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**WATER FRAMEWORK DIRECTIVE ASSESSMENT
REDROCK QUARRY AT CLOGRENNANE,
CO. CARLOW**

FINAL REPORT

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TABLE OF CONTENTS

1. INTRODUCTION	4
1.1 BACKGROUND	4
1.2 STATEMENT OF AUTHORITY	4
1.3 WATER FRAMEWORK DIRECTIVE	5
2. WATERBODY IDENTIFICATION & CLASSIFICATION.....	6
2.1 INTRODUCTION.....	6
2.2 SURFACE WATERBODY IDENTIFICATION	6
2.3 SURFACE WATER BODY CLASSIFICATION	9
2.4 GROUNDWATER BODY IDENTIFICATION	11
2.5 GROUNDWATER BODY CLASSIFICATION.....	11
2.6 ZONE OF INFLUENCE	13
2.7 PROTECTED AREAS	13
2.7.1 Nature Conservation Designations	13
2.7.2 Bathing Waters	14
2.7.3 Nutrient Sensitive Areas	14
2.7.4 Shellfish Area.....	14
2.7.5 Salmonid Waters	14
2.7.6 Drinking Water	14
3. WFD SCREENING	15
3.1 SURFACE WATER BODIES	15
3.2 GROUNDWATER BODIES	15
3.3 PROTECTED AREAS	15
3.4 WFD SCREENING SUMMARY	16
4. WFD COMPLIANCE ASSESSMENT	20
4.1 PROPOSALS	20
4.2 POTENTIAL EFFECTS.....	20
4.2.1 Operational Phase (Unmitigated)	20
4.3 MITIGATION MEASURES	23
4.3.1 Operational Phase	23
4.3.2 Restoration Phase	25
4.3.3 Potential Effects with the Implementation of Mitigation.....	25
4.4 CUMULATIVE IMPACTS	25
5. WFD ASSESSMENT CONCLUSION	27

FIGURES (IN TEXT)

Figure A: Local Hydrology Map.....	8
Figure B: WFD Groundwater and Surface Waterbody Status (2016-2021)	12

TABLES IN TEXT

Table A: Downstream Catchment Size for River Waterbodies	7
Table B: Summary WFD Information for Surface Water Bodies	10
Table C: Summary WFD Information for Groundwater Bodies	11
Table D: Screening of WFD Waterbodies Located Downstream and/or Underlying the Site	17
Table E: Potential Effects on Surface Water Quantity during Operational Phase (Unmitigated)	21
Table F: Potential Surface Water Quality Effects during Operational Phase (Unmitigated)	21
Table G: Potential Groundwater Quantity Effects During Operational Phase (Unmitigated)	22
Table H: Groundwater Quantity Effects During Operational Phase (Unmitigated)	22
Table I: Summary of WFD Status for Unmitigated and Mitigated Scenarios	25

1. INTRODUCTION

1.1 BACKGROUND

Hydro-Environmental Services (HES) were requested by Tom Philips and Associates (TPA) to complete a Water Framework Directive (WFD) Compliance Assessment for the Proposed Development at Clogrennane, Co. Carlow.

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

This WFD Compliance Assessment is intended to supplement the EIAR submitted as part of the planning application.

This WFD Compliance Assessment report has been compiled using the following data sources:

- Environmental Protection Agency database (www.epa.ie);
- Observation recorded during various site visits as described in Section 8.2.2 of the EIAR;
- Drainage mapping as described in Section 8.3.3.3 of the EIAR;
- Surface water flow monitoring as described in Section 8.3.3.3 of the EIAR; and,
- Surface water quality sampling (EPA biological Q-monitoring and HES surface water sampling) as described in Section 8.3.3.4 of the EIAR.

1.2 STATEMENT OF AUTHORITY

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

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

Michael Gill (BA, BAI, Dip Geol., MSc, MIEI) is a Civil/Environmental Engineer, Hydrologist and Hydrogeologist with 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, Middleton Quarry in County Cork, and Rathcore and Clonard Quarries in County Meath.

Conor McGettigan (BSc, MSc) is an Environmental Scientist, with over 5 years' experience in the environmental sector in Ireland. Conor holds an MSc in Applied Environmental Science and a BSc in Geology from University College Dublin. Conor routinely completes hydrological and hydrogeological assessments for a wide range of developments including sand and gravel pits and bedrock 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. 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 Proposed Development and include:

- Ensure full compliance with relevant EU legislation;
- Prevent deterioration;
- Meet the water standards and objectives for designated protected areas;
- Protect high-status waters; and,
- Implement targeted actions and pilot schemes in focus sub-catchments aimed at (1) targeting water bodies close to meeting their objectives and (2) addressing more complex issues that will build knowledge for future cycles.

2. WATERBODY IDENTIFICATION & CLASSIFICATION

2.1 INTRODUCTION

This section identifies those surface waterbodies (SWBs) and groundwater bodies (GWBs) with the potential to be affected by the Proposed Development and reviews any available WFD information.

2.2 SURFACE WATERBODY IDENTIFICATION

Regionally, the majority of the Proposed Development Site is located within the River Barrow surface water catchment and Hydrometric Area 14 of the Southeastern River Basin District. Meanwhile, a small section in the west of the Proposed Development Site is located within the River Nore surface water catchment and Hydrometric Area 15 of the Southeastern River Basin District.

More locally, within the River Barrow surface water catchment, the Proposed Development Site is mapped within the Barrow_SC_110 sub-catchment and Barrow_170 WFD river sub-basin. Within the Barrow_170 WFD river sub-basin, the EPA map a small 1st order stream, referred to by the EPA as the Raheendoran Stream (EPA Code: 14R41) to flow through the centre of the Proposed Development Site. The stream is mapped to flow from northwest to southeast across the existing quarry void before continuing to the south, crossing the L7134, flowing to the east through Clogrennane Woods for ~3km, before discharging into the River Barrow. However, based on site walkover surveys and drainage mapping, the course of this stream has been altered by the previous quarrying activities. No watercourse crosses the existing quarry void. Water gathers in the floor of the existing quarry and drains out from existing ponds in the east of the quarry. From here the stream/quarry discharge flows to the southeast along the existing quarry access road. The drain is culverted under the access road and flows to the east where it joins the EPA named Mortarstown Stream (EPA Code: 14M40) ~670 to the east. This stream flows to the east and discharges into the Fushoge River (EPA Code: 14F03) just upstream of its confluence with the River Barrow. All of these watercourses in the vicinity of the Proposed Development Site form part of the Barrow_170 SWB. Further downstream, the River Barrow drains out into Upper Barrow Estuary transitional waterbody.

Within the River Nore surface water catchment, the Proposed Development Site is mapped within Dinin[South]_SC_010 sub-catchment and Dinin (South)_010 WFD river sub-basin. Within the Dinin (South)_010 WFD river sub-basin, the closest EPA mapped stream is an unnamed stream located ~1.3km west of the Proposed Development Site. This stream flows for ~1km before discharging into Dinin (South) River (EPA Code: 15D08). Inspection of local 6" and 25" basemaps for the local area shows that this watercourse, referred to on these maps as the Dinin River, rises ~500m west of the Proposed Development Site. There is no existing (and/or proposed) discharge from the quarry within the River Nore catchment. However, runoff from some areas in the west of the Proposed Development Site may currently flow to the west towards the Dinin River. The streams in this area form part of the Dinin (South)_010 SWB. Further downstream the Dinin (South)_020 SWB discharges into the Dinin (Main Channel)_010 SWB, approximately 10.7km west of the Proposed Development Site. The Dinin (Main Channel)_020 SWB discharges into the Nore_160 SWB.

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

Table A presents the total upstream catchment area of each river waterbody downstream of the Proposed Development Site. Within River Barrow surface water catchment, the Barrow_170 SWB has a significant total upstream catchment area of ~2,314km². The catchment area of the River Barrow increase progressively downstream as more tributaries discharge into this catchment draining river. Within River Nore surface water catchment, the Dinin (South)_010 has a relatively small total upstream catchment area of ~21km².

Table A: Downstream Catchment Size for River Waterbodies

WFD River Sub-Basin	Total Upstream Catchment Area (km ²)
Barrow_170	~2,314
Barrow_180	~2,377
Barrow_190	~2,407
Barrow_200	~2,420
Barrow_210	~2,524
Barrow_220	~2,607
Barrow_230	~2,805
Barrow_240	~2,812
Dinin (South)_010	~21
Dinin (South)_020	~87
Dinin (Main Channel)_010	~246
Dinin (Main Channel)_020	~300
Nore_160	~1,562

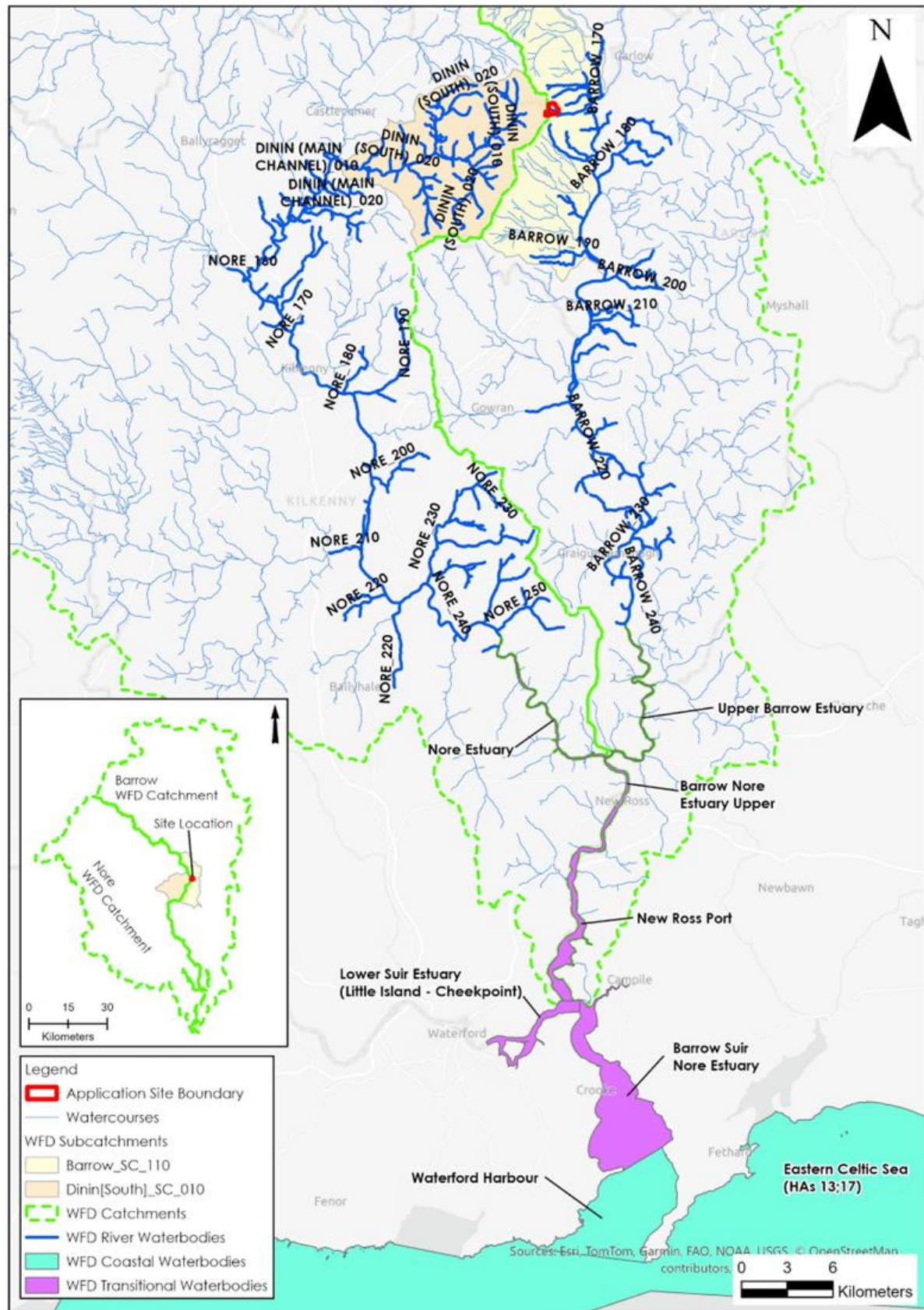


Figure A: Local Hydrology Map

2.3 SURFACE WATER BODY CLASSIFICATION

A summary of the WFD status and risk result for SWBs downstream of the Proposed Development Site are shown in **Table B**. 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).

Within the River Barrow regional surface water catchment, the River Barrow downstream of the Development Site (Barrow_170 to Barrow_240 SWBs) typically achieved "Moderate" status in the latest WFD cycle (2019-2024) with the exception of the Barrow_210 and Barrow_230 SWBs which achieved "Poor" status. In the vicinity of the Proposed Development Site, the Barrow_170 SWB achieved "Moderate" status in all WFD cycles.

All segments of the River Barrow (Barrow_170 to Barrow_240 SWBs) are "at risk" of failing to meet their WFD objectives except for Barrow_190 and Barrow_240 SWBs who's risk status are "under review". Further downstream the Upper Barrow Estuary achieved "moderate" status in the latest WFD cycle and is at risk of failing to meet its WFD objectives.

Within the River Nore regional surface water catchment, the Dinin (South)_010 and Dinin (South)_020 SWBs have achieved "Good" status in the latest WFD cycle and are "not at risk" of failing to meet their WFD objectives. Further downstream, the Dinin (Main Channel)_010 and Dinin (Main Channel)_020 SWBs have achieved "Good" and "Moderate" status respectively. The Dinin (Main Channel)_020 SWB flows down into River Nore which achieved "Good" status.

Within the River Barrow catchment, agriculture is listed as a significant pressure on 4 no. river waterbodies downstream of the Proposed Development Site (Barrow_170, _180, _200 and _220 SWBs). Hydromorphology is identified as a significant pressure on 3 no. river waterbodies (Barrow_170, _210 and _230 SWBs). Urban run-off is the significant pressure on 3 no. river waterbodies (Barrow_180, _200 and _210 SWBs) whilst urban wastewater is the significant pressure identified on 1 no. river waterbody (Barrow_200 SWB). Finally, industry is listed as a significant pressure on the Barrow_210 SWB. Within the River Nore catchment, agriculture is listed as a significant pressure on the Dinin (Main Channel)_010 and _020 SWBs, whilst abstractions and mines and quarries are significant pressures impacting the Dinin (Main Channel)_020 SWB.

In regard to transitional waterbodies, the Upper Barrow Estuary is "at risk" of failing to meet its WFD objectives. Agriculture and urban runoff are the listed pressures.

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

Table B: Summary WFD Information for Surface Water Bodies

SWB	Overall Status (2013-2018)	Overall Status (2016-2021)	Overall Status (2019-2024)	Risk Status (3 rd Cycle)	Pressures
River Barrow Catchment					
Barrow_170	Moderate	Moderate	Moderate	At risk	Hydromorphology and agriculture
Barrow_180	Moderate	Moderate	Moderate	At risk	Urban run-off and agriculture
Barrow_190	Unassigned	Moderate	Moderate	Under review	None
Barrow_200	Good	Moderate	Moderate	At risk	Urban run-off, agriculture and urban wastewater
Barrow_210	Poor	Poor	Poor	At risk	Urban Run-off, hydromorphology and industry
Barrow_220	Moderate	Moderate	Moderate	At risk	Agriculture
Barrow_230	Poor	Poor	Poor	At risk	Hydromorphology
Barrow_240	Moderate	Moderate	Moderate	Under review	None
River Nore Catchment					
Dinin (South)_010	Moderate	Good	Good	Not at risk	None
Dinin (South)_020	Good	Good	Good	Not at risk	None
Dinin (Main Channel)_010	Moderate	Moderate	Good	At risk	Agriculture
Dinin (Main Channel)_020	Moderate	Moderate	Moderate	At risk	Agriculture, abstractions and mines and quarries
Nore_160	Good	Good	Good	Not at risk	None
Transitional Waterbodies					
Upper Barrow Estuary	Good	Moderate	Moderate	At risk	Urban run-off and agriculture

2.4 GROUNDWATER BODY IDENTIFICATION

The southwest and some areas in the east of the Proposed Development Site are underlain by the Bregaun Flagstone Formation described as thick flaggy sandstone and siltstone. The majority of the Proposed Development Site is underlain by Moyadd Coal Formation described as shale, siltstone and minor sandstone.

The Bregaun Flagstone Formation is classified as being a Poor Bedrock Aquifer - Bedrock which is Generally Unproductive except for Local Zones (PI). Meanwhile, the Moyadd Coal Formation is classified as a Poor Aquifer - Bedrock which is Generally Unproductive (Pu).

In terms of GWBs, the Proposed Development Site is underlain by the Shanragh GWB (IE_SE_G_124).

2.5 GROUNDWATER BODY CLASSIFICATION

The Shanragh GWB (IE_SE_G_124) achieved "Good" status in all WFD cycles which is defined based on the quantitative status and chemical status of the GWB. This GWB is "not at risk" and there are no significant pressures identified to be impacting on this GWB

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

Table C: Summary WFD Information for Groundwater Bodies

GWB	Overall Status (2013-2018)	Overall Status (2016-2021)	Overall Status (2019-2024)	Risk Status (3 rd Cycle)	Pressures
Shanragh	Good	Good	Good	Not at risk	None

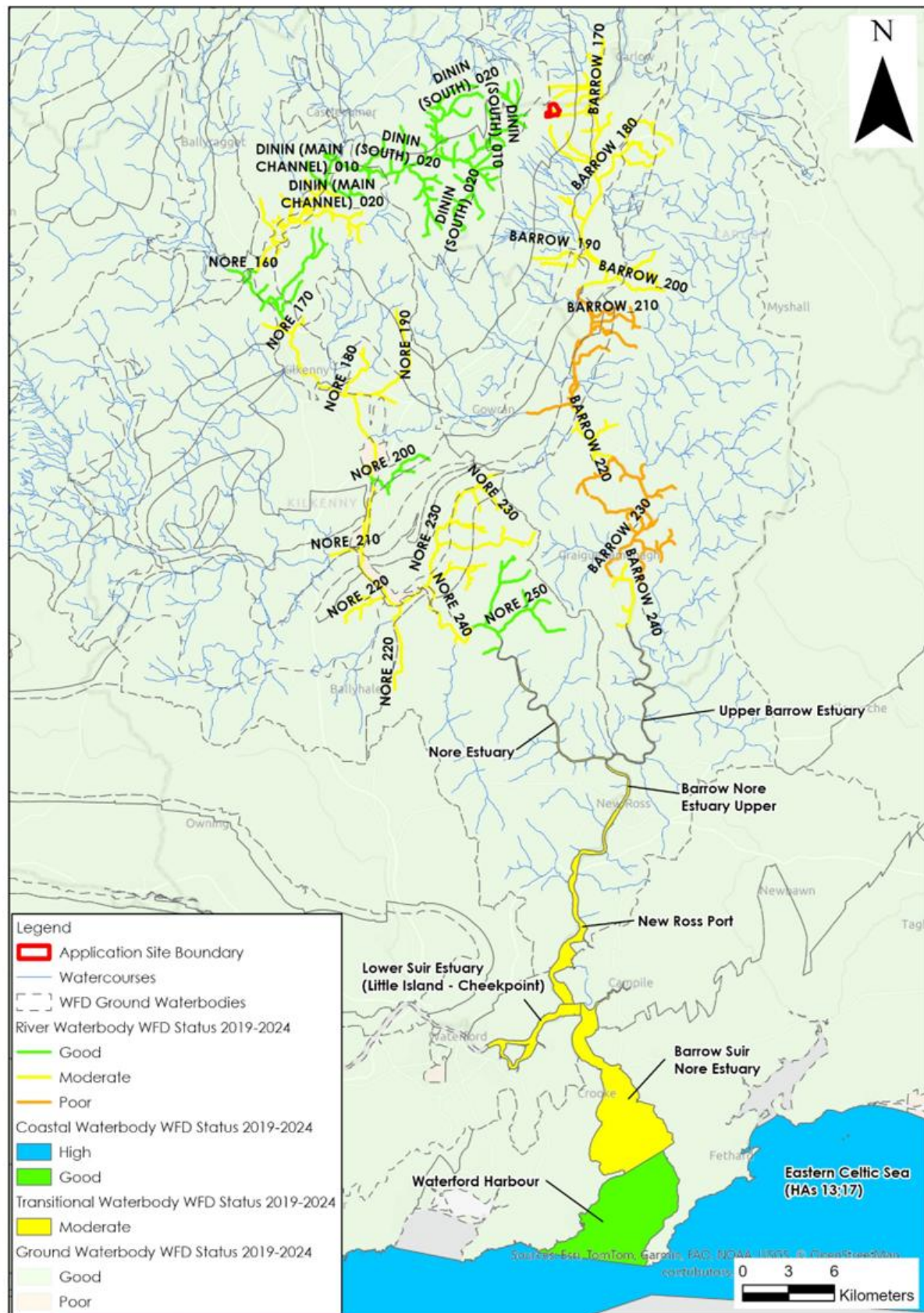


Figure B: WFD Groundwater and Surface Waterbody Status (2019-2024)

2.6 ZONE OF INFLUENCE

The Zone of Influence (Zoi) of the Proposed Development extends to the following SWBs, GWBS, and Transitional and Coastal water bodies:

- SWBs – River Barrow (Barrow_170 to Barrow_240), Dinin (South)_010 & 020, Dinin (Main Channel)_010 & 020 and River Nore (Nore_160)
- GWBs – Shanragh GWB.
- Transitional waterbodies – Upper Barrow Estuary.

2.7 PROTECTED AREAS

The WFD requires that activities are also in compliance with other relevant legislation, as considered below.

The potential effect of the Proposed Development on nature conservation designations, bathing waters, nutrient sensitive areas (NSAs), shellfish areas and drinking water protected area's (DWPAs) are also included as part of the WFD Compliance Assessment.

2.7.1 Nature Conservation Designations

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

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

The Proposed Development Site is not located within a Ramsar site or a designated site of national (Natural Heritage Area (NHA) / Proposed Natural Heritage Area (pNHA)) or European importance (Special Area of Conservation (SAC) / Special Protection Area (SPA).

However, there are downstream hydrological connections with some Natura 2000 sites within the River Barrow surface water catchment. Designated sites that lie downstream of the site include:

- River Barrow and River Nore SAC (Site Code: 002162), is hydrologically linked within the Proposed Development Site and is located ~1.8km east and ~5.6km southwest of the Proposed Development Site. The Proposed Development Site is hydrologically (~2.7km) connected with this SAC via the Mortarstown Stream which received the discharge from the Proposed Development Site. The lower reaches of this stream and the Fushoge River form part of the SAC.
- Cloghrick Wood pNHA (Site Code: 000806) located ~3.48km southeast of the Proposed Development Site. The Cloghrick Wood pNHA is located on the eastern banks of the River Barrow downstream of the Proposed Development Site. The length of the hydrological flowpath between the Proposed Development Site and this pNHA is ~6.3km. The pNHA includes some wet woodland adjacent to the river.
- River Nore SPA (Site Code: 004233) is located downstream and at ~22km southwest of the Proposed Development Site. Within the River Nore catchment, the River Nore SPA is located downgradient of the Proposed Development Site via the Dinin River. only a very small area of the Proposed Development Site is located in this catchment. The length of any potential hydrological flowpath would be in excess of 30km. Furthermore, there is no surface water discharge from the site to any tributary of the Dinin River.

Other protected sites located within 10km of the Proposed Development Site but are not directly linked via surface water pathways are considered below:

- Coan Bogs NHA (Site Code: 002382) located ~5km west of the Proposed Development Site. There is no hydrological or hydrogeological connectivity between the Proposed Development Site and this NHA.

2.7.2 Bathing Waters

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

There are no bathing water sites located in the Zol. Duncannon bathing water (IESEBWT100_0100_0100) is the mapped bathing water downstream of the Proposed Development Site located ~65km south.

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).

The River Barrow (Barrow_170 to Barrow_240 SWBs, and several transitional waterbodies downstream of the Development Site (Upper Barrow Estuary, Nore Estuary, Barrow Nore Estuary Upper, New Ross Port, Lower Suir Estuary (Little Island - Cheekpoint)) are listed as NSAs. Note that many of these are located outside the Zol i.e. downstream of the Upper Barrow Estuary.

2.7.4 Shellfish Area

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

There are no designated shellfish areas located in the Zol. The Waterford Harbour (Cheekpoint/Arthurstown/Creadon) shellfish area (IE_SE_100_0100) is the nearest protected shellfish area downstream of the Proposed Development Site, located ~58km to the south.

2.7.5 Salmonid Waters

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

The River Nore (Nore_160 to Nore_250) are identified as designated Salmonid Waters and is located downstream of the Proposed Development Site.

2.7.6 Drinking Water

Within the River Nore catchment, the DWPA downstream of the Proposed Development Site is located on the Dinin (Main Channel)_020 SWB. This surface water abstraction is associated with the Public Water Scheme Supply for Kilkenny City. This DWPA is distant from the Proposed Development Site. As stated above, there is extremely limited potential for effects in the River Nore Catchment as all discharge during the operational phase will be within the River Barrow catchment.

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

3. WFD SCREENING

3.1 SURFACE WATER BODIES

With consideration for the construction, operational and decommissioning phases of the Proposed Development, it is considered that the Barrow_170 and Dinin (South)_010 SWB will be carried through to the WFD Compliance Assessment due to the location of the Proposed Development Site within these WFD river sub-basins. Additionally, the Dinin (South)_020 and Barrow_180 SWBs will be carried through to the WFD Compliance Assessment due to their location directly downstream of the Barrow_170 and Dinin (South)_010 SWBs. The Proposed Development must not in any way result in a deterioration in the status of these SWBs and/or prevent them from meeting the biological and chemical characteristics for good status in the future.

The Barrow_190 to _240 SWBs, Dinin (Main Channel)_010, Dinin (Main Channel)_020 and Nore_160 SWBs have been screened out of further assessment due to the large volumes of water within these rivers and their distant location from the Proposed Development Site. Furthermore, all transitional and coastal waterbodies downstream of the Proposed Development Site have been screened out of further assessment due to the large volumes of water within these SWBs and the saline nature of these waters. The Proposed Development has no potential to cause a deterioration in status of these SWBs and/or jeopardise the attainment of good surface water status in the future.

3.2 GROUNDWATER BODIES

With respect to GWBs, the Shanragh GWBs have been screened in due to its location directly underlying the Proposed Development Site. The Proposed Development must not in any way result in a deterioration in the status of this GWB and/or prevent it from meeting its required qualitative and quantitative characteristics in order to achieve good status in the future.

3.3 PROTECTED AREAS

The Proposed Development Site is hydrologically connected to the River Barrow and River Nore SAC. The length of the hydrological flowpath between the Proposed Development Site and this SAC is ~2.7km. With consideration for the construction, operational and decommissioning phases of the Proposed Development, it is considered that the River Barrow and River Nore SAC is carried through into the WFD Compliance Assessment.

Cloghristrick Wood pNHA is located ~6.3km downstream of the Proposed Development Site and is associated with Barrow_180 SWB. Cloghristrick Wood pNHA has been screened in for the purposes of a conservative assessment however the potential for effects is limited given the large volumes of water within the River Barrow.

River Nore SPA is located ~22km southwest of the Proposed Development Site within the River Nore catchment. The River Nore SPA is located downgradient of the Proposed Development Site via the Dinin River. Only a very small area of the Proposed Development Site is located in this catchment. The length of any potential hydrological flowpath would be in excess of 30km. Furthermore, there is no surface water discharge from the site to any tributary of the Dinin River. Therefore, the River Nore SPA has been screened out of the WFD Compliance Assessment.

Coan Bogs NHA is located ~5km west of the Proposed Development Site has been screened out due to the lack of hydrological and hydrogeological connections between the site and the NHA. Therefore, the Proposed Development has no potential to impact the NHA.

The majority of the Proposed Development Site is located within the Barrow_170 river sub-basin. The Barrow_170 and _180 NSA downstream of the Proposed Development Site has been screened in due to the existing surface water connections between the Proposed Development Site and the Barrow_170 SWB. Therefore, an assessment is required to consider the potential impacts of the Proposed Development on this NSA.

The Barrow_190 to 240 and all transitional waterbodies NSAs has been screened out due to their large upstream catchment, the large volumes of water within these NSAs and their distant location from the Proposed Development Site. The Proposed Development has no potential to impact the status of these NSAs.

The Waterford Harbour (Cheekpoint/Arthurstown/Creadon) shellfish area has been screened out due its distant location from the Proposed Development Site and the large volumes of water within the estuary at this location.

The Nore_160 to Nore_250 Salmonid Waters has been screened out due to its large upstream catchment, the large volumes of water within these Salmonid Waters and its distant location from the Proposed Development Site. Furthermore, there are no surface water outfalls from the quarry to within the River Nore catchment. The Proposed Development has no potential to impact the status of these Salmonid Waters.

In terms of DWPAs, the Dinin (Main Channel)_020 and Nore_160 DPWAs have been screened out due to their large upstream catchment, the large volumes of water within these DWPAs and their distant location from the Proposed Development Site. The Proposed Development has no potential to impact the status of these DPWAs. The Shanragh GWB DWPA is included for further assessment due to its location underlying the Proposed Development Site.

3.4 WFD SCREENING SUMMARY

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

Table D: Screening of WFD Waterbodies Located Downstream and/or Underlying the Site

Type	WFD Classification	Waterbody Name/ID	Inclusion in Assessment	Justification
Surface Water Body	River	Barrow_170	Yes	The majority of the Proposed Development Site is located within the Barrow_170 WFD river sub-basin. Therefore, an assessment is required to consider the potential impacts of the Proposed Development on this SWB.
	River	Barrow_180	Yes	The Barrow_180 SWB is located directly downstream of the Barrow_170 SWB. Therefore, an assessment is required to consider the potential impacts of the Proposed Development on this SWB.
	River	Barrow_190	No	The Barrow_190 SWB has been screened out due to its large upstream catchment (~2,407km ²), the large volumes of water within this SWB and its distant location from the Proposed Development Site. The Proposed Development has no potential to impact the status of this SWB.
	River	Barrow_200	No	The Barrow_200 SWB has been screened out due to its large upstream catchment (~2,420km ²), the large volumes of water within this SWB and its distant location from the Proposed Development Site. The Proposed Development has no potential to impact the status of this SWB.
	River	Barrow_210	No	The Barrow_210 SWB has been screened out due to its large upstream catchment (~2,524km ²), the large volumes of water within this SWB and its distant location from the Proposed Development Site. The Proposed Development has no potential to impact the status of this SWB.
	River	Barrow_220	No	The Barrow_220 SWB has been screened out due to its large upstream catchment (~2,607km ²), the large volumes of water within this SWB and its distant location from the Proposed Development Site. The Proposed Development has no potential to impact the status of this SWB.
	River	Barrow_230	No	The Barrow_230 SWB has been screened out due to its large upstream catchment (~2,805km ²), the large volumes of water within this SWB and its distant location from the Proposed Development Site. The Proposed Development has no potential to impact the status of this SWB.
	River	Barrow_240	No	The Barrow_240 SWB has been screened out due to its large upstream catchment (~2,812km ²), the large volumes of water within this SWB and its distant location from the Proposed Development Site. The Proposed Development has no potential to impact the status of this SWB.
	River	Dinin (South)_010	Yes	The western part of the Proposed Development Site is located within the Dinin (South)_010 WFD river sub-basin. Therefore, an assessment is required to consider the potential impacts of the Proposed Development on this SWB.

	River	Dinin (South)_020	Yes	The Dinin (South)_020 SWB is located directly downstream of the Dinin (South)_010 SWB. Therefore, an assessment is required to consider the potential impacts of the Proposed Development on this SWB.
	River	Dinin (Main Channel)_010	No	The Dinin (Main Channel)_010 SWB has been screened out due to its large upstream catchment (~246km ²), the large volumes of water within this SWB and its distant location from the Proposed Development Site. The Proposed Development has no potential to impact the status of this SWB.
	River	Dinin (Main Channel)_020	No	The Dinin (Main Channel)_020 SWB has been screened out due to its large upstream catchment (~300km ²), the large volumes of water within this SWB and its distant location from the Proposed Development Site. The Proposed Development has no potential to impact the status of this SWB.
	River	Nore_160	No	The Nore_160 SWB has been screened out due to its large upstream catchment (~1,562km ²), the large volumes of water within this SWB and its distant location from the Proposed Development Site. The Proposed Development has no potential to impact the status of this SWB.
	Transitional	Upper Barrow Estuary	No	The Upper Barrow Estuary has been screened out due to distant location and large volume of water within this SWB. The Proposed Development has no potential to impact the status of this SWB.
Groundwater Body	Groundwater	Shanragh	Yes	The Proposed Development directly overlies the Shanragh GWB. An assessment is required to consider potential impacts of the Proposed Development on this GWB.
Protected Areas	Nature Conservation Designations	River Barrow and River Nore SAC	Yes	The Proposed Development Site is hydrologically connected to the River Barrow and River Nore SAC. An assessment is required to consider the potential impacts of the Proposed Development on this designated site.
		Cloghristrick Wood pNHA	Yes	Cloghristrick Wood pNHA is associated with Barrow_180 SWB and will be included in the WFD Compliance Assessment for the purposes of a conservative assessment.
		River Nore SPA	No	River Nore SPA has been screened out due to distant location and large upstream catchment area of the River Nore. Therefore, the Proposed Development has no potential to impact the SPA.
		Coan Bogs NHA	No	Coan Bogs NHA has been screened out due to the lack of hydrological and hydrogeological connections between the site and the NHA. Therefore, the Proposed Development has no potential to impact the NHA.
	Nutrient Sensitive Areas	Barrow_170 to 180	Yes	The majority of the Proposed Development Site is located within the Barrow_170 river sub-basin. Therefore, an assessment is required to consider the potential impacts of the Proposed Development Site on this NSA.
		Barrow_190 to 240	No	The Barrow_190 to 240 NSA has been screened out due to its large upstream catchment, the large volumes of water within these NSAs and its distant location

				from the Proposed Development Site. The Proposed Development has no potential to impact the status of these NSA.
		Upper Barrow Estuary	No	The Upper Barrow Estuary NSA has been screened out due to distant location and large volume of water within this NSA. The Proposed Development has no potential to impact the status of this NSA.
		Nore Estuary	No	The Nore Estuary NSA has been screened out due to distant location and large volume of water. The Proposed Development Site has no potential to impact the status of this NSA.
		Barrow Nore Estuary Upper	No	The Barrow Nore Estuary Upper NSA has been screened out due to distant location and large volume of water within this NSA. The Proposed Development has no potential to impact the status of this NSA.
		New Ross Port	No	The New Ross Port NSA has been screened out due to distant location and large volume of water within this NSA. The Proposed Development has no potential to impact the status of this NSA.
		Lower Suir Estuary (Little Island - Cheekpoint)	No	The Lower Suir Estuary (Little Island - Cheekpoint) NSA has been screened out due to distant location and large volume of water. The Proposed Development has no potential to impact the status of this NSA.
	Shellfish Areas	The Waterford Harbour (Cheekpoint / Arthurstown / Creadon)	No	The Waterford Harbour (Cheekpoint/Arthurstown/Creadon) shellfish area has been screened out due to its distant location from the Proposed Development Site. The Proposed Development has no potential to impact this Shellfish Area.
	Salmonid Waters	Nore_160 to Nore_250	No	The Nore_160 to Nore_250 Salmonid Waters has been screened out due to its large upstream catchment, the large volumes of water within these Salmonid Waters and its distant location from the Proposed Development Site. The Proposed Development has no potential to impact the status of these Salmonid Waters.
	DWPAs	Dinin (Main Channel)_020	No	The Dinin (Main Channel)_020 DPWA has been screened out due to its large upstream catchment (~300km ²), the large volumes of water within this DPWA and its distant location from the Proposed Development Site. The Proposed Development has no potential to impact the status of this DPWA.
		River Nore (Nore_160)	No	The Nore_160 DPWA has been screened out due to its large upstream catchment, the large volumes of water within this DPWA and its distant location from the Proposed Development Site. The Proposed Development has no potential to impact the status of this DPWA.

4. WFD COMPLIANCE ASSESSMENT

4.1 PROPOSALS

The Proposed Development is described in full in Chapter 3 of this EIAR.

The development site consists of an area of 41.86 ha within a total landholding of 45.68 ha, of which c. 41.86 ha is currently subject to an application for substitute consent under Section 177E of the Planning and Development Act 2000 (As amended) to regularise previous unauthorised development. The proposed development will consist of further quarry extraction over a total area of 16.17 ha to include the pre-existing quarry and additional agricultural lands with a projected lifespan of c. 20 years.

The proposed development will involve blasting, extraction and processing of rock using mobile primary crushing / screening and associated plant on the proposed quarry floor. The proposed quarry void will be extracted over 4 no. phases to a depth of 2 no. benches of c. 10m each to a quarry depth of c. 300m AOD with a proposed rate of extraction of c. 200K tonnes per annum. The proposed development will include for construction of earthen screening berms, soil storage areas and will utilise existing quarry entrance from the northern boundary linking to the L7130 local road to the east. Existing and proposed access tracks and existing settlement ponds will be utilised as part of the proposed development. The proposed development will be accompanied by a phased restoration plan.

4.2 POTENTIAL EFFECTS

4.2.1 Operational Phase (Unmitigated)

4.2.1.1 Potential Effects on Surface Water Quantity

The Proposed Development has the potential to increase the volumes of water being discharged from the site as surface waters which enter the Mortarstown Stream and the River Barrow downstream of the Proposed Development Site. The increase in surface water discharge will be as a consequence of the increased volumes of surface and shallow groundwater being generated within the proposed expanded quarry void. Any unmitigated or uncontrolled increase in discharge volumes has the potential to adversely impact downstream hydromorphology, water quality and increase the downstream flood risk.

However, any potential increase is likely to be small as the Proposed Development will not drastically change the local hydrological and/or hydrogeological regime. Currently the vast majority of water within the Proposed Development Site is directed to the ponds in the existing quarry void and is subsequently discharged as surface water.

Furthermore, the site investigations (5 no. boreholes) at the Proposed Development Site did not encounter any significant groundwater strikes. The bedrock encountered is of low permeability and all groundwater strikes were described as minor water strikes or slow/very slow water inflow. The floor of the existing quarry is currently well below the recorded groundwater level, but no significant groundwater inflows were recorded. This is a function of the low permeability of the bedrock aquifer. Therefore, there will be little groundwater ingress into the quarry void.

As a consequence, the surface water being discharged from the Proposed Development Site will consist largely of rainfall falling within the quarry void. The discharge rate from the quarry is a very small discharge volume, and therefore, there will be no significant increase in flow volumes in the surface water bodies downstream of the Proposed Development, particularly given the large volumes of water within the Barrow_170 SWB.

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

Table E: Potential Effects on Surface Water Quantity during Operational Phase (Unmitigated)

SWB	WFD Code	Current Status	Assessed Potential Status Change
Barrow_170	IE_SE_14B012600	Moderate	Moderate
Barrow_180	IE_SE_14B012700	Moderate	Moderate
Dinin (South)_010	IE_SE_15D080450	Good	Good
Dinin (South)_020	IE_SE_15D080600	Good	Good

4.2.1.2 Potential Effects on Surface Water Quality

During the operational phase, surface water is the main sensitive receptor associated with the Proposed Development due to the local hydrogeological regime, the low permeability of the underlying bedrock and the surface water outfall. There will be a requirement to strip and store overburden from the proposed extension area. Earthworks, the stripping of soil/subsoil, the creation of boundary berms, will be a potential source of sediment laden water. This will have the potential to impact surface water quality in the Barrow Catchment. Due to the large flow volumes in the River Barrow there will be limited potential for effects on this watercourse (even in the absence of mitigation measures).

There will also be a very limited potential to impact surface water quality downstream of the Proposed Development Site in the River Nore catchment. Once the boundary berms are in place and bedrock extraction has commenced, the bowl-shaped nature of the quarry will remove the potential for any effects in the River Nore Catchment. Therefore, there is only the potential for short-term effects on the Dinin River.

The potential for effects is limited given the large volumes of water within the receiving Barrow_170 SWB.

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

Table F: Potential Surface Water Quality Effects during Operational Phase (Unmitigated)

SWB	WFD Code	Current Status	Assessed Potential Status Change
Barrow_170	IE_SE_14B012600	Moderate	Moderate
Barrow_180	IE_SE_14B012700	Moderate	Moderate
Dinin (South)_010	IE_SE_15D080450	Good	Good
Dinin (South)_020	IE_SE_15D080600	Good	Good

4.2.1.3 Potential Effects on Groundwater Quantity

Quarrying activities below the groundwater table have the potential to impact local groundwater levels in the vicinity of the Proposed Development.

Groundwater monitoring has revealed the presence of a shallow groundwater system which lies above the proposed final floor level of the quarry (300mOD). During the site investigations (borehole drilling) all water strikes were minor and described typically as seepages.

Furthermore, inspections of the current quarry void faces and footprint does not suggest any significant inflows of groundwater. No significant groundwater inflows would be expected at elevations of 300mOD. The groundwater present at the Proposed Development Site is hosted in bedrock that has a low permeability and groundwater flowpaths will be short.

Therefore, based on the hydrogeological and topographic setting of the Proposed Development Site there will be no significant effects on groundwater levels. Due to the low permeability of the bedrock aquifer any minor effects will be localised.

A summary of potential status change to GWBs arising from dewatering activities during the operation phase of the Proposed Development in the unmitigated scenario are outlined in **Table G**.

Table G: Potential Groundwater Quantity Effects During Operational Phase (Unmitigated)

GWB	WFD Code	Current Status	Assessed Status Change	Potential
Shanragh	IE_SE_G_124	Good	Good	

4.2.1.4 Potential Groundwater Quality Effects

The removal of the protective layer of soil and subsoil will increase the vulnerability of the underlying bedrock to contamination. During the operational phase, groundwater vulnerability in the extraction areas will be 'Extreme' with exposed bedrock at the surface. Groundwater contamination can occur due to hydrocarbon spills or leaks on the quarry floor or through the use of explosives during blasting operations.

However, blasting has been completed at Red Rock Quarry as part of the previous historic extraction of bedrock at the established quarry. No significant effects associated with the historic blasting were recorded to date. The future blasting practices will not differ from those previously completed at the site and at similar sites across the country.

Furthermore, the potential for effects is limited given the scale of the Proposed Development in comparison to the overall scale of the Shanragh GWB (148km²).

A summary of potential status change to GWBs arising from dewatering activities during the operation phase of the Proposed Development in the unmitigated scenario are outlined in **Table H**.

Table H: Groundwater Quantity Effects During Operational Phase (Unmitigated)

GWB	WFD Code	Current Status	Assessed Status Change	Potential
Shanragh	IE_SE_G_124	Good	Good	

4.2.1.5 Potential Effects on Protected Areas

During the operational phase, the surface water connections from the Proposed Development Site to the Barrow_170 SWB could transfer poor quality surface water that may impact the conservation objectives of the River Barrow and River Nore SAC, Barrow_170 and _180 NSA and the Cloghrick Wood pNHA. However, the potential for effects is very limited given the large volumes of water within the River Barrow.

Furthermore, potential groundwater quality and groundwater quantity effects have the potential to impact the Shanragh GWB DWPA. However, given the scale of the Proposed

Development in comparison to the scale of the overall GWB the potential for effects is very limited.

4.3 MITIGATION MEASURES

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

4.3.1 Operational Phase

4.3.1.1 Increased Surface Water Discharge Volumes

The Proposed Development includes the provision of a water management system which will include the installation of surface water attenuation and settlement ponds on the quarry floor to cater for water generated within both the existing void and the quarry extension areas.

The proposed water management system will direct surface water and any minor groundwater inflows in the site towards suitably designed settlement lagoons on the quarry floor. These lagoons will serve to attenuate discharge from the site and will ensure that discharge rates do not exceed the greenfield runoff rates or the maximum permitted daily discharge volume as per the discharge licence.

The proposed infrastructure will attenuate storm water so that any increase in discharge volumes during storm events are gradual and controlled, preventing an increase in the flood risk downstream of the Proposed Development Site.

4.3.1.2 Mitigation Measures to Protect Surface Water Quality

Mitigation Measures for Blasting

The Proposed Development will utilise a water management system designed to prevent contamination of local surface waters with elevated concentrations of suspended solids. All water within the quarry void will be directed to suitably sized ponds in the floor of the quarry which will allow for the settlement of suspended solids. All discharge will be in accordance with the discharge licence requirements.

Management of Drainage from Spoil Storage Areas: Excavated soil/subsoil material from the extension area will be used for landscaping throughout the Proposed Development Site and in the construction of boundary berms. Berms will be sealed with a digger bucket and vegetated as soon as possible to reduce sediment entrainment in drainage water. Once re-vegetated and stabilised berms will no longer be a potential source of silt laden drainage water.

The topsoil/overburden removed from one phased extraction area will be spread over the void created in the previous phased extraction area. These reinstated areas will be within the quarry void, which will have a bowl-shaped topography and all runoff will be directed to the water management system.

Timing of Site Preparation Works: The removal of soil/subsoil from the other proposed extension areas will only be carried out during periods of low rainfall. This will minimise the risk of entrainment of suspended sediment in drainage water.

No other mitigation measures are required.

Mitigation Measures for Oil and Fuel Spillage

The Proposed Development will utilise a water management system designed to prevent contamination of local surface waters with hydrocarbons. Water from the wheel wash will be recycled and will not enter the settlement ponds or be discharge to surface waters.

In addition, the following measures will be implemented to ensure that surface waters are not contaminated with hydrocarbons:

- Hydrocarbons at the Proposed Development Site will be delivered via fuel truck;
- There will be no storage of hydrocarbons on site;
- Major repairs will be completed off site. Emergency mechanical repairs will use spill kits kept on-site;
- All water from the site will be passed through a hydrocarbon interceptor prior to discharge; and,
- All activities on site will be completed in accordance with the EMP.

Highest standards of site management will be maintained and utmost care and vigilance followed to prevent accidental contamination or unnecessary disturbance to the site and surrounding environment during the operation of the quarry.

Mitigation Measure for Wastewater Disposal

The Proposed Development will utilise an established wastewater treatment system.

The Proposed Development does not include any discharge of untreated wastewater to ground or surface waters.

4.3.1.3 Mitigation Measures to Protect Groundwater Quantity

The proposed extraction will only extend to 300mOD, thereby significantly limiting the potential for effects on groundwater levels.

Site investigations and groundwater monitoring has revealed that the rock underlying the Proposed Development Site is of low permeability. No significant groundwater inflow occurs into the existing quarry void with the current discharge rate from the quarry estimated to be 178m³/day. Groundwater inflow will therefore be minimal, and the Proposed Development will not have the potential to significantly impact local groundwater levels.

Furthermore, there will be no significant alteration of local groundwater recharge or surface water runoff rates as a result of the Proposed Development.

No specific mitigation measures are required.

4.3.1.4 Mitigation Measures to Protect Groundwater Quality

Red Rock Quarry will operate a site-specific protocol for blasting which will follow the current international best practice. This protocol will be employed to mitigate the potential effects of explosives on groundwater and surface water quality during blasting operations.

4.3.1.5 Protected Areas

There is no potential for effects on the River Barrow and River Nore SAC or Cloghrick Wood pNHA for the following reasons:

- Whilst the Proposed Development is hydrologically connected to the River Barrow and these designated sites, the Proposed Development is in excess of 2km from the Barrow;

- The length of the hydrological flowpath between the Proposed Development Site and the SAC is >2.5km whilst the flowpath to the pNHA is ~6km;
- There is limited potential for effects due to the volume of water within the Barroe River in comparison to the proposed discharge volumes;
- However, the Proposed Development does not rely on the dilution or assimilative capacity of any downstream watercourse;
- Nevertheless, the Proposed Development will utilise a water management system designed to prevent contamination of local surface waters with hydrocarbons or suspended solids;
- The detailed, tried and tested, best practice mitigation measures presented above, will ensure the protection of all watercourses in the immediate vicinity of the Proposed Development Site;
- By ensuring the protection of watercourses proximal to the site, the status of all downstream designated sites is also protected.

4.3.2 Restoration Phase

Similar mitigation measures prescribed above for the operational phase will be implemented during the restoration phase.

4.3.3 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

WFD Waterbody	WFD Code	WFD Status (2016-2021)	Assessed Potential Status Change- Unmitigated	Assessed Potential Status Change
Surface Water Bodies				
Barrow_170	IE_SE_14B012600	Moderate	Moderate	Moderate
Barrow_180	IE_SE_14B012700	Moderate	Moderate	Moderate
Dinin (South)_010	IE_SE_15D080450	Good	Good	Good
Dinin (South)_020	IE_SE_15D080600	Good	Good	Good
Groundwater Body				
Shanragh GWB	IE_SE_G_124	Good	Good	Good

4.4 POTENTIAL CUMULATIVE EFFECTS

Other land use activities in the surrounding area comprise mainly of agricultural land and coniferous forestry plantations. Several other quarries are also located in the local area.

Due to the local hydrogeological regime, the greatest potential for cumulative or in-combination effects with other developments or land use practices will be in terms of surface water quantity and surface water quality. However, the Proposed Development and other quarries in the local area will operate under strict conditions set out in their respective Environmental Management Plans and IPC Licences designed for the protection of surface water quality and quantity. Due to the lack of any significant residual impacts from the Proposed Development that would affect the wider hydrological environment, there will be no significant cumulative impacts to downstream surface watercourses.

Similarly, in terms of groundwater, the Proposed Development will not have a significant impact on groundwater quantity (groundwater levels) or groundwater quality due to the nature of the local hydrogeological regime with short groundwater flowpaths and bedrock of low permeability.

Therefore, no significant hydrological and/or hydrogeological cumulative effects will occur.

5. CONCLUSION

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

The Proposed Development comprises the lateral extension of a former bedrock quarry in the townland of Clogrennane, Co. Carlow. The quarry void will extend to a final floor level of 300mOD which is below the existing groundwater table. However, based on site investigations groundwater inflows into the void will be minimal and the Proposed Development will not have a significant impact on groundwater levels (groundwater quantity).

Mitigation for the protection of surface water quality during the operation and restoration phases of the Proposed Development will ensure the qualitative and quantitative status of the receiving waters will not be altered by the Proposed Development Site.

There is also mitigation proposed to protect groundwater quality within the Proposed Development during the operation and restoration phases of the Proposed Development. These mitigation measures will ensure the qualitative status of the underlying GWBs will not be altered by the Proposed Development.

There will be no change in GWB or SWB status in the underlying GWB or downstream SWBs resulting from the Proposed Development. 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.

Furthermore, with the implementation of the mitigation measures, there will be no potential effects on any downstream protected areas as a result of the Proposed Development.

As such, the Proposed Development:

- will not cause a deterioration in the status of all surface and groundwater bodies assessed;
- will not jeopardise the objectives to achieve 'Good' surface water/groundwater status;
- does not jeopardise the attainment of 'Good' surface water/groundwater chemical status;
- does not jeopardise the attainment of 'Good' surface water/groundwater quantity status;
- does not permanently exclude or compromise the achievement of the objectives of the WFD in other waterbodies within the same river basin district;
- is compliant with the requirements of the Water Framework Directive (2000/60/EC); and,
- is consistent with other Community Environmental Legislation including the EIA Directive (2014/52/EU), the Habitats Directive (92/43/EEC) and the Birds Directive (2009/147/EC) (Note that a full list of legislation complied with in relation to hydrology and hydrogeology is included in Section 8.1.4 of EIAR Chapter 8).

* * * * *

6. REFERENCES

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Environmental Protection Agency (2024). Cycle 3: HA 14 Barrow Catchment Report.

Environmental Protection Agency (2024). Cycle 3: HA 15 Nore Catchment Report.

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

Directives and Legislation

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

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

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

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

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

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

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

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

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

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