Wind Farm site has no potential to impact the status of this SWB.
	Transitional	Barrow Suir Nore Estuary	No	The Barrow Suir Nore Estuary SWB has been screened out due to its distant location

				from the Proposed Wind Farm site and the increasing volumes of water. Therefore, the Proposed Wind Farm site has no potential to impact the status of this SWB.
	Coastal	Waterford Harbour	No	The Waterford Harbour SWB has been screened out due to its distant location from the Proposed Wind Farm site and the increasing volumes of water. Therefore, the Proposed Wind Farm site has no potential to impact the status of this SWB.
	Coastal	Eastern Celtic Sea (HAs 13;17)	No	The Eastern Celtic Sea (HAs 13;17) SWB has been screened out due to its distant location from the Proposed Wind Farm site and the increasing volumes of water. Therefore, the Proposed Wind Farm site has no potential to impact the status of this SWB.
Groundwater Body	Groundwater	Lisdowney	**Yes**	The Proposed Wind Farm site is mapped to overlie the Lisdowney GWB. Therefore, an assessment is required to consider the impacts of the Proposed Wind Farm site on this GWB.
	Groundwater	Durrow	**Yes**	The Proposed Wind Farm site and the Proposed Grid Connection Route are mapped to overlie the Durrow GWB. Therefore, an assessment is required to consider the impacts of the Proposed Wind Farm site and the Proposed Grid Connection Route on this GWB.
	Groundwater	Killkenny-Ballynakill	**Yes**	The Proposed Grid Connection Route are mapped to overlie the Killkenny-Ballynakill GWB. Therefore, an assessment is required to consider the impacts of the Proposed Grid Connection Route on this GWB.
Protected Areas	Designated Sites	River Barrow and River Nore SAC	**Yes**	The River Barrow and River Nore SAC has been screened into the assessment as it includes sections of the River Nore which flows adjacent to and immediately downstream of the Proposed Wind Farm site and the Proposed Grid Connection Route.
		River Nore SPA	**Yes**	The River Nore SPA has been screened into the assessment as it includes sections of the River Nore which flows adjacent to and immediately downstream of the Proposed Wind Farm site and the Proposed Grid Connection Route.
		River Nore/ Abbeyleix Woods Complex pNHA	**Yes**	The River Nore/Abbeyleix Woods Complex pNHA has been screened into the assessment as it includes sections of the River Nore which flows adjacent to and immediately downstream of the Proposed Wind Farm site and the Proposed Grid Connection Route.
		Lisbigney Bog SAC/pNHA	No	Lisbigney Bog SAC/pNHA has been screened out as there are no hydrological or hydrogeological connections between the Proposed Wind Farm site and the SAC/pNHA.
		Cullahill Mountain SAC/pNHA	No	Cullahill Mountain SAC/pNHA has been screened out as there are no hydrological or hydrogeological connections between the Proposed Wind Farm site and the SAC/pNHA.
		Spahill and Clomantagh Hill SAC/pNHA	No	Spahill and Clomantagh Hill SAC/pNHA has been screened out as there are no hydrological or hydrogeological connections between the Proposed Wind Farm site and the SAC/pNHA.

		Waterford Harbour pNHA	No	Waterford Harbour pNHA has been screened out due to distant location and increased volume of water. Therefore, the Proposed Wind Farm site has no potential to impact the status of this pNHA.
	Drinking Water Protected Areas	Nore_120	**Yes**	The Proposed Wind Farm site and the Proposed Grid Connection Route is mapped within the Nore_120 river sub-basin. An assessment is required to consider the potential impacts of the Proposed Wind Farm site and the Proposed Grid Connection Connection Route on this DWPA.
		Nore_160	No	The Nore_160 DWPA has been screened out due to its distant location from the Proposed Wind Farm site and the increasing volumes of water within the River Nore. This DWPA has an upstream catchment area of ~1,562km^2. Therefore, the Proposed Wind Farm site has no potential to impact the status of this DWPA.
		Nore_220	No	The Nore_220 DWPA has been screened out due to its distant location from the Proposed Wind Farm site and the increasing volumes of water within the River Nore. This DWPA has an upstream catchment area of ~2,239km^2. Therefore, the Proposed Wind Farm site has no potential to impact the status of this DWPA.
		Seskin Group Water Scheme SPA	**Yes**	The southern portion of the Proposed Wind Farm site is mapped within Ballyconra PWS Public Water Supply Source Protection Area. An assessment is required to consider the potential impacts of the Proposed Wind Farm site on this Group Water Scheme.
		Ballyconra PWS	**Yes**	The eastern side of the central portion of the Proposed Wind Farm site is mapped in Seskin Group Water Scheme Preliminary Source Protection Area. An assessment is required to consider the potential impacts of the Proposed Wind Farm site on this PWS.

4. WFD COMPLIANCE ASSESSMENT

4.1 DEVELOPMENT PROPOSALS

The Proposed Development is described in full in Chapter 4 of the EIAR.

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

The primary risk to surface waters will be entrained suspended sediments (soil particles) in site runoff during earthworks along with the release of cement-based compounds and/or hydrocarbons. The Proposed Development may also result in changes to surface water runoff volumes and flow patterns.

There are a number of potential adverse effects to both surface and groundwater.

4.2 POTENTIAL EFFECTS

4.2.1 Construction Phase (Unmitigated)

4.2.1.1 Potential Surface Water Quality Effects from Works within the Proposed Wind Farm site

Construction phase activities including site levelling, roadway construction and turbine/substation foundation excavation 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 and spoil areas 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 groundwater and 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. Hydrocarbons have 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.

Construction phase activities can result in the release of suspended solids and pollutants in runoff water and could result in an increase in the suspended sediment load, resulting in increased turbidity, increased pH and contamination which in turn could affect the water quality and fish stocks in the downstream SWBs.

The SWB likely to be most impacted by these activities is the Lisdowney_010, Nore_110, Nore_120, Nore_130 and Nore_140 SWB. Further downstream, the potential for water quality effects will decrease downstream due to the increasing volumes of water within the respective SWBs.

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

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

SWB	WFD Code	Current Status	Assessed Potential Status Change
Lisdowney_010	IE_SE_15L020100	Moderate	Poor
Nore_110	IE_SE_15N011300	Good	Moderate
Nore_120	IE_SE_15N011400	Moderate	Poor
Nore_130	IE_SE_15N011500	Good	Moderate
Nore_140	IE_SE_15N011600	Good	Moderate
Nore_150	IE_SE_15N011700	Good	Good
Nore_160	IE_SE_15N011750	Good	Good

4.2.1.2 Potential Surface Water Quality Effects Along the Proposed Grid Connection Route

The Proposed Grid Connection Route will run underground along the N77 roadway which runs adjacent to the River Nore (between ~25-850m). Due to the close proximity of local waterbodies to the Proposed Grid Connection Route at the crossing locations there is a potential for surface water quality impacts during trench excavation work due to runoff from the road surface. This runoff may contain elevated concentrations of suspended sediment, cementitious runoff and/or hydrocarbons.

Some minor groundwater/surface water seepages will likely occur in trench excavations and substation foundation excavations and this will create additional volumes of water to be treated by the runoff management system. Inflows will likely require management and treatment to reduce suspended sediments.

Construction activities along the Proposed Grid Connection Route only have the potential for short term effects due to the minor and transient nature of the works. This limits the potential for the Proposed Project to alter the overall status of a SWB.

A summary of potential status change to SWBs arising from works along the Proposed Grid Connection Route during the construction phase of the Proposed Project in the unmitigated scenario are outlined in **Table F.**

Table F: Potential Surface Water Quality Effects along the Proposed Grid Connection Route During Construction Phase (Unmitigated)

SWB	WFD Code	Current Status	Assessed Potential Status Change
Nore_120	IE_SE_15N011400	Moderate	Poor
Nore_130	IE_SE_15N011500	Good	Moderate
Nore_140	IE_SE_15N011600	Good	Moderate
Nore_150	IE_SE_15N011700	Good	Good
Nore_160	IE_SE_15N011750	Good	Good

4.2.1.3 Potential Groundwater Quality/Quantity Effects

The accidental spillage of hydrocarbons, the release of effluent from wastewater treatment systems and the release of cement-based products have the potential to negatively impact on groundwater water quality at the Proposed Wind Farm site.

Any contaminants which may be accidently released on-site are more likely to reach the bedrock rather than nearby streams and rivers across the majority of the site. In addition, groundwater seepages may occur in turbine base excavations, particularly those on lower elevations and this will create additional volumes of water to be treated by the drainage management system. Furthermore, temporary dewatering of excavations (turbine bases etc) may drawdown the local groundwater table.

Piling, which may be undertaken at some turbine locations, does not require active dewatering (albeit some temporary displacement of local groundwater may occur) and therefore has no potential to significantly affect groundwater levels during construction.

Groundwater flows in the bedrock of the borrow pit will be limited to minor seepages at the subsoil-bedrock interface. No regional groundwater flows will be intercepted during the operation of the borrow pit, which will exist above the modelled groundwater level of ~100mOD at the location of the borrow pit, based on recorded groundwater levels across the Site (refer to Figure 9-11 of Chapter 9).

Groundwater level impacts due to the Proposed Wind Farm site are not anticipated to be significant due to the local hydrogeological regime. No groundwater level impacts are predicted from the turbine base construction, construction of the collector cabling trench, access roads, substation, compounds or met mast due to the relatively shallow nature of the excavation (i.e. 0 -~3-4m).

The Proposed Grid Connection Route is located in the Durrow and Killkenny-Ballynakill Gravels GWBs. However, due to the shallow, short-term and transient nature of the proposed works, there is no potential for any effects during earthworks and excavation works on the GWBs.

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

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

GWB	WFD Code	Current Status	Assessed Potential Status Change
Lisdowney	IE_SE_G_088	Good	Good
Durrow	IE_SE_G_156	Poor	Poor
Killkenny-Ballynakill Gravels	IE_SE_G_163	Good	Good

4.2.1.4 Potential Protected Area Impacts

The hydrological and hydrogeological water connections from the Proposed Project could transfer poor quality surface water that may affect the conservation objectives of these designated sites. The designated sites included in this assessment and deemed to be hydrologically or hydrogeologically connected to the Proposed Wind Farm site include:

River Barrow and River Nore SAC: This SAC is located adjacent to and immediately downstream of the Proposed Wind Farm site and the Proposed Grid Connection Route. Any potential deterioration in surface water quality has the potential to affect this SAC.

River Nore SPA: This SPA is located adjacent to and immediately downstream of the Proposed Wind Farm site and the Proposed Grid Connection Route. Any potential deterioration in surface water quality has the potential to affect this SPA.

River Nore/Abbeyleix Woods Complex pNHA: This pNHA consists of the River Nore, which is located adjacent to and immediately downstream of the Proposed Wind Farm site and the Proposed Grid Connection Route. Any potential deterioration in surface water quality has the potential to affect this pNHA.

Other Designated sites are either not connected hydrologically with the Proposed Wind Farm site or are located at a distance with increased volume of water in it. Therefore, the Proposed Wind Farm site have no potential to impact these designated site.

4.2.2 Operational Phase (Unmitigated)

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

4.2.2.1 Potential Surface Water Quantity Effects Downstream of Proposed Development Site

Progressive replacement of the soil or vegetated surfaces 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 Development 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.

A summary of potential status change to SWBs arising from increased runoff during the operation stage of the Proposed wind Farm site in the unmitigated scenario are outlined in **Table H**.

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

SWB	WFD Code	Current Status	Assessed Potential Status Change
Lisdowney_010	IE_SE_15L020100	Moderate	Poor
Nore_110	IE_SE_15N011300	Good	Moderate
Nore_120	IE_SE_15N011400	Moderate	Poor
Nore_130	IE_SE_15N011500	Good	Moderate
Nore_140	IE_SE_15N011600	Good	Moderate
Nore_150	IE_SE_15N011700	Good	Good
Nore_160	IE_SE_15N011750	Good	Good

4.2.2.2 Surface Water Quality Impacts from Operational Site Drainage

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

A summary of potential status change to SWBs arising from surface water quality impacts during the operation stage of the Proposed Wind Farm site in the unmitigated scenario are outlined in

Table I.

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

SWB	WFD Code	Current Status	Assessed Potential Status Change
Lisdowney_010	IE_SE_15L020100	Moderate	Poor
Nore_110	IE_SE_15N011300	Good	Moderate
Nore_120	IE_SE_15N011400	Moderate	Poor
Nore_130	IE_SE_15N011500	Good	Moderate
Nore_140	IE_SE_15N011600	Good	Moderate
Nore_150	IE_SE_15N011700	Good	Good
Nore_160	IE_SE_15N011750	Good	Good

4.2.2.3 Potential Protected Area Impacts

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.

Therefore, the risk of any operational phase activities that may affect the conservation objectives of the protected areas is greatly reduced.

4.3 MITIGATION MEASURES

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

4.3.1 Construction Phase

4.3.1.1 Mitigation Measures to Protect Surface Water Quality during Earthworks

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

Table J: Summary of Drainage Mitigation & their Application

Management Type	Description of SuDs drainage control method	Applicable Works Area
Avoidance Controls:	• Application of buffer zones to natural watercourses where possible to avoid excavations in close proximity to watercourses and avoid the release of suspended sediment into watercourses; • Using small working areas; and, • Working in appropriate weather and suspending certain work activities in advance of forecasted wet weather.	Construction work areas where sediment is being generated.

Source Controls:	• Use of upstream interceptor drains and downstream collector drains, vee-drains, diversion drains, flumes and culvert pipes.	Construction work areas where sediment is being generated.
	• Using small working areas; • Covering stockpiles; • Weathering off / sealing stockpiles and promoting vegetation growth.	Stockpiles areas

In-Line Controls:	• Interceptor drains, vee-drains, oversized swales/collector drains;
	• Erosion and velocity control measures such as:
	  o sand bags;
	  o oyster bags filled with gravel;
	  o filter fabrics;
	  o straw bales;
	  o flow limiters;
	  o weirs or baffles;
	  o and/or other similar/equivalent or appropriate systems.
	• Silt fences, filter fabrics;
	• Collection sumps, temporary sumps, pumping systems;
	• Attenuation lagoons;
	• Sediment traps, stilling / settlement ponds.
		Interceptor and collection drainage systems

Water Treatment Controls:	• Temporary sumps; • Attenuation ponds; • Temporary storage lagoons; • Sediment traps, Stilling / Settlement ponds, silt bags; • Proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems.	Surface water treatment locations
Outfall Controls:	• Level spreaders; • Buffered outfalls; • Vegetation filters; • Silt bags; • Flow limiters and weirs.	Drainage run outfalls and overland discharge points

Each element of the Proposed Project will have an array of drainage control measures to ensure protection of downstream watercourses. Each drainage control element is not stand alone but occurs as part of a treatment train of control systems (i.e., check dams, silt traps, settlement ponds etc).

4.3.1.2 Mitigation Measures to Protect Against the Release of Hydrocarbons

Mitigation measures proposed to avoid the release of hydrocarbons at the Wind Farm site and along the Grid Connection route include:

- Minimal refuelling or maintenance of vehicles or plant will take place on-site. Off-site refuelling will occur where possible;
- On site re-fuelling of machinery will be carried out using a double skinned fuel truck;
- The fuel truck will be re-filled off site, and will drive to where machinery is located;
- The fuel truck will also carry fuel absorbent material and pads in the event of any accidental spillages;
- The fuel truck will be parked on a level area in the construction compound when not in use and only designated trained and competent operatives will be authorised to refuel plant on site;
- Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations;
- Onsite refuelling will be carried out by trained personnel only;
- Fuels stored on site will be minimized and will be appropriately bunded;

- Surface water runoff from temporary construction compounds will be collected and drained via silt traps and hydrocarbons interceptors prior to recharge to ground;
- A permit to fuel will be put in place;
- The plant used during construction will be regularly inspected for leaks and fitness for purpose;
- An emergency plan for the construction phase to deal with accidental spillages is included within the Construction and Environmental Management Plan; and,
- Spill kits will be available to deal with any accidental spillage in and outside the re-fuelling area.

4.3.1.3 Mitigation Measures to Prevent Groundwater and Surface Water Contamination from Wastewater Disposal

Mitigation measures proposed to avoid the release of wastewater at the Wind Farm site include:

- It is proposed to manage wastewater from the staff welfare facilities in the control buildings/substation by means of a sealed storage tank, with all wastewater being tankered off site by permitted waste collector to wastewater treatment plants. It is not proposed to treat wastewater on-site.

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

Best practice methods for cement-based compounds:

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

4.3.1.5 Mitigation Measures to Prevent Morphological Changes to Surface Water Crossing and Drainage Patterns

The proposed mitigation measures include:

- The proposed newwatercourse crossing near turbine T8 will be clear span bridge crossing and the existing banks will remain undisturbed. No in-stream excavation works are proposed at these locations and therefore there will be no direct impact on the stream at the proposed crossing locations. Abutments will be constructed from precast units combined with in-situ foundations;
- All guidance / mitigation measures required by the OPW and/or the Inland Fisheries Ireland (IFI)1 is incorporated into the design of the proposed crossings;
- All drainage measures will be installed in advance of the works;
- Plant and equipment will not be permitted to track across the watercourse;

[1] Inland Fisheries Ireland (2016): Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters

- A foundation base will be excavated to rock or competent ground with a mechanical excavator with the foundation formed in-situ using a semi-dry concrete lean mix. The base will be excavated along the stream bank with no instream works required;
- Access to the opposite side of the watercourse for excavation and foundation installation will require the installation of a temporary pre-cast concrete or metal bridge across the watercourse to provide temporary access for the excavator. Plant and equipment will not be permitted to track across the watercourse;
- Once the foundation base has been completed, the pre-cast concrete clear-span structure will be installed using a crane which will be set up on the bank of the watercourse and will be lifted into place from the bank with no contact with the watercourse;
- Once the crossing is in position stone backfill will be placed and compacted against the structure up to the required level above the foundations;
- Underground cabling ducting will be contained within the road make-up of the proposed crossing;
- As a further precaution, near stream construction work, will only be carried out during the period permitted by IFI for in-stream works according to the IFI (2016) guidance document "Guidelines on protection of fisheries during construction works in and adjacent to waters", i.e., July to September inclusive. This time period coincides with the period of lowest expected 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 (any deviation from this will be done in discussion with the IFI);
- Where works are necessary inside the 50m buffer double row silt fences will be emplaced immediately down-gradient of the construction area for the duration of the construction phase; and,
- All new river/stream crossings will be designed in accordance with OPW guidelines/requirements on applying for a Section 50 consent.

4.3.1.6 Mitigation Measures to Prevent Water Quality Effect to surface Watercourses along the Proposed Grid Connection Route

Prior to the commencement of substation, cable trenching, access road or end mast works the following key temporary drainage measures will be installed:

- All existing roadside drains (where present) that intercept the proposed works area will be temporarily blocked down-gradient of the works using check dams/silt traps;
- Culverts, manholes and other drainage inlets (where present) will also be temporarily blocked;
- A double silt fence perimeter will be placed along the road verge on the down-slope side of works areas that are located inside the watercourse 50m buffer zone.

The following mitigation measures are proposed for the underground cabling watercourse crossing works:

- No stock-piling of construction materials will take place along the grid route;
- No refuelling of machinery or overnight parking of machinery is permitted in this area;
- No concrete truck chute cleaning is permitted in this area;
- Works will not take place at periods of high rainfall, and will be scaled back or suspended if heavy rain is forecast;
- Local road drainage, culverts and manholes will be temporarily blocked during the works;
- Machinery deliveries will be arranged using existing structures along the public road;
- All machinery operations will take place away from the stream and ditch banks, apart from where crossings occur. Although no instream works are proposed or will occur;
- Any excess construction material will be immediately removed from the area and sent to a licenced waste facility;
- No stockpiling of materials will be permitted in the constraint zones;

- Spill kits will be available in each item of plant required to complete the stream crossing; and,
- Silt fencing will be erected on ground sloping towards watercourses at the stream crossings if required.
- The area around the Clear Bore™ (or similar alternative) 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.

4.3.1.7 Mitigation Measures to Protect Groundwater Quality

The potential pollution of groundwater during the construction phase will be mitigated by the provision of appropriate controls and working methods. These include best practice methods for storage and handling of fuels and chemicals and wastewater outlined in Sections 4.3.1.2, 4.3.1.3 and 4.3.1.4 above.

4.3.1.8 Mitigation Measures to Protect Water Quality along the Turbine Delivery Route

Proposed Mitigation Measures:

- All works are minor and localised and cover very small areas;
- These works are distributed over a wide area;
- All works are temporary in nature; and,
- Application of the Pre-Construction Drainage Measures for surface water quality protection.

4.3.1.9 Mitigation Measures for Protected Areas

The potential for material to enter the downstream protected areas is negligible as mitigation controls as described above will be implemented. These measures include the use of silt fences, silt traps and check dams. Emphasis will also be placed on prevention of hydrocarbon releases to local watercourses.

It can be concluded that with best practice methods adhered to during the construction of the Proposed Development, as outlined above, the potential to affect the qualifying interests of downstream designated sites is not significant.

4.3.2 Operational Phase

4.3.2.1 Increased Site Runoff and Hydromorphology Effects

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

- Interceptor drains will be installed up-gradient of all proposed infrastructure to collect clean surface runoff, in order to minimise the amount of runoff reaching areas where suspended sediment could become entrained. It will then be directed to areas where it can be re-distributed over the ground by means of a level spreader;

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

4.3.2.2 Mitigation Measures to Protect Surface Water Quality

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

Mitigation measures for oils and fuels during the operational phase of the Proposed Project are the same as those outlined in **Section 4.3.1.2** above.

4.3.2.3 Mitigation Measures to Protect Groundwater Quality

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

4.3.2.4 Mitigation Measures for Protected Areas

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

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

It can be concluded that with best practice methods adhered to during the operation phase of the Proposed Project, the potential for the project to impact upon the qualifying interests of the local designated sites is not significant.

4.3.3 Decommissioning Phase

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

During decommissioning, it will be possible to reverse or at least reduce some of the potential effects caused during construction, and to a lesser extent operation, by rehabilitating constructed areas such as turbine bases and hard standing areas. The turbine bases will be rehabilitated by covering with local soil/subsoil in order to regenerate vegetation which will reduce runoff and sedimentation effects. Mitigation measures to avoid contamination by accidental fuel leakage and compaction of soil by on-site plant will be implemented as per the construction phase mitigation measures.

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

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

Other impacts such as possible soil compaction and contamination by fuel leaks will remain but will be of reduced magnitude than the construction phase because of the smaller scale of the works and reduced volumes on-site.

As noted in the Scottish Natural Heritage report (SNH) Research and Guidance on Restoration and Decommissioning of Onshore Wind Farms (SNH, 2013) reinstatement proposals for a wind farm are made approximately 30 years in advance, so within the lifespan of the wind farm, technological advances and preferred approaches to reinstatement are likely to change. According to the SNH guidance, it is, therefore:

> *"best practice not to limit options too far in advance of actual decommissioning but to maintain informed flexibility until close to the end-of-life of the wind farm".*

Some of the impacts will be avoided by leaving elements of the Proposed Wind Farm site in place where appropriate. The Proposed Grid connection substation and underground cabling will be retained by EirGrid/ESB as a permanent part of the national grid.

No significant effects on the hydrological and hydrogeological environment are envisaged during the decommissioning stage of the Proposed Wind Farm site.

4.3.4 Potential Effects with the Implementation of Mitigation

In all instances, the mitigation measures described in **Section 4.3** will allow all relevant waterbodies to maintain their existing status and meet future WFD Objectives. The assessment of WFD elements for the WFD waterbodies is summarised in

Table K below.

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

SWB	WFD Code	Current Status	Assessed Potential Status Change – Unmitigated	Assessed Potential Status Change – Mitigated
Surface Water Bodies				
Lisdowney_010	IE_SE_15L020100	Moderate	Poor	Moderate
Nore_110	IE_SE_15N011300	Good	Moderate	Good
Nore_120	IE_SE_15N011400	Moderate	Poor	Moderate
Nore_130	IE_SE_15N011500	Good	Moderate	Good
Nore_140	IE_SE_15N011600	Good	Moderate	Good
Nore_150	IE_SE_15N011700	Good	Good	Good
Nore_160	IE_SE_15N011750	Good	Good	Good
Nore_170	IE_SE_15N011950	Good	Good	Good
Nore_180	IE_SE_15N012000	Good	Good	Good
Nore_190	IE_SE_15N012090	Poor	Poor	Poor
Nore_200	IE_SE_15N012130	Good	Good	Good
Nore_210	IE_SE_15N01220	Good	Good	Good
Nore_220	IE_SE_15N012310	Good	Good	Good
Nore_230	IE_SE_15N012330	Moderate	Moderate	Moderate
Nore_240	IE_SE_15N012400	Good	Good	Good
Nore_250	IE_SE_15N012500	Good	Good	Good
Nore Estuary	IE_SE_100_0400	Moderate	Moderate	Moderate
Barrow Nore Estuary Upper	IE_SE_100_0250	Moderate	Moderate	Moderate
New Ross Port	IE_SE_100_0200	Moderate	Moderate	Moderate
Lower Suir Estuary (Little Island – Cheekpoint)	IE_SE_100_0500	Moderate	Moderate	Moderate
Barrow Suir Nore Estuary	IE_SE_100_0100	Moderate	Moderate	Moderate
Waterford Harbour	IE_SE_100_0000	Moderate	Moderate	Moderate
Eastern Celtic Sea (HAs 13;17)	IE_SE_050_0000	High	High	High
Groundwater Body				

Lisdowney	IE_SE_G_088	Good	Good	Good
Durrow	IE_SE_G_156	Poor	Poor	Poor
Killkenny-Ballynakill Gravels	IE_SE_G_163	Good	Good	Good

4.4 CUMULATIVE ASSESSMENT

A detailed cumulative assessment has been carried out for all planning applications (granted and awaiting decisions) within a combined river sub-basin zone within the vicinity of the Site defined within Appendix 2-3 of the EIAR.

A dataset of 3,910 no. planning applications within the defined potential cumulative boundary (defined by boundaries of downgradient water catchments) has been completed. Of the 3,910 no. applications, 406 no. applications are for agricultural buildings, typically slatted sheds and milking parlors. There are 163 no. commercial units within the dataset and 2,288 no. residential dwellings. There are 22 no. wind farms listed within 25km of the Site. Based on the scale of the works, their proximity to the Proposed Development and the temporal period of likely works, no cumulative effects will occur as a result of the Proposed Development. As such, there will be no potential for effects on the WFD status of any surface water or groundwater body, as a result of cumulative effects associated with the Proposed Development.

5. WFD ASSESSMENT CONCLUSION

WFD status for SWBs (Surface Water Bodies) and GWBs (Groundwater Bodies) hydraulically linked to the Proposed Wind Farm site and the Proposed Grid Connection Route are defined in **Section 2** above.

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

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

There is also mitigation proposed to protect groundwater quality within the Proposed Wind Farm site and the Proposed Grid Connection Route during the construction, operational and decommissioning phases of the Proposed Wind Farm site and the Proposed Grid Connection Route. These mitigation measures will ensure the qualitative status of the underlying GWB will not be altered by the Proposed Wind Farm site and the Proposed Grid Connection Route.

There will be no change in GWB or SWB status in the underlying GWB or downstream SWBs resulting from the Proposed Wind Farm site and the Proposed Grid Connection Route. 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 Proposed Wind Farm site and the Proposed Grid Connection Route:

- will not cause a deterioration in the status of all surface and groundwater bodies assessed;
- will not jeopardise the objectives to achieve 'Good' 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 quantity status;
- 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 the Water Framework Directive (2000/60/EC); 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).

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