# APPENDIX 9-3

***WATER FRAMEWORK DIRECTIVE ASSESSMENT***

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# WATER FRAMEWORK DIRECTIVE ASSESSMENT
# LACKAREAGH WIND FARM, CO. CLARE

**FINAL REPORT**

Prepared for:

**EDF RENEWABLES IRELAND**

Prepared by:

**HYDRO-ENVIRONMENTAL SERVICES**

## DOCUMENT INFORMATION



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# 1. INTRODUCTION



## 1.1 BACKGROUND

Hydro-Environmental Services (HES) were requested by MKO Ireland (MKO) on behalf of EDF Renewables Ireland (the Client) to complete a Water Framework Directive (WFD) Compliance Assessment for a planning application for the Proposed Project.

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 impacted, describe the proposed mitigation measures and determine if the project is in compliance with the objectives of the WFD.

This WFD Assessment is intended to supplement the EIAR submitted as part of the Lackareagh Wind Farm planning application (the Proposed Project). The Proposed Project is described in full in Chapter 4 of the EIAR. For the purposes of this WFD Assessment, and consistent with the EIAR, the various components are described and assessed using the following references: 'Proposed Project', 'Proposed Wind Farm', 'Proposed Grid Connection Route' and the 'site'.

## 1.2 STATEMENT OF AUTHORITY

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, with their main office is located in Dungarvan, County Waterford. HES 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, Conor McGettigan and Jenny Law.

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

Conor McGettigan (BSc, MSc) is an Environmental Scientist with over 4 years' experience in environmental consultancy in Ireland. Conor holds an M.Sc. in Applied Environmental Science (2020) and a B.Sc. in Geology (2016) from University College Dublin. Conor has prepared the Land, Soils and Geology and Hydrology and Hydrogeology Chapters for numerous wind farm EIAR projects. Conor routinely competes WFD Assessments for a wide variety of projects including wind farms, quarries and proposed residential developments.

Jenny Law (BSc, MSc) is a junior Environmental Geoscientist, holding an M.Sc. in Applied Environmental Geoscience (2022) from University College Cork. Jenny has also completed a B.Sc. in Earth and Ocean Science (2019) from National University of Ireland. In recent times Jenny has assisted in the preparation of hydrological and hydrogeological impact assessments and numerous WFD Assessments for a variety of developments.

## 1.3 WATER FRAMEWORK DIRECTIVE



The EU Water Framework Directive (2000/60/EC), as amended by Directives 2008/105/EC, 2013/39/EU and 2014/101/EU ("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 in the process of finalizing the River Basin Management Plan (2022 - 2027). As of July 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 Waterbodies (SWBs) and Groundwater Bodies (GWBs) with potential to be affected by the Proposed Project and reviews any available WFD information.

## 2.2 SURFACE WATERBODY IDENTIFICATION

The Proposed Wind Farm site is located across 2 no. regional surface water catchments. The east of the Proposed Wind Farm site is located in the Lower Shannon surface water catchment and Hydrometric Area 25D. Meanwhile, the west of the Proposed Wind Farm site is located in the Shannon Estuary North surface water catchment and Hydrometric Area 27. Both regional surface water catchments are located in the Shannon River Basin District.

Within the Lower Shannon surface water catchment, the Proposed Wind Farm site is located in the Shannon[Lower]_SC_080 sub-catchment. More locally this area lies within the catchment of the Ardcloony River. This river rises near the summit of Moylussa and flows to the southeast, ~1km east of the Proposed Wind Farm site. All Surface Waterbodies (SWBs) in this area form part of the Ardcloony_010 SWB. In terms of the Proposed Wind Farm, a total of 3 no. turbines are mapped in the Ardcloony_010 WFD river sub-basin. The Ardcloony_010 SWB discharges into the Lough Derg heavily modified waterbody (Derg HMWB). The River Shannon (Shannon (Lower)_050 SWB) outfalls from Lough Derg, before it discharges into the Limerick Dock transitional waterbody in the vicinity of Limerick City.

Within the Shannon Estuary North surface water catchment, the Proposed Wind Farm site is located in the Owenogarney_SC_010 sub-catchment. More locally, this area is drained by the Glenomra River and is mapped in the Broadford_010 WFD river sub-basin. The Glenomra River flows to the northwest, ~1km southwest of the Proposed Wind Farm site. Several mountain streams rise on the slopes of Lackareagh and Glennagalliagh mountains and flow to the southwest, through the Proposed Wind Farm site, before discharging into the Glenomra River. The Glenomra River and its tributary streams in the vicinity of the Proposed Wind Farm site form part of the Broadford_010 SWB. In terms of the Proposed Project, a total of 4 no. turbines, the onsite 38kV substation, borrow pit and construction compound are all located in the Broadford_010 WFD river sub-basin. Downstream of the Proposed Wind Farm site, the Glenomra River flows to the west, through the village of Broadford. Downstream of Broadford, this watercourse is referred to as the Broadford River. The Broadford_030 SWB discharges into Doon Lough, ~6.7km west of the Proposed Wind Farm site and outfalls from this lake as part of the Owenogarney River system (Owenogarney_030 SWB). The Owenogarney River flows to the south, passing through the Castle Lake waterbody, before the Owenogarney_060 SWB discharges into the Upper Shannon Estuary transitional waterbody ~3km south of Sixmilebridge.

With respect to the Proposed Grid Connection Route, the northern section in the vicinity of the Proposed Wind Farm site, is located in the Broadford_010 river sub-basin. There are 5 no. mapped watercourse crossings over the Broadford_010 SWB (1 of which is located within the Proposed Wind Farm site). The majority of the Proposed Grid Connection Route is mapped in the Shannon Lower surface water catchment and 2 no. sub-catchments. A section of the Proposed Grid Connection Route is mapped in the Bridgetown (Clare)_010 WFD river sub-basin in the Shannon[Lower]_SC_080 sub-catchment. There are no proposed watercourse crossings over the Bridgetown(Clare)_010 SWB. The southern section is mapped in the Shannon[Lower]_SC_100 sub-catchment and within 3 no. WFD river sub-basins. No crossings are proposed over the Glenomra Wood Stream_010 or the North Ballycannan_010 SWBs whilst, there is 1 no. crossings over the Blackwater River (Blackwater (Clare)_020 SWB).

The blade transition area along the TDR is located in the Lower Shannon regional surface water catchment. More locally this area is within the Shannon[Lower]_SC_080 sub-catchment and the

Bridgetown (Clare)_010 WFD river sub-basin. There are no EPA mapped watercourses in the immediate vicinity of the blade transition area along the TDR.



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

**Table A** presents the catchment area of each waterbody downstream of the Proposed Project as far as the Upper Shannon Estuary transitional waterbody and the Limerick Dock transitional waterbodies. The catchment area for the waterbodies increases progressively downstream as more tributaries discharge into the Glenomra, Broadford and Owenogarney rivers and the River Shannon.

Therefore, those river waterbodies which are located in close proximity to the Proposed Wind Farm 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.

**Table A: Catchment Area Downstream of Proposed Wind Farm site**

| WFD River Sub-Basin | Total Upstream Catchment Area (km²) |
|---|---|
| Shannon Estuary North WFD catchment | |
| Broadford_010 | 14 |
| Broadford_020 | 22 |
| Broadford_030 | 35 |
| Owenogarney_030 | 141 |
| Owenogarney_040 | 155 |
| Owenogarney_050 | 162 |
| Owenogarney_060 | 204 |
| Lower Shannon Catchment | |
| Ardcloony_010 | 14 |
| Bridgetown (Clare)_010 | 22 |
| Glenomra Wood Stream_010 | 11 |
| Blackwater (Clare)_020 | 55 |
| North Ballycannan_010 | 27 |
| Shannon (Lower)_050 | 1,0782 |

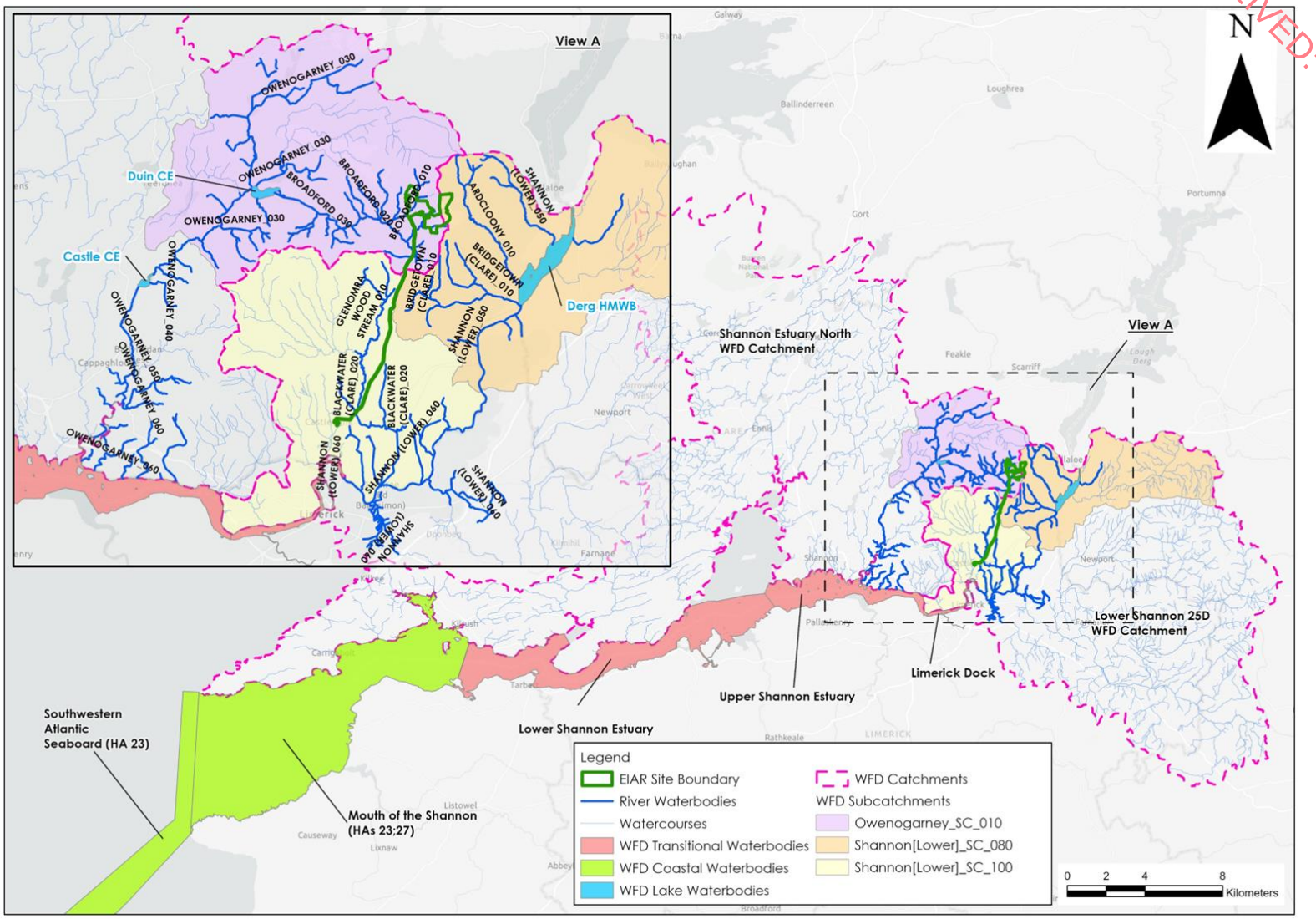


**Figure A: Local Hydrology Map**

## 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 are shown in **Table B**. The overall status is based on the ecological, chemical and quantitative status of each SWB.

Local Surface Water Body (SWB) status information is available from (www.catchments.ie).

Within the Shannon Estuary North surface water catchment, the Broadford_010 SWB in the vicinity of the Proposed Wind Farm site achieved 'Moderate' status in the latest WFD cycle (2016-2021). Further downstream the Broadford_020 SWB achieved 'Good' status. This waterbody is a high ecological status objective waterbody. Further downstream, the Broadford_030 SWB achieved 'Moderate' status. The Broadford River flows into the Owenogarnery_030 SWB before it discharges into the Duin CE Lake waterbody. The Owengarney_030 SWB achieved 'Good' status while Duin CE lake waterbody achieved 'Moderate' status in the latest WFD cycle. Further downstream, the Owenogarney_040 and _050 SWBs also achieved 'Good' status. However, the Castle CE lake waterbody was found to be of 'Poor' status. The Owenogarney_060 SWB achieved 'Good' status while the Upper Shannon Estuary is of 'Poor' status.

A total of 5 no. SWBs downstream of the Proposed Wind Farm site in the Shannon Estuary North surface water catchment have been deemed to be 'at risk' of failing to meet their respective WFD objectives. These 'at risk' SWBs include the Broadford_010, _020 and _030 river waterbodies, Castle Lake waterbody and the Upper Shannon Estuary transitional waterbody. The risk status of the Duin lake waterbody and the Owenogarney_060 SWB are currently under review. The remaining SWBs have been deemed to be 'not at risk' of failing to meet their WFD objectives.

The 3rd Cycle Shannon Estuary North Catchment Report (EPA, 2024) states that excess nutrients and morphological issues remain the most prevalent issues in this catchment. The Broadford_010 SWB is under significant pressure due to hydromorphological changes in its catchment. The Broadford_030 and Upper Shannon Estuary SWBs are listed as being under significant pressure from agricultural activities. Meanwhile, the Castle Lake SWB is under significant pressure from agriculture, invasive species (in the form of zebra mussels) and surface water abstraction (Shannon/Sixmilebridge public water supply abstraction).

Within the Lower Shannon surface water catchment, the Ardcloony_010 SWB in the vicinity of the Proposed Wind Farm site achieved 'Good' status in the latest WFD cycle (2016-2021). This SWB is listed as a high ecological status objective waterbody This SWB however did achieve 'High' status in the 1st and 2nd WFD cycles. The Arcloony_010 SWB discharges into the Lough Derg heavily modified waterbody (HMWB). This SWB has been modified due to power generation at Ardnacrusha. The Derg HMWB achieved 'Good' status in the latest WFD cycle. Meanwhile, the Glenomra Wood Stream_010 along the Proposed Grid Connection Route achieved "High" status. Further to the south along the Proposed Grid Connection Route, the Blackwater (Clare)_020 and the North Ballycannan_010 SWBs achieved 'Good' status. Downstream of Lough Derg, the Shannon (Lower)_050 and _060 SWBs 'Poor' and 'Moderate' status respectively.

A total of 3 no. river waterbodies downstream of the Proposed Wind Farm site in the Lower Shannon surface water catchment have been deemed to be 'at risk' of failing to meet their WFD objectives. These include the Ardcloony_010, Blackwater (Clare)_020 and Shannon (Lower)_050 SWBs. Further downstream the Limerick Dock waterbody is also "at risk".

The 3rd Cycle Lower Shannon and Mulkear Catchment Report (HA 25D) (EPA, 2024) states that excess nutrients and morphological impacts remain the most prevalent issues in this catchment. No significant pressures have been identified on the Ardcloony_010 SWB. Agriculture is listed as a pressure on the Blackwater (Clare)_020 SWB. In relation to agriculture the catchment report

states that the issues relating to farming in this catchment are diffuse phosphorus loss to surface waters and sediment from land drainage works, bank erosion or stream crossings. Meanwhile, the Shannon (Lower)_050 SWB and the Limerick Dock transitional waterbody are under significant pressure due to hydromorphological changes.



Finally, the Mouth of the Shannon (HAs 23;27) and the Southwestern Atlantic Seaboard (HA 23) coastal waterbodies downstream of the Proposed Wind Farm site achieved 'Good' and 'High' status respectively. Both the Mouth of the Shannon and the Southwestern Atlantic Seaboard coastal waterbodies have been deemed to be 'not at risk' of failing to meet their WFD objectives in the future.

The SWB status for the 2016-2021 WFD cycle are shown on **Figure B.**

**Table B: Summary WFD Information for River Water Bodies**

| SWB | Overall Status 2010-2015 | Overall Status 2013-2018 | Overall Status 2016-2021 | Risk Status 3rd Cycle | Pressures |
|---|---|---|---|---|---|
| Shannon Estuary North Surface Water Catchment | | | | | |
| Broadford_010 | Poor | Poor | Moderate | At risk | Hydromorphology |
| Broadford_020 | High | Good | Good | At risk | Hydromorphology & agriculture |
| Broadford_030 | Good | Good | Moderate | At risk | Agriculture |
| Owenogarney_030 | Good | Good | Good | Not at risk | None |
| Duin CE | Unassigned | Good | Moderate | Under Review | None |
| Owenogarney_040 | Good | Good | Good | Not at risk | None |
| Castle CE | Moderate | Poor | Moderate | At risk | Agriculture & abstraction and invasive species |
| Owenogarney_050 | Good | Good | Good | Not at risk | None |
| Owenogarney_060 | Unassigned | Moderate | Good | Under Review | None |
| Upper Shannon Estuary | Poor | Poor | Poor | At risk | Agriculture |
| Lower Shannon Estuary | Moderate | Good | Good | Not at risk | None |
| Lower Shannon Surface Water Catchment | | | | | |
| Ardcloony_010 | High | High | Good | At risk | None |
| Derg HMWB | Good | Good | Good | Under Review | None |
| Bridgetown (Clare)_010 | Good | Good | Good | Not at risk | None |
| Glenomra Wood Stram_010 | Good | High | High | Not at risk | None |
| Blackwater (Clare)_020 | Good | Good | Good | At risk | Agriculture |
| Shannon (Lower)_050 | Moderate | Moderate | Poor | At risk | Hydromorphology |
| Shannon (Lower)_060 | Unassigned | Moderate | Moderate | Under Review | None |
| Limerick Dock | Moderate | Good | Poor | At risk | Hydromorphology |
| Mouth of the Shannon (HAs 23;27) | Moderate | Good | Good | Not at risk | None |
| Southwestern Atlantic Seaboard (HA 23) | Unassigned | High | High | Not at risk | None |

## 2.4 GROUNDWATER BODY IDENTIFICATION

The bedrock geology underlying the Proposed Wind Farm site is mapped as Silurian Metasediments and Volcanics (www.gsi.ie). These rocks are classified by the GSI as being a Poor Aquifer – Bedrock which is Generally Unproductive except for Local Zones.

In terms of Groundwater Bodies (GWBs), the east of the Proposed Wind Farm site is underlain by the Lough Graney GWB and the west is underlain by the Tulla-Newmarket on Fergus GWB. Additionally, a small area in the west of the Proposed Wind Farm site, in the vicinity of Kilbane village, is underlain by the Broadford Gravels GWB. This gravel aquifer is located in the Glenomra River valley.

The Proposed Grid Connection Route is predominantly underlain by Poor and Locally Important bedrock aquifers. Meanwhile, approximately 1.4km in the south and in the vicinity of the existing Ardnacrusha 110kV substation, is underlain by a Regionally Important Aquifer - Karstified (diffuse).

The blade transition area along the TDR is underlain by the Lough Graney GWB.

## 2.5 GROUNDWATER BODY CLASSIFICATION

Local Ground Water Body (GWB) status information is available from (www.catchments.ie). A summary of the WFD status and risk result for GWBs underlying the Proposed Project are shown in **Table C**. The overall status is based on the ecological, chemical and quantitative status of each SWB.

The Lough Graney GWB (IE_SH_G_157) underlies the east of the Proposed Wind Farm site, much of the Proposed Grid Connection Route and the blade transition area along the TDR. Meanwhile, the west of the Proposed Wind Farm site and the northern section of the Proposed Grid Connection Route are underlain by the Tulla-Newmarket-on-Fergus GWB (IE_SH_G_229). The Broadford Gravels GWB (IE_SH_G_095) also overlies the Tulla-Newmarket-on-Fergus GWB in the Glenomra River valley. The Ardnacrusha GWB (IE_SH_G_09) underlies the south of the Proposed Grid Connection Route. Summary WFD information for these GWBs is presented in Table 9-13 below.

These 4 no. GWBs achieved 'Good' status in all 3 no. WFD cycles (2010-2015, 2013-2018 and 2016-2021) which is defined based on the quantitative status and chemical status of the GWB. These GWBs have been deemed to be 'not at risk' of failing to meet their respective WFD objectives. Furthermore, no significant pressures have been identified on these GWBs.

**Table C: Summary WFD Information for Groundwater Bodies**

| GWB | Overall Status 2010-2015 | Overall Status 2013-2018 | Overall Status 2016-2021 | Risk Status 3rd Cycle | Pressures |
|---|---|---|---|---|---|
| Lough Graney | Good | Good | Good | Not at risk | None |
| Tulla-Newmarket on Fergus | Good | Good | Good | Not at risk | None |
| Broadford Gravels | Good | Good | Good | Not at risk | None |
| Ardnacrusha | Good | Good | Good | Not at risk | None |

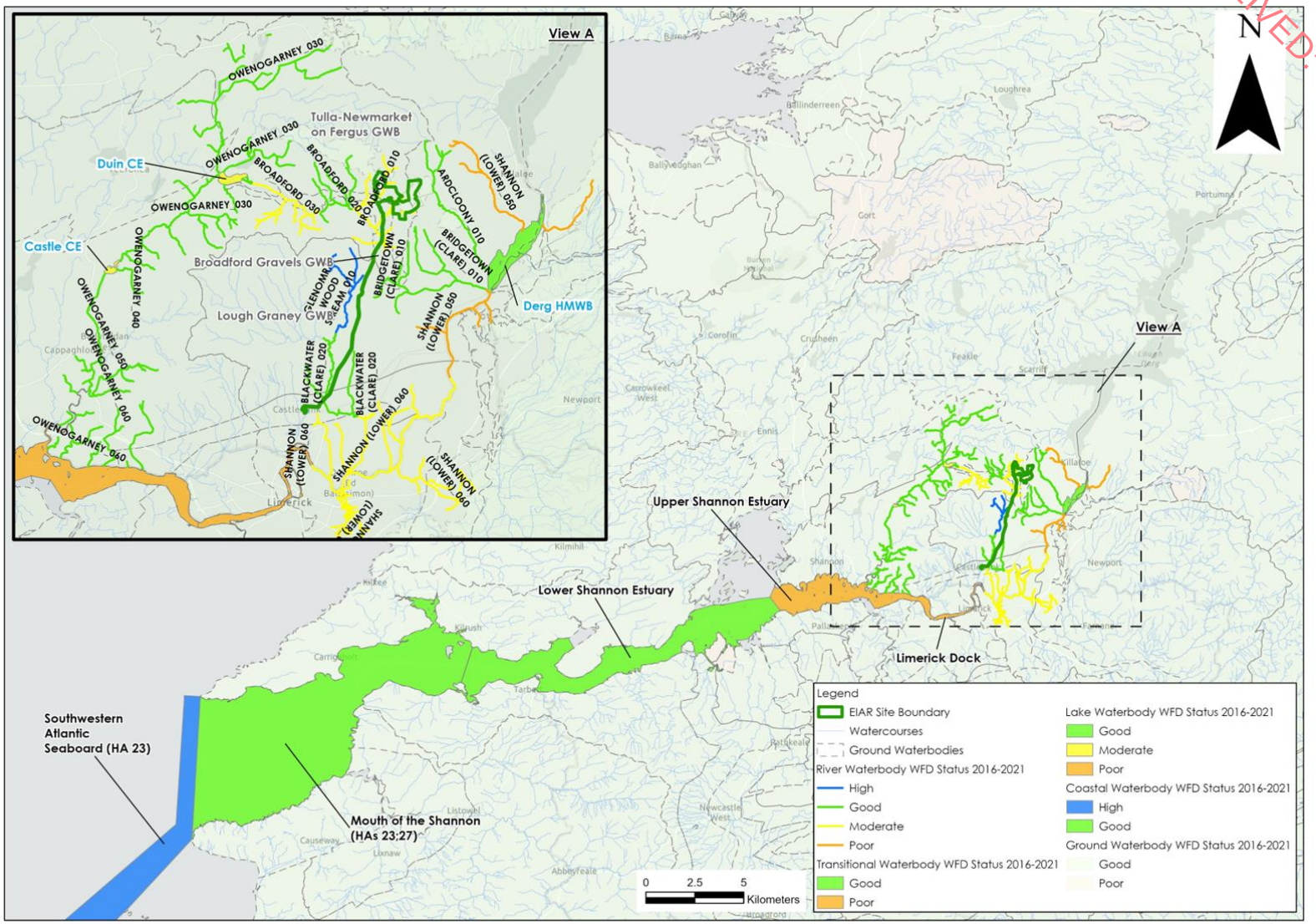


**Figure B: WFD Groundwater and Surface Waterbody Status (2016-2021)**

## 2.6 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 areas (DWPA) are looked at as part of the assessment.

### 2.6.1 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 Proposed Wind Farm site is not located within any designated conservation site, however there are several designated sites in close proximity and downstream of the site. The connectivity of these designated sites to the Proposed Wind Farm is discussed below.

Within the Shannon Estuary North surface water catchment:

- The Slieve Bernagh Bog SAC (Site Code: 002312) is located directly to the north of the Proposed Wind Farm site. However, this SAC is located upgradient of the Proposed Wind Farm site. Therefore, there is no potential for the Proposed Wind Farm to impact on the status of this SAC.
- Gortacullin Bog NHA (Site Code: 002401) is located ~5.6km (straight line distance) southwest of the Proposed Wind Farm site. There is no hydrological connectivity between the Proposed Wind Farm site and this NHA as the Broadford River acts as a hydrological barrier.
- Doon Lough NHA (Site Code: 000337) is located ~5km (straight line distance) to the west of the Proposed Wind Farm site. The NHA comprises a raised bog, that includes both areas of high bog and cutover bog, woodlands, lakes, marsh, fen and wet meadows. This NHA is hydrologically connected to the Proposed Wind Farm site via the Glenomra and Broadford rivers. The hydrological flowpath between the Proposed Wind Farm site and the NHA is ~6.4km.
- Danes Hole, Poulnalecka SAC/pNHA (Site Code: 00030) is located downstream of Doon Lough and ~8km southwest of the Proposed Wind Farm site (straight line distance). This SAC/pNHA consists of a small fossil cave in the banks of the Ahaclare River situated within a wood. It is a winter hibernation site and also a mating site of the Lesser Horseshoe Bat. This SAC/pNHA is hydrologically connected with the Proposed Wind Farm site via the Broadford and the Owenogarney rivers. The hydrological flowpath between the Proposed Wind Farm site and this SAC/pNHA is ~11.7km.
- Castle Lake pNHA (Site Code: 000239) is located ~12.3km (straight line distance) southwest of the Proposed Wind Farm site. This pNHA is hydrologically connected to the Proposed Wind Farm site via Broadford and the Owenogarney rivers. The hydrological flowpath between the Proposed Wind Farm site and this pNHA is ~16.38km.
- The Ratty River Cave SAC (Site Code: 002316) is located ~14.5km (straight line distance) to the southwest of the Proposed Wind Farm site. This site consists of a cave, and also an important winter roost and is a breeding site of the Lesser Horseshoe Bat. This designated site is hydrologically linked with the Proposed Wind Farm site via the Owenogarney and Broadford rivers. The hydrological flowpath between the Proposed Wind Farm site and this SAC is ~19.32km.
- The Lower River Shannon SAC (Site Code: 002165) is located ~19km (straight line distance) to the southwest. This very large site stretches along the Shannon valley from Killaloe in Co. Clare to Loop Head/ Kerry Head, a distance of some 120 km. The site is

an SAC for the presence of several special and habitats listed on Annex I/II of the Habitats Directive. This designated site is hydrologically linked with the Proposed Wind Farm site via the Owenogarney and Broadford rivers. The hydrological flowpath between the Proposed Wind Farm site and this SAC is ~29.24km.

- The Fergus Estuary and Inner Shannon, North Shore pNHA (Site Code: 002048) is located ~20.6km (straight line distance) southwest of the Proposed Wind Farm site. This designated site is hydrologically linked with the Proposed Wind Farm site via the Owenogarney and Broadford rivers.
- The River Shannon and Fergus Estuary SPA (Site Code: 004077) is located 20.6km (straight line distance) from the Proposed Wind Farm site. This designated site is hydrologically linked with the Proposed Wind Farm site via the Owenogarney and Broadford rivers. The hydrological flowpath between the Proposed Wind Farm site and this SPA is ~31.93km.



With regards to the Proposed Grid Connection Route, the route is mapped to cross the Glenomra Wood SAC and pNHA (Site Code: 001013) in the townland of Leitrim. In addition, the north of the Proposed Grid Connection Route is drained by the Glenomra River and is hydrologically connected with several downstream designated sites including Doon Lough NHA, Danes Hole, Poulnalecka SAC/pNHA and the Castle Lake pNHA. Most of the Proposed Grid Connection Route drains towards the Shannon River. The local watercourses in the vicinity of the Proposed Grid Connection Route provide a hydrological connection with downstream designated sites including the Lower River Shannon SAC.

No designated sites are mapped in the area of the Temporary Transition Compound. This area however is hydrologically connected with the Lower River Shannon SAC.

### 2.6.2 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 designated bathing waters located immediately downstream of the Proposed Project.

The closest designated bathing water is located at Kilrush and is located in the Mouth of the Shannon coastal waterbody.

### 2.6.3 Nutrient Sensitive Areas

NSAs 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 no NSAs located downstream of the Proposed Project within the Shannon Estuary North surface water catchment. Meanwhile, within the Lower Shannon surface water catchment, Lough Derg NSA is located downstream of the Proposed Wind Farm site via the Ardcloony_010 SWB.

### 2.6.4 Shellfish Areas

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

The closest mapped designated shellfish areas to the Proposed Wind Farm and the Proposed Grid Connection Route are the West Shannon Ballylongford and West Shannon Poulnasherry

Bay shellfish areas, respectively. These shellfish areas are located in the Mouth of the Shannon coastal waterbody.



### 2.6.5 Drinking Waters

The 3rd Cycle Shannon Estuary North Catchment Report (EPA, 2024) states that there are a total of 6 no. SWBs in the catchment which are identified as Drinking Water Protected Areas (DWPA). However, only 1 of these is located downstream of the Proposed Project. This designated DWPA is located at Castle Lake and is downstream of the Proposed Wind Farm site via the Glenomra, Broadfield and Owenogarney rivers.

The 3rd Cycle Lower Shannon Catchment Report (EPA, 2024) states that there are a total of 3 no. SWBs in the catchment which are identified as DWPAs. The Shannon (Lower)_060 SWB has been identified as a DWPA and is located downstream of the Proposed Wind Farm site and the Proposed Grid Connection Route.

Meanwhile, the underlying GWBs are also listed as DWPAs but there are no public or private water schemes in the area of the Proposed Project.

# 3. WFD SCREENING



As discussed in **Section 2**, there are a total of 21 no. SWBs which are located in the vicinity and downstream of the Proposed Project site. In addition, 4 no. GWBs underlie the Proposed Project site. Furthermore, there are several protected areas located within the immediate vicinity and downstream of the Proposed Project.

## 3.1 SURFACE WATER BODIES

The SWBs in the immediate vicinity and downstream of the Proposed Project are shown in **Figure A** and described in **Section 2.2** above.

With consideration for the construction, operational and decommissioning phases of the Proposed Project, it is considered that, within the Shannon Estuary North Catchment, that all sections of the Glenomra and Broadford rivers (Broadford_010, _020 and _030 SWBs) are included in the compliance assessment. These SWBs are included due to the occurrence of proposed works, associated with both the Proposed Wind Farm and the Proposed Grid Connection, in the Broadford_010 river sub-basin. The Proposed Project must not in any way result in a deterioration in the status of these SWBS and/or prevent them from meeting the biological and chemical characteristics for good status in the future. Further downstream, Duin Lake SWB is screened in to the WFD impact assessment due to its location directly downstream of the Broadford River. Please note that according WFD mapping, the Owenogarney_030 SWB includes the lower reaches of the Broadford River upstream of Doon Lough, and therefore will also be included in the impact assessment. As outlined in **Table A** the catchment area for the Owenogarney River immediately downstream of Doon Lough increases dramatically. The potential for works associated with the Proposed Wind Farm or the Proposed Grid Connection Route to impact the Owenogarney River is also significantly decreased due to the dilution effect provided by Doon Lough. Therefore, all SWBs downstream of Doon Lough are screened out of the compliance assessment. This lake acts as a hydrological buffer between the Proposed Wind Farm and Proposed Grid Connection Route and downstream watercourses. The Proposed Wind Farm and Proposed Grid Connection have no potential to cause a deterioration in status of these SWBs and/or jeopardise the attainment of good surface water status in the future.

Meanwhile, within the Lower Shannon surface water catchment, the Ardcloony_010 SWB is included in the compliance assessment due to occurrence of proposed works associated with the Proposed Wind Farm within this river sub-basin. Meanwhile, the Bridgetown (Clare)_010, Glenomra Wood Stream_010, Blackwater (Clare)_020 and North Ballycannan_010 SWBs are carried through to the WFD impact assessment due to the occurrence of the Proposed Grid Connection Route within these river sub-basins. The Bridgetown (Clare)_010 SWB is included in the compliance assessment due to the occurrence of the temporary blade transition area along the TDR in this river sub-basin. The Derg HMWB is also screened in due to its close proximity to the Proposed Wind Farm site and the hydrological linkage via the Ardcloony River and its associated tributaries. The Proposed Project must not in any way result in a deterioration in the status of these SWBS and/or prevent them from meeting the biological and chemical characteristics for good status in the future. Further downstream, the Shannon (Lower)_050 and _060 SWBs have been screened out due to the large volumes of water within these SWBs. Furthermore, these SWBs are located downstream of Lough Derg which provides a significant buffering capacity and dilution effect. 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.

Furthermore, the downstream transitional and coastal waterbodies have been screened out due to the large volumes of water within these waterbodies 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.

## 3.2 GROUNDWATER BODIES



With respect to GWBs, the Lough Graney, Tulla-Newmarket on Fergus and Broadford Gravels GWBs are carried through to the WFD Compliance Assessment due to their location directly underlying the Proposed Wind Farm site and the Proposed Grid Connection Route. Furthermore, the Ardnacrusha GWB is screened in due to its location directly underlying the Proposed Grid Connection Route.

The Proposed Project must not in any way prevent these GWBs from achieving "Good" status in the future.

## 3.3 PROTECTED AREAS

### 3.3.1 Designated Sites

The Slieve Bernagh Bog SAC is mapped directly north of the Proposed Wind Farm site. This SAC is located upgradient of all proposed works areas and there is no potential for effects on this designated site. Therefore, the Slieve Bernagh Bog SAC has been screened out of this WFD compliance assessment.

There is no hydrological connection between the Proposed Wind Farm site and Gortacullin Bog NHA with the Glenomra River acting as a hydrological barrier. Furthermore, there is no hydrological connection between the NHA and the Proposed Grid Connection Route and the NHA is distant (~5.3km) from the proposed works areas. Therefore, this NHA will be screened out of the compliance assessment.

Doon Lough NHA includes the lower reaches of the Broadford River, upstream of the lake and will therefore be included in the compliance assessment. All other designated sites downstream of Doon Lough will be screened out due to the increasing volumes of water within these watercourses, the buffering capacity of Doon Lough and the increasing distant location from the Proposed Project.

The Glenomra Wood SAC will be included in the compliance assessment due to the occurrence of the Proposed Grid Connection Route within this SAC.

Furthermore, the Lower River Shannon SAC will be included in the impact assessment as the Proposed Wind Farm site is hydrologically connected with this SAC via the Ardcloony River which discharges into Lough Derg.

### 3.3.1 Bathing Waters

No designated bathing waters are screened into the compliance assessment.

### 3.3.2 Nutrient Sensitive Areas

The Lough Derg NSA will be included in the compliance assessment as the Proposed Wind Farm site is hydrologically connected with this NSA via the Ardcloony River which discharges into Lough Derg.

### 3.3.3 Shellfish Areas

No designated shellfish waters are screened into the compliance assessment.

### 3.3.4 Drinking Waters

The Castle Lake DWPA will not be included in the compliance assessment. This DWPA is located downstream of Doon Lough which provides a significant buffering and dilution effect.

Similarly, the Shannon (Lower)_060 SWB has been identified as a DWPA and is located downstream of the Proposed Wind Farm site, the Proposed Grid Connection Route and the blade transition area along the TDR.



## 3.4 WFD SCREENING SUMMARY

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

**Table D: Screening of WFD Water Bodies and Protected Areas**

| Type | WFD Classification | Waterbody Name/ID | Inclusion in Assessment | Justification |
|---|---|---|---|---|
| Surface Water Body | Shannon Estuary North Surface Water Catchment | | | |
| | River | Broadford_010 | **Yes** | The Proposed Wind Farm site, including 4 no. turbines, a borrow pit, onsite 38kV substation, met mast, access roads, construction compound and storage area, is mapped within the Broadford_010 river sub-basin. Furthermore, the northern section of the Proposed Grid Connection Route, including 3 no. watercourse crossings, is mapped in this river sub-basin. Therefore, an assessment is required to consider the potential effects of the Proposed Project on this SWB. |
| | River | Broadford_020 | **Yes** | The Broadford_020 SWB is located downstream of the Broadford_010 SWB and in close proximity to the Proposed Project. Therefore, an assessment is required to consider the potential impacts of the Proposed Project on this SWB. |
| | River | Broadford_030 | **Yes** | The Broadford_030 SWB is located downstream of the Broadford_020 SWB and in close proximity to the Proposed Project. Therefore, an assessment is required to consider the potential impacts of the Proposed Project on this SWB. |
| | River | Owenogarney_030 | **Yes** | The Owenogarney_030 SWB, includes the lower reaches of the Broadford River. Therefore, an assessment is required to consider the potential impacts of the Proposed Project on this SWB. |
| | Lake | Duin CE | No | The Duin CE lake waterbody is located downstream of the Broadford River. However, this SWB has been screened out due to the large volumes of water within the lake. The Proposed Project has no potential to impact the status of this SWB. |
| | River | Owenogarney_040 | No | The Owenogarney_040 SWB has been screened out due to its distant location from the Proposed Project (>10km) and the increasing volumes of water within the Owenogarney River. Furthermore, this SWB is located downstream of Doon Lough which acts as a hydrological buffer. The Proposed Project has no potential to impact the status of this SWB. |
| | Lake | Castle CE | No | The Castle CE Lake waterbody has been screened out due to its distant location from the Proposed Project (>10.5km) and large volumes of water within the lake. The Proposed Project has no potential to impact the status of this SWB. |
| | River | Owenogarney_050 | No | The Owenogarney_050 SWB has been screened out due to its distant location from the Proposed Project and the increasing volumes of water within the Owenogarney River. The Proposed Project has no potential to impact the status of this SWB. |
| | River | Owenogarney_060 | No | The Owenogarney_060 SWB has been screened out due to its distant location from the Proposed Project and the increasing volumes of water within the Owenogarney River. 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. |

| Type | WFD Classification | Waterbody Name/ID | Inclusion in Assessment | Justification |
|---|---|---|---|---|
| | 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 Estuary. The Proposed Project has no potential to impact the status of this SWB. |
| | Lower Shannon Surface Water Catchment | | | |
| | River | Ardcloony_010 | **Yes** | The Proposed Wind Farm site, including 3 no. turbines, is mapped within the Ardcloony_010 river sub-basin. Therefore, an assessment is required to consider the potential effects of the Proposed Project on this SWB. |
| | River | Bridgetown (Clare)_010 | **Yes** | The Proposed Grid Connection Route and the blade transition area along the TDR are mapped within the Bridgetown (Clare)_010 river sub-basin. Therefore, an assessment is required to consider the potential effects of the Proposed Project on this SWB. |
| | River | Glenomra Wood Stream_010 | **Yes** | The Proposed Grid Connection Route is mapped within the Glenomra Wood Stream_010 river sub-basin. Therefore, an assessment is required to consider the potential effects of the Proposed Project on this SWB. |
| | River | Blackwater (Clare)_020 | **Yes** | The Proposed Grid Connection Route, including 1 no. watercourse crossing, is mapped within the Blackwater (Clare)_020 river sub-basin. Therefore, an assessment is required to consider the potential effects of the Proposed Project on this SWB. |
| | River | North Ballycannan_010 | **Yes** | The Proposed Grid Connection Route is mapped within the North Ballycannan_010 river sub-basin. Therefore, an assessment is required to consider the potential effects of the Proposed Project on this SWB. |
| | Lake | Derg HMWB | **Yes** | The Derg HMWB lake waterbody is located in close proximity to the Proposed Wind Farm site and directly downstream of the Ardcloony_010 SWB. Therefore, an assessment is required to consider the potential effects of the Proposed Project on this SWB. |
| | River | Shannon (Lower)_050 | No | The Shannon (Lower)_050 is located downstream of Lough Derg. This SWB can be screened out due to the large volumes of water within the River Shannon and the buffering capacity of Lough Derg. The Proposed Project has no potential to impact the status of this SWB. |
| | River | Shannon (Lower)_060 | No | The Shannon (Lower)_060 is located downstream of Lough Derg. This SWB can be screened out due to the large volumes of water within the River Shannon and the buffering capacity of Lough Derg. The Proposed Project has no potential to impact the status of this SWB. |
| | Transitional | Limerick Dock | No | The Limerick Dock transitional waterbody has been screened out due to the saline nature of its waters and the large volumes of water within the Dock. The Proposed Project has no potential to impact the status of this SWB. |
| | Coastal | Mouth of the Shannon (HA's 23;27) | No | The Mouth of the Shannon (HA's 23;27) has been screened out due to the saline nature of its waters and the large volumes of water here. 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) has been screened out due to the saline nature of its waters and the large volumes of water here. The Proposed Project has no potential to impact the status of this SWB. |
| Groundwater Bodies | | | | |

| Type | WFD Classification | Waterbody Name/ID | Inclusion in Assessment | Justification |
|---|---|---|---|---|
| Groundwater Body | Groundwater | Lough Graney | **Yes** | The Proposed Wind Farm site, including 3 no. turbines, the Proposed Grid Connection Route and the blade transition area along the TDR are mapped to overlie the Lough Graney GWB. An assessment is required to consider the potential impacts of the Proposed Project on this GWB. |
| | Groundwater | Tulla-Newmarket on Fergus | **Yes** | The Proposed Wind Farm site, including 4 no. turbines, and the northern section of the Proposed Grid Connection Route are mapped to overlie the Tulla-Newmarket on Fergus GWB. An assessment is required to consider the potential impacts of the Proposed Project on this GWB. |
| | Groundwater | Broadford Gravels | **Yes** | The Proposed Grid Connection Route is mapped to overlie the Broadford Gravels GWB in the Glenomra River valley. An assessment is required to consider the potential impacts of the Proposed Project on this GWB. |
| | Groundwater | Ardnacrusha | **Yes** | The south of the Proposed Grid Connection is mapped to overlie the Ardnacrusha GWB. An assessment is required to consider the potential impacts of the Proposed Project on this GWB. |
| Protected Areas | | | | |
| Protected Areas | Nature Designations | Slieve Bernagh Bog SAC | No | The Slieve Bernagh Bog SAC is mapped immediate to the north of the Proposed Wind Farm site. However, all works are located downgradient of this SAC. The Proposed Project has no potential to impact the status of this SAC. |
| | | Glenomra Wood pNHA and SAC | **Yes** | Glenomra Wood pNHA and SAC has been screened in due to the occurrence of works along the Proposed Grid Connection Route within this designated site. An assessment is required to consider the potential impacts of the Proposed Project on this pNHA/SAC. |
| | | Lower River Shannon SAC | **Yes** | The Lower River Shannon SAC is downstream of the Proposed Project and includes Lough Derg. As stated previously, Lough Derg is located in close proximity to the Proposed Project and is hydrologically linked with the Proposed Wind Farm site, via the Ardcloony River and its tributaries. An assessment is required to consider potential impacts of the Proposed Project on this SAC. |
| | | Doon Lough NHA | **Yes** | The Doon Lough NHA is downstream of the Proposed Project and includes the lower reaches of the Broadford River. An assessment is required to consider potential impacts of the Proposed Project on this NHA. |
| | | Castle Lake pNHA | No | The Castle Lake pNHA has been screened out due to its distant location from the Proposed Project (>10.5km) and large volumes of water within the lake. The Proposed Project has no potential to impact this pNHA. |
| | | Ratty River Cave SAC | No | The Ratty River Cave SAC has been screened out due to its distant location from the Proposed Project and the large volumes of water within the Owenogarney River. The Proposed Project has no potential to impact this SAC. |
| | | Fergus Estuary and Inner Shannon, North Shore pNHA | No | This pNHA has been screened out due to its distant location from the Proposed Project, and large volumes of water within the estuary and the saline nature of these waters. The Proposed Project has no potential to impact this pNHA. |
| | | River Shannon and River Fergus SPA | No | This SPA has been screened out due to its distant location from the Proposed Project, and large volumes of water within the estuary and the saline nature of these waters. The Proposed Project has no potential to impact this SPA. |

| Type | WFD Classification | Waterbody Name/ID | Inclusion in Assessment | Justification |
|---|---|---|---|---|
| | Nutrient Sensitive Areas | Derg NSA | **Yes** | The Lough Derg NSA has been screened in to the assessment due to its location downstream of the Proposed Wind Farm site via the Ardcloony River. An assessment is required to consider potential impacts of the Proposed Project on this NSA. |
| | Drinking Waters | Castle CE | No | The Castle CE DWPA has been screened out due to its distant location from the Proposed Project. The Proposed Project has no potential to cause a deterioration in the status of this DWPA. |
| | | Shannon (Lower)_060 | No | The Shannon (Lower)_060 DWPA has been screened out due to its distant location from the Proposed Project and the buffering provided by Lough Derg upstream of this SWB. The Proposed Project has no potential to cause a deterioration in the status of this DWPA. |

# 4. WFD COMPLIANCE ASSESSMENT



## 4.1 PROPOSALS

The Proposed Project is detailed in full in Chapter 4 of the EIAR.

In summary the Proposed Project includes 7 no. proposed wind turbines, a proposed onsite 38kV substation, a battery storage compound, a temporary construction compound, a permanent meteorological mast, borrow pit, new site access roads, upgrades to existing site access roads, an underground 38kV grid connection to the existing Ardnacrusha 110kV substation and a blade transition area along the TDR.

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

The primary risk to surface waters will be entrained suspended sediments (peat and soil particles) in site runoff during earthworks and tree felling along with release cement-based compounds and/or hydrocarbons. The Proposed Project may also result in changes to surface water runoff volumes and flow patterns. The Proposed Project also includes works over and in close proximity to watercourses.

## 4.2 POTENTIAL EFFECTS

### 4.2.1 Construction Phase (Unmitigated)

#### 4.2.1.1 Potential Surface Water Quality Effects from Works within Proposed Wind Farm Site

Construction phase activities including tree felling, site levelling/construction and building turbine foundation excavation and the borrow pit 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/peat, borrow pit drainage 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.

Within the Proposed Wind Farm site, there are a total of 3 no. crossings over EPA mapped watercourses. Two of these crossings are new proposed crossings whilst one crossing is located along an existing track which will be upgraded as part of the Proposed Project. In addition, there are 2 no. new crossings proposed over streams which do not form part of the EPA database. The upgrade of existing crossings and the construction of new watercourse crossings has the potential to significantly interfere with water quality and flows during the construction phase.

Clear felling of coniferous forestry plantations is also proposed over 13.8ha. Potential surface water quality effects from felling include the release of elevated concentrations of suspended solids and nutrient release which has the potential to effect downstream surface water quality.



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 SWBs likely to be impacted by these activities include the Broadford_010, _020 and _030 SWBs and the Ardcloony_010 SWB. We note that the Owenogarney_030, Duin and Derg HMWB are less susceptible to potential effects due to the large volumes of waters within these waterbodies.

A summary of potential status change to SWBs arising from works within the Proposed Wind Farm site during the construction phase of the Proposed Project in the unmitigated scenario are outlined in **Table E**.

**Table E: Surface Water Quality Effects Downstream of Proposed Wind Farm Site during Construction Phase (Unmitigated)**

| SWB | WFD Code | Current Status | Assessed Potential Status Change |
|---|---|---|---|
| Broadford_010 | IE_SH_27B020300 | Moderate | Poor |
| Broadford_020 | IE_SH_27B020600 | Good | Moderate |
| Broadford_030 | IE_SH_27B020800 | Moderate | Poor |
| Owenogarney_030 | IE_SH_27O010600 | Good | Good |
| Duin CE | IE_SH_27_121 | Moderate | Moderate |
| Ardcloony_010 | IE_SH_25A030100 | Good | Moderate |
| Derg HMWB | IE_SH_25_191b | Good | Good |

#### *4.2.1.1.1 Potential Surface Water Quality Effects along TDR*

Minor earthworks are required for turbine delivery works and for the construction of the temporary compound and blade set down area along the haul route. However, due to the minor nature of the works, and the short-construction period, there is limited potential for the works to change the status of the entire SWB.

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

**Table F: Surface Water Quality Effects along the TDR During Construction Phase (Unmitigated)**

| SWB | WFD Code | Current Status | Assessed Potential Status Change |
|---|---|---|---|
| Bridgetown (Clare)_010 | IE_SH_25B230100 | Good | Good |

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

Based on the WFD mapping, there will be a requirement for 5 no. watercourse crossings over EPA mapped waterbodies along the Proposed Grid Connection Route (including 1 no. crossing within the Proposed Wind Farm site along an existing local road proposed for upgrade). These are located over existing bridge and culvert along the local road network. 5 no. crossings (1 no. of which is located within the Proposed Wind Farm site) are mapped in the Broadford_010 river sub-basin with an additional crossing in the Blackwater (Clare)_020 river sub-basin. In addition, there are a total of 8 no. culvert crossings over watercourses and drains which are not part of the EPA database.

Due to the close proximity of local waterbodies to 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. The 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 G**.

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

| SWB | WFD Code | Current Status | Assessed Potential Status Change |
|---|---|---|---|
| Broadford_010 | IE_SH_27B020300 | Moderate | Moderate |
| Broadford_020 | IE_SH_27B020600 | Good | Good |
| Bridgetown (Clare)_010 | IE_SH_25B230100 | Good | Good |
| Glenomra Wood Stream_010 | IE_SH_25G120100 | High | High |
| Blackwater (Clare)_020 | IE_SH_25B060250 | Moderate | Moderate |
| North Ballycannan_010 | IE_SH_25N170970 | Good | Good |

#### 4.2.1.3 Potential Groundwater Quality/Quantity Effects at the Proposed Wind Farm Site

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.

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 (borrow pit, turbine base etc) may drawdown the local groundwater table.



However, due to the low permeability of the bedrock aquifer and the shallow nature of the proposed works, there is limited potential for the Proposed Project to change the overall status of the underlying GWBs.

A summary of potential status change to GWBs arising from works at the Proposed Wind Farm site during the construction phase of the Proposed Project in the unmitigated scenario are outlined in **Table H**.

**Table H: Groundwater Quality Impacts at Proposed Wind Farm Site during Construction Phase (Unmitigated)**

| GWB | WFD Code | Current Status | Assessed Potential Status Change |
|---|---|---|---|
| Lough Graney | IE_SH_G_157 | Good | Good |
| Tulla-Newmarket on Fergus | IE_SH_G_229 | Good | Good |

#### *4.2.1.3.1 Potential Groundwater Effects along TDR*

Due to the small scale, shallow and short-term nature of the proposed works associated with the temporary blade transition area, relative to the size of the Lough Graney GWB (~466km$^2$) there is no potential for any effects on the status of this GWB.

A summary of potential status change to GWBs arising from works along the TDR during the construction phase of the Proposed Project in the unmitigated scenario are outlined in **Table I.**

**Table I: Groundwater Quality Effects along TDR during Construction Phase (Unmitigated)**

| GWB | WFD Code | Current Status | Assessed Potential Status Change |
|---|---|---|---|
| Lough Graney | IE_SH_G_157 | Good | Good |

### 4.2.1.4 Potential Groundwater Quality/Quantity Effects along the Proposed Grid Connection Route

The accidental spillage of hydrocarbons, the release of effluent from wastewater treatment systems and the release of cement-based products has the potential to negatively impact on groundwater water quality along the Proposed Grid Connection Route. Some minor groundwater/surface water seepages will likely occur in trench excavations which will impact local groundwater quantity.

These sources of contamination have the potential to impact on groundwater quality in the underlying groundwater body. However, due to the shallow, short-term and transient nature of the Proposed Grid Connection Route works, there is no potential for any effects during earthworks and excavation works on the overall status of the underlying GWBs.

A summary of potential status change to GWBs 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 J**.

**Table J: Groundwater Quality Effects along the Proposed Grid Connection Route during Construction Phase (Unmitigated)**

| GWB | WFD Code | Current Status | Assessed Potential Status Change |
|---|---|---|---|
| Tulla-Newmarket on Fergus | IE_SH_G_229 | Good | Good |
| Broadford Gravels | IE_SH_G_095 | Good | Good |
| Lough Graney | IE_SH_G_157 | Good | Good |
| Ardnacrusha | IE_SH_25170970 | Good | Good |

#### 4.2.1.5 Potential Effects on Protected Areas

The surface 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 connected to the Proposed Project include:

Doon Lough NHA:
Doon Lough NHA is hydrologically connected to the Proposed Wind Farm site and the Proposed Grid Connection Route via the Glenomra/Broadford River and its tributaries. The potential for the Proposed Project to affect this NHA is limited due to the large volumes of water within the lake.

Glenomra Wood SAC/pNHA:
Works along the Proposed Grid Connection Route are located within this pNHA/SAC. Any surface water quality/quantity effects have the potential to effect the status of this designated site.

Lower River Shannon SAC:
This designated site is hydrologically connected with the Proposed Wind Farm site and the Proposed Grid Connection Route in the Lower Shannon surface water catchment. Due to the large volumes of water within Lough Derg, there is limited potential for effects to occur.

Derg NSA:
This NSA is hydrologically connected with the Proposed Wind Farm site and the Proposed Grid Connection Route in the Lower Shannon surface water catchment. Due to the large volumes of water within Lough Derg, there is limited potential for effects to occur.

### 4.2.2 Operational Phase (Unmitigated)

#### 4.2.2.1 Surface Water Quantity Effects Downstream of the Proposed Wind Farm 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 areas and increase flood risk downstream of the Proposed Wind Farm.

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.



However, due to the small permanent footprint of the Proposed Project (~8.4ha) in comparison to the overall EIAR site boundary (291ha) and the respective catchments of the downstream SWBs (as detailed in **Table A**), the potential for effects is limited.

A summary of potential status change to SWBs arising from increased runoff during the operation phase of the Proposed Project in the unmitigated scenario are outlined in **Table K**.

**Table K: Potential Effect on Surface Water Quantity (Proposed Wind Farm) during Operational Phase (Unmitigated)**

| SWB | WFD Code | Current Status | Assessed Potential Status Change |
|---|---|---|---|
| Broadford_010 | IE_SH_27B020300 | Moderate | Moderate |
| Broadford_020 | IE_SH_27B020600 | Good | Good |
| Broadford_030 | IE_SH_27B020800 | Moderate | Moderate |
| Owenogarney_030 | IE_SH_27O010600 | Good | Good |
| Duin CE | IE_SH_27_121 | Moderate | Moderate |
| Ardcloony_010 | IE_SH_25A030100 | Good | Good |
| Derg HMWB | IE_SH_25_191b | Good | Good |

#### 4.2.2.2 Surface Water Quality Effects Downstream of Proposed Wind Farm Site

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 phase of the Proposed Project in the unmitigated scenario are outlined in **Table L**.

**Table L: Surface Water Quality Impacts (Proposed Wind Farm site) during Operational Phase (Unmitigated)**

| SWB | WFD Code | Current Status | Assessed Potential Status Change |
|---|---|---|---|
| Broadford_010 | IE_SH_27B020300 | Moderate | Moderate |
| Broadford_020 | IE_SH_27B020600 | Good | Good |
| Broadford_030 | IE_SH_27B020800 | Moderate | Moderate |
| Owenogarney_030 | IE_SH_27O010600 | Good | Good |
| Duin CE | IE_SH_27_121 | Moderate | Moderate |
| Ardcloony_010 | IE_SH_25A030100 | Good | Good |
| Derg HMWB | IE_SH_25_191b | Good | Good |

#### 4.2.2.3 Potential Effects on Protected Areas

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 designated sites is greatly reduced.

### 4.2.3 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.

### 4.2.4 Construction Phase

#### 4.2.4.1 Mitigation Measures to Protect Surface Water Quality

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

During the construction phase of the Development, excavations will be limited to minimise the generation of spoil. Sediment will be generated where excavations are required (turbine foundations) and dirty water from these work areas will be routed via drains to settlement ponds for treatment and removal of suspended solids prior to release into the existing drainage network. There will be no direct or untreated discharge from construction work areas into the existing drainage network.

Finally, regular inspection and maintenance for the on-site drainage system will be completed during the construction phase. This will be a particular importance following periods of heavy rainfall to check for blockages in any drains and any excess build-up of silt within settlement ponds which will decrease the effectiveness of the drainage system unless removed.

**Table M: Summary of Drainage Mitigation and 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;<br>• Using small working areas; and,<br>• 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;<br>• Covering stockpiles;<br>• Weathering off / sealing stockpiles and promoting vegetation growth. | Stockpiles areas |
| In-Line Controls: | • Interceptor drains, vee-drains, oversized swales/collector drains;<br>• Erosion and velocity control measures such as:<br>o sand bags;<br>o oyster bags filled with gravel;<br>o filter fabrics;<br>o straw bales;<br>o flow limiters;<br>o weirs or baffles;<br>o and/or other similar/equivalent or appropriate systems.<br>• Silt fences, filter fabrics;<br>• Collection sumps, temporary sumps, pumping systems;<br>• Attenuation lagoons;<br>• Sediment traps, stilling / settlement ponds. | Interceptor and collection drainage systems |
| Water Treatment Controls: | • Temporary sumps;<br>• Attenuation ponds;<br>• Temporary storage lagoons;<br>• Sediment traps, Stilling / Settlement ponds, silt bags;<br>• Proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems. | Surface water treatment locations |
| Outfall Controls: | • Levelspreaders;<br>• Buffered outfalls;<br>• Vegetation filters;<br>• Silt bags;<br>• Flow limiters and weirs. | Drainage run outfalls and overland discharge points |

Each element of the Proposed Project (*i.e.*, access roads, turbines, borrow pit, etc) 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).

### 4.2.4.2 Mitigation Measures to Protect Against Release of Hydrocarbons

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

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

#### 4.2.4.3 Mitigation Measures to Prevent Release of Wastewater

The best practice methods for wastewater management at the proposed on-site construction compound during the construction phase include:

- During the construction phase, a self-contained port-a-loo with an integrated waste holding tank will be used at each of the site construction compounds, maintained by the providing contractor, and removed from site on completion of the construction works;
- Water supply for the site office and other sanitation will be brought to site and removed after use from the site to be discharged at a suitable off-site treatment location; and,
- No water or wastewater will be sourced on the site, nor discharged at the Proposed Wind Farm site.

#### 4.2.4.4 Mitigation Measures to Prevent Release of Cement-Based Products

Best practice methods for cement-based compounds includes:

- 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.



#### 4.2.4.5 Mitigation Measures for Clear-Felling

All felling operations will conform to current best practice Forest Service regulations, policies and strategic guidance documents as well as Coillte and the Department of Agriculture, Food and the Marine (DAFM) guidance documents, to ensure that felling, planting and other forestry operations result in minimal potential negative effects to the receiving environment.

There is a requirement in the Forest Service Code of Practice and in the FSC Certification Standard for the installation of buffer zones adjacent to aquatic zones at planting stage. Minimum buffer zone widths recommended in the Forest Service (2000) guidance document "Forestry and Water Quality Guidelines" will be adhered to during felling operations. The setback distance from sensitive hydrological features means that adequate room is maintained for the proposed mitigation measures (discussed below) to be properly installed and operate effectively.

Mitigation measures, which will reduce the risk of entrainment of suspended solids and nutrient release in surface watercourses, which comprise best practice methods are set out as follows:

- Machine combinations will be chosen which are most suitable for ground conditions at the time of felling, and which will minimise soils disturbance. The harvester and the forwarder are designed specifically for the forest environment and are low ground pressure machines;
- All machinery will be operated by suitably qualified personnel;
- Checking and maintenance of roads and culverts will be on-going through any felling operations. No tracking of vehicle through watercourses will occur, as vehicles will use road infrastructure and existing watercourse crossing points. Where possible, existing drains will not be disturbed during felling works;
- These machines will traverse the site along specified off-road routes (referred to as racks);
- The location of racks will be chosen to avoid wet and potentially sensitive areas;
- Brash mats will be placed on the racks to support the vehicles on soft ground, reducing peat and mineral soil disturbance and erosion and avoiding the formation of rutted areas, in which surface water ponding can occur. Brash mat renewal should take place when they become heavily used and worn. Provision should be made for brash mats along all off-road routes, to protect the soil from compaction and rutting. Where there is risk of severe erosion occurring, extraction will be suspended during periods of high rainfall;
- Silt fences will be installed at the outfalls of existing drains downstream of felling areas. No direct discharge of such drains to watercourses will occur. Sediment traps and silt fences will be installed in advance of any felling works and will provide surface water settlement for runoff from work areas and will prevent sediment from entering downstream watercourses. Accumulated sediment will be carefully disposed of at pre-selected peat disposal areas. Where possible, all new silt traps will be constructed on even ground and not on sloping ground;
- In areas particularly sensitive to erosion it will be necessary to install double or triple sediment traps and increase buffer zone width. These measures will be reviewed on site during construction;
- Double silt fencing will also be put down slope of felling areas which are located in close proximity to streams and/or relevant watercourses;
- Drains and silt traps will be maintained throughout all felling works, ensuring that they are clear of sediment build-up and are not severely eroded;

- Timber will be stacked in dry areas, and outside watercourse buffer zones. Straw bales and check dams to be emplaced on the down gradient side of timber storage/processing sites;
- Works will be carried out during periods of no, or low rainfall, in order to minimise entrainment of exposed sediment in surface water runoff;
- Refuelling or maintenance of machinery will not occur within 50m of an aquatic zone or within 20m of any other hydrological feature. Mobile bowser, drip kits, qualified personnel will be used where refuelling is required; and,
- Branches, logs or debris will not be allowed to build up in aquatic zones. All such material will be removed when harvesting operations have been completed, but care will be taken to avoid removing natural debris deflectors.



In addition, felling works will only be completed during periods of low rainfall and all drains will be inspected and maintained before, during and after the proposed felling works.

#### 4.2.4.6 Mitigation Measures to Protect Water Quality During Excavation Dewatering

Management of groundwater seepages 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;
- If required, pumping of excavation inflows will prevent build-up of water in the excavation;
- The interceptor drainage will be discharged to the site constructed drainage system or onto natural vegetated surfaces and not directly to surface waters;
- The pumped water volumes will be discharged via volume and sediment attenuation ponds 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 excavations by a suitably qualified person will occur during the construction phase. If high levels of seepage inflow occur, excavation work should immediately be stopped and a geotechnical assessment undertaken; and,
- A mobile 'Siltbuster' or similar equivalent specialist treatment system will be available on-site for emergencies in order to treat sediment polluted waters from settlement ponds or excavations should they occur. 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 a final line of defence if needed.

#### 4.2.4.7 Mitigation Measures to Prevent Morphological Changes to Surface Watercourses within Wind Farm Site

The Proposed Project design has been optimised to utilise the existing infrastructure (roads and hardstands) where practicable. This design prevents the unnecessary disturbance of the existing site drainage network prevents the requirement for widespread instream works.
The Proposed Project design has been optimised to utilise the existing infrastructure (i.e. existing site roads) where practicable. Only 4 no. new crossings are proposed. The use of existing crossings where possible prevents the unnecessary disturbance of the existing site drainage network prevents the requirement for widespread instream works across the Proposed Wind Farm site.

Mitigation measures for the proposed new crossings with the Proposed Wind Farm site are detailed below:

- The proposed new stream crossings and upgrade of an existing crossing will be clear span or box culvert crossings and the existing banks will remain undisturbed. No in-stream excavation works are proposed at this location and therefore there will be no direct impact on the stream at the proposed crossing location;
- All guidance / mitigation measures required by the OPW and/or the Inland Fisheries Ireland (IFI) 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;
- Access to the opposite site of the watercourse for excavation and foundation installation will require the installation of a temporary pre-cast concrete or metal bridge;
- Once the foundations have been completed at both sides of the watercourse, the pre-cast concrete box culvert will be installed using a crane and there will be no contact with the watercourse;
- Where the box culvert is installed in sections, the joint will be sealed to prevent granular material entering the watercourse;
- 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. There will be no batching or storage of concrete allowed in the vicinity of the crossing construction areas; and,
- All new river/stream crossings will require a Section 50 application (Arterial Drainage Act, 1945). The river/stream crossings will be designed in accordance with OPW guidelines/requirements on applying for a Section 50 consent.

The watercourse crossings will be constructed to the specifications of the OPW bridge design guidelines 'Construction, Replacement or Alteration of Bridges and Culverts - A Guide to Applying for Consent under Section 50 of the Arterial Drainage Act, 1945', and in consultation with Inland Fisheries Ireland (IFI). Abutments will be constructed from precast units combined with in-situ foundations, placed within an acceptable backfill material.

Confirmatory inspections of the proposed new watercourse crossing location will be carried out by the Project Civil/Structural Engineer and the Project Hydrologist prior to the construction of the crossing.

#### 4.2.4.8 Mitigation Measures for Morphological Changes to Watercourses along the Proposed Grid Connection Route

Prior to the commencement of cable trenching or crossing works the following key temporary drainage measures will be installed:

- All existing roadside drains 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 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 grid connection crossing works:
- No stockpiling 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.



Sections 9.5.2.13 and Section 9.5.2.14 details specific mitigation measures to be implemented at some of the bridge crossings relating to directional drilling and bridge strapping.

#### 4.2.4.9 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 Project, the potential to impact upon the qualifying interests of designated sites is not significant.

### 4.2.5 Operational Phase

#### 4.2.5.1 Increased Site Runoff and Hydromorphology Effects

The operational phase drainage system of the Proposed Project 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 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 substation 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;
- Settlement ponds, emplaced downstream of track swale sections, turbine locations and the selected substation option, 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;
- 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 Proposed Grid Connection Route will not result in any likely hydrological or water quality effects and therefore do not require mitigation measures.



#### 4.2.5.2 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 outlines in **Section 4.2.4.1** above.

Mitigation measures for oils and fuels during the operational phase of the Proposed Project are the same as those outlines in **Section 4.2.4.2** above.

#### 4.2.5.3 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.

#### 4.2.5.4 Mitigation for Protected Areas

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 4.2.4.1** above.

Mitigation measures for oils and fuels during the operational phase of the Proposed Project are the same as those outlined in **Section 4.2.4.2** above.

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

### 4.2.6 Decommissioning Phase

The potential impacts associated with decommissioning of the Proposed Project 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.

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.

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

Other impacts such as possible soil compaction and contamination by fuel leaks will remain but will be of reduced magnitude than the construction phase because of the smaller scale of the works and reduced volumes on-site. Similar mitigation as outlined in **Sections 4.2.4.1** and **4.2.4.2** for the construction phase will be implemented during the decommissioning phase to ensure no impacts of receiving waters.

Some of the potential impacts of water bodies will be avoided by leaving elements of the Proposed Project in place where appropriate. The onsite 38kV substation will be retained by ESB Networks and/or EirGrid as a permanent part of the national grid. The turbine bases will be rehabilitated by covering with local topsoil/peat in order to regenerate vegetation which will reduce runoff and sedimentation effects. Mitigation measures to avoid contamination by

accidental fuel leakage and compaction of soil by on-site plant will be implemented as per the construction phase mitigation measures.

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



### 4.2.7 Potential Effects with the Implementation of Mitigation

In all instances, the mitigation measures described in **Section 4.2.10** are sufficient to meet the WFD Objectives. The assessment of WFD elements for the WFD waterbodies is summarised in **Table N** below.

**Table N: Summary of WFD Status for Unmitigated and Mitigated Scenarios**

| SWB | WFD Code | Current Status | Assessed Status - Unmitigated | Assessed Status with Mitigation Measures |
|---|---|---|---|---|
| Shannon Estuary North Surface Water Catchment | | | | |
| Broadford_010 | IE_SH_27B020300 | Moderate | Poor | Moderate |
| Broadford_020 | IE_SH_27B020600 | Good | Moderate | Good |
| Broadford_030 | IE_SH_27B020800 | Moderate | Poor | Moderate |
| Owenogarney_030 | IE_SH_27O010600 | Good | Good | Good |
| Duin CE | IE_SH_27_121 | Moderate | Moderate | Moderate |
| Lower Shannon Surface Water Catchment | | | | |
| Ardcloony_010 | IE_SH_25A030100 | Good | Moderate | Good |
| Derg HMWB | IE_SH_25_191b | Good | Good | Good |
| Bridgetown (Clare)_010 | IE_SH_25B230100 | Good | Good | Good |
| Glenomra Wood Stream_010 | IE_SH_25G120100 | High | High | High |
| Blackwater (Clare)_020 | IE_SH_25B060250 | Moderate | Moderate | Moderate |
| North Ballycannan_010 | IE_SH_25N170970 | Good | Good | Good |
| Groundwater Bodies | | | | |
| Lough Graney | IE_SH_G_157 | Good | Good | Good |
| Tulla-Newmarket on Fergus | IE_SH_G_229 | Good | Good | Good |

| SWB | WFD Code | Current Status | Assessed Status - Unmitigated | Assessed Status with Mitigation Measures |
|---|---|---|---|---|
| Broadford Gravels | IE_SH_G_095 | Good | Good | Good |
| Ardnacrusha | IE_SH_25170970 | Good | Good | Good |

# 5. SUMMARY



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

The Proposed Project 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 Project.

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

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

There will be no change in GWB or SWB status in the underlying GWB or downstream SWBs resulting from the Proposed Project. 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 construction, operation and subsequent decommissioning of the Proposed Project:

- 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) (Note that a full list of legislation complied with in relation to hydrology and hydrogeology is included in Section 9.1.4 of EIAR Chapter 9).

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