APPENDIX 23-2

WATER FRAMEWORK DIRECTIVE COMPLIANCE ASSESSMENT

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WATER FRAMEWORK DIRECTIVE COMPLIANCE ASSESSMENT SCEIRDE ROCKS OFFSHORE WIND FARM – ONSHORE SITE, CO. CLARE

FINAL REPORT

Prepared for:

FUINNEAMH SCEIRDE TEORANTA

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1. INTRODUCTION

1.1 BACKGROUND

Hydro-Environmental Services (HES) were requested by MKO, on behalf of Fuinneamh Sceirde Teoranta (FST), to complete a Water Framework Directive (WFD) Compliance Assessment for the onshore components of the Sceirde Rocks Offshore Wind Farm (i.e. 'the Project').

The purpose of this WFD assessment is to determine if any specific components or activities associated with the Onshore Site (see definitions below and at Section 4.1) of the Project will compromise WFD objectives or cause a deterioration in the status of any surface water or groundwater body and/or jeopardise the attainment of good surface water or groundwater status. This assessment will determine the water bodies with the potential to be impacted, describe the proposed mitigation measures and determine if the project is in compliance with the objectives of the WFD.

This WFD Assessment is intended to supplement the EIAR submitted as part of the wind farm planning application. As detailed in Section 1.1.1 in Chapter 1 of the EIAR, the various project components are described and assessed using the following references: the 'Project', the 'Onshore Site', the Onshore Grid Connection (OGC'), the Onshore Compensation Compound ('OCC'), and the Onshore Land Location ('OLL').

1.2 STATEMENT OF AUTHORITY

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

This WFD assessment was prepared by Michael Gill, 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. 22 years' environmental consultancy experience in Ireland. Michael has a degree in Civil and Environmental Engineering, a MSc in Engineering hydrology from TCD and a MSc in Applied Hydrogeology from Newcastle University. Michael has completed numerous (60+) hydrological and hydrogeological assessments relating to bedrock quarries and sand and gravel pits. Recent examples include Ardfert quarry in County Kerry and Middleton Quarry in County Cork.

Conor McGettigan (MSc, BSc) is an Environmental Scientist with over 4 years' experience in the environmental sector in Ireland. Conor holds an MSc in Applied Environment Science and a BSc in Geology. Conor routinely completed hydrological and hydrogeological impact assessment, flood risk assessments and WFD compliance assessments for a range of proposed developments including wind farms, residential developments, industrial developments, and quarries.

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

1.3 WATER FRAMEWORK DIRECTIVE

The EU Water Framework Directive (2000/60/EC), as amended by Directives 2008/105/EC, 2013/39/EU and 2014/101/EU ("**WFD**"), was established to ensure the protection of the water

environment. The Directive was transposed in Ireland by the European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003), as amended.

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 2009 to 2015 with the second cycle plan covering the period from 2016 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 and maintain a 'high' status where it already exists;
- Protect, enhance and restore all waters with aim to achieve at least good status by 2027;
- Ensure waters in protected areas meet requirements; and,
- Implement targeted actions and pilot schemes in focused sub-catchments aimed at (1) targeting water bodies close to meeting their objectives and (2) addressing more complex issues that will build knowledge during the third cycle.

[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), Groundwater Bodies (GWBs) and protected areas with potential to be affected by the Onshore Site and reviews all available WFD information.

2.2 SURFACE WATERBODY IDENTIFICATION

2.2.1 Onshore Landfall Location

On a regional scale, the Onshore Landfall Location (OLL) is located within the Mal Bay surface water catchment and Hydrometric Area 28 of the Shannon River Basin District. More locally the OLL site is located in the Doonbeg River WFD sub-catchment (Doonbeg_SC_010) and the Doonbeg_050 WFD river sub-basin.

There are no EPA/WFD mapped watercourses in the immediate vicinity of the OLL. The closest SWB to the OLL is a small stream located ~150m to the southeast. This watercourse forms part of the Doonbeg_050 SWB and flows to the northeast for ~680m before entering into the Shannon Plume coastal waterbody.

The Transition Joint Bay (TJB) at the OLL is situated ~115m from the cliff edge and the Shannon Plume coastal water body.

2.2.2 Onshore Grid Connection

The Onshore Grid Connection (OGC) is located within 2 no. regional surface water catchments. The northern section is located within the May Bay surface water catchment and Hydrometric Area 28 whilst the southern section is located within the Shannon Estuary North surface water catchment and Hydrometric Area 27. Both of these regional surface water catchments are located in the Shannon River Basin District.

Within the Mal Bay surface water catchment, the OGC is predominantly located in the Doonbeg river sub-catchment (Doonbeg_SC_010). The OGC passes through the Doonbeg_050 and Ballard_010 WFD River sub-basins with 4 no. watercourse crossings over the Doonbeg_050 SWB.

Within the Shannon Estuary North surface water catchment, the OGC is predominantly mapped in the Wood River sub-catchment (Wood_SC_010). Meanwhile, ~1.7km in the south is located in the Cloon[Clare] River sub-catchment (Cloon[Clare]_SC_010). The OGC is mapped with a total of 4 no. WFD river sub-basins. There are a total of 2 no. crossings over the Moyasta_010 SWB, 2 no. crossings over the Wood_020 SWB, and 3 no. crossings over the Tonavoher_010 SWB.

2.2.3 Onshore Compensation Compound

On a regional scale, the Onshore Compensation Compound (OCC) is located in the Shannon Estuary North surface water catchment and the Cloon[Clare]_SC_010 river sub-catchment.

On a more local scale, the OCC is located within the Tonahover_010 WFD river sub-basin. The closest mapped watercourse to the OCC is the Ballynote East stream, which runs along the northern border of the OCC. This stream forms part of the Tonavoher_010 SWB. This stream flows to the west before veering to the south for 1.8km and discharging into the Lower Shannon Estuary transitional water body.

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

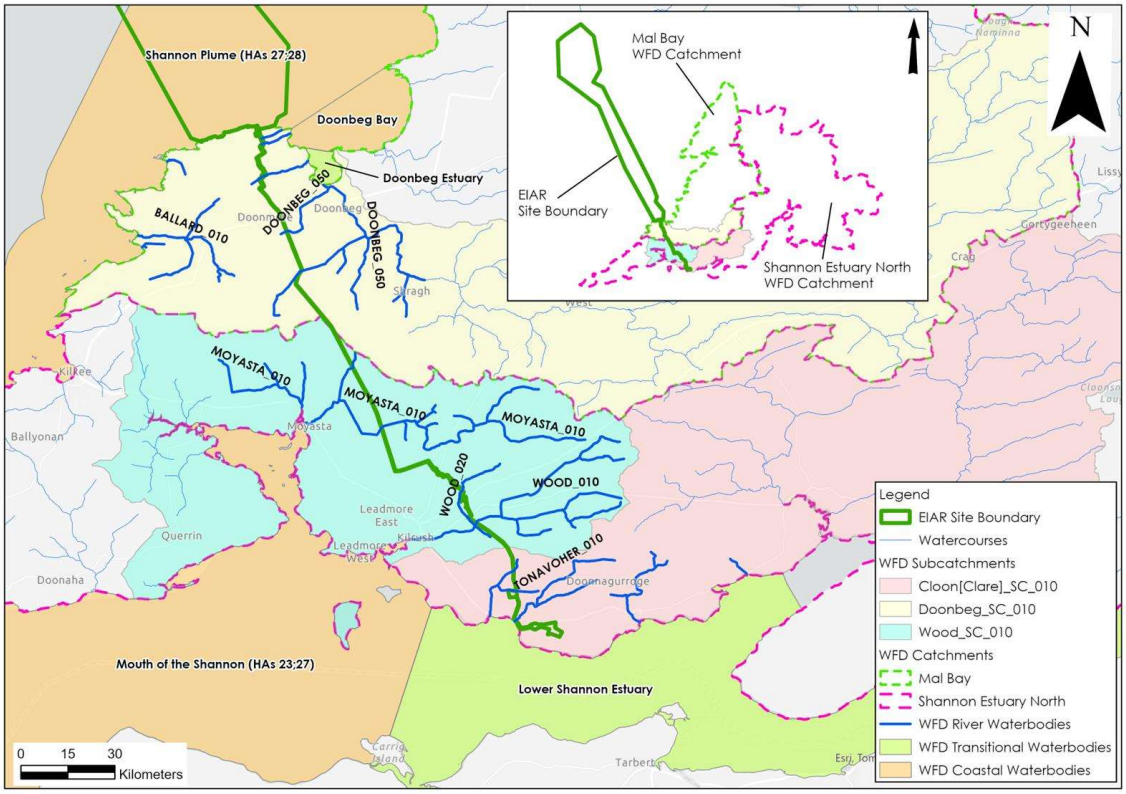

Figure A: Local Hydrology Map

2.3 SURFACE WATER BODY CLASSIFICATION

A summary of the WFD status and risk result for SWBs downstream of the Onshore Site are shown in **Table A**. The overall status of SWBs is based on the ecological, chemical and quantitative status of each SWB. Local SWB status information is available from (www.catchments.ie).

2.3.1 Onshore Landfall Location

The OLL is mapped in the Doonbeg_050 WFD river sub-basin. This SWB achieved 'Good' status based on the latest WFD cycle (2016-2021). This was an improvement on the 'Moderate' status which achieved in the 2nd cycle (2013-2018). The risk status of the Doonbeg_050 SWB is currently under review. No significant pressures have been identified to be impacting on this SWB.

Further downstream the Shannon Plume coastal waterbody achieved 'High' status in the latest WFD cycle (2016-2021). This SWB is deemed to be 'not at risk' and no significant pressures have been identified.

2.3.2 Onshore Grid Connection

The OGC passes through a total of 6 no. WFD river sub-basins.

The status of the Doonbeg_050 SWB is described above in Section 2.3.1.

Elsewhere, the SWBs along the OGC predominantly achieved 'Moderate' status based on the latest WFD cycle (2016-2021). These SWBs include the Ballard_010, Moyasta_010, Wood_020 and Tonavoher_010 SWBs. This represented a deterioration in status for the Moyasta_010 SWB which achieved 'Good' status based on 2013-2018 data. The status of the Ballard_010,

Wood_020 and Tonavoher_010 SWBS remains unchanged (based on data from 2013-2018 and data from 2016-2021). The Wood_010 SWB achieved 'Poor' status in all data periods (2010-2015, 2013-2018, and 2016-2021).

The risk status of the SWBs along the OGC are predominantly under review. The Wood_010 and Wood_020 SWBs are deemed to be 'at risk' of failing to meet their respective WFD objectives. Agriculture is listed as a significant pressure on both of these SWBs with forestry, urban runoff and other unknown pressures also impacting the Wood_020 SWB.

In terms of transitional and coastal waterbodies downstream of the OGC, the Lower Shannon Estuary SWB, Doonbeg Bay SWB and the Mouth of the Shannon SWB are of 'Good' status. The Shannon Estuary Plume is of 'High' status. These SWBs are deemed to be 'not at risk' and no significant pressures have been identified.

2.3.3 Onshore Compensation Compound

The OCC is located within the Tonavoher_010 WFD river sub-basin. The status of this SWB and the downstream Lower Shannon Estuary transitional SWB are described above.

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

Table A: Summary WFD Information for Surface Water Bodies

SWB	Overall Status (2010-2015)	Overall Status (2013-2018)	Overall Status (2016-2021)	WFD Risk	Pressures
Doonbeg_050	Good	Moderate	Good	Under review	None
Ballard_010	Unassigned	Moderate	Moderate	Under review	None
Moyasta_010	Unassigned	Good	Moderate	Under Review	None
Wood_010	Poor	Poor	Poor	At risk	Agriculture
Wood_020	Poor	Moderate	Moderate	At risk	Agriculture, forestry, other & urban runoff
Tonavoher_010	Unassigned	Moderate	Moderate	Under Review	None
Doonbeg Estuary	Unassigned	Moderate	Moderate	Under Review	None
Lower Shannon Estuary	Moderate	Good	Good	Not at risk	None
Doonbeg Bay	Unassigned	High	Good	Not at risk	None
Mouth of the Shannon (HAs 23;27)	Moderate	Good	Good	Not at risk	None
Shannon Plume (HAs 27;28)	Unassigned	High	High	Not at risk	None

2.4 GROUNDWATER BODY IDENTIFICATION

There are two groundwater bodies below the footprint of the Onshore Site. The area of these two GWBs define the extents of the GWB ZOI (zone of influence) for the Onshore Site (refer to **Figure B**).

The Miltown Malbay GWB underlies the north of the Onshore Site, including the OLL and the northern section of the OGC. According to GSI mapping (www.gsi.ie) this area of the Onshore Site is underlain by Namurian Sandstones which are classified as being a Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones.

The Kilrush GWB underlies the south of the Onshore Site, including the central and southern section of the OGC and the OCC. According to GSI mapping (www.gsi.ie) the area is underlain by Namurian Undifferentiated rocks which are classified as being a Locally Important Aquifer (LI) - Bedrock which is Moderately Productive only in Local Zones.

2.5 GROUNDWATER BODY CLASSIFICATION

The Miltown Malbay GWB (IE_SH_G_167) and Kilrush GWB (IE_SH_G_123) which underlie the Onshore Site achieved 'Good' status in all 3 no. WFD cycles. This applies to both quantitative status and chemical status of the GWBs. Both GWBs have been deemed to be "not at risk" and no significant pressures have been identified.

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

Table B: Summary WFD Information for Groundwater Bodies

GWB	Overall Status (2010-2015)	Overall Status (2013-2018)	Overall Status (2016-2021)	WFD Risk	Pressures
Miltown Malbay	Good	Good	Good	Not at risk	None
Kilrush	Good	Good	Good	Not at risk	None

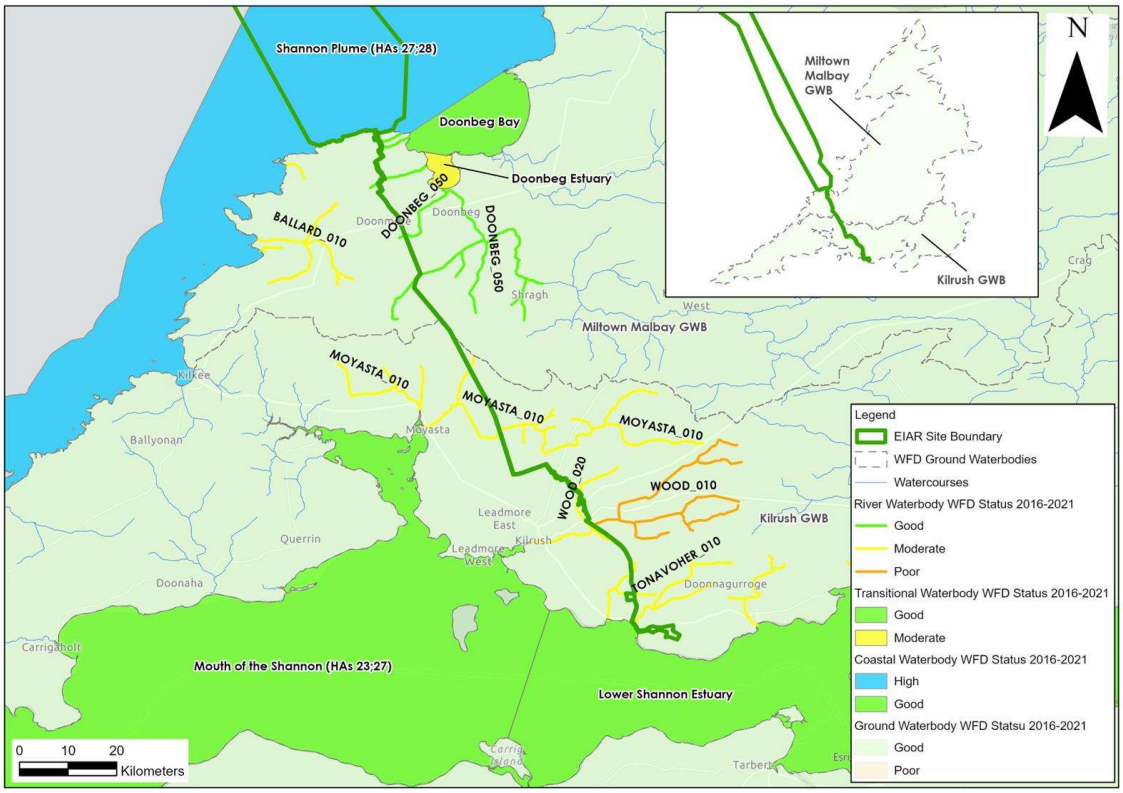

Figure B: WFD Groundwater and Surface Waterbody Status (2016-2021)

2.6 ZONE OF INFLUENCE

The zone of influence of the Onshore Site of the Project extends to the following SWBs, GWBS, and Transitional and Coastal water bodies:

- SWBs – Doonbeg_050, Ballard_010, Moyasta_010, Wood_010, Wood_020, and Tonavoher_010.
- GWBs – Miltown Malbay GWB and Kilrush GWB.
- Transitional and Coastal waterbodies – Doonbeg Estuary, Lower Shannon Estuary, Doonbeg Bay, Mouth of the Shannon, and Shannon Plume.

2.7 PROTECTED AREAS IDENTIFICATION

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

2.7.1 Nature Conservation Designations

Within the Republic of Ireland designated sites include Natural Heritage Areas (NHAs), Proposed Natural Heritage Areas (pNHAs), and European Sites.

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

The Onshore Site is not located within any designated conservation site. However, there are designated sites located within the ZOI (zone of influence) to the OGC route as described below:

- Approximately 1.3km of the OGC in the townland of Carrowmore South is located adjacent to Tullaher Lough and Bog SAC (Site Code: 002343) and pNHA (Site Code: 000070). This designated site is located immediately to the west of the local road within which the OGC is proposed; and,
- Approximately 400m of the OGC between the OCC and Moneypoint, along the N67, is located adjacent and to the east of the River Shannon and River Fergus Estuaries SPA (Site Code: 004077) and the Lower River Shannon SAC (Site Code: 002165).

Other designated sites downstream of the Onshore Site include:

- The Mid-Clare Coast SPA (Site Code: 004182) which is located downstream of the OGC via the Doonbeg River and its tributaries;
- Carrowmore Dunes SAC (Site Code: 002250) which is located downstream of the OGC via the Doonbeg River and its tributaries;
- The White Strand/Carrowmore Marsh pNHA (Site Code: 01007) which is located downstream of the OGC via the Doonbeg River and its tributaries;
- Farrihy Lough pNHA (Site Code: 000200) is located downstream of the OGC in the Ballard_010 river sub-basin. There is no direct mapped hydrological connection between the Onshore Site and this pNHA. Only 200m of the OGC is mapped within this river sub-basin, thereby further limiting the potential for a deterioration in the status of the pNHA to occur;
- Kilkee Reefs SAC (Site Code: 002264) is located downstream of the OGC in the Ballard_010 river sub-basin. There is no direct hydrological connection between the Onshore Site and this SAC;
- The River Shannon and River Fergus Estuaries SPA (Site Code: 004077) is located downstream of the OGC and OCC in the Shannon Estuary North surface water catchment; and,
- The Lower River Shannon SAC (Site Code: 002165) is located downstream of the OGC and OCC in the Shannon Estuary North surface water catchment.

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 is 1 no. designated bathing water in the ZOI to the OLL and the northern section of the OGC. These bathing waters are situated on White Strand in Doonbeg, ~950m to the east of the OLL and are associated with the Doonbeg Bay coastal waterbody.

There is also a designated bathing water downstream of the OGC at Cappagh Pier, Kilrush. This designated bathing water is associated with the Mouth of the Shannon coastal waterbody and is located ~2.7km southwest of the OGC.

2.7.3 Nutrient Sensitive Areas

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

There are no NSAs in the ZOI of the Onshore Site.

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.

There is 1 no. designated shellfish protected area downstream of the OGC. The West Shannon Poulnasherry Bay designated shellfish area is located ~2.9km to the southwest and downstream of the OGC via the Moyasta_010 SWB. The shellfish area is hosted in the Mouth of the Shannon coastal waterbody.

2.7.5 Drinking Water

There are no listed/mapped surface water abstractions for drinking water in the ZOI of the Onshore Site.

All GWB's in Ireland are considered as DWPAs. The Miltown Malbay GWB (IE_SH_G_167) and Kilrush GWB (IE_SH_G_123) are both used for the abstraction of drinking water for local supplies. No public or group water schemes are located in the local area.

3. WFD SCREENING

As discussed in **Section 2**, there are a total of 6 no. river water bodies that are located within the ZOIs defined above for the Onshore Site. In addition, there are 2 no. transitional waterbodies and 3 no. coastal waterbodies in the ZOI. Furthermore, the Onshore Site is underlain by 2 no. GWBs (refer to ZOI defined above).

3.1 SURFACE WATER BODIES

With consideration for the construction, operational and decommissioning phases of the Project, it is considered that the Doonbeg_050, Ballard_010, Moyasta_010, Wood_010, Wood_010 and Tonavoher_010 SWBs will be included in the WFD Compliance Assessment due to the occurrence of components of the Project within each of these WFD river sub-basins. The 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.

In terms of the onshore components (OGC, OCC, and OLL) of the Project, all transitional and coastal waterbodies downstream of the Onshore Site have been screened out of the WFD Compliance Assessment due to the large volume of saline waters within each of these waterbodies, and the associated high assimilation capacity of these waterbodies (estuary/bay). Given the scale of the works being proposed there would be very limited potential for a deterioration in the status of the Lower Shannon Estuary, Doonbeg Estuary, Doonbeg Bay, Mouth of the Shannon and Shannon Plume SWBs. The Onshore Site would have no potential to cause deterioration of the WFD status of these SWBs.

3.2 GROUNDWATER BODIES

With respect to GWBs, the Miltown Malbay and Kilrush GWBs have been screened in due to their location directly underlying the Onshore Site. The proposed works must not in any way result in a deterioration in the status of this GWB and/or prevent it from meeting the biological and chemical characteristics for good status in the future.

3.3 PROTECTED AREAS

3.3.1 Nature Conservation Designations

The following designated sites are included in the WFD Compliance Assessment:

- The Tullaher Lough and Bog SAC/pNHA is screened in due to its proximal location to the OGC. Approximately 1.3km of the OGC in the townland of Carrowmore South is located adjacent to Tullaher Lough and Bog SAC (Site Code: 002343) and pNHA (Site Code: 000070);
- The River Shannon and River Fergus SPA is screened in due to its proximal location to the OGC. Approximately 400m of the OGC between the OCC and Moneypoint, along the N67, is located adjacent and to the east of the River Shannon and River Fergus Estuaries SPA (Site Code: 004077);
- The Lower River Shannon SAC is screened in due to its proximal location to the OGC. Approximately 400m of the OGC between the OCC and Moneypoint, along the N67, is located adjacent and to the east of the Lower River Shannon SAC (Site Code: 002165); and,
- Farrihy Lough pNHA (Site Code: 000200) is located ~200m downstream from the OGC and will also be included in the WFD Compliance Assessment.

All other downstream designated sites have been screened out of the assessment due to their distant location from the Onshore Site, the large volumes of water within the associated coastal and transitional waterbodies (which provides infinite assimilative capacity) and the saline nature of the waters. Given the separation distance, the large volumes of saline water

within the associated waterbodies, and the scale of the Onshore Site, there is no potential for a deterioration in the status of the following designated sites:

- The Mid-Clare Coast SPA (Site Code: 004182);
- Carrowmore Dunes SAC (Site Code: 002250);
- White Strand/Carrowmore Marsh pNHA; and,
- Kilkee Reefs SAC (Site Code: 02264).

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

3.3.2 Bathing Waters

The bathing waters at White Strand in Doonbeg and at Cappagh Pier, Kilrush have been screened out of the WFD Compliance Assessment due to their distant location (>900m) from the proposed works areas and the large volume of saline waters within the coastal waterbodies associated with these bathing waters.

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

3.3.3 Nutrient Sensitive Areas

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

3.3.4 Shellfish Areas

The West Shannon Poulnasherry Bay designated shellfish area has been screened out due to its distant location from the proposed works (~2.9km) and the large volume of saline water within the Mouth of the Shannon coastal waterbody.

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

3.3.5 Drinking Water Protected Areas

There are no SWB DWPAs within the ZOI of the Onshore Site.

The GWBs underlying the Onshore Site are DWPAs and will be assessed (in this report) in the overall assessment of the Project on the Miltown Malbay and Kilrush GWBs.

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

3.4 WFD SCREENING SUMMARY

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

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

Type	WFD Classification	Water body Name/ID	Inclusion in Assessment	Justification
Surface Water Body	River	Doonbeg_050	**Yes**	The OLL and OGC (including 4 no. SWB crossings) are located within the Doonbeg_050 river sub-basin. An assessment is required to consider whether the potential impacts associated with the Project will cause a deterioration in the status of this SWB.
	River	Moyasta_010	**Yes**	The OGC (including 2 no. SWB crossings) is mapped in the Moyasta_010 river sub-basin. An assessment is required to consider whether the potential impacts associated with the Project will cause a deterioration in the status of this SWB.
	River	Wood_010	**Yes**	The OGC is mapped in the Wood_010 river sub-basin. An assessment is required to consider whether the potential impacts associated with the Project will cause a deterioration in the status of this SWB.
	River	Wood_020	**Yes**	The OGC (including 2 no. SWB crossings) is mapped in the Wood_020 river sub-basin. An assessment is required to consider whether the potential impacts associated with the Project will cause a deterioration in the status of this SWB.
	River	Tonavoher_010	**Yes**	The OGC (including 3 no. SWB crossings) and the OCC are mapped in the Tonavoher_010 river sub-basin. An assessment is required to consider whether the potential impacts associated with the Project will cause a deterioration in the status of this SWB.
	River	Ballard_010	**Yes**	The OGC is mapped within the Ballard_010 river sub-basin. An assessment is required to consider whether the potential impacts associated with the Project will cause a deterioration in the status of this SWB.
	Transitional	Doonbeg Estuary	No	Doonbeg Estuary is located downstream from the Doonbeg_050 SWB. However, due to the large volume of salt water present in the estuary, any possible contaminants from the OLL, the OGC or the OCC will be diluted and there is no potential for a deterioration in the WFD status. The proposed works therefore have no potential to result in a deterioration in the status of this SWB.
	Transitional	Lower Shannon Estuary	No	The Lower Shannon Estuary has been screened out due to the large volume of salt water present in the estuary, any possible contaminants will be diluted and not affect the quality of the water body. The proposed works therefore have no potential to result in a deterioration in the status of this SWB.
	Coastal	Shannon Plume	No	The Shannon Plume has been screened out due to the large volume of salt water present in the coastal water body, any possible contaminants from the OLL, the OGC or the OCC will be diluted and not affect the quality of the water body. The proposed works therefore have no potential to result in a deterioration in the status of this SWB.
	Coastal	Doonbeg Bay	No	Doonbeg Bay has been screened out due to the large volume of salt water present in the coastal water body, any possible contaminants from the OLL, the OGC or the OCC will be diluted and not affect the quality of the water body. The proposed works therefore have no potential to result in a deterioration in the status of this SWB.
	Coastal	Mouth of the Shannon (HAs 23;27)	No	The Mouth of the Shannon (HAs 23;27) has been screened out due to the large amount of salt water present in the coastal water body, any possible contaminants from the OLL, the OGC or the OCC will be diluted and not affect the quality of the water body. The proposed works therefore have no potential to result in a deterioration in the status of this SWB.

Groundwater Body	Groundwater	Miltown Malbay	**Yes**	The Miltown Malbay GWB will be brought forward into the WFD Compliance Assessment as it lies directly underneath the OLL and the OGC. An assessment is required to consider whether the potential impacts associated with the Project will cause a deterioration in the status of this GWB.
	Groundwater	Kilrush	**Yes**	The Kilrush GWB will be brought forward into the WFD Compliance Assessment as it lies directly underneath the OGC or the OCC. An assessment is required to consider whether the potential impacts associated with the Project will cause a deterioration in the status of this GWB.
Protected Area	Nature Conservation Site	Mid-Clare Coast SPA	No	The Mid-Clare Coast SPA has been screened put due to the large volume of salt water present in the coastal water body associated with the SPA. The proposed works therefore have no potential to degrade the ecological quality of this protected site.
		Carrowmore Dunes SAC	No	The Carrowmore Dunes SAC has been screened put due to the large volume of salt water present in the coastal water body associated with the SAC. The proposed works therefore have no potential to degrade the ecological quality of this protected site.
		Kilkee Reefs SAC	No	Kilkee Reefs SAC has been screened out due to the large volume of salt water present in the coastal water body associated with the SAC. The proposed works have no potential to degrade the ecological quality of this protected site.
		Farrihy Lough pNHA	**Yes**	Farrihy Lough pNHA is located in the close proximity to the OGC. An assessment is required to consider whether the Project has the potential to degrade the quality of this protected site.
		Tullaher Lough and Bog SAC and pNHA	**Yes**	Tullaher Lough and Bog SAC and pNHA is located in the close proximity to the OGC. An assessment is required to consider whether the Project has the potential to degrade the ecological quality of this protected site.
		Lower River Shannon SAC	**Yes**	Lower River Shannon SAC is located in the close proximity to the OGC. An assessment is required to consider whether the Project has the potential to degrade the ecological quality of this protected site.
		River Shannon and River Fergus Estuaries SPA	**Yes**	River Shannon and River Fergus Estuaries SPA is located in the close proximity to the OGC. An assessment is required to consider whether the Project has the potential to degrade the ecological quality of this protected site.
	Shellfish Waters	West Shannon Poulnasherry Bay	No	The West Shannon Poulnasherry Bay shellfish protected area has been screened out due to the large volume of salt water present in the coastal water body associated with the SAC. The proposed works therefore have no potential to degrade the ecological quality of this protected site.
	Bathing Waters	White Strand, Doonbeg	No	The bathing waters at White Strand in Doonbeg have been screened out of the WFD Compliance Assessment due to their distant location (>900m) from the proposed works areas and the large volume of saline waters within the coastal waterbody associated with these bathing waters. The proposed works therefore have no potential to degrade the quality of this protected site.
		Cappagh Pier, Kilrush	No	The bathing waters at Cappagh Pier, Kilrush have been screened out of the WFD Compliance Assessment due to their distant location (2.7km) from the proposed works areas and the large volume of saline waters within the coastal waterbody associated with these bathing waters. The proposed works therefore have no potential to degrade the ecological quality of this protected site.

4. WFD COMPLIANCE ASSESSMENT

4.1 DEVELOPMENT PROPOSALS

The Onshore Site includes the OLL, the OCC and the OGC. For clarity, these include:

- A temporary construction compound at the landfall, of 5,460m^2 in area, with associated temporary access track in the townland of Killard, to facilitate the trenchless drilling operations at landfall;
- A high voltage (220kV) alternating current export cable laid underground for approximately 19.3 km between the transition joint bay in the townland of Killard, Co. Clare to the new Onshore Compensation Compound in the townland of Ballymacrinan, Co. Clare;
- Fibre optic cables for operation and control purposes, and earthing cables, laid underground with the export cable for approximately 19.3 km between the transition joint bay in the townland of Killard, Co. Clare to the new 220kV Onshore Compensation Compound in the townland of Ballymacrinan, Co. Clare;
- A high voltage (220kV) alternating current export cable laid underground for approximately 3 km between the new Onshore Compensation Compound in the townland of Ballymacrinan, Co. Clare and the existing 220kV Moneypoint substation in the townland of Carrowdotia South, Co. Clare;
- Fibre optic cables for operation and control purposes, and earthing cables, laid underground with the export cable for approximately 3 km between the new Onshore Compensation Compound in the townland of Ballymacrinan, Co. Clare and the the existing 220kV Moneypoint substation in the townland of Carrowdotia South, Co. Clare;
- 43 no. joint bays along the export cable route;
- 1 no. onshore 220kV electrical Onshore Compensation Compound (OCC) located in the townland of Ballymacrinan, Co. Clare. The OCC consists of an Eirgrid 220kV Gas Insulated Switchgear (GIS) building, a ESB 220kV Networks GIS building, a Customer SCADA and MV power building and a Statcom building, welfare facilities, wastewater holding tank, access roads, car parking, security fencing, telecommunications pole, lighting, lightning masts, landscaping, and drainage;
- 2 no. temporary construction compounds (in addition to the temporary construction compound at the landfall) with temporary site offices and staff facilities;
- Reinstatement of the road or field surface above the proposed cabling trench along the OGC route;

The Onshore Site is described in full in Chapter 5 of the EIAR.

4.2 POTENTIAL EFFECTS

4.2.1 Construction Phase (Unmitigated)

4.2.1.1 Potential Surface Water Quality Effects

Construction phase activities including tree felling, site levelling/construction and foundation excavation will require earthworks resulting in removal of vegetation cover and excavation of

soil and subsoils. The main risk will be from surface water runoff from bare soil and spoil storage areas during the construction works.

Hydrocarbons and cement-based compounds will also be used during the construction phase. The unintended release of effluent from temporary welfare facilities used during the construction phase also has the potential to impact on surface water quality.

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

There is also a requirement for watercourse crossings over EPA mapped watercourses along the OGC. In addition, there are several crossings over unmapped watercourses. Due to the close proximity of works to streams and rivers at the crossing locations, there is a potential for surface water quality effects during trench excavation due to runoff from the road surface. This runoff may contain elevated concentration of suspended solids, cementitious materials and/or hydrocarbons. A total of 4 no. EPA mapped watercourses will be crossed by horizontal directional drilling (HDD), with an additional 15 no. crossings over manmade ditches and drains will also utilise HDD. All other crossings will be achieved using either Standard Trefoil Formation and Flatbed Formation.

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 require management and treatment to reduce suspended sediments.

However, construction activities along the OGC only have the potential for short-term effects due to the minor and transient nature of the works (refer to Section 1.5.2.1 of Chapter 5: Project Description of the EIAR for construction phasing and timing). No watercourses are mapped in close proximity to the OLL and no significant effects on the hydrological environment will occur. The greatest potential for a deterioration in the WFD status would be on the Tonavoher_010 SWB due to the proximal location of the OCC to a mapped watercourse.

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

Table D: Potential Deterioration in Surface Waterbody Status during the Construction Phase (Unmitigated)

SWB	WFD Code	Current Status	Assessed Potential Status Change
Doonbeg_050	IE_SH_28D020770	Good	Good
Ballard_010	IE_SH_28B420460	Good	Good
Moyasta_010	IE_SH_27M040900	Moderate	Moderate
Wood_010	IE_SH_27W010100	Poor	Poor
Wood_020	IE_SH_27W010200	Moderate	Moderate
Tonavoher_010	IE_SH_27T230880	Moderate	Poor

4.2.1.2 Potential Groundwater Quality/Quantity Effects

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. These sources of contamination have the potential to impact on groundwater quality in the underlying groundwater bodies in the area of the Onshore Site. These sources of contamination have the potential to impact on groundwater quality in the underlying GWBs.

In terms of groundwater quantity, no significant dewatering is being proposed. Due to the shallow, short-term and transient nature of the proposed works along the proposed Onshore Grid Connection, there is no potential for a deterioration in the qualitative status of the overall GWBs.

Furthermore, due to the low permeability of the bedrock aquifers and the shallow nature of the proposed works, there is limited potential for the Onshore Site to result in a deterioration in the overall quantitative status of the underlying GWBs. The potential for the Project to result in a deterioration in the status of the GWBs is further limited by the scale of the Project in comparison to the overall size of the Miltown Malbay (770km^2) and Kilrush (440km^2) GWBs.

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

Table E: Potential Deterioration of Groundwater Body Status during the Construction Phase (Unmitigated)

GWB	WFD Code	Current Status	Assessed Potential Status Change
Miltown Malbay	IE_SH_G_167	Good	Good
Kilrush	IE_SH_G_123	Good	Good

4.2.1.3 Potential Effects on Protected Areas

The surface water and groundwater connections from the Onshore Site could transfer poor quality surface water that may affect the conservation objectives of these designated sites.

Farrihy Lough pNHA:
Due to the nature and scale of the works along the OGC within the Ballard_010 sub-basin there is limited potential for the works to result in a deterioration in the status of this pNHA. The works will be transient and short-term in nature and only ~200m of works are mapped within this sub-basin. All works will be located within the carriageway of the existing public road network. Furthermore, there is no direct hydrological connection mapped between the Onshore Site and this pNHA.

Tullaher Lough and Bog SAC/pNHA:
Due to the nature and scale of the works along the OGC there is limited potential for the works to result in a deterioration in the status of this SAC/pNHA. The works will be transient and short-term in nature, and all works adjacent the SAC/pNHA will be located within the carriageway of the existing public road network.

The SAC/pNHA is located in the Doonbeg_050 river sub-basin and the bog is drained by the EPA mapped Carrowmore South Stream which flows northwards from Tullagher Lough, crossing the local road within which the underground cabling is proposed, before eventually discharging into the Doonbeg River. The OGC is therefore, located downgradient of this SAC/pNHA. Groundwater flow direction will mimic surface water flows and will also flow to the north.

Furthermore, during site walkover surveys deep roadside drains were noted to be present in the section of the OGC adjacent to the SAC/pNHA. These roadside drains hydraulically isolate the road carriageway from the SAC/pNHA. These roadside drains have drained the local groundwater table and form part of the baseline environment. The road would not exist without these roadside drains. As a result, no additional dewatering or drainage will occur along this section of the OGC during trench excavations. As such, The Project has no potential to alter groundwater levels within the adjacent bog.

Lower River Shannon SAC:
Due to the nature and scale of the works along the OGC near Moneypoint, there is limited potential for the works to result in a deterioration in the status of this SAC. The works will be transient and short-term in nature, and all works adjacent to the SAC will be located within the verge of the existing public road network, on the opposite side of the road to the SAC. Furthermore, the large volumes of saline water in the adjacent waterbody will provide a significant dilution effect.

River Shannon and River Fergus Estuaries SPA:
Due to the nature and scale of the works along the OGC near Moneypoint, there is limited potential for the works to result in a deterioration in the status of this SPA. The works will be transient and short-term in nature, and all works adjacent to the SPA will be located within the verge of the existing public road network, on the opposite side of the road to the SAC. Furthermore, the large volumes of saline water in the adjacent waterbody will provide a significant dilution effect.

4.2.2 Operational Phase (Unmitigated)

4.2.2.1 Potential Surface Water Quantity Effects

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 Onshore Site and increase flood risk downstream.

However, the construction compound at the OLL is temporary and the area will be reinstated once construction works are complete. Therefore, there is limited potential for changes to runoff rates at the OLL.

There will be limited potential for effects on surface water quantity associated with the OGC, as the works are predominantly located within the carriageway of the existing roads. New access tracks will be built over some off-road sections of the route in 3rd party lands.

The greatest potential for effects on surface water quantity is associated with the OCC which is located in the Tonavoher_010 river sub-basin. The replacement natural surfaces with impermeable surfaces, associated with the substation and the associated compound, has the potential to increase runoff rates to local watercourses and can increase downstream flow volumes. However, there is limited potential for a deterioration in the quantitative status of the Tonavoher_010 SWB due to the small footprint of the Project.

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

Table F: Potential Deterioration in Surface Waterbody Status Due to Quantitative Effects During Operational Phase (Unmitigated)

SWB	WFD Code	Current Status	Assessed Potential Status Change
Doonbeg_050	IE_SH_28D020770	Good	Good
Ballard_010	IE_SH_28B420460	Good	Good
Moyasta_010	IE_SH_27M040900	Moderate	Moderate
Wood_010	IE_SH_27W010100	Poor	Poor
Wood_020	IE_SH_27W010200	Moderate	Moderate
Tonavoher_010	IE_SH_27T230880	Moderate	Poor

4.2.2.2 Potential Surface Water Quality Effects

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 at the OCC or along access tracks over the OGC, and 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 road material is added during maintenance works.

The greatest potential for a deterioration in the status of downstream SWBs will be associated with the OCC. Any leakage of oils or release of untreated wastewater would have the potential to impact on local surface water quality. The OCC is mapped in the Tonavoher_010 river sub-basin and therefore this SWB is most susceptible to a potential deterioration in its WFD status.

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

Table G: Potential Deterioration in Surface Waterbody Status due to Qualitative Effects During Operational Phase (Unmitigated)

SWB	WFD Code	Current Status	Assessed Potential Status Change
Doonbeg_050	IE_SH_28D020770	Good	Good
Ballard_010	IE_SH_28B420460	Good	Good
Moyasta_010	IE_SH_27M040900	Moderate	Moderate
Wood_010	IE_SH_27W010100	Poor	Poor
Wood_020	IE_SH_27W010200	Moderate	Moderate
Tonavoher_010	IE_SH_27T230880	Moderate	Poor

4.2.2.3 Potential Groundwater Quality/Quantity Effects

The potential for effects on groundwater quality is reduced in comparison with the construction phase. Any leakage of oils or wastewater at the OCC would have the potential to result in a deterioration in the qualitative status of local groundwater. However, due to the nature of the operational phase and the overall scall of the underlying GWBs, there is no potential for a deterioration in the overall qualitative status of the underlying GWBs to be impacted.

It is proposed to abstract water via a water supply well at the OCC during the operational phase. The abstraction rate will be comparable to a domestic supply well (<1m^3/day). Therefore, no effects on local groundwater levels will occur.

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

Table H: Potential Deterioration in Groundwater Body Status Due to Qualitative and Quantitative Effects During Operational Phase (Unmitigated)

GWB	WFD Code	Current Status	Assessed Potential Status Change
Miltown Malbay	IE_SH_G_167	Good	Good
Kilrush	IE_SH_G_123	Good	Good

4.2.2.4 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 reduced from that defined for the construction phase (i.e. the greatest potential for the deterioration in the status of downstream protected areas occurs during the construction phase).

4.3 MITIGATION MEASURES

In order to mitigate against any deterioration of surface and groundwater quality, quantity and flow patterns, mitigation measures will be implemented during the construction and operational phases of the Onshore Site. These are outlined below.

4.3.1 Construction Phase

4.3.1.1 Mitigation Measures to Protect Surface Water Quality During Vegetation Clearance

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

- Prior to the commencement of works all existing drains that intercept the area to be cleared area will be temporarily blocked downgradient through the use of check dams/silt fences;
- 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;
- Where possible, existing drains will not be disturbed during the clearance 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 peat and mineral soil disturbance and erosion and avoiding the formation of rutted areas, in which surface water ponding can occur;
- Sediment traps and silt fences will be installed in advance of any clearance works and will provide surface water settlement for runoff from work areas and will prevent sediment from entering downstream watercourses;
- In areas particularly sensitive to erosion it will be necessary to install double or triple sediment traps;
- Drains and silt traps will be maintained throughout all clearance works, ensuring that they are clear of sediment build-up and are not severely eroded;
- Cleared vegetation will be stacked in dry areas, and outside of hydrological buffer zones. Straw bales and check dams to be emplaced on the down gradient side of timber storage/processing sites;
- Works will be carried out during periods of no, or low rainfall, in order to minimise entrainment of exposed sediment in surface water runoff;
- Refuelling or maintenance of machinery will not occur within 50m of an aquatic zone or within 20m of any other hydrological feature. Mobile bowser, drip kits, qualified personnel will be used where refuelling is required; and,
- Branches, logs or debris will not be allowed to build up in aquatic zones. All such material will be removed when harvesting operations have been completed, but care will be taken to avoid removing natural debris deflectors.

4.3.1.2 Mitigation Measures to Protect Surface Water Quality During Earthworks

Mitigation by Avoidance:

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

All of the key Onshore Site areas are located outside of the delineated 50m watercourse buffer zones with the exception of the following:

- Existing watercourse crossings along the OGC;
- The OCC is within the 50m buffer associated with the Ballynote East Stream which lies to the north;
- ~210m of the OGC is within the 50m buffer associated with the Ballynote East Stream on its approach to the OCC; and,
- ~400m of the OGC along the N67 lies to the east and within 50m of the Lower Shannon Estuary (although it is noted that this section of the OGC is located on the opposite side of the N67 to this waterbody, with the N67 located at a higher level than the works and acts as a barrier between the proposed works and the estuary).

The large self-imposed 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:
Onshore Landfall Location and Onshore Compensation Compound:

- 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, straw bales, 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 some existing manmade agricultural field drains exist in these areas, and these will be integrated and enhanced as required and used within the proposed drainage system. The integration of the existing drainage network and the proposed drainage 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 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 / hedgerow/tree removal is taking place, and these will be diverted into proposed interceptor drains, or culverted under/across the works area;
- Runoff from individual hardstanding areas will be not discharged into the existing drain network but discharged locally at each hardstand location through settlement ponds and buffered outfalls onto vegetated surfaces;
- Buffered outfalls 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 Onshore 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, straw bales, 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.

Onshore Grid Connection

The majority of the OGC routes are >50m from any nearby watercourse. Sections within 50m of watercourses are confined to existing bridge and culvert watercourse crossings, and short sections along the N67 and on the approach to the OCC. 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 are a total of 11 no. watercourse crossings over EPA mapped watercourses along the OGC. In addition there are several crossings over drains which do not form part of the EPA blueline database.

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.

Temporary silt fencing / silt trap arrangements will be placed within existing drainage features along public/private roads to remove any suspended sediments from the works area. The trapped sediment will be removed and disposed at an appropriate licenced facility.

All excess material emanating from trenches within the public road will be disposed of at an appropriate licenced facility.

Pre-commencement Temporary Drainage Works

Prior to the commencement of road upgrades (or new tracks along the OGC in 3rd party lands and hardstand installs associated with the OCC or works at the OLL) the following key temporary drainage measures will be installed:

- All existing dry agricultural 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 drains that have surface water flows and also along existing roadside drains; 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 subsoils/sandstone and shale tills that overlie the majority of the Onshore Site. This will act to prevent entry to watercourses of sand and gravel sized sediment, released from excavation of mineral sub-soils of glacial and glacio-fluvial origin, and entrained in surface water runoff. Inspection and maintenance of these of these structures during construction phase is critical to their functioning to stated purpose. They will remain in place throughout the entire construction phase. Double silt fences will be 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:
2 no. temporary settlement ponds will be required adjacent to the TJB at the OLL to attenuate runoff from the work areas. Settlement ponds will also be used during the construction of the OCC.

Stormwater runoff rates for these areas, based on the 10-year return period rainfall event, were calculated for each catchment. These flows were then used to design the settlement ponds. 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:
Level spreaders and buffered outfall will be used during the construction of the OLL and OCC.

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 Onshore 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 (i.e. source controls → check dams → silt traps → settlement ponds → level spreaders → silt fences → vegetation filters).

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

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

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

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

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

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

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

- All active excavations will be secured and sealed off;
- Temporary or emergency drainage will be installed to prevent back-up of surface runoff; and,
- No works will be completed during heavy rainfall and for up to 24 hours after heavy events to ensure drainage systems are not overloaded.

Management of Runoff from Spoil Repository Areas:

It is proposed that excavated soils and subsoil (spoil) at the OCC location will be stored in a spoil repository area within the site or used for landscaping. The repository area is to be located in a designated area and will be enclosed by an interceptor drain.

Proposed surface water quality protection measures regarding the spoil repository area are as follows:

In relation to the spoil repository areas:

- During the initial construction, silt fences, straw bales and biodegradable matting will be used to control surface water runoff from the work areas;

- An interceptor drain will be installed around the designated spoil storage area to ensure that there is no runoff which would potentially carry suspended sediment;
- Where applicable the vegetative topsoil layer of the spoil management areas will be rolled back to facilitate placement of excavated spoil up to a maximum height of 1.0 metres, following which the vegetative-top soils layer will be reinstated.
- Where reinstatement is not possible, spoil management areas will be sealed with a digger bucket and seeded as soon possible to reduce sediment entrainment in runoff.

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 hedgerow and tree removal.

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 5-16 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 Project. It is likely that the long-term effects of climate change on rainfall patterns will not be observed during the lifetime of the Project. 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 Project will likely be built over a much shorter period (12-18 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 to Protect Against Surface Water Quality Effects from 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.

4.3.1.4 Mitigation Measures to Protect Against the Release of Hydrocarbons

Mitigation by Avoidance:

- No refuelling of construction vehicles or plant will take place within the 50m of a watercourse;
- No maintenance of construction vehicles or plant will take place along the proposed route, except in emergency circumstances; and,
- Fuels or chemicals will not be stored along the OGC route.

Mitigation by design:

- All plant will be inspected and certified to ensure that they are leak free and in good working order prior to use at the Onshore Site;
- On site re-fuelling of machinery will be carried out using a mobile double skinned fuel bowser;
- The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled off site, and will be towed around the site by a 4x4 jeep to where machinery is located;
- The 4x4 jeep will also carry fuel absorbent material and pads in the event of any accidental spillages;
- The fuel bowser will be parked on a level area in the construction compound when not in use and only designated trained and competent operatives will be authorised to refuel plant on site;
- Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations;
- Onsite refuelling will be carried out by trained personnel only;
- A permit to fuel system will be put in place;
- Taps, nozzles or valves associated with refuelling equipment will be fitted with a lock system;
- All fuel storage areas will be bunded appropriately for the duration of the construction phase. The temporary construction compounds will contain bunded refuelling and containment areas. All bunded areas will be fitted with a storm drainage system and an appropriate oil interceptor. Ancillary equipment such as hoses, pipes will be contained within the bunded area;
- Fuel and oil stores including tanks and drums will be regularly inspected for leaks and signs of damage;
- The electrical control building (at the substation) will be bunded appropriately to 110% of the volume of oils that will be stored, and to prevent leakage of any associated chemicals to groundwater or surface water. The bunded area will be fitted with a storm drainage system and an appropriate oil interceptor;

- The plant used during construction will be regularly inspected for leaks and fitness for purpose; and,
- An emergency plan for the construction phase to deal with accidental spillages is included within the Construction and Environmental Management Plan (Appendix 5-16). Spill kits will be available to deal with any accidental spillage in and outside the re-fuelling area.

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

Mitigation measures proposed to avoid the release of wastewater include:

- During the construction phase, a self-contained port-a-loo with an integrated waste holding tank will be used at the construction compounds, will be regularly 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 from the site.

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

Best practice methods for cement-based compounds:

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

4.3.1.7 Mitigation Measures to Prevent Effects from Morphological Changes to Surface Watercourses along the OGC

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

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

The following mitigation measures are proposed for the OGC crossing works:

- No stockpiling of construction materials will take place along the OGC;
- No refuelling of machinery or overnight parking of machinery is permitted in this area;
- No concrete truck chute cleaning is permitted in this area;
- Works will not take place at periods of high rainfall, and will be scaled back or suspended if heavy rain is forecast;
- Local road drainage, culverts and manholes will be temporarily blocked during the works;

- Machinery deliveries will be arranged using existing structures along the public road;
- All machinery operations will take place away from the stream and ditch banks, apart from where crossings occur, although no instream works are proposed or will occur;
- Any excess construction material will be immediately removed from the area and sent to a licenced waste facility;
- No stockpiling of materials will be permitted in the constraint zones;
- Spill kits will be available in each item of plant required to complete the stream crossing; and,
- Silt fencing will be erected on ground sloping towards watercourses at the stream crossings if required.

Additional mitigation for horizontal directional drilling are as follows:

- Although no in-stream works are proposed, the drilling works at the 4 no. EPA mapped watercourse crossings will only be done over a dry period (or as required by IFI for in-stream works) to avoid the salmon spawning season and to have more favourable (dryer) ground conditions. the other 15 no. crossings to be achieved by HDD as over manmade drains/ditches and as these aren't natural watercourses seasonal restrictions will not apply (nevertheless, all other mitigation for the protection of surface water quality detailed in the following bullet points will be implemented at these crossings);
- The crossing works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance;
- There will be no storage of material / equipment or overnight parking of machinery inside the 15m buffer zone;
- Before any ground works are undertaken, double silt fencing will be placed upslope of the watercourse channel along the 15m buffer zone boundary;
- 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 stored 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 percolation area at least 50m from the watercourse;
- The discharge of water onto vegetated ground at the percolation area 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 forecast;
- 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 or resurfaced 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 or storage of cement allowed at the watercourse crossing;
- There will be no refuelling allowed within 50m 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:

- A minim depth of 3m below the watercourse bed and other structures is proposed to minimise the risk of trac-out;
- The drilling fluid/bentonite will be non-toxic and naturally biodegradable (i.e., Clear Bore Drilling Fluid or similar will be used);
- The area around the drilling fluid batching, pumping and recycling plants will be bunded using terram and/or sandbags to contain any potential spillage;
- 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.

4.3.1.8 Mitigation Measures for Duct Installation in Peatland Areas Along the Onshore Grid Connection

A key mitigation is the utilisation of suitable construction methodologies in these 2 no. sections of the OGC which will significantly reduce the potential for effects.

In order to inform a suitable construction methodology, these 2 no. sections of the OGC (Section 01 and Section 02) have been subject to comprehensive and multi-phased site investigations designed to determine the nature and thickness of the peat deposits and underlying subsoils.

Section 01 which is located to the north of the OCC has peat depths of ~2mbgl. Due to the shallow peat depths along this section of the OGC, conventional trench installation is deemed to be the most appropriate construction methodology. Furthermore, the local road is surrounded on both sides by deep roadside drains which separate the works from the surrounding bog, meaning that there is no potential for the works to impact on the local bog hydrogeology (the peat within the road is isolated from the peat in the surrounding areas).
Section 02 has deeper peat depths of ~4mbgl. Due to the presence of deep peat it is proposed to utilise HDD along this section of the OGC. It is proposed that the cable will be installed using HDD in the mineral subsoils below the peat layer. It is proposed to be installed at depths of ~8mbgl which is 4m below the bottom of the peat. This significantly reduces the potential for effects on the local bog hydrogeology. The cable will be held in underlying mineral subsoils and in places in the underlying bedrock (geophysical surveys indicate that the depth to rock ranges from 2.5 to 7mbgl in the south of this section of the OGC). Furthermore, by utilising HDD in this section of the OGC, a longitudinal excavation will be

avoided reducing the impact on the existing road. The only areas in which disturbance to the road structure would take place is at the Joint Bay Locations whereby a Cofferdam Construction approach could be utilised. This significantly reduces the potential for the entrainment of suspended solids in runoff. The HDD will be completed in this section as follows:

- At each joint bay location, a sheetpile cofferdam will be installed and the peat removed and replaced with rockfill.
- The cofferdam technique of installing the rockfill jointing area will cut off any drainage of the surrounding peat.
- The directional drilling machine will set up at a launch pit (to be established at the Joint Bay Locations). The drill will then bore under the peat from one joint bay to another.
- The drill head will enter the mineral soil within the confines of the rockfill area and will progress at a minimum of 4m below the peat clay interface.
- The drilling head of the boring tool has a series of nozzles that feed a liquid bentonite mix along the bore direction, which provides both lubrication and support to the bore.
- Once the bore reaches the far side, the duct is then attached to the drill head and the duct is pulled back along the infrastructure of the bore to the original drilling point.
- Any bentonite mix is deposited within the bore shaft and is collected at either end of the bore within the dedicated launch/receiver pits; all excavated material and excess bentonite will be removed from site and brought to an authorised waste facility.
- Once the duct is in place under the peat sections and the transition section completed, the normal process of road trenching can continue from either side of the HDD sections.

The use of HDD will significantly reduce to disturbance to the peat deposits, ensuring that there are no significant effects on the adjacent peatlands or downstream surface water quality.

4.3.2 Operational Phase

4.3.2.1 Mitigation Measures for Increased Runoff

Over the edge drainage will be implemented on the new gravel tracks to be constructed along the OGC at the limited locations where the route passes through 3rd party lands and there isn't already an access track in place.

A stormwater drainage system has been designed for the operation phase of the Project at the OCC. All stormwater from the buildings and bunded areas will be directed to an underground system where it will be attenuated prior to discharge. Discharge from the attenuation tank will be via a hydrobrake and discharge will be limited to existing greenfield runoff rates. The drainage system has been suitably designed to cater for a 100-year plus 20% climate change rainfall event. The proposed access roads and compound area will be constructed with permeable material which will allow infiltration and recharge to ground.

4.3.2.2 Mitigation Measures to Protect Surface Water Quality from the Proposed Surface Water Discharge at the Onshore Compensation Compound

The proposed operational phase drainage system at the OCC has been designed to ensure the protection of downstream surface watercourses.

The proposed drainage system at the OCC will ensure that there is no discharge of untreated or unattenuated stormwater. All water from the bunded areas will pass through a hydrocarbon interceptor prior to discharge. Sumps will also be used throughout the drainage system to facilitate the settlement of suspended solids. Rip-rap aprons will be located at the outlet to prevent erosion and the entrainment of suspended solids.

A foulwater drainage system has also been designed for the OCC. This system comprises of suitably sized tanks which will be fitted with a high-level alarm so that the tank can be

emptied and prevents the risk of overflowing. There will be no discharge of wastewater at the site.

4.3.2.3 Mitigation Measures to Prevent Contamination of Surface Waters During Maintenance Works

Mitigation measures for sediment control are the same as those outlined above for the construction phase.

Mitigation measures for control of hydrocarbons during maintenance works are similar to those outlined in Section 4.3.1.4.

4.3.2.4 Mitigation Measures to Protect Groundwater Quality

The mitigation measures detailed above for the protection of surface water quality at the OCC will also protect the underlying groundwater quality.

4.3.2.5 Mitigation Measures to Protect Groundwater Quantity

The abstraction rate for the proposed groundwater well at the OCC will be comparable to a domestic well, with a well supplying a single household typically abstracting less than 1m3/day. The well is proposed in a locally important aquifer which is moderately productive only in local zones. This aquifer forms part of the Kilrush GWB which is comprised of poorly productive bedrock. Therefore, due to the nature of the bedrock aquifer and the proposed extraction rate, no effects on GWB status will occur.

For these reasons no mitigation measures are required.

4.3.1 Decommissioning Phase

The potential effects associated with decommissioning will be similar to those associated with construction but of significantly reduced magnitude.

The Rehabilitation Schedule is presented in Appendix 5-18 of the EIAR. Some of the effects relating to the Onshore elements will be avoided by leaving elements of the Project in place where appropriate, for example:

- The above ground components of the OCC building and compound will be removed fully from site. For the underground components, such as the foundations and non-electrical infrastructure, the Best Environmentally Practicable Option (BEPO)least disruptive option would be is for these to remain in situ;
- The planted area adjacent to the OCC, as presented in the Landscape Mitigation Plan in Appendix 27-1, will remain in situ. The remainder of the OCC site will be reinstated to its original form with a grassed surface;
- For the OGC, the ducts and joint bay infrastructure will remain in situ and can be used for future cable installation if required. The joint bays will be opened up and the cables will be cut. Once cut, the cables are pulled through the ducting and removed. The joint bays are then backfilled and reinstated to the relevant road standards, or to original condition for those located on private lands; and,
- Onshore access tracks within private lands will remain in situ and can be provided for alternative future use by the landowners.

Mitigation measures applied during decommissioning activities will be similar to those applied during construction where relevant. Refer to Section 4.3.1 for mitigation measures.
No Significant effects on the hydrological and hydrogeological environment will occur during the decommissioning phase of the Project. No deterioration of the hydrological and hydrogeological environment will occur during the decommissioning phase of the Project.

4.3.2 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 I** below.

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

SWB	WFD Code	Current Status	Assessed Potential Status Change (Unmitigated)	Assessed Potential Status Change (Mitigated)
Doonbeg_050	IE_SH_28D020770	Good	Good	Good
Ballard_010	IE_SH_28B420460	Good	Good	Good
Moyasta_010	IE_SH_27M040900	Moderate	Moderate	Moderate
Wood_010	IE_SH_27W010100	Poor	Poor	Poor
Wood_020	IE_SH_27W010200	Moderate	Moderate	Moderate
Tonavoher_010	IE_SH_27T230880	Moderate	Poor	Moderate
Miltown Malbay GWB	IE_SH_G_167	Good	Good	Good
Kilrush GWB	IE_SH_G_123	Good	Good	Good

4.4 CUMULATIVE ASSESSMENT

This section presents an assessment of the potential cumulative effects associated with the Onshore Site of the Project and other developments (existing and/or proposed) on the hydrological and hydrogeological environment (i.e. the ZOI defined in Section 2.6).

The main likelihood of cumulative effects is assessed to be hydrological (surface water quality) rather than hydrogeological (groundwater). Due to the hydrogeological setting of the Onshore Site (i.e. low permeability soils and subsoils overlying locally important bedrock aquifers) and the near surface nature of construction activities, cumulative effects with regard to groundwater quality or quantity arising from the Onshore Site are assessed as not likely to cause any deterioration of the GWBs quantitative or qualitative status.

With respect to SWBs, the primary potential for cumulative effects will occur during the construction phase of the Project as this is when earthworks and excavations will be undertaken at the Onshore Site. The potential for cumulative effects during the operational phase will be significantly reduced as there will be no exposed excavations, there will be no sources of sediment to reach watercourses, there will be no use of cementitious materials and fuels/oil will be kept to a minimum at the site. During the decommissioning phase, the potential cumulative effects are similar to the construction phase, but to a lesser degree with less ground disturbance, and some elements of the onshore development remaining in-situ (which reduces the potential for ground disturbance).

A cumulative hydrological study area has been delineated as follows:

- The Tonavoher_010 WFD river sub-basins due to the location of the OCC within this sub-basin;

- The area immediately around the OLL within the Doonbeg_050 WFD river sub-basin. There is no requirement to include this entire sub-basin as the OLL is situated in the northwestern corner of the sub-basin, whereby all drainage is directed to the north and into the sea; and,
- A 200m study buffer zone has been applied to the OGC. This is considered to be an appropriate scale given the nature of the proposed works and the potential effects on the hydrological environment.

4.4.1 Cumulative Effects with Agriculture

The delineated cumulative study area is a largely agricultural area.

Agriculture is the largest pressure on water quality in Ireland. Agricultural practices such as the movement of soil and the addition of fertilizers and pesticides can lead to nutrient losses and the entrainment of suspended solids in local surface watercourses. This can have a negative effect on local and downstream surface water quality.

In an unmitigated scenario the Onshore Site would have the potential to interact with these agricultural activities and contribute to a deterioration of downstream surface water quality through the emissions of elevated concentrations of suspended solids and ammonia.

However, the mitigation measures detailed above in Section 4.3 will ensure the protection of downstream surface water quality.

For these reasons, and with the implementation of the referenced mitigation measures, it is considered that there will be no deterioration in WFD status of SWBs arising from cumulative effects associated with agricultural activities.

4.4.2 Cumulative Effects with Tree and Hedge Removal

A section of the OGC in the vicinity of Moneypoint Powerplant is situated in an area of coniferous forestry, and some tree removal will be required, along with local hedge removal along other section of the OGC.

The most common water quality problems arising from tree/hedge removal relate to the release of sediment and nutrients to the aquatic environment and impacts from acidification.

However, the mitigation measures detailed above in Section 4.3 will ensure the protection of downstream surface water quality.

For these reasons, and with the implementation of the listed mitigation, it is considered that there will be no deterioration in WFD status of SWBs arising from cumulative effects associated with other commercial forestry activities.

4.4.3 Cumulative Effects with Other Development

A detailed cumulative assessment has been carried out for all planning applications (granted and awaiting decisions) within the cumulative assessment area for the Onshore Site as described above.

The planning applications identified within the study area are for new dwellings or renovations of existing dwellings, as well as for the erection of farm buildings. The planning applications have been reviewed based on their type, scale and proximity to the Onshore Site. Based on the scale of the works, their proximity to the site and the temporal period of likely works, no cumulative effects will occur as a result of the Onshore Site's construction, operation and maintenance, and decommissioning phases), and therefore there will be no deterioration in WFD status of SWBs arising from cumulative effects associated with other Development proposals.

5. WFD ASSESSMENT CONCLUSIONS

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

The Onshore Landfall Location and the Onshore Grid Connection do not involve any abstraction of groundwater or alteration of drainage patterns. Therefore, the quantitative status (i.e., the available quantity (volume) of groundwater and surface water locally) to the receiving waters will remain unaltered during the construction and operational phase of these components of the Project. During the operational phase, it is proposed to abstract water from a supply well at the Onshore Compensation Compound. However, given the small abstraction volumes proposed and the low permeability of the bedrock aquifer, no deterioration of the quantitative status of the underlying GWB will occur.

There is no direct discharge from the Onshore Site to downstream receiving waters. Mitigation for the protection of surface water during the construction, operation and decommissioning phases of the development will ensure the qualitative and quantitative status of the receiving waters will not be altered by the Project. During the operational phase, all water at the Onshore Compensation Compound will be treated, attenuated and discharged at greenfield runoff rates.

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

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

As such, the Project will not impact upon any surface water or groundwater body as it will not cause a deterioration of the status of the body and/or it will not jeopardise the attainment of good status.

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

- will not cause a deterioration in the status of any surface and groundwater bodies;
- will not jeopardise the achievement of 'Good' quality surface water/groundwater status;
- does not jeopardise the attainment of 'Good' surface water/groundwater chemical status;
- does not jeopardise the attainment of 'Good' surface water/groundwater ecological potential;
- does not permanently exclude or compromise the achievement of the objectives of the WFD in other waterbodies within the same river basin district;
- is compliant with the requirements of and not likely to compromise the ability of any water bodies to meet the objectives of the Water Framework Directive (2000/60/EC) as amended and its transposing legislation;
- does not degrade the ecological quality of the protected sites associated with connected waterbodies nor jeopardise the goals and/or targets set out for these protected sites: and,
- is consistent with other Community Environmental Legislation including the EIA Directive (2014/52/EU), the Habitats Directive (92/43/EEC) and the Birds Directive (2009/147/EC) (Note that a full list of legislation complied with in relation to hydrology and hydrogeology is included in Section 9.1.4 of the EIAR).