APPENDIX 9-3

WATER FRAMEWORK DIRECTIVE COMPLIANCE ASSESSMNET

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WATER FRAMEWORK DIRECTIVE ASSESSMENT
GANNOW RENEWABLE ENERGY DEVELOPMENT, CO. GALWAY

FINAL REPORT

Prepared for:

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HYDRO-ENVIRONMENTAL SERVICES

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1. INTRODUCTION

1.1 BACKGROUND

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

The purpose of this WFD Compliance 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 Compliance Assessment is intended to supplement the EIAR submitted as part of the planning application. As detailed in Section 1.1.1 of EIAR Chapter 1, the following references are used throughout the EIAR and this document: the "Proposed Project", the "Proposed Wind Farm", "proposed turbines", "Proposed Grid Connection", "Site", and "Proposed Wind Farm site".

1.2 STATEMENT OF AUTHORITY

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

This WFD Compliance Assessment was prepared by Michael Gill, Conor McGettigan and Nitesh Dalal.

Michael Gill (P. Geo., B.A.I., MSc, Dip. Geol., MIEI) is an Environmental Engineer with over 22 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 5 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 completes WFD Compliance Assessments for a wide variety of projects including wind farms, quarries and proposed residential developments.

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

1.3 WATER FRAMEWORK DIRECTIVE

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

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

The WFD is implemented through the River Basin Management Plans (RBMP) which comprises a six-yearly cycle of planning, action and review. RBMPs include identifying river basin districts, water bodies, protected areas and any pressures or risks, monitoring and setting environmental objectives. In Ireland the first RBMP covered the period from 2010 to 2015 with the second cycle plan covering the period from 2018 to 2021, and the third cycle covers the period from 2022 to 2027[1]. The RBMPs are forward looking.

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

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

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

[1] *The WFD RBMP cycles are forward looking plans, so 2009-2015 (1st Cycle), 2016-2021 (2nd Cycle), and 2022-2027 (3rd Cycle) are the plans and they use status from the previous 6 years.*
The EPA updates status every three years, but they also complete an additional assessment mid-RBMP cycle. The mid-cycle status does not get reported to the Commission.
The linkage between the two is that the 2nd Cycle plan uses the 2009-2015 status, the 3rd Cycle plan uses the 2016-2021 status. The 2013-2018 status was not used in the RBMP and the 2019-2024 status will not be used in the next RBMP.

2. WATERBODY IDENTIFICATION AND 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

Regionally, the Site is located in the Galway Bay Southeast WFD regional surface water catchment within Hydrometric Area No. 29 of the Western River Basin District.

Proposed Wind Farm site

The vast majority of the Proposed Wind Farm site is mapped within the Raford River sub-catchment (Raford_SC_010). A very small area in the west of the Proposed Wind Farm site is located in the Clarinbridge River sub-catchment (Clarinbridge_SC_010).

Within the Raford River sub-catchment, the Proposed Wind Farm site is mapped in 2 no. WFD river sub-basins: the Raford_020 WFD river sub-basin in the west and the Raford_030 WFD river sub-basin in the east. Within the Raford_020 WFD river sub-basin the Proposed Wind Farm site is dissected by the Raford River. The Raford River flows to the west ~250m south of T7 and to the southeast ~90m south of T8. The Raford River then continues to the southeast before it veers to the west to the north of the R348. Within the Raford_030 WFD river sub-basin, the Proposed Wind Farm site is dissected by the Killimor River (referred to by the EPA as the Attimonbeg Stream). The Killimor River flows to the south ~230m west of T3 and ~40m east of T2. The Killimor River, which forms part of the Raford_020 SWB, continues to flow to the south and discharges into the Raford River near Kiltullagh. The Raford River (Raford_030 SWB) then continues to flow to the southwest and discharges into the Kilcolgan River near Craughwell (Kilcolgan_040 SWB). The Kilcolgan River is also known locally as the Dunkellin River. The Kilcolgan River continues to the west, passing through Rahasane Turlough, before the Kilcolgan_050 SWB discharges into the Dunbulcaun Bay transitional SWB. Within the Proposed Wind Farm site, the onsite 38kV substation is mapped in the Raford River sub-catchment (Raford_SC_010).

Within the Clarinbridge River sub-catchment, the Proposed Wind Farm site is located in the Clarinbridge_010 WFD river sub-basin. The Clarinbridge River (Clarinbridge_010 SWB) flows to the south ~1km to the west of the Proposed Wind Farm site. This river flows to the south-east of Athenry Town and continues to the southwest before the Clarinbridge_050 SWB discharges into the Dunbulcaun Bay transitional SWB.

Table A presents the catchment area of each waterbody downstream of the Proposed Wind Farm site as far as Dunbulcaun Bay. The catchment area for the waterbodies increases progressively downstream as more tributaries discharge into the Raford and Kilcolgan rivers. Downstream of Craughwell there is a high density of karst features, including Rahasane Turlough (which is designated as an SAC/pNHA and SPA – refer to Section 2.7), and surface and groundwaters are closely interlinked in this area. Therefore, the upstream catchment areas detailed in **Table A** are estimates of the surface water catchment area and do not account for any karstic groundwater flows which may cross surface water catchment divides. Those 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 (both surface water and groundwater flows).

Table A: Surface Water Catchment Area of Waterbodies Downstream of the Proposed Wind Farm site

WFD River Sub-Basin	Total Catchment Area (km^2)
Raford_SC_10 sub-catchment	
Raford_020	~74
Raford_030	~120
Kilcolgan_030	~240
Kilcolgan_040	~305
Kilcolgan_050	~329
Clarinbridge_SC_010 sub-catchment	
Clarinbridge_010	~12
Clarinbridge_020	~34

Proposed Grid Connection

The Proposed Grid Connection underground cabling route is mapped within 3 no. WFD river sub-catchments. In the vicinity of the Proposed Wind Farm, ~100m of the Proposed Grid Connection underground cabling route is mapped in the Raford River sub-catchment (Raford_SC_010). Much of the eastern section of the Proposed Grid Connection underground cabling route is mapped in the Clarinbridge River sub-catchment (Clarinbridge_SC_010) whilst the western section is mapped in the Carrowmoneash River sub-catchment (Carrowmoneash [Oranmore]_SC_010).

Within the Clarinbridge River sub-catchment, the Proposed Grid Connection underground cabling route is mapped within the Clarinbridge_010 and the Clarinbridge_020 WFD river sub-basins. ~5.8km of the Proposed Grid Connection underground cabling route is mapped within the Clarinbridge_010 WFD river sub-basin. There are a total of 3 no. watercourse crossings od EPA mapped watercourses within this WFD river sub-basin. ~3.7km of the Proposed Grid Connection underground cabling route is mapped within the Clarinbridge_020 WFD river sub-basin. 1 no. watercourse crossing over an EPA mapped watercourse is proposed in this river sub-basin. All of these watercourse crossings are at existing bridge and culvert locations.

Further to the west, within the Carrowmoneash River sub-catchment, ~11.7km of the Proposed Grid Connection underground cabling route is mapped within Carrowmoneash (Oranmore)_010 WFD river sub-basin. This area is devoid of rivers and streams and there are no surface water features in the vicinity of the Proposed Grid Connection underground cabling route. The nearest mapped SWB is located ~4.9km to the southwest.

We note that the closest SWB to Cashla substation is ~2.8km to the northwest. This SWB is located in the Corrib catchment within Hydrometric Area 30 and forms part of the Clare (Galway)_090 SWB. The Clare (Galway)_100 SWB discharges into Lough Corrib lake waterbody. Whilst there is no hydrological connection between the Proposed Grid Connection and these SWBs, the western section of the Proposed Grid Connection is underlain by a karst aquifer which has the potential to provide hydrogeological pathways across surface water catchments. For the purposes of a conservative assessment, these SWBs are addressed and referenced in this report.

The total upstream catchment area for the waterbodies along the Proposed Grid Connection is detailed in **Table B**.

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

Table B: Surface Water Catchment Area of Waterbodies along the Proposed Grid Connection

WFD River Sub-Basin	Total Upstream Catchment Area (km²)
Raford_SC_010 Sub-catchment	
Raford_030	~120
Clarinbridge_SC_010 Sub-catchment	
Clarinbridge_010	~12
Clarinbridge_020	~34
Carrowmoneash [Oranmore]_010 Sub-catchment	
Carrowmoneash [Oranmore]_010	~99

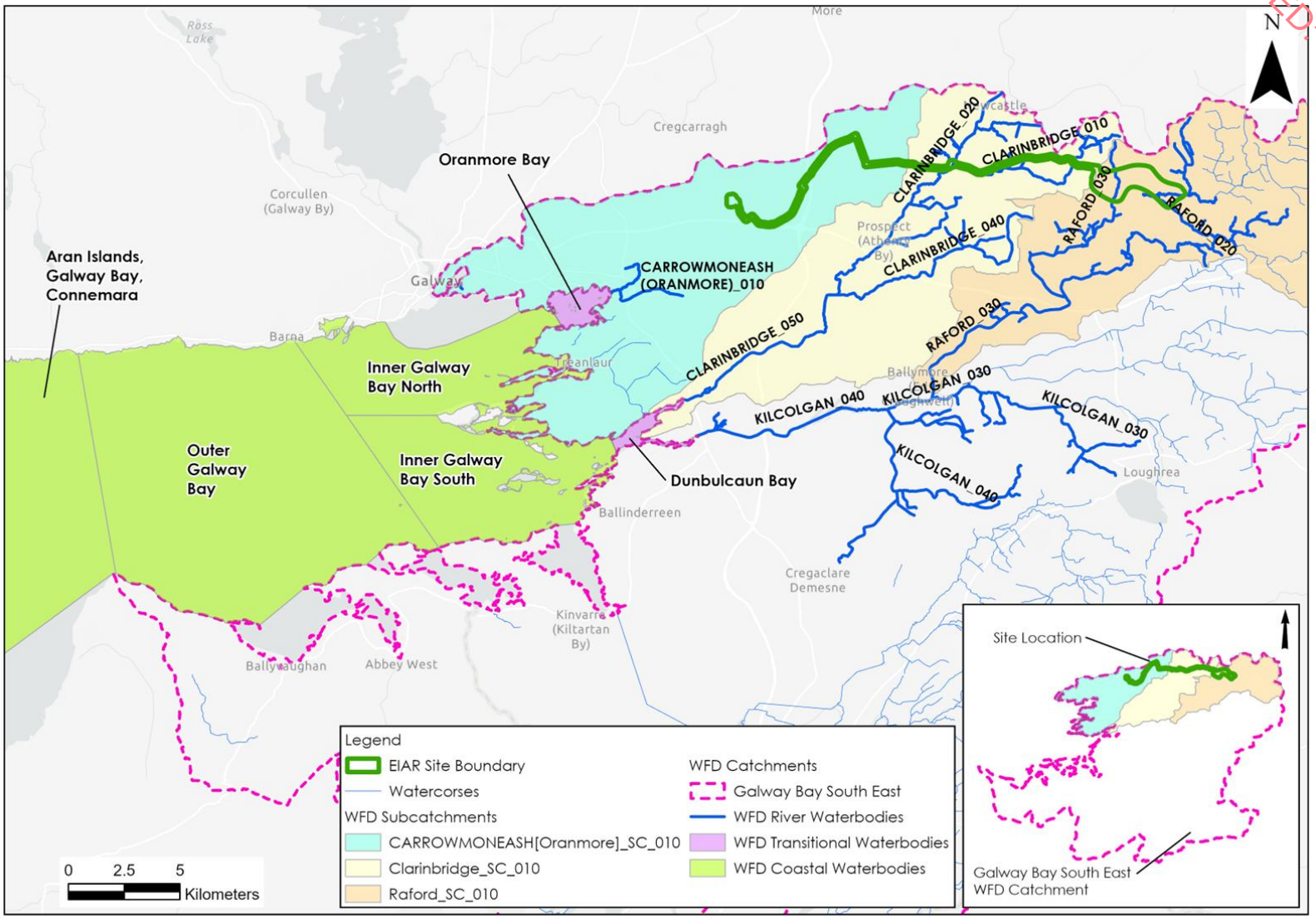

Figure A: Local Hydrology Map

2.3 SURFACE WATER BODY CLASSIFICATION

A summary of the WFD status and risk result for SWBs downstream of the Proposed Project are shown in **Table C**. The overall status is based on the ecological, chemical and quantitative status of each SWB.

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

As described in **Section 2.2** above, the eastern section of the Proposed Wind Farm is located in the Raford_020 WFD river sub-basin. The Raford_020 SWB achieved "Moderate" status in all 3 no. WFD cycles. The western section of the Proposed Wind Farm is located in the Raford_030 WFD river sub-basin. The Raford_030 SWB achieved "Good" status in all 3 no. WFD cycles. Further downstream, the Kilolgan_030 and Kilcolgan_040 SWBs achieved "Poor" status in the latest WFD cycle (2016-2021). This represented an improvement in status for the Kilcolgan_030 SWB. The Kilcolgan_050 SWB achieved "Moderate" status in the latest WFD cycle. Meanwhile, the Dunbulcaun Bay transitional SWB downstream of the Kilcolgan River achieved "Good" status in the latest WFD cycle. All coastal SWBs downstream of the Proposed Wind Farm (Inner Galway Bay South, Outer Galway Bay and Aran Islands, Galway Bay, Connemara coastal SWBs) are all of "High" status.

With respect to risk status, the Raford_020, Kilcolgan_030 and Kilcolgan_040 SWBs in the vicinity and downstream of the Proposed Wind Farm are "at risk" of failing to meet their WFD objectives. Meanwhile the risk status of the Raford_030 and Kilcolgan_050 SWBs is currently "under review".

Agriculture and domestic wastewater have been recognised as significant pressures on the Raford_020 SWB. No significant pressures have been identified for the Raford_030 SWB. Further downstream, agriculture, hydromorphology, industry and wastewater have been listed as significant pressures on the Kilcolgan_030 and Kilcolgan_040 SWBs.

With respect to the Proposed Grid Connection, the Clarinbridge_010 SWB has achieved "Good" status in the latest WFD Cycle and is "not at risk". Meanwhile the Clarinbridge_020 SWB achieved "Moderate" status and its risk status is currently "under review". Further downstream, the Clarinbridge_030 SWB has achieved "Moderate" status while Clarinbridge_040 and _050 SWBs have achieved "Poor" status. These SWBs are "at risk" of failing to meet their WFD objectives. Urban wastewater has been listed as a significant pressure impacting on the Clarinbridge River (Clarinbridge_020 to Clarinbridge_040 SWBs). Agriculture, domestic wastewater, and urban run-off are also listed as significant pressures on the Clarinbridge_050 SWB.

The western portion of the Proposed Grid Connection underground cabling route is located within the Carrowmoneash (Oranmore)_010 WFD river basin. The Carrowmoneash (Oranmore)_010 SWB achieved "Poor" status in the latest WFD Cycle. The risk status for this SWB is currently "under review". Domestic wastewater and urban run-off are significant pressures acting on the Carrowmoneash (Oranmore)_010 SWB. The Oranmore Bay transitional SWB achieved "High" status in the 2nd WFD Cycle, while its status has not been assigned in the latest WFD Cycle. This transitional SWB is "not at risk" of failing to meet its WFD objectives.

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

Table C: Summary WFD Information for Surface Waterbodies

SWB	Overall Status 2010-2015	Overall Status 2013-2018	Overall Status 2016-2021	Risk Status 3rd Cycle	Pressures
	Galway Bay Southeast WFD Catchment				
Raford_020	Moderate	Moderate	Moderate	At risk	Domestic wastewater and agriculture
Raford_030	Good	Good	Good	Under review	None
Kilcolgan_030	Moderate	Bad	Poor	At risk	Agriculture, hydromorphology, industry, domestic and urban wastewater
Kilcolgan_040	Moderate	Poor	Poor	At risk	Agriculture, hydromorphology, industry and domestic wastewater
Kilcolgan_050	Unassigned	Moderate	Moderate	Under Review	None
Clarinbridge_010	Moderate	Good	Good	Not at Risk	None
Clarinbridge_020	Unassigned	Moderate	Moderate	Under Review	None
Clarinbridge_030	Poor	Poor	Moderate	At Risk	Urban wastewater
Clarinbridge_040	Poor	Poor	Poor	At Risk	Urban wastewater
Clarinbridge_050	Poor	Poor	Poor	At Risk	Agriculture, domestic wastewater and urban run-off
Carrowmoneash (Oranmore)_010	Unassigned	Unassigned	Poor	Under Review	Urban Run-off and domestic wastewater
Dunbulcaun Bay	Unassigned	High	Good	Not at Risk	None
Oranmore Bay	Unassigned	High	Unassigned	Not at risk	None
Inner Galway Bay North	Good	Good	Good	Not at risk	None
Inner Galway Bay South	Unassigned	Good	High	Not at risk	None
Outer Galway Bay	High	High	High	Not at risk	None
Aran Islands, Galway Bay, Connemara	Unassigned	High	High	Under review	None
	Corrib Catchment				
Clare (Galway)_090	Moderate	Moderate	Moderate	At risk	Hydromorphology
Clare (Galway)_100	Unassigned	Moderate	Moderate	Under review	None
Corrib Lower	Moderate	Good	Good	Not at risk	None

2.4 GROUNDWATER BODY IDENTIFICATION

Proposed Wind Farm site

The Proposed Wind Farm site is mapped to be underlain by the Dinantian Upper Impure Limestones of the Lucan Formation (www.gsi.ie). The bedrock underlying the Proposed Wind Farm site is classified by the GSI as being a Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones.

In terms of Groundwater Bodies (GWBs), the vast majority of the Proposed Wind Farm site is underlain by the Groundwater Dependant Terrestrial Ecosystem – Rahasane Turlough (SAC000322). Meanwhile, a very small area in the west of the Proposed Wind Farm site is underlain by the Loughrea GWB.

Proposed Grid Connection

The eastern section of the Proposed Grid Connection underground cabling route is mapped to be underlain by Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones. Meanwhile, ~9.6km of the Proposed Grid Connection underground cabling route is underlain by a Regionally Important Aquifer – Karstified (conduit).

In terms of GWBs, much of the eastern section (~7.4km) is underlain by the Loughrea GWB. A small section in the vicinity of the Proposed Wind Farm is also underlain by the GWDTE – Rahasane Turlough GWB. Much of the western section of the Proposed Grid Connection underground cabling route is underlain by the Clarinbridge GWB. In addition, ~2.2km of the Proposed Grid Connection underground cabling route in the vicinity of the M6 is underlain by the GWDTE-Galway Bay Complex Fens (SAC000268).

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

2.5 GROUNDWATER BODY CLASSIFICATION

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

All GWBs underlying the Proposed Wind Farm site and the Proposed Grid Connection underground cabling route achieved "Good" status in all 3 no. WFD cycles. The Loughrea, GWDTE-Galway Bay Complex Fens (SAC000268), and Clarinbridge GWBs are deemed to be "not at risk" whilst the GWDTE-Rahasane Turlough GWB is "at risk" of failing to meet its WFD objectives. Agriculture and domestic wastewater have been identified as significant pressures impacting this GWB.

Table D: Summary WFD Information for Groundwater Bodies

GWB	Overall Status 2010-2015	Overall Status 2013-2018	Overall Status 2016-2021	Risk Status 3rd Cycle	Pressures
GWDTE-Rahasane Turlough	Good	Good	Good	At risk	Agriculture and domestic wastewater
Loughrea	Good	Good	Good	Not at risk	None
Clarinbridge	Good	Good	Good	Not at risk	None
GWDTE-Galway Bay Complex Fens (SAC000268)	Good	Good	Good	Not at risk	None

2.6 ZONE OF INFLUENCE

The potential Zone of Influence (ZOI) for the Proposed Project extends to the following SWBs, GBs, and transitional and coastal waterbodies.

- River waterbodies:
  - Raford_020, Raford_030, Kilcolgan_030, Kilcolgan_040 and Kilcolgan_050 SWBs downstream of the Proposed Wind Farm site; and,
  - Carrowmoneash (Oranmore)_010 and Clarinbridge_010 to _050 SWBs downstream of the Proposed Grid Connection underground cabling route.
- Lake waterbodies: Corrib Lower downstream (via potential pathways in the underlying karstic aquifer which can cross surface water catchments) of the Proposed Grid Connection underground cabling route.
- Transitional and coastal waterbodies – Dunbulcaun, Inner Galway Bay South, Outer Galway Bay and Aran Islands, Galway Bay, Connemara SWBs.
- GWBs - GWDTE-Rahasane Turlough, Loughrea, GWDTE-Galway Bay Complex Fens (SAC000268), and Clarinbridge GWBs.

2.7 PROTECTED AREA IDENTIFICATION

The WFD requires that the Proposed Project is also in compliance with other relevant legislation, as considered below. Nature conservation designations, bathing waters, Nutrient Sensitive areas (NSA), shellfish areas and Drinking Water Protected Area's (DWPA) are considered as part of the WFD Compliance Assessment.

2.7.1 Nature Conservation Designations

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

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

Proposed Wind Farm site

There are no designated sites mapped within or immediately adjacent to the Proposed Wind Farm site. However, there are downstream hydrological connections to some designated sites as described below:

- The Raford River Bog NHA (Site Code 000321) is located ~0.4 km to the southeast of the Proposed Wind Farm site. This NHA is hydrologically connected with the Proposed Wind Farm site via the Raford River. This NHA is comprised of a raised bog which includes both areas of high and cutover bog.
- The Rahasane Turlough SAC/pNHA (Site Code: 000322) and SPA (Site Code: 004089) is located ~14km to the southwest of the Proposed Wind Farm site. This SAC comprises of 2 no. basins which are connected at times of flood. Rahasane Turlough used to be the natural sink of the Dunkellin River but now an artificial channel takes some of the water further downstream. Water escapes the channel and flows into active swallow-ole systems. This SAC/pNHA and SPA is hydrologically connected to the Proposed Wind Farm site via the Killimor, Raford and Kilcolgan rivers.
- The Galway Bay Complex SAC/pNHA (Site Code: 000268) is located ~21km to the southwest of the Proposed Wind Farm site. This site comprises of the inner, shallow part of a large bay and is hydrologically connected to the Proposed Wind Farm site via the Killimor, Raford and Kilcolgan rivers.
- The Inner Galway Bay SPA (Site Code: 004031) is located ~21km to the southwest of the Proposed Wind Farm site. This SPA is hydrologically connected to the Proposed Wind Farm site via the Killimor, Raford and Kilcolgan rivers.

Other designated sites within 10km of the Proposed Wind Farm site include:

- The Lough Corrib SAC (Site Code: 000297), located ~3.8km to the northwest;
- The Lough Tee Bog NHA (Site Code: 000307), located ~4.2km to the northwest;
- Monivea Bog pNHA (Site Code: 000311) located ~5.8km to the northwest;
- Monivea Bog SAC (Site Code: 002352) located ~5.8km to the northwest;
- Tiaquin Bog pNHA, located ~6.5km to the northwest; and,
- Callow Lough pNHA (Site Code: 001239), located ~9.7km to the northeast.

These sites are located upstream an upgradient of the Proposed Wind Farm site.

Proposed Grid Connection

The Proposed Grid Connection underground cabling route is not located within or adjacent to any designated site. However, there are downstream hydrological connections to several designated site as described below:

- The Galway Bay Complex SAC/pNHA (Site Code: 000268) is located ~4.5km to the south of the Proposed Grid Connection. The SAC/pNHA is hydrologically connected to the Proposed Grid Connection via the Clarinbridge River.
- The Inner Galway Bay SPA (Site Code: 004031) is located ~6.4km to the southwest of the Proposed Grid Connection underground cabling route. This SPA is hydrologically connected to the Proposed Grid Connection via the Clarinbridge River.
- Rahasane Turlough SAC (Site Code: 000322) is located ~9.7km to the south.

Other designated sites within 10km of the Proposed Grid Connection underground cabling route include:

- Cregganna Marsh SPA (Site Code: 004142) and NHA (Site Code: 000253) is located ~6.8km to the southwest of the Proposed Grid Connection underground cabling route. There are no direct hydrological connections. However, given the karstic nature of the local bedrock indirect hydrogeological connections may exist.
- Lough Corrib SAC (Site Code: 000297) is located ~3.7km to the northwest of the Proposed Grid Connection underground cabling route. There are no direct hydrological connections. However, given the karstic nature of the local bedrock indirect hydrogeological connections may exist.
- Kiltullagh Turlough pNHA (Site Code: 000287) is located ~6km west of the Proposed Grid Connection underground cabling route. There are no direct hydrological connections. However, given the karstic nature of the local bedrock indirect hydrogeological connections may exist.

Meanwhile, Monivea bog pNHA, Lough Tee Bog NHA and Tiaquin Bog pNHA are all located to the north and upstream/upgradient of the Proposed Grid Connection underground cabling route to the west of Attymon.

2.7.2 Bathing Waters

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

There are no bathing waters directly adjacent to or immediately downstream of the Proposed Project. The only designated bathing waters within the ZOI are at Traught Kinvara (IEWEBWC160_0000_0100). These bathing waters are associated with the Inner Galway Bay South coastal SWB.

2.7.3 Nutrient Sensitive Areas

Nutrient Sensitive Areas (NSA) comprise Nitrate Vulnerable Zones and polluted waters designated under the Nitrates Directive (91/676/EEC) and areas designated as sensitive areas under the Urban Wastewater Treatment Directive (UWWTD)(91/271/EEC).

There are no NSAs within the ZOI for the Proposed Project. The nearest NSA is located on the River Shannon ~35km east of the Proposed Wind Farm site. There is no hydrological connection between the Proposed Project and this NSA.

2.7.4 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 Clarinbridge/Kinvara Bay designated shellfish area is located within the ZOI for the Proposed Project. These shellfish waters are located ~21.6km southwest of the Proposed Wind Farm site. These designated shellfish waters are associated with the Dunbulcaun Bay transitional SWB and the Inner Galway Bay South coastal SWB.

2.7.5 Salmonid Waters

There are no designated salmonid waters in the ZOI of the Proposed Project.

2.7.6 Drinking Water Protected Areas

The Corrib Lower Drinking Water Protected Area (DWPA, relating to the abstraction at Luimnagh WTP) is located ~13km to the west of the western section of the Proposed Grid Connection underground cabling route and the existing Cashla 200kV substation. There is a distinct lack of surface water features in the area of the Proposed Grid Connection underground cabling route that would provide a hydrological connection to this DWPA. The closest mapped watercourse to Cashla substation is ~2.8km to the northwest. Further downstream this stream discharges into the Clare (Galway) River which in turn discharges into the Lough Corrib.

Meanwhile, the Raford River in the vicinity of the Proposed Wind Farm site forms part of the Zone of Contribution for the Rhynn Killeeneen Group Water Scheme (GWS). The main ZOC for this GWS is located in the vicinity of Rahasane Turlough to the southwest of Craughwell Village. Due to the close connectivity between surface and groundwaters in karst areas, the main watercourses feeding into the turlough have also been included in the ZOC to this GWS.

The Clarinbridge River which drains the eastern portion of the Proposed Grid Connection underground cabling route forms part of the Zone of Contribution for the Brockagh Lavally River and Tributaries Group water Scheme. The main ZOC for this GWS is located in the vicinity of Brockagh Lisduff townlands, ~9.3km downstream from the Grid connection Route. Due to the close connectivity between surface and groundwaters in karst areas, the main watercourses feeding into the turlough have also been included in the ZOC to this GWS.

Furthermore, a search of private well locations (accuracy of 1 – 50m only) using the GSI well database (www.gsi.ie) identified several water supplies along the Proposed Grid Connection underground cabling route:

A well (GSI Well ID: IE_GSI_GW_Well_8540) has a locational accuracy of 50m and is assigned a 'Good' yield class. This well is mapped along the R347 and is stated as being for the Carnaun, Castle Ellen GWS. Note that the GSI's database of Group and Public Water Supplies does not identify this GWS. Nevertheless, for the purposes of a conservative assessment it is assumed that a supply exists at this location.

- A well (GSI Well ID: IE_GSI_GW_Well_8561) is located ~150m east of the Proposed Grid Connection in the townland of Castlelambert. This well is associated with the Castlelambert GWS. Note that the GSI's database of Group and Public Water Supplies does not identify this GWS. Nevertheless, for the purposes of a conservative assessment it is assumed that a supply exists at this location.
- A well (GSI Well ID: IE_GSI_GW_Well_8697) is located ~750m south of the Proposed Grid Connection in the townland of Lisheenkyle East. This well is associated with the Palmerstown PWS. Note that the GSI's database of Group and Public Water Supplies does not identify this GWS. Nevertheless, for the purposes of a conservative assessment it is assumed that a supply exists at this location.
- A well (GSI Well ID: IE_GSI_GW_Well_8677) is located ~1.1km to the northwest of the Proposed Grid Connection in the townland of Cashla. This well is associated with the Cashla, Athenry GWS. Note that the GSI's database of Group and Public Water Supplies does not identify this GWS. Nevertheless, for the purposes of a conservative assessment it is assumed that a supply exists at this location.
- A well (GSI Well ID: IE_GSI_GW_Well_8676) is located ~1.1km to the northwest of the Proposed Grid Connection in the townland of Cartymore. This well is associated with the Cartymore GWS. Note that the GSI's database of Group and Public Water Supplies does not identify this GWS. Nevertheless, for the purposes of a conservative assessment it is assumed that a supply exists at this location.

Meanwhile, all GWBs within the catchment are listed as DWPAs.

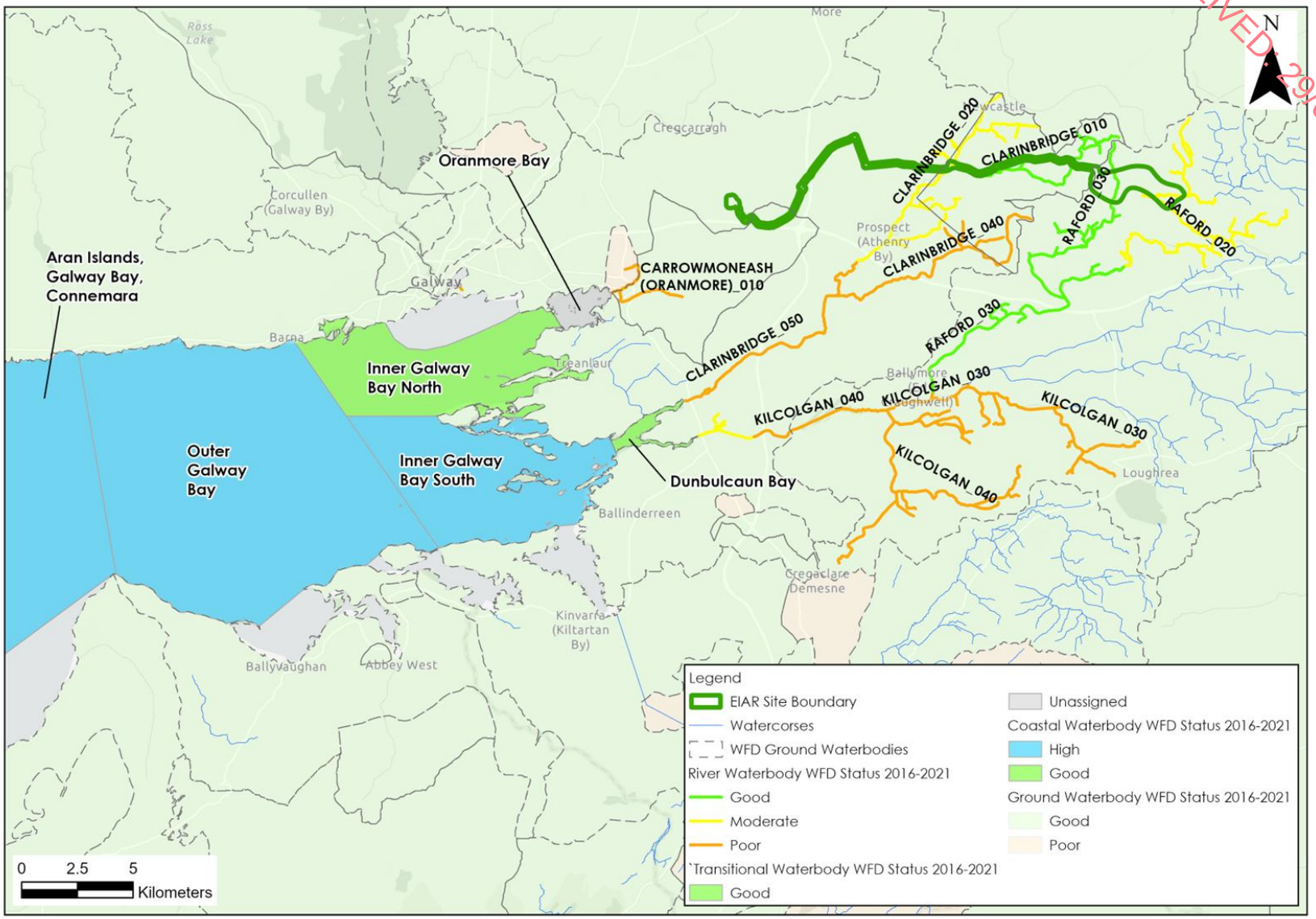

Figure B: WFD Groundwater and Surface Waterbody Status (2016-2021)

3. WFD SCREENING

3.1 SURFACE WATER BODIES

The SWBs in the immediate vicinity and downstream of the Site 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 Raford_020 and Raford_030 SWBs are included in the WFD Compliance Assessment due to the occurrence of infrastructure associated with the Proposed Project in these WFD river sub-basins. Furthermore, the Kilcolgan_030 SWB is included in the WFD Compliance Assessment due to its location downstream of the Raford River. The Proposed Project must not in any way result in a deterioration in the status of these river waterbodies and/or prevent them from meeting the biological and chemical characteristics for good status in the future.

Meanwhile, the Kilcolgan_040 and Kilcolgan_050 SWBs are screened out of the WFD Compliance Assessment due to their distant location from the Proposed Project and increasing volumes of water within the Kilcolgan River. The Proposed Project would have no potential to cause a deterioration of the WFD status of these SWBs. Note that the Proposed Project does not rely in any way upon the dilution or assimilative capacity of any downstream SWB. The mitigation measures prescribed in Section 4.3 ensure the protection of all watercourses in the vicinity and downstream of the Site.

Furthermore, with consideration for the Proposed Grid Connection, the Clarinbridge_010, Clarinbridge_020 and the Carrowmoneash (Oranmore)_010 SWBs are included in the WFD Compliance Assessment due to the occurrence of the Proposed Grid Connection underground cabling route within these WFD river sub-basins. The works along the Proposed Grid Connection underground cabling route must not in any way result in a deterioration in the status of these river waterbodies and/or prevent them from meeting the biological and chemical characteristics for good status in the future.

Further downstream the Clarinbridge_030, Clarinbridge_040 and the Clarinbridge_050 SWBs, and the Clare(Galway)_100 SWB (*i.e.* the closest mapped SWB to the existing Cashla substation) have been screened out due to the lack of any works in these WFD river sub-basins and the small scale and transient nature of the works along the Proposed Grid Connection underground cabling route, upstream of these SWBs. Given the scale of the works there would be very little potential for a deterioration in the status of these SWBs. The Corrib Lower Lake waterbody is also screened out of the WFD Compliance Assessment due to the large volumes of water within this SWB, the lack of direct hydrological connection (only possible connection is via groundwater flows in the karstic bedrock aquifer) and the associated high assimilation capacity of this lake. The Proposed Project would have no potential to cause a deterioration of the WFD status of these SWBs.

In terms of transitional and coastal waterbodies; Dunbulcaun Bay, Oranmore Bay, Inner Galway Bay North, Inner Galway Bay South, Outer Galway Bay and the Aran Islands, Galway Bay, Connemara SWBs have been screened out due to their distant location from the Site, the large volumes of saline waters within these SWBs and the associated high assimilation capacity of these estuarine and coastal waters. The Proposed Project would have no potential to cause a deterioration of the WFD status of these SWBs.

3.2 GROUNDWATER BODIES

With respect to GWBs, the GWDTE-Rahasane Turlough GWB is carried through to the WFD Compliance Assessment due to its location directly underlying the Proposed Wind Farm site. The Loughrea, GWDTE-Galway Bay Complex Fens (SAC000268), and Clarinbridge GWBs will also be brought through to the WFD Compliance Assessment as they are underlying the

Proposed Grid Connection underground cabling route. The Proposed Project must not in any way result in a deterioration in the status of these GWB and/or prevent them from meeting the biological and chemical characteristics for good status in the future.

3.3 PROTECTED AREAS

3.3.1 Nature Conservation Designations

The Raford River Bog NHA is located within 0.4km of the Proposed Wind Farm site to the east. Given its close proximity to the Site, the NHA will be included in the WFD assessment.

The Lower Corrib SAC and the Monivea Bog SAC have been screened out as these are located upstream of the Site and there is no hydrological connection between the Site and these SACs.

The Rahasane Turlough SPA, the Lough Corrib SPA and the Lough Rea SPA have been screened out due to their distant location from the Site and there is no hydrological connection between these SPAs and the Site.

The Lough Tee Bog NHA and the Monivea Bog pNHA are located upstream of the Proposed Grid Connection underground cabling route and there is no hydrological connection between the Site and both the NHA and pNHA. Therefore, these have been screened out.

The Galway Bay Complex pNHA and the Kiltullagh Turlough pNHA have been screened due to its distal location from the Proposed Grid Connection underground cabling route and there is no hydrological connection between the pNHA and the Site.

As stated above in **Section 2.7.6**, there are 2 no. surface water abstractions mapped downstream of the Site. Both DWPA's (Rea Lake and Corrib Lake) have been screened out of the impact assessment due to their distal locations and increasing volume of water. The Proposed Project works have no potential to cause a deterioration in the status of these DWPA's.

3.3.2 Bathing Waters

The designated bathing waters at Traught Kinvara have been screened out of the WFD Compliance Assessment due to their distant location from the Site and the large volumes of saline waters within the coastal waterbody associated with these bathing waters.

3.3.3 Nutrient Sensitive Areas

As no NSAs are currently defined within the ZOI of the Proposed Project, no NSAs are included in the WFD Compliance Assessment.

3.3.4 Salmonid Waters

As no salmonid protected waters are currently designated within the ZOI of the Proposed Project, no salmonid protected waters are included in the WFD Compliance Assessment.

3.3.5 Drinking Water Protected Areas

For the purposes of a conservative assessment, the Lough Corrib DWPA will be included in the WFD Compliance Assessment. However, it is worth noting that there is limited potential for effects due to the short term and transient nature of the works along the Proposed Grid Connection underground cabling route.

The Rhynn Killeeneen GWS will also be included in the WFD Compliance Assessment as this Raford River in the vicinity of the Proposed Wind Farm site is included in the ZOC to this GWS.

The Brockagh Lisduff GWS will also be included in the WFD Compliance Assessment as the Clarinbridge River in the vicinity of the Proposed Grid Connection is included in the ZOC to this GWS.

3.4 WFD SCREENING SUMMARY

A summary of WFD Screening for SWBs and GWBs discussed above is shown in **Table 3** below.

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

Type	WFD Classification	Waterbody Name/ID	Inclusion in Assessment	Justification
Surface Water Body	**Galway Bay Southeast WFD Catchment**			
	River	Raford_020	**Yes**	The Proposed Wind Farm site is mapped within the Raford_020 WFD river sub-basin. An assessment is required to consider the potential impacts of the Proposed Project on this SWB.
		Raford_030	**Yes**	The Proposed Wind Farm site and the Proposed Grid Connection underground cabling route are mapped within the Raford_030 WFD river sub-basin. An assessment is required to consider the potential impacts of the Proposed Project on this SWB.
		Kilcolgan_030	**Yes**	The Kilcolgan_030 SWB is included in the WFD Compliance Assessment due to its location downstream of the Raford_030 SWB. As assessment is required to consider the potential effects of the Proposed Project on this SWB.
		Kilcolgan_040	No	The Kilcolgan_040 SWB is screened out of the assessment due to the absence of any works within this sub-basin and the small scale of all upstream works.
		Kilcolgan_050	No	The Kilcolgan_040 SWB is screened out of the assessment due to the absence of any works within this sub-basin and the small scale of all upstream works.
		Clarinbridge_010	**Yes**	The Proposed Grid Connection underground cabling route is mapped within the Clarinbridge_010 WFD river sub-basin. An assessment is required to consider the potential impacts of the Proposed Project on this SWB.
		Clarinbridge_020	**Yes**	The Proposed Grid Connection underground cabling route is mapped within the Clarinbridge_020 WFD river sub-basin. An assessment is required to consider the potential impacts of the Proposed Project on this SWB.
		Clarinbridge_030	No	The Clarinbridge_030 SWB is screened out of the WFD Compliance Assessment due to the lack pf any works associated with the Proposed Grid Connection underground cabling route within this WFD river sub-basin. Therefore, the Proposed Project has no potential to affect the status of this SWB.
		Clarinbridge_040	No	The Clarinbridge_040 SWB has been screened out due to its distant location from the Proposed Grid Connection underground cabling route (~4.3 km straight line distance) and the increasing volumes of water within the Clarinbridge River. Therefore, the Proposed Project has no potential to affect the status of this SWB.
		Clarinbridge_050	No	The Clarinbridge_050 SWB has been screened out due to its distant location from the Proposed Grid Connection underground cabling route (~7.8km straight line distance) and the increasing volumes of water within the Clarinbridge River. Therefore, the Proposed Project has no potential to affect the status of this SWB.
		Carrowmoneash [Oranmore]_010	**Yes**	The Proposed Grid Connection underground cabling route is mapped within the Carrowmoneash [Oranmore]_010 WFD river sub-basin. An assessment is required to consider the potential impacts of the Proposed Project on this SWB
		Clare	No	This SWB has been screened out of the WFD Compliance Assessment due to the lack of any

		(Galway)_090		works within this WFD river sub-basin. The Proposed Project is located in a separate catchment to this SWB.
		Clare (Galway)_100	No	This SWB has been screened out of the WFD Compliance Assessment due to the lack of any works within this WFD river sub-basin. The Proposed Project is located in a separate catchment to this SWB.
	Lake	Lough Corrib Lower	No	This SWB has been screened out of the WFD Compliance Assessment due to the lack of any works within the catchment to this lake waterbody. The Proposed Project is located in a separate catchment to this SWB.
	Transitional	Dunbulcaun Bay	No	The Dunbulcaun Bay SWB has been screened out due to its distant location from the Proposed Grid Connection underground cabling route (~13.2km straight line distance) the saline nature of the water body, and the increasing volumes of water within this SWB. Therefore, the Proposed Project has no potential to affect the status of this SWB.
	Transitional	Oranmore Bay	No	The Oranmore Bay SWB has been screened out due to its distant location from the Proposed Grid Connection underground cabling route (~13.2km straight line distance), the saline nature of these waters, and the increasing volumes of water within this SWB. Therefore, the Proposed Project has no potential to affect the status of this SWB.
	Coastal	Inner Galway Bay North	No	This coastal SWB has been screened out due to its distant location from the Proposed Project, the saline nature of these waters, and the increasing volumes of water within this SWB. Therefore, the Proposed Project has no potential to affect the status of this SWB.
		Inner Galway Bay South	No	This coastal SWB has been screened out due to its distant location from the Proposed Project, the saline nature of these waters, and the increasing volumes of water within this SWB. Therefore, the Proposed Project has no potential to affect the status of this SWB.
		Outer Galway Bay	No	This coastal SWB has been screened out due to its distant location from the Proposed Project, the saline nature of these waters, and the increasing volumes of water within this SWB. Therefore, the Proposed Project has no potential to affect the status of this SWB.
		Aran Islands, Galway Bay, Connemara	No	This coastal SWB has been screened out due to its distant location from the Proposed Project, the saline nature of these waters, and the increasing volumes of water within this SWB. Therefore, the Proposed Project has no potential to affect the status of this SWB.
Groundwater Bodies				
Groundwater Body	Groundwater	GWDTE-Rahasane Turlough	**Yes**	The Proposed Wind Farm site is mapped to overlie the GWDTE-Rahasane Turlough GWB. An assessment is required to consider the potential impacts of the Proposed Project on this GWB.
		Loughrea	**Yes**	The Proposed Wind Farm Site and the Proposed Grid Connection underground cabling route is mapped to overlie the Loughrea GWB. An assessment is required to consider the potential impacts of the Proposed Project on this GWB.
		Clarinbridge	**Yes**	The Proposed Grid Connection underground cabling route is mapped to overlie the Clarinbridge GWB. An assessment is required to consider the potential impacts of the Proposed Project on this GWB.
		GWDTE-Galway Bay	**Yes**	The Proposed Grid Connection underground cabling route is mapped to overlie the GWDTE-Galway Bay Complex Fens (SAC000268) GWB. An assessment is required to consider the

		Complex Fens (SAC000268)		potential impacts of the Proposed Project on this GWB.
Protected Areas				
Protected Areas	Nature Conservation Designations	Raford River Bog NHA	**Yes**	The Raford River Bog NHA is within 0.4km of the Site and hydrologically linked to the Proposed Wind Farm site via the Raford_020 SWB. An assessment is required to consider the potential impacts of the Proposed Project on this protected area.
		Lough Corrib SAC/SPA	**Yes**	The Lower Corrib SAC included in the impact assessment due to the potential hydrogeological connection, via the karst bedrock, with the Proposed Grid Connection underground cabling route.
		Monivea Bog SAC	No	The Monivea Bog SAC has been screened out of the WFD Compliance Assessment due to the lack of any hydrological or hydrogeological connectivity with the Proposed Project.
		Rahasane Turlough SAC/SPA/pNHA	No	The Rahasane Turlough SAC/SPA/pNHA has been screened in due to its distal location downstream of the Proposed Wind Farm site via the Kilcolgan River. An assessment is required to consider the potential impacts of the Proposed Project on this protected area.
		Lough Tee Bog NHA	No	The Lough Tee Bog NHA is located ~4.2km to the northwest of the Proposed Wind Farm site. This NHA is located upstream and upgradient of the Proposed Project.
		Monivea Bog pNHA	No	The Monivea Bog pNHA is located ~5.8km to the northwest of the Proposed Wind Farm site. This pNHA is located upstream and upgradient of the Proposed Project.
		Galway Bay Complex pNHA	**Yes**	The Galway Bay Complex pNHA is located ~8.3km to the south of the Proposed Grid Connection underground cabling route. The SAC/pNHA is hydrologically connected to the Proposed Grid Connection via the Clarinbridge River. An assessment is required to consider the potential impacts of the Proposed Project on this protected area.
		Inner Galway Bay SPA	**Yes**	This SPA is located ~8.3km to the south of the Proposed Grid Connection underground cabling route. This SPA is hydrologically connected to the Proposed Grid Connection via the Clarinbridge River. An assessment is required to consider the potential impacts of the Proposed Project on this protected area.
		Kiltullagh Turlough pNHA	**Yes**	The Kiltullagh Turlough pNHA has been included in the impact assessment due to the potential hydrogeological connection, via the karst bedrock, with the Proposed Grid Connection underground cabling route.
		Cregganna Marsh SPA	**Yes**	The Cregganna Marsh SPA has been included in the impact assessment due to the potential hydrogeological connection, via the karst bedrock, with the Proposed Grid Connection underground cabling route.
	Nutrient Sensitive Areas	Lough Derg on the River Shannon NSA	No	The Lough Derg on the River Shannon NSA has been screened out as there is no hydrological connection between the Site and this NSA. The Proposed Project has no potential to impact the status of this NSA.
	Shellfish Area	Clarinbridge/Kinvara Bay	No	Clarinbridge/Kinvara Bay Shellfish area has been screened out due to its distant location from the Proposed Project and the large volumes of water within the associated coastal SWB. Therefore, the Proposed Project has no potential to impact on this protected area.
	Drinking	Corrib Lower	**Yes**	For the purposes of a conservative assessment the Corrib Lower DWPA has been included in the

	Water	Lake		assessment. Whilst there is no hydrological (surface water) connection between the Proposed Project and this DWPA, there is a potential indirect hydrogeological connection via the underlying karstic aquifer.
		Rhynn Killeeneen GWS	**Yes**	This GWS is located downstream of the Proposed Wind Farm site and the Raford River forms part of the Zone of Contribution to this GWS.
		Brockagh Lisduff GWS	**Yes**	The Proposed Grid Connection underground cabling route includes 4 no. watercourse crossings of the Clarinbridge River which forms part of the Outer Source Protection Area of the Brockagh Lisduff Group Water Scheme.
		Carnaun, Castle Ellen GWS, Castlelambert GWS, Palmerstown PWS, Cashla, Athenry GWS and Cartymore GWS	**Yes**	These GWSs are located in close proximity to the Proposed Grid Connection underground cabling route.

4. WFD COMPLIANCE ASSESSMENT

4.1 PROPOSALS

The Proposed Project is defined in Chapter 4 of the EIAR.

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.

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

4.2 POTENTIAL EFFECTS

4.2.1 Construction Phase (Unmitigated)

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

Construction phase activities including tree felling, site levelling/construction and building turbine foundation excavation, access roads, hardstand areas and peat and spoil management areas, 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 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 untreated effluent from wastewater systems also has the potential to impact on surface waters.

Clear felling of coniferous forestry plantations is also proposed over ~7.5ha. It is also proposed to fell 0.1ha of native woodland. 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. In addition, the biodiversity enhancement works will have the potential to release suspended solids to surface waters.

There are also 2 no. crossings proposed over mapped watercourses in the Proposed Wind Farm site. Works have the potential to result in morphological changes to watercourses. There are also several crossings proposed over existing manmade drains within the Proposed Wind Farm site.

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 most impacted by these activities include the Raford_020 and _030 SWBs as these are the river sub-basins within which the works are proposed. Further downstream, the potential for water quality effects will decrease downstream due to the increasing volumes of water within the respective SWBs.

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

Table F: Potential Surface Water Quality Effects Downstream of the Proposed Wind Farm during Construction Phase (Unmitigated)

SWB	WFD Code	Current Status	Assessed Potential Status Change
Raford_020	IE_WE_29R010200	Moderate	Poor
Raford_030	IE_WE_29R010500	Good	Moderate
Kilcolgan_030	IE_WE_29K010400	Poor	Poor

4.2.1.2 Potential Surface Water Quality Effects Along the Proposed Grid Connection

The Proposed Grid Connection includes a total of 4 no. crossings over EPA mapped watercourses and an additional 6 no. unmapped crossings. These crossings comprise of existing bridge/culvert crossings.

Due to the close proximity of local waterbodies to the works at the crossing locations, there is a potential for surface water quality impacts during trench excavation work due to runoff from the road surface. This runoff may contain elevated concentrations of suspended sediment, cementitious runoff and/or hydrocarbons.

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

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

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

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

SWB	WFD Code	Current Status	Assessed Potential Status Change
Clarinbridge_010	IE_WE_29C020040	Good	Good
Clarinbridge_020	IE_WE_29C020200	Moderate	Moderate
Clarinbridge_030	IE_WE_29C020300	Moderate	Moderate
Carrowmoneash (Oranmore)_010	IE_WE_29C050400	Poor	Poor

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 may drawdown the local groundwater table.

However, due to the shallow nature of the proposed works, and the scale of the Proposed Wind Farm site in comparison to the scale of the GWDTE Rahasane Turlough GWB (~33,700ha) and the Loughrea GWB (3,200ha), there is no potential for works at the Proposed Wind Farm site 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: Potential Groundwater Effects at the Proposed Wind Farm site during Construction Phase (Unmitigated)

GWB	WFD Code	Current Status	Assessed Potential Status Change
GWDTE-Rahasane Turlough	IE_WE_G_0100	Good	Good
Loughrea	IE_WE_G_0007	Good	Good

4.2.1.4 Potential Groundwater Quality/Quantity Effects along Proposed Grid Connection

The Proposed Grid Connection is located over the GWDTE-Rahasane Turlough GWB, the Loughrea GWB and the Clarinbridge GWB.

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

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

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

However, Due to the shallow, short-term and transient nature of the Proposed Grid Connection works, there is no potential for any significant effects during earthworks and excavation works on the GWBs.

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

Table I: Potential Groundwater Effects Along Proposed Grid Connection during Construction Phase (Unmitigated)

GWB	WFD Code	Current Status	Assessed Potential Status Change
GWDTE-Rahasane Turlough	IE_WE_G_0100	Good	Good
Loughrea	IE_WE_G_0007	Good	Good
Clarinbridge	IE_WE_G_0008	Good	Good
GWDTE-Galway Bay Complex Fens (SAC000268)	IE_WE_G_0087	Good	Good

4.2.1.5 Potential Effects on Protected Areas

The surface water connections from the Proposed Wind Farm site could potentially transfer poor quality surface water that may affect the conservation objectives of the Raford River Bog NHA and the Rahasane Turlough SAC/pNHA and SPA. Any deterioration in surface water quality at the Proposed Wind Farm site also has the potential to affect the Rhynn Killeeneen GWS as the Raford River in the vicinity of the Proposed Wind Farm site forms part of the ZoC to this GWS.

Similarly, the surface water connections from Proposed Grid Connection could transfer poor quality surface water to the Galway Bay Complex SAC/pNHA and the Inner Galway Bay SPA. However, given the small scale and transient nature of the works and the large volumes of water in Galway Bay the potential for effects would be very limited.

Furthermore, the Cregganna Marsh SPA and NHA, the Lough Corrib SAC and the Kiltullagh Turlough pNHA are included for the purposes of a conservative impact assessment due to the potential hydrogeological connection, via the karst bedrock, along the Proposed Grid Connection underground cabling route. However, the potential for effects is limited given the small scale and transient nature of the works.

Any deterioration in groundwater quality along the Proposed Grid Connection has the potential to impact water quality in the underlying karstic aquifer which may provide a pathway to Lough Corrib, and effect the Lough Corrib DWPA. However, the potential for effects is limited given the small scale, shallow and transient nature of the works. Furthermore, any deterioration in surface or groundwater quality along the Proposed Grid Connection has the potential to effect the following group water supplies: Brockagh Lisduff GWS, Carnaun, Castle Ellen GWS, the Castlelambert GWS, the Palmerstown PWS, the Cashla, Athenry GWS and the Cartymore GWS.

4.2.2 Operational Phase (Unmitigated)

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

No maintenance works will be required along the Proposed Grid Connection and therefore there is no potential to impact on the status of downstream SWBs, underlying GWBs or local protected areas.

4.2.2.1 Potential 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 Proposed Wind Farm site and increase flood risk downstream of the Proposed Project.

A quantitative analysis presented in Section 9.5.3.1 of the EIAR demonstrates that the Proposed Project infrastructure, in the absence of any mitigation measures, will only result in an increase in surface water runoff of 0.035% in comparison to baseline runoff rates at the Proposed Wind Farm. This is due to the small footprint of the Proposed Project and the high rates of surface water runoff which characterise the baseline hydrological environment.

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 J**.

Table J: Potential Surface Water Quantity Effects Downstream of the Proposed Wind Farm site during the Operational Phase (Unmitigated)

SWB	WFD Code	Current Status	Assessed Potential Status Change
Raford_020	IE_WE_29R010200	Moderate	Moderate
Raford_030	IE_WE_29R010500	Good	Good
Kilcolgan_030	IE_WE_29K010400	Poor	Poor

4.2.2.2 Potential Surface Water Quality Effects from Operational Proposed Wind Farm site Drainage

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

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

Table K: Potential Surface Water Quality Effects Downstream of Proposed Wind Farm site during Operational Phase (Unmitigated)

SWB	WFD Code	Current Status	Assessed Potential Status Change
Raford_020	IE_WE_29R010200	Moderate	Moderate
Raford_030	IE_WE_29R010500	Good	Good
Kilcolgan_030	IE_WE_29K010400	Poor	Poor

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 protected areas is greatly reduced.

4.3 MITIGATION MEASURES

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

4.3.1 Construction Phase

4.3.1.1 Mitigation Measures to Protect Surface Water Quality during Tree Felling

Tree felling operations will conform to current best practice Forest Service regulations, policies and strategic guidance documents as well as Coillte and DAFM guidance documents, including the specific guidelines listed below, to ensure that felling, planting and other forestry operations result in minimal potential negative effects to the receiving environment.

- Forestry Standards Manual (Forest Service, 2015)
- Forest Protection Guidelines (Forest Service, 2002)
- Forest Operations and Water Protection Guidelines (Coillte, 2013)
- Forestry and Water Quality Guidelines (Forest Service, 2000b)
- Forestry and the Landscape Guidelines (Forest Service, 2000c)
- Forests and Water, Achieving Objectives under Ireland's River Basin Management Plan 2018-2021 (DAFM, 2018)
- Coillte Planting Guideline SOP
- Code of Best Forest Practice (Forest Service, 2000)

Mitigation by Avoidance:
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".

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. The buffer/setback zone will:

- Avoid physical damage (river/stream banks and river/stream beds) to watercourses and the associated release of sediment;

- Avoid soil disturbance and compaction within close proximity to surface watercourses;
- Avoid the entry of suspended sediment from works into watercourses; and,
- Avoid the entry of suspended sediment from the drainage system into watercourses, achieved in part by ending drain discharge outside the buffer zone and allowing percolation across the vegetation of the buffer zone.

In addition to the application of buffer/setback zones, the following supplementary mitigation measures will be employed during felling works:

Mitigation by Design:

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

- Machine combinations (i.e. handheld or mechanical) will be chosen which are most suitable for ground conditions and which will minimise soils disturbance;
- All machinery will be operated by suitably qualified personnel;
- Checking and maintenance of roads and culverts will be on-going through any felling operation. 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;
- 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 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 spoil repository 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. Check dams and silt traps will 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;
- All refuelling will be completed outside of the designated 50m hydrological buffer zones. 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.

Silt Traps:
Silt traps will be strategically placed down-gradient within forestry drains near streams. The main purpose of the silt traps and drain blocking is to slow water flow, increase residence time, and allow settling of silt in a controlled manner.

Pre-emptive Site Drainage Management:
The works programme for the felling operations will also take account of weather forecasts and predicted rainfall in particular. Operations will be suspended or scaled back if heavy rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast.

Works will be suspended if forecasting suggests any of the following is likely to occur:
- >10 mm/hr (i.e. high intensity local rainfall events);
- >25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or,
- >half monthly average rainfall in any 7 days.

Timing of Proposed Project Felling Works:
Felling will only be carried out during periods of no or low rainfall, and therefore minimum runoff rates. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses.

Drain Inspection and Maintenance:
- The following items will be carried out during pre-felling inspections and after:
- Communication with tree felling operatives in advance to determine whether any areas have been reported where there is unusual water logging or bogging of machines;
- Inspection of all areas reported as having unusual ground conditions;
- Inspection of main drainage ditches and outfalls. During pre-felling inspections the main drainage ditches will be identified. Ideally the pre-felling inspection will be carried out during rainfall;
- Following tree felling all main drains will be inspected to ensure that they are functioning;
- Extraction tracks within 10m of drains will be broken up and diversion channels created to ensure that water in the tracks spreads out over the adjoining ground;
- Culverts on drains exiting the Site, if impeded by silt or debris, will be unblocked; and,
- All accumulated silt will be removed from drains and culverts, and silt traps, and this removed material will be deposited away from watercourses to ensure that it will not be carried back into the trap or stream during subsequent rainfall.

Surface Water Quality Monitoring:
Sampling will be completed before, during (if the operation is conducted over a protracted time) and after the felling activity. The 'before' sampling will be conducted within 4 weeks of the felling activity commencing, preferably in medium to high water flow conditions. The "during" sampling will be undertaken once a week or after rainfall events. The 'after' sampling will comprise as many samplings as necessary to demonstrate that water quality has returned to pre-activity status (i.e. where an impact has been shown).

4.3.1.2 Mitigation Measures to Prevent the Entrainment of Suspended Solids in Surface Waters

Mitigation by Avoidance
The key mitigation measure during the construction phase is the avoidance of sensitive hydrological features where possible, by application of suitable buffer zones (i.e. 50m to main watercourses).

In relation to hydrological constraints, where appropriate a self-imposed buffer zone of 50m has been put in place for on-site streams and rivers (Note that some infrastructure is proposed

within the delineated 50m hydrological buffer zone and additional mitigation measures are prescribed for these works). The majority of the key Proposed Project areas are located significantly away from the delineated 50m watercourse buffer zones with the exception of T2, its' associated hardstand and access roads, the upgrading of an existing watercourse crossing, new watercourse crossings, upgrades to existing site access tracks and new site access tracks. Additional control measures, which are outlined further in Section 4.3.1.3, will be undertaken at these locations.

The large setback distance from sensitive hydrological features means that adequate room is maintained for the proposed drainage mitigation measures (discussed below) to be properly installed and operate effectively. The proposed buffer zone will:

- Avoid physical damage (river/stream banks and river/stream beds) to watercourses and associated release of sediment;
- Avoid excavations within close proximity to surface watercourses;
- Avoid the entry of suspended sediment from earthworks into watercourses; and,
- Avoid the entry of suspended sediment from the construction phase drainage system into watercourses, achieved in part by ending drain discharge outside the buffer zone and allowing percolation across the vegetation of the buffer zone.

Mitigation by Design:

Proposed Wind Farm site:

- Source controls:
  - Interceptor drains, vee-drains, diversion drains, flume pipes, erosion and velocity control measures such as use of sand bags, oyster bags filled with gravel, filter fabrics, and other similar/equivalent or appropriate systems.
  - Small working areas, covering stockpiles, weathering off stockpiles, cessation of works in certain areas.
- In-Line controls:
  - Interceptor drains, vee-drains, oversized swales, erosion and velocity control measures such as check dams, sand bags, oyster bags, flow limiters, weirs, baffles, silt bags, silt fences, sedimats, filter fabrics, and collection sumps, temporary sumps, sediment traps, pumping systems, settlement ponds, temporary pumping chambers, or other similar/equivalent or appropriate systems.
- Treatment systems:
  - Temporary sumps and ponds, temporary storage lagoons, sediment traps, and settlement ponds, and proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems.

It should be noted that for the Proposed Wind Farm site, an extensive network of forestry, peat and agricultural drains already exist, and these will be integrated and enhanced as required and used within the Proposed Wind Farm drainage system. The integration of the existing forestry drainage network and the Proposed Wind Farm network is relatively simple. The key elements being the upgrading and improvements to existing water treatment elements, such as in line controls and treatment systems, including silt traps, settlement ponds and buffered outfalls.

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

- Apart from interceptor drains, which will convey clean runoff water to the downstream drainage system, there will be no direct discharge (without treatment for sediment reduction, and attenuation for flow management) of runoff from the Proposed Wind Farm site drainage into the existing site drainage network. This will reduce the potential for any increased risk of downstream flooding or sediment transport/erosion;
- Silt traps will be placed in the existing drains upstream of any streams where construction works / tree felling is taking place, and these will be diverted into proposed interceptor drains, or culverted under/across the works area;

- Runoff from individual turbine hardstanding areas will be not discharged into the existing drain network but discharged locally at each turbine location through settlement ponds and buffered outfalls onto vegetated surfaces;
- Buffered outfalls which will be numerous over the Site will promote percolation of drainage waters across vegetation and close to the point at which the additional runoff is generated, rather than direct discharge to the existing drains of the Proposed Wind Farm site; and,
- Drains running parallel to the existing roads requiring widening will be upgraded, widening will be targeted to the opposite side of the road. Velocity and silt control measures such as check dams, sand bags, oyster bags, flow limiters, weirs, baffles, silt fences will be used during the upgrade construction works. Regular buffered outfalls will also be added to these drains to protect downstream surface waters.

Proposed Grid Connection:
The majority of the Proposed Grid Connection underground cabling route is >50m from any nearby watercourse, sections within 50m of the Proposed Grid Connection underground cabling route are confined to existing watercourse crossings at bridges and culverts. It is proposed to limit any works in any areas located within 50m of any watercourse/waterbody including the stockpiling of excavated soils and subsoils.

There is a total of 4 no. watercourse crossings crossings over EPA mapped watercourses and an additional 6 no. unmapped crossings along the Proposed Grid Connection underground cabling route. All the crossings are existing bridges and culverts along the public road.

No in-stream works are required at any of these crossings, however due to the proximity of the streams to the construction work at the crossing locations, there is a potential for surface water quality impacts during trench excavation work. Mitigation measures are outlined below.

A constraint/buffer zone will be maintained for all crossing locations where possible, whereby all watercourses will be fenced off. In addition, measures which are outlined below will be implemented to ensure that silt laden or contaminated surface water runoff from the excavation work does not discharge directly to the watercourse.

Pre-commencement Temporary Drainage Works
Prior to the commencement of construction works (new road/hardstand, turbine foundation installs or upgrade of existing roads) the following key temporary drainage measures will be installed:

- All existing land and forestry drains that intercept the proposed works area will be temporarily blocked down-gradient of the works using forestry check dams/silt traps;
- Clean water interceptor drains will be installed upgradient of the works areas;
- Check dams/silt fence arrangements (silt traps) will be placed in all existing that have surface water flows; and,
- A double silt fence perimeter will be placed down-slope of works areas that are located inside the watercourse 50m buffer zone.

Silt Fences:
Silt fences will be emplaced within drains down-gradient of all construction areas. Silt fences are effective at removing heavy settleable solids such as those present in the peat and tills that overlie the Site. This will act to prevent entry to watercourses of sediment, released from excavation of sub-soils, and entrained in surface water runoff. Inspection and maintenance of these structures during the construction phase is critical to their functioning to stated purpose. They will remain in place throughout the entire construction phase. Double silt fences will be placed within drains down-gradient of all construction areas inside the hydrological buffer zones.

Silt Bags:

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

Settlement Ponds:
The Proposed Wind Farm footprint has been divided into drainage catchments (based on topography, outfall locations, catchment size) and stormwater runoff rates based on the 10-year return period rainfall event were calculated for each catchment. These flows were then used to design settlement ponds for each drainage catchment. The settlement ponds are designed for 11hr or 24hr retention times used to settle out medium silt (0.006mm) and fine silt (0.004mm) respectively (EPA, 2006).

Level Spreaders and Vegetation Filters:
The purpose of level spreaders is to release treated drainage flow in a diffuse manner, and to prevent the concentration of flows at any one location thereby avoiding erosion. Level spreaders are not intended to be a primary treatment component for development surface water runoff. They are not stand alone but occur as part of a treatment train of systems that will reduce the velocity of runoff prior to be released at the level spreader. In the absence of level spreaders, the potential for ground erosion is significantly greater than not using them.

Vegetation filters are essentially end-of-line polishing filters that are located at the end of the treatment train. In fact, vegetation filters are ultimately a positive consequence of not discharging directly into watercourses which is one of the mitigation components of the drainage philosophy. This makes use of the natural vegetation of the site to provide a polishing filter for the Proposed Wind Farm site drainage prior to reaching the downstream watercourses.

Again, vegetation filters are not intended to be a single or primary treatment component for treatment of works area runoff. They are not stand alone but are intended as part of a treatment train of water quality improvement/control systems.

Water Treatment Train:
A final line of defence will be provided by a water treatment train such as a "Siltbuster". If the discharge water from construction areas fails to be of a high quality during regular inspections, then a filtration treatment system (such as a 'Siltbuster' or similar equivalent treatment train (sequence of water treatment processes) will be used to filter and treat all surface discharge water collected in the dirty water drainage system. This will apply for all of the construction phase.

Pre-emptive Site Drainage Management:
The works programme for the entire construction stage of the Proposed Project will also take account of weather forecasts, and predicted rainfall in particular. Large excavations and movements of soil/subsoil or vegetation stripping will be suspended or scaled back if heavy rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast.

Management of Runoff from the Peat and Spoil Management Areas:

It is proposed that excavated peat/soil/subsoil (spoil) will be placed in the designated spoil management areas within the Proposed Wind Farm site and in linear berms along access roads and turbine hardstands where appropriate. The spoil management areas are located outside the 50m hydrological buffer zone.

Proposed surface water quality protection measures regarding the peat and spoil management areas are as follows:

- Where applicable the vegetative topsoil layer of the peat and spoil management areas will be rolled back to facilitate placement of excavated spoil up to a maximum height of 1.5 metres, following which the vegetative-top soils layer will be reinstated;
- Where reinstatement is not possible, peat and spoil management areas will be sealed with a digger bucket and seeded as soon possible to reduce sediment entrainment in runoff;
- An interceptor drain will be installed upslope of the identified peat and spoil management areas to divert any surface water away from these areas where necessary;
- Silt fences and double silt-fences will be emplaced down-gradient of the designated peat and spoil management areas and will remain in place throughout the entire construction phase, or until reseeding has been established to a sufficient level;
- The peat and spoil management areas are an enclosed areas and its drainage can be easily managed;
- Once the peat and spoil management area has been seeded and vegetation is established the risk to downstream surface water is significantly reduced.

Therefore, at each stage of the spoil management area development the above mitigation measures will be deployed to ensure protection of downstream water quality.

Timing of Site Construction Works:
Construction of the site drainage system will only be carried out during periods of low rainfall, and therefore minimum runoff rates. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses. Construction of the drainage system during this period will also ensure that attenuation features associated with the drainage system will be in place and operational for all subsequent construction works.

Monitoring:
An inspection and maintenance plan for the on-site construction drainage system will be prepared in advance of commencement of any works. Regular inspections of all installed drainage systems will be undertaken, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water in parts of the systems where it is not intended. Inspections will also be undertaken after tree felling.

Any excess build-up of silt levels at dams, the settlement pond, or any other drainage features that may decrease the effectiveness of the drainage feature, will be removed. Checks will be carried out on a daily basis.

During the construction phase field testing and laboratory analysis of a range of parameters with relevant regulatory limits and Environmental Quality Standards (EQSs) will be undertaken for each primary watercourse, and specifically following heavy rainfall events (as per the CEMP included in Appendix 4-2 of this EIAR).

Allowance for Climate Change:
Climate change rainfall projections are typically for a mid-century (2050) timeline. The projected effects of climate change on rainfall are therefore modelled towards the end of the life cycle of the Proposed Project, as the turbines have a life span of 35 years. It is likely that the long-term effects of climate change on rainfall patterns will not be observed during the lifetime of the Proposed Wind Farm. As outlined in the above sections we have designed settlement ponds for a 1 in 10-year return flow. This approach is conservative given that the Proposed Project will likely be built over a much shorter period (18-18 months), and therefore this in-built redundancy in the drainage design more than accounts for any potential short term climate change rainfall effects.

However, the settlement ponds are designed for 1 in 10 years flows with built in redundancy (+20%) to account for climate change effects on rainfall.

4.3.1.3 Mitigation Measures for Works Within the Hydrological Buffer Zones

Mitigation by Avoidance:
The Proposed Wind Farm layout has been designed to limit the amount of works within the delineated hydrological buffer zones associated with natural watercourses. Several consultations between HES, MKO and the project design team completed in the spring and summer of 2024 resulted in several design iterations which had the overall aim of reducing the volume of works within the buffer zones.

It is worth noting that whilst T2 is located within the 50m buffer zone. An existing road separates the proposed turbine location from the EPA mapped watercourse, which provides a natural barrier to prevent any runoff from the works are entering the watercourse at this location.

Mitigation by Design:
All mitigation measures detailed in Section 4.3.1.2 above will be implemented at these work locations.

The following additional mitigation measures will also be implemented:

- Double or triple silt fences will be placed downgradient of all work locations within the hydrological buffer zones; and,
- All works will be completed during the dry weather periods and works will be postponed in the event of rainfall.

4.3.1.4 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 the Environmental Clerk of Works will occur during the construction phase. If high levels of seepage inflow occur, excavation work will 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 final line of defence if needed.

4.3.1.5 Mitigation Measures for Effects on Groundwater Levels

The Proposed Wind Farm site is underlain by a Locally Important Bedrock Aquifer which is unproductive in terms of groundwater flow. This bedrock aquifer is overlain by glacial tills,

lacustrine clays and peat which are also of low permeability. No significant occurrence of granular sand and gravels was encountered during the site investigations.

The hydrogeological setting of the Proposed Wind Farm site means that no significant groundwater dewatering will be required during the construction phase. Moreover, direct rainfall and surface water runoff will be the main inflows that will require water volume and water quality management. For the avoidance of doubt, we would generally define dewatering as a requirement to temporarily drawdown the local groundwater table by means of over pumping, e.g. as would be required for the operation of a bedrock quarry in a valley floor. We consider that this example is very different in scale of excavations proposed.

Our reasoning is detailed in a series of bullet points as follows:

- The excavations will be relatively shallow;
- The local bedrock is known to be unproductive. This means that groundwater flows will be relatively minor;
- The flow paths (i.e. the distance from the point of recharge to the point of discharge) in this type of geology is short, localised, and will also be relatively shallow;
- No regional groundwater flow regime, i.e. large volumes of groundwater flow, will be encountered at these elevations;
- Therefore, shallow groundwater inflows will largely be fed by recent rainfall, and possibly by limited groundwater seepage;
- Site investigations show that there are no deposits of potentially water bearing granular subsoils in the local area – the subsoils are dominated by glacial tills, and lacustrine clays of relatively low permeability;
- This means that the hydrogeological regime of the area comprises of high surface water runoff as opposed to groundwater recharge and flow; and,
- Hence, we consider that the management of surface water will form the largest proportion of water to be managed and treated at the proposed excavation locations.

4.3.1.6 Mitigation Measures for Hydrocarbons

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

- All plant will be inspected and certified to ensure that they are leak free and in good working order prior to use at the Site.
- On-site re-fuelling will be undertaken using a double skinned bowser or a refuelling truck with spill kits kept onboard;
- Only designated trained operatives will be authorised to refuel plant on-site;
- Refuelling or maintenance of machinery will not occur within the delineated hydrological buffer zones;
- Fuels stored on Site will be minimised;
- Any diesel or fuel oils stored at the temporary construction compound will be bunded. The bund capacity will be sufficient to contain 110% of the storage tank's maximum capacity;
- The plant used will be regularly inspected for leaks and fitness for purpose; and,
- An emergency plan for the construction phase to deal with accidental spillages will be contained within the Construction and Environmental Management Plan (EIAR Appendix 4-2). Spill kits will be available to deal with accidental spillages.

In relation to the Proposed Grid Connection, whilst no oils are around the cables, a lubricant will be used during cable pulling. The lubricant to be used is Techlude PHD which is a pourable, non-flammable, non-toxic and substantially biodegradable water-based product that does not pose a threat to the environment (Techlube PHD Technical Information Datasheet: https://www.socomore.com/en/waterbased-lubricant-techlube-phd-20l-p-bk1.html).

4.3.1.7 Mitigation Measures for Cement-Based Products

Mitigation measures in relation to cement-based products are as follows:

- 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 cement 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; and,
- At turbine foundations, sand blinding, DPM, and lean-mix blinding are used to vertically contain the concrete. While the concrete is contained laterally by temporary/permanent shuttering. The concrete cures within 72hrs.

4.3.1.8 Mitigation Measures for Wastewater

Mitigation measures in relation to wastewater are as follows:

- 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 (and along the Proposed Grid Connection underground cabling route as required), maintained by the providing contractor, and removed from site on completion of the construction works;
- Water supply for the site office and other sanitation will be brought to Site and removed after use from the Site to be discharged at a suitable off-site treatment location; and,
- No water or wastewater will be sourced on the Site, nor discharged to the Site.

4.3.1.9 Mitigation Measures at Watercourse/Drain Crossings within the Proposed Wind Farm site

Mitigation measures for the new watercourse crossings are detailed below:

- The proposed new stream crossings at the Proposed Wind Farm site will be clear span watercourse crossings or bottomless box culverts. The construction methodology for these crossing have been designed to eliminate the requirement for instream works. No in-stream excavation works are proposed at these locations and therefore there will be no direct impact on the stream at the proposed crossing locations. Abutments will be constructed from precast units combined with in-situ foundations;
- All guidance / mitigation measures required by the OPW and/or the Inland Fisheries Ireland (IFI) 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;
- 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; and,
- All new 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. 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.

In relation to the new proposed culverts and proposed culvert upgrades at field drain crossings, the culverts will be suitably sized for the expected peak flows in the relevant drain. All culverts will be installed with a minimum internal gradient of 1% (1 in 100). Smaller culverts will have a smooth internal surface. Larger culverts may have corrugated surfaces which will trap silt and contribute to the stream ecosystem. Depending on the management of water on the downstream side of the culvert, large stone may be used to interrupt the flow of water. This will help dissipate its energy and help prevent problems of erosion. Smaller water crossings will simply consist of an appropriately sized pipe buried in the sub-base of the road at the necessary invert level to ensure ponding or pooling does not occur above or below the culvert and water can continue to flow as necessary.

4.3.1.10 Mitigation Measures at Watercourse Crossings along the Proposed Grid Connection

The vast majority of the Proposed Grid Connection is >50m from any nearby watercourse, sections within 50m of the route are confined to watercourse crossings and a small section of the route adjacent which runs adjacent to the Clarinbridge River. It is proposed to limit any works in any areas located within 50m of any watercourse/waterbody including the stockpiling of excavated soils and subsoils.

No in-stream works are required at any of these crossings, however due to the proximity of the streams to the construction work at the crossing locations, there is a potential for surface water quality impacts during trench excavation work. Mitigation measures are outlined below.

A constraint/buffer zone will be maintained for all crossing locations where possible, whereby all watercourses will be fenced off. In addition, measures which are outlined below will be implemented to ensure that silt laden or contaminated surface water runoff from the excavation work does not discharge directly to the watercourse.

The following mitigation measures are proposed for the Proposed Grid Connection watercourse crossing works:

- A constraint/buffer zone will be maintained for all crossing locations where possible;
- No stockpiling of construction materials will take place along the 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;
- Spill kits will be available in each item of plant required to complete the works; and,
- Silt fencing will be erected on ground sloping towards watercourses at the stream crossings if required.

Additional mitigation measures in relation to the proposed directional drilling are as follows:

- Near stream construction work, will only be carried out during the period permitted by Inland Fisheries Ireland for in-stream works according to the Eastern Regional Fisheries Board (2004) guidance document "Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites", i.e., May 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);
- The crossing works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance;
- Before any ground works are undertaken, double silt fencing will be placed upslope of the watercourse channels;
- Additional silt fencing or straw bales (pinned down firmly with stakes) will be placed across any natural surface depressions / channels that slope towards the watercourse;
- Silt fencing will be embedded into the local soils to ensure all site water is captured and filtered;
- The area around the bentonite batching, pumping and recycling plant will be bunded using terram (as it will clog) and sandbags in order to contain any spillages;
- Drilling fluid returns will be contained within a sealed tank / sump to prevent migration from the works area;
- Spills of drilling fluid will be cleaned up immediately and contained in an adequately sized skip before been taken off-site;
- If rainfall events occur during the works, there will be a requirement to collect and treat small volumes of surface water from areas of disturbed ground (i.e. soil and subsoil exposures created during site preparation works);
- This will be completed using a shallow swale and sump down slope of the disturbed ground; and water will be pumped to a proposed settlement pond area at least 50m from the watercourse;
- The discharge of water onto vegetated ground will be via a silt bag which will filter any remaining sediment from the pumped water. The entire percolation area will be enclosed by a perimeter of double silt fencing;
- Any sediment laden water from the works area will not be discharged directly to a watercourse or drain;
- Works shall not take place during periods of heavy rainfall and will be scaled back or suspended if heavy rain is forecasted;
- Daily monitoring of the compound works area, the water treatment and pumping system and the percolation area will be completed by a suitably qualified person during the construction phase. All necessary preventative measures will be implemented to ensure no entrained sediment, or deleterious matter is discharged to the watercourse;
- If high levels of silt or other contamination is noted in the pumped water or the treatment systems, all construction works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied;

- On completion of the works, the ground surface disturbed during the site preparation works and at the entry and exit pits will be carefully reinstated and re-seeded at the soonest opportunity to prevent soil erosion;
- The silt fencing upslope of the river will be left in place and maintained until the disturbed ground has re-vegetated;
- There will be no batching of cement along the Proposed Grid Connection underground cabling route;
- There will be no refuelling allowed within 100m of the watercourse crossing; and,
- All plant will be checked for purpose of use prior to mobilisation at the watercourse crossing.

Fracture Blow-out (Frac-out) Prevention and Contingency Plan:

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

4.3.1.11 Mitigation Measures for Piling Works

The proposed mitigation measures designed for the protection of downstream surface water quality and groundwater quality within the peat bog will be implemented at all construction work areas.

- Mitigation measures for sediment control are detailed in Section 4.3.1.1 and 4.3.1.2.
- Mitigation measures for the control of hydrocarbons during construction works are detailed in Section 4.3.1.4.
- Mitigation measures for the control of cement-based products during construction works are detailed in Section 4.3.1.5.

Proposed mitigation measures relative to piling works will comprise:

- Strict QA/QC procedures for piling works will be followed;
- Piles will be kept vertical during piling works;
- Good workmanship will be employed during all piling works; and,
- Where required use bentonite seal to prevent upward/downward movement of surface water/groundwater.

4.3.1.12 Mitigation Measures for the Use of Siltbuster

Measures employed to prevent overdosing and potential chemical carryover:

- The siltbuster system comprises an electronic in-line dosing system which provides an accurate means of adding reagents, so overdosing cannot occur;
- Continued monitoring and water analysis of pre and post treated water by means of an inhouse lab and dedicated staff, means the correct amount of chemical is added by the dosing system;

- Dosing rates of chemical to initiate settlement is small, being in the order of 2-10 mg/L and the vast majority of the chemical is removed in the deposited sediment;
- Final effluent not meeting the discharge criteria is recycled and retreated, which has a secondary positive effect of reducing carryover; and,
- Use of biodegradable chemical agents can be used at very sensitive sites (i.e. adjacent to SACs).

4.3.1.13 Mitigation Measures to Protect Surface Water Quality During Flood Event

Despite the low likelihood of a fluvial flood event occurring during the construction of the Proposed Wind Farm, weather/rainfall events of those magnitudes likely to generate significant rainfall which would in turn cause fluvial flooding would be forecastable.

An emergency response system has been development for the construction phase of the Proposed Project to respond to high rainfall events which may result in fluvial flooding.

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

As above, the first point of mitigation is ongoing monitoring of weather forecasts and weather warning. The project EM (Environmental Manager) or the site ECoW will be responsible for monitoring weather forecasts during the construction phase. There will be a 24-hour advance meteorological forecasting (Met Eireann download) linked to a trigger-response system. When a pre-determined rainfall trigger levels is exceeded (e.g., sustained rainfall (any foreseen rainfall event longer than 4 hour duration) and/or any yellow or greater rainfall warning (>25mm/hour) issued by Met Eireann), planned responses will be undertaken.

- Cessation of all construction works until the storm event, including the storm runoff has passed. All construction works will cease during storm events such as yellow warning rainfall events. Following heavy rainfall events, and before construction works recommence, the Site will be inspected and corrective measures implemented to ensure safe working conditions e.g. dewatering of standing water in open excavations, etc.
- Exposed soils/peat (exposed temporary stockpiles) will be sealed with the bucket of an excavator with plastic sheeting during all relatively heavy rainfall events and during periods where works have temporarily ceased before completion at a particular area (e.g., overnight and weekends).

With regards to the fluvial flood zones at the Proposed Wind Farm site, a managed retreat from the fluvial flood zones will be implemented in the event of a high intensity rainfall event and/or weather warning related to rainfall. This will include the following:

- Any areas where soil/subsoil is exposed at the surface will be compacted firmly with a digger bucket of a suitably sized excavator.
- Open trenches will be backfilled and compacted.
- All oils, fuels and waste material will be removed from the flood zones.
- Existing sediment control measures will be removed, as these may be washed away and deposited elsewhere by the floodwaters.
- Site access tracks will be scraps and any excess soft material will be removed from the flood zones.
- All plant, machinery and equipment will be removed from the flood zones.

4.3.2 Operational Phase

4.3.2.1 Mitigation Measures to Prevent Increase in Surface Water Runoff Rates

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; and,
- Settlement ponds will be designed in accordance the greenfield runoff rate requirements; and,
- Imported rock for construction purposes and road surfacing will be strong, well-graded limestone which will be resistant to erosion and have a low likelihood to generate fines in hardstand runoff.

As described above the proposed integration of the Proposed Wind Farm site drainage with the existing drainage is a key component of the proposed drainage management within the Proposed Project. By integration we mean maintaining surface water flowpaths where they already exist, avoid creation of new or altered surface water flowpaths, and maintaining the drainage regime (i.e. normal flow) within the agricultural lands and forested areas. Critically, there will be no alteration of the catchment size contributing to each of the main downstream watercourses. All wind farm drainage water captured within individual site sub-catchments will be attenuated and released within the same sub-catchments that it was captured.

4.3.2.2 Mitigation Measures to Protect Surface Water and Groundwater 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 4.3.1.2** above.

With regards to hydrocarbons:

- Onsite re-fuelling of normal operational vehicles will not be carried out during the operational phase of the development. These vehicles will be refuelled offsite;
- Fuels stored on site will be minimised and any hydrocarbons stored on-site will be bunded. The bund capacity will be sufficient to contain 110% of the storage tank's maximum capacity;
- The substation will be bunded appropriately to the volume of oils likely to be stored, and to prevent leakage of any associated chemicals and to groundwater or surface water. The bunded area will be fitted with a storm drainage system and an appropriate oil interceptor;
- Oil in the turbine transformers will be fully bunded within the enclosed turbine and as such, there is no potential pathway to the water environment i.e. the pathway has been blocked;

- Any plant used during the operational phase will be regularly inspected for leaks and fitness for purpose; and,
- Spill kits will be available to deal with accidental spillages.

4.3.2.3 Mitigation Measures for Downstream Flood Risk

The Proposed Wind Farm has been designed, cognisant of the fluvial flood risk at the Proposed Wind Farm site. Hardstands for the turbines located within or in close proximity to the modelled fluvial flood zones (T1, T2 and T8) have been designed with finished floor levels 0.5m above the flood levels for flood Zone B (1 in 1,000-year flood event). This design of a high level flood terrace, e.g. turbine hardstands with and a 0.50m freeboard for floor levels with ramps to wind farm road network that is to be placed at exiting ground levels, will ensure that flooding at the Proposed Wind Farm site poses no risk to the proposed infrastructure and that access will be maintained during flooding events. The proposed road network will be constructed at existing ground levels in order to avoid flood plain flow blockage of pre-construction flood flow paths. Access and egress to the Proposed Wind Farm site during the operational phase will be from the west, via the L3115. This location is outside of the modelled flood zones.

Furthermore, all works at watercourse crossings will be constructed in compliance with OPW Section 50 guidance.

The Stage 3 FRA demonstrates that the Proposed Wind Farm will not result in any significant change to water levels or flow velocities in the Raford or Killimor rivers. The FRA is included as Appendix 9-1. The FRA states that any potential increase in flood water levels as a result of the Proposed Project will be minimal, with some localised water level increases of 0.06m and 0.15m for the 100-year and 1,000-year flood events (plus climate change) respectively. Modelling also revealed that there will be no perceptible change in the river velocity as a result of the Proposed Wind Farm infrastructure (no potential for increased erosion). Calculations of the pre and post development peak run-off flow rates have an increase in flow to the river of 0.85m3/s for the critical rainfall event, and this relatively low flow will have an imperceptible effect on flood levels. Therefore, on the basis of the calculations and modelling presented in the FRA, it can be concluded that the development will not increase flood risk on the site or elsewhere.

Precautionary rock armouring should also be provided around new culverts and bridges within the Proposed Wind Farm site.

4.3.3 Decommissioning Phase

Proposed Wind Farm

In the event of decommissioning of the Proposed Wind Farm site, similar activities to the construction phase are carried out.

Potential effects will be similar to the construction phase but to a lesser degree. There may be increased trafficking and an increased risk of disturbance to underlying soils at the Proposed Wind Farm site, during the decommissioning phase. Any such potential effects will be less than during the construction stage as the drainage system will be fully mature and will provide additional filtration of runoff. Any diesel or fuel oils stored on site will be bunded. In the event of decommissioning of the Proposed Wind Farm, the proposed access tracks may be used in the decommissioning process.

Following decommissioning of the Proposed Wind Farm site; the turbine foundation areas will be rehabilitated, i.e. left in place, covered over with local soils/subsoils and allowed to re-vegetate naturally, if required. The internal site access tracks will be left in place. It is

considered that leaving these areas in-situ will cause less environmental damage than removing and recycling them.

The removal of this infrastructure (hardstanding areas, foundations etc.) would result in disturbance to the local environment in terms of disturbance to underlying soils and an increase in erosion, sedimentation, dust, noise, traffic and an increased possibility of contamination of the local water table. As such, these areas will be left in place and there will be no effects from a decommissioning process.

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

The residual effect on the water environment as a result of the decommissioning phase is considered to be: Negative, indirect, imperceptible, long-term, unlikely effect on groundwater quality and groundwater quantity in the Clare-Corrib GWB.

Proposed Grid Connection

The onsite substation will remain in place as it will be under the ownership/ control of the ESBN/ EirGrid. The Proposed Grid Connection underground cabling will also remain in place. As such there will be no effects associated with the Proposed Grid Connection during the decommissioning stage of the Proposed Project .

4.3.4 Potential Effects with the Implementation of Mitigation

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

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

SWB	WFD Code	Current Status	Assessed Status - Unmitigated	Assessed Status with Mitigation Measures
Raford_020	IE_WE_29R010200	Moderate	Poor	Moderate
Raford_030	IE_WE_29R010500	Good	Moderate	Good
Kilcolgan_030	IE_WE_29K010400	Poor	Poor	Poor
Clarinbridge_010	IE_WE_29C020040	Good	Good	Good
Clarinbridge_020	IE_WE_29C020200	Moderate	Moderate	Moderate
Clarinbridge_030	IE_WE_29C020300	Moderate	Moderate	Moderate
Carrowmoneash (Oranmore)_010	IE_WE_29C050400	Poor	Poor	Poor
GWDTE-Galway Bay Complex Fens (SAC000268)	IE_WE_G_0087	Good	Good	Good
GWDTE-Rahasane Turlough GWB	IE_WE_G_0100	Good	Good	Good
Loughrea GWB	IE_WE_G_0007	Good	Good	Good
Clarinbridge GWB	IE_WE_G_0008	Good	Good	Good

5. WFD ASSESSMENT CONCLUSION

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 significant 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 Wind Farm site to downstream receiving waters. Mitigation for the protection of surface water during the construction, operation and decommissioning phases of the Proposed Project 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 Site during the construction, operational and decommissioning phases of the Proposed Project. 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 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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6. REFERENCES

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Water Framework Directive "catchments.ie" Map Viewer (www.catchments.ie).

Directives and Legislation

Council Directive (76/160/EEC) Bathing Water and revised (2006/7/EC).

Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources (Nitrates Directive).

Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment.

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption.

Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy.

Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds.

Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014, amending Directive 2011/92/EU of the European Parliament and the Council of 13 December 2011 on the assessment of the impacts of certain public and private projects on the environment.

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S.I. No. 477/2011 - European Communities (Birds and Natural Habitats) Regulations 2011.

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