March 2022

Natura Impact Statement

IEL Reg. No. P1069-01

William Connolly & Sons Unlimited Company

Grange Lower, Goresbridge, Co. Kilkenny

MALONE O'REGAN ENVIRONMENTAL

MALONE O'REGAN

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MALONE O'REGAN ENVIRONMENTAL

Ground Floor – Unit 3
Bracken Business Park
Bracken Road, Sandyford
Dublin 18, D18 V32Y
Tel: +353- 1- 567 76 55
Email: enviro@mores.ie

Title: Natura Impact Statement, IEL Reg. No. P1069-01, William Connolly & Sons Unlimited Company, Grange Lower, Goresbridge, Co. Kilkenny

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Prepared By: Gus Egan / Sarah de Courcy **Signed:** _____

Checked By: Kevin O'Regan / Dyfrig Hubble **Signed:** _____

Approved By: Kevin O'Regan / Dyfrig Hubble **Signed:** _____

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01	30/11/21	NIS Report	Final	SdC	DH	DH
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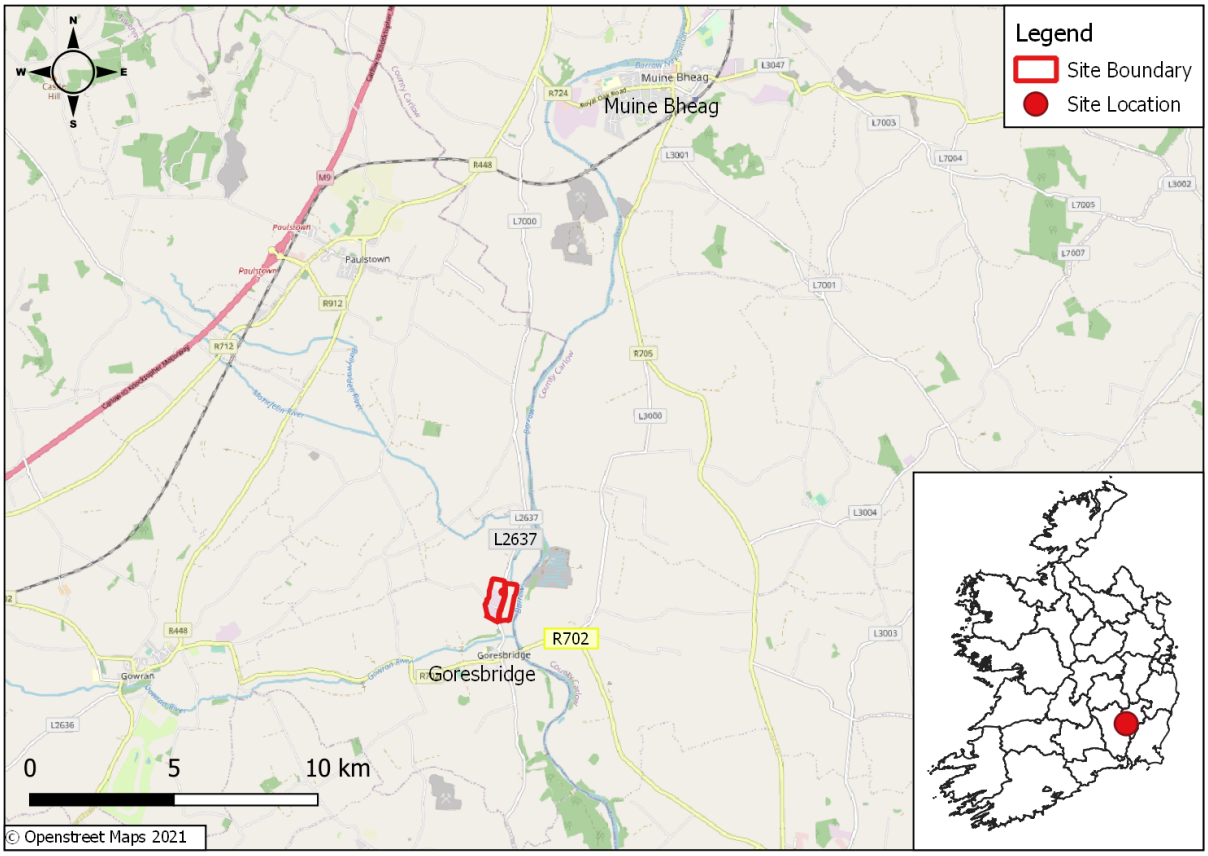
1 INTRODUCTION

1.1 Background

Malone O'Regan Environmental (MOR) were commissioned by William Connolly & Sons Unlimited Company herein referred to as 'Red Mills' to undertake a Stage 2: Appropriate Assessment, i.e. Natura Impact Statement (NIS), to assess the potential adverse effects, if any, of the current operations at their facility and the proposed upgrade works, on nearby sites with European conservation designations (i.e. Natura 2000 sites).

The location of the facility ('the Site') is on lands in Grange Lower, Goresbridge, Co. Kilkenny (OS Reference S 68090 54390), as shown in Figure 1-1 below.

Figure 1-1: Site Location



This NIS has been prepared in response to a request for further information, that was issued by the Environmental Protection Agency (the Agency) on the 20th November 2018 in regards to the Red Mills application for an Industrial Emissions Licence (IEL) Reg. No. P1069-01.

The purpose of this assessment was to determine the appropriateness, or otherwise, of the current operation of the Site and the proposed upgrade works in the context of the conservation objectives of Natura 2000 sites.

1.2 Statement of Authority

This report was approved by Mr. Dyfrig Hubble BSc (Hons) MSc, Principal Ecologist with MOR. Dyfrig is a full member of the Chartered Institute of Ecology and Environmental Management. Dyfrig has over 15 years of experience working in the ecological consultancy sector including habitat appraisals, specialist species-specific surveys, ecological assessments and appraisals including undertaking Appropriate Assessments.

The assessment relating to noise emissions was reviewed by Kenneth Goodwin, the Principal Acoustician with MOR. He is a full member of the Institute of Acoustics (MIOA) and the

Association of Acoustic Consultants of Ireland (AACI) with over 15 years' experience in environmental and acoustic consultancy.

The assessment relating to air emissions was reviewed by Klara Kovacic, Associate Director with MOR. Klara has over 20 years of professional experience, including 15 years in environmental consultancy positions as a senior consultant and project manager. Klara has been a chartered environmentalist since 2014 and is a full member of the Institute of Environmental Management and Assessment (IEMA). She is also an air quality specialist and is suitably qualified in Air Quality and Air Dispersion Modelling.

Assessments relating to surface water quality were overseen and reviewed by Janette McDonald BSc in Environmental Science and MSc in Water Resource Management, Principle Environmental Consultant with MOR. Janette is an associate member of IEMA and has over 9 years' experience in environmental consultancy. Specialist input was also received from IE consulting in relation to the Integrated constructed Wetlands (ICW) design and management. IE Consulting is a water, environmental and civil engineering consultancy who specialise in water resource engineering, hydrology, hydrogeology and related environmental assessment.

1.3 Regulatory Context

This Natura Impact Statement (NIS) was prepared in accordance with Article 33 of the Planning and Development Regulations 2001 and in compliance with the following legislation:

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna better known as "The Habitats Directive" provides the framework for legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000. These are Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Conservation of Wild Birds Directive (79/409/EEC as amended 2009/149/EC) (better known as "The Birds Directive").

Article 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to affect Natura 2000 sites (Annex 1.1). Article 6(3) establishes the requirement for Appropriate Assessment (now termed Natura Impact Statement):

> "*Any plan or project not directly connected with or necessary to the management of the [Natura 2000] site but likely to have a significant effect thereon, either individually or in combination with other plans and projects, shall be subjected to appropriate assessment of its implications for the site in view of the site's conservation objectives. In light of the conclusions of the assessment of the implication for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public"*

The Habitats Directive promotes a hierarchy of avoidance, mitigation and compensatory measures. First, the project should aim to avoid any negative impacts on European sites by identifying possible impacts early in the planning stage and designing the project in order to avoid such impacts. Second, mitigation measures should be applied, if necessary, during the Appropriate Assessment (AA) process to the point, where no adverse impacts on the site(s) remain. If the project is still likely to result in adverse effects, and no further practicable mitigation is possible, it is rejected. If no alternative solutions are identified and the project is required for imperative reasons of overriding public interest (IROPI test) under Article 6 (4) of the Habitats Directive, then compensation measures are required for any remaining adverse effect.

1.1 Stages of the Appropriate Assessment

There are four distinct stages to undertaking an AA as outlined in current EU and DOEHLG guidance:

Stage 1: Screening

This process identifies the potential impacts of a plan or project on a Natura site, either alone or in combination with other plans and projects and considers whether these impacts are likely to be significant. If potentially significant impacts are identified the plan or project cannot be screened out and must proceed to Stage 2.

Stage 2: Appropriate Assessment

Where potentially significant impacts are identified, an assessment of the potential mitigation of those impacts is required; this stage considers the appropriateness of those mitigation measures in the context of maintaining the integrity of the Natura 2000 sites. If potential significant impacts cannot be eliminated with appropriate mitigation measures, the assessment must proceed to Stage 3.

Stage 3: Assessment of Alternatives Solutions

This process examines alternative ways to achieve the objectives of the plan or project that avoid adverse impacts on the integrity of the Natura 2000 site if mitigation measures are deemed insufficient.

Stage 4: Imperative Reasons of Overriding Public Interest (IROPI)

Assessment where no alternative solution exists for a plan or project and where adverse impacts remain. This includes an assessment of compensatory measures, where in the case of projects or plans, can be considered necessary for IROPI.

This report has been prepared to inform the planning authority with regard to Stage 1 (Screening) and Stage 2 (Appropriate Assessment) of the ongoing operations onsite and the proposed upgrade works through the research and interpretation of available scientific, geographic and engineering knowledge. The report seeks to determine whether the ongoing operations onsite and the implementation of the proposed upgrade works will, on its own or in combination with other plans/projects have a significant effect on Natura 2000 sites within a defined radius of the subject Site.

2 METHODOLOGY

2.1 Desk Based Study

A desk-based review of information sources was completed, which included the following:

- All relevant available documents on the EPA website in regard to the application for an Industrial Emissions Licence (IEL) Reg. No. P1069-01.
- The National Parks and Wildlife Service (NPWS) website was consulted to obtain the most up to date detail on conservation objectives for the Natura 2000 sites relevant to this assessment (NPWS, 2021);
- The National Biodiversity Data Centre (NBDC) website was consulted with regard to species distributions within 2km of the Site (NBDC, 2021); and,
- The EPA Envision website was consulted to obtain details about watercourses in the vicinity of the Site (EPA, 2021).

In addition, a review was undertaken of a number of technical assessments that have also been undertaken in support of this response to the Agency including:

- '*Noise Impact Assessment'* (NIA);
- *'Air Dispersion Modelling Report*;' and,
- 'Integrated Constructed Wetland (ICW) System' prepared by IE Consulting.

The findings of these technical assessments have been used to inform the assessment of potential adverse effects on Natura 2000 sites identified as part of this study.

2.2 Field Based Studies

2.2.1 Otter

An otter survey conducted on the 15th July 2021 investigated areas identified as having potential for otter. These areas included the adjacent sections of the River Barrow, Monefelim stream and the Mill Race. The survey aimed to identify and examine areas where otter might occur by noting any evidence of otter observed. Evidence of otter searched for included:

- Holts (features log piles, caves and cavities);
- Slides (flattened areas of mud or vegetation);
- Paw prints;
- Evidence of foraging (usually in the form of feeding remains such as fish scales and shellfish); and,
- Spraints.

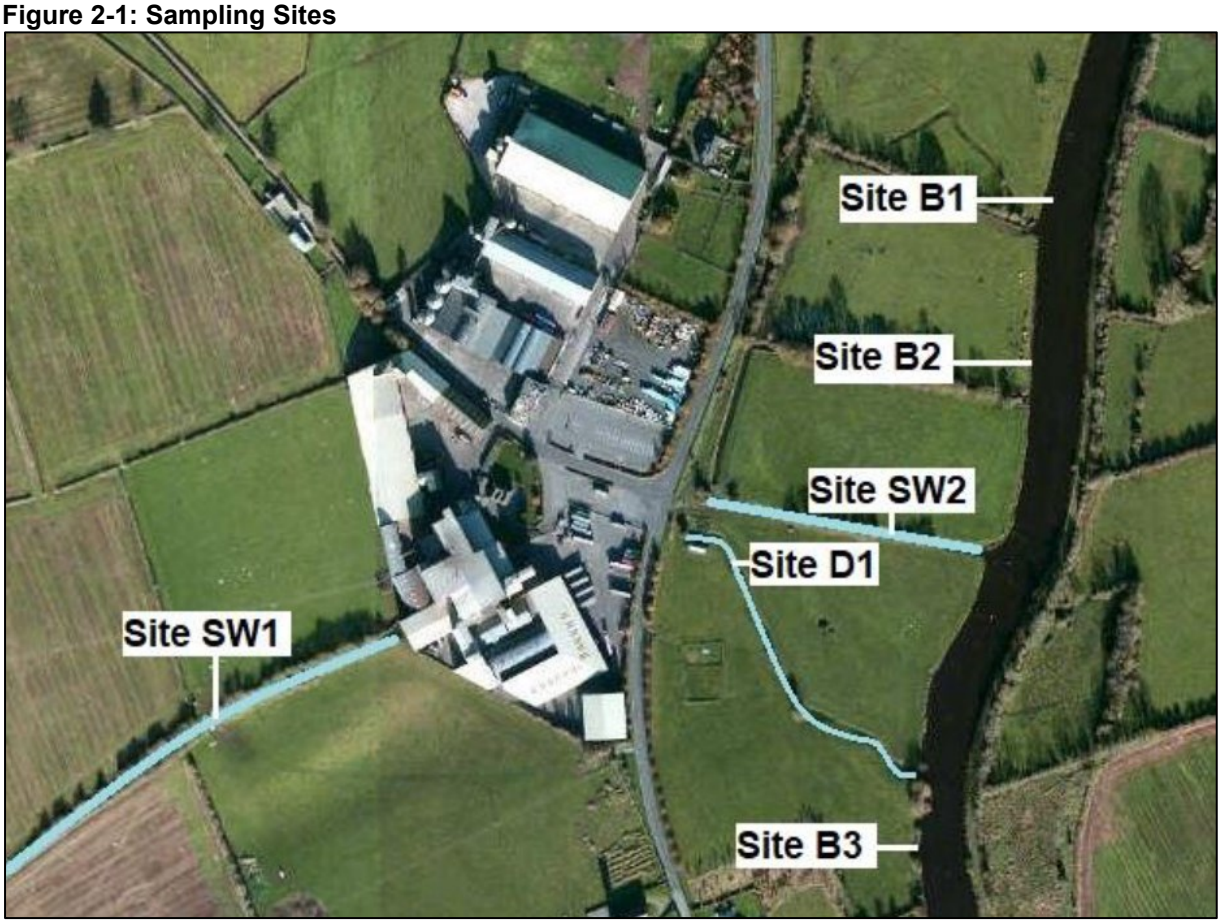
2.2.2 Aquatic Surveys

Specialist aquatic surveys were undertaken by Sweeney Consultancy on the 23rd of July and 26th of August 2021 in sections of the River Barrow and Mill Race, refer to Appendix B for further details. These surveys aimed to assess the habitat quality within the relevant waterbodies based on their physical nature and ecology. The following methodology was followed:

- The grid references of photographs were recorded using a handheld GPS device. All photographs were taken with a digital camera;
- Pond-net samples were taken and invertebrates were identified on the bankside to the lowest taxonomic level possible with the naked eye. Six (6No.) locations were sampled:

- Barrow Site 1 (B1) – upstream of all possible influences of the Red Mills plant, both current and future;
- Barrow Site 2 (B2) – immediately upstream of current surface water discharge;
- Barrow Site 3 (B3) – downstream of all possible influences of the Red Mills plant;
- Mill Race / Surface Water Discharge Site 1 (SW1) – on the former mill race, referred to as Gowran North Channel stream by the EPA, upstream of the Red Mills facility;
- Mill Race / Surface Water Discharge Site 2 (SW2) is on the former mill race, downstream of the Red Mills facility;
- Small Surface Watercourse / Drain Site (D1) - upstream end of the channel of the small surface watercourse. Checked to avoid the possible influence of runoff from slurry that was spread in the adjoining field to the south.

Figure 2-1: Sampling Sites



Excerpt from '*Aquatic Ecological Assessment*' (See Appendix B for further details)

- The contents of the pond net were first examined for protected species prior to the invertebrate faunal assessment;
- The biological water quality was assessed following the most recent EPA Standard Operational Procedure for the Q-scheme methodology, where possible, which is based primarily on analysis of the aquatic invertebrate fauna;
- As the physical habitat conditions at Sites SW1, SW2 and D make them unsuitable for the application of the EPA Q-scheme methodology, the invertebrate fauna was

assessed in comparison to that of other similar watercourses, based on previous experience and knowledge of the operator;

- The habitat quality for salmonids (*Salmo salar* and *Salmo trutta*) was assessed, based on criteria for the physical instream requirements of these species for spawning, nursery and adult habitat (Kennedy, 1984; Bardonnet & Baglinière, 2000);
- The habitat quality for lamprey species, was assessed, based on criteria for the physical instream requirements of these species for spawning, nursery and adult habitat (Maitland, 2003; Johns, 2002); and,
- The habitat quality for crayfish (Austropotamobius pallipes) was assessed, based on the criteria outlined in '*Ecology of the White-clawed Crayfish'* (Holdich, 2003).

2.2.3 Surface Water Monitoring Methodology

Surface water was sampled on three (3No) occasions on the 15th July, 25thAugust and 22nd September at two locations on the River Barrow, upstream and downstream of the Site. Samples taken were analysed for the parameters as listed in Table 2-1.

Table 2-1: Surface water parameters

Parameters
pH
Dissolved Oxygen
Biochemical Oxygen Demand
Total ammonia as N
Nitrate as NO_3
Total phosphorous
Ortho-phosphate as P
Fats, oils and greases
Total suspended solids

The surface water samples were obtained using a telescopic pole with scoop attachment. The equipment was decontaminated after each sampling location in order to prevent cross-contamination between locations. The water samples were decanted into labelled containers supplied by the laboratories. The samples were kept cool, in darkness and sent to an ISO 17025 accredited laboratory for analysis. In order to maintain sample integrity, a Chain of Custody document was completed to track sample possession from time of sample collection to time of analysis.

3 DESCRIPTION OF THE PROJECT

3.1 Site Context and Description

The Site encompasses a total area of ca.17.9hectares (ha) with ca.10.55ha consisting of the main facility within the townland of Grange Lower, Goresbridge, Co. Kilkenny. The Site is ca.0.5km north of the main crossroads at Goresbridge town adjacent to the River Barrow. The L2639 local road runs between the existing facility to the west and the integrated constructed wetland (ICW) system (Planning Reference No. PL19235) to the east.

The wider area surrounding the Site is largely composed of agricultural land in the form of arable fields and pastures. Scattered residential properties and farms are also present. To the northeast of the Site, across the River Barrow, lies the historic Ballyellen Limestone Flour works.

3.2 Watercourses within the Vicinity of the Site

The Site is located within the Barrow Catchment [Catchment ID:14] and the Barrow_SC_120 subcatchment [Subcatchment ID: 14_8] (EPA, 2021).

There are three (3No.) hydrological features of note in relation to the Site:

- River Barrow;
- Monefelim river; and,
- Gowran North Channel stream / Mill Race.

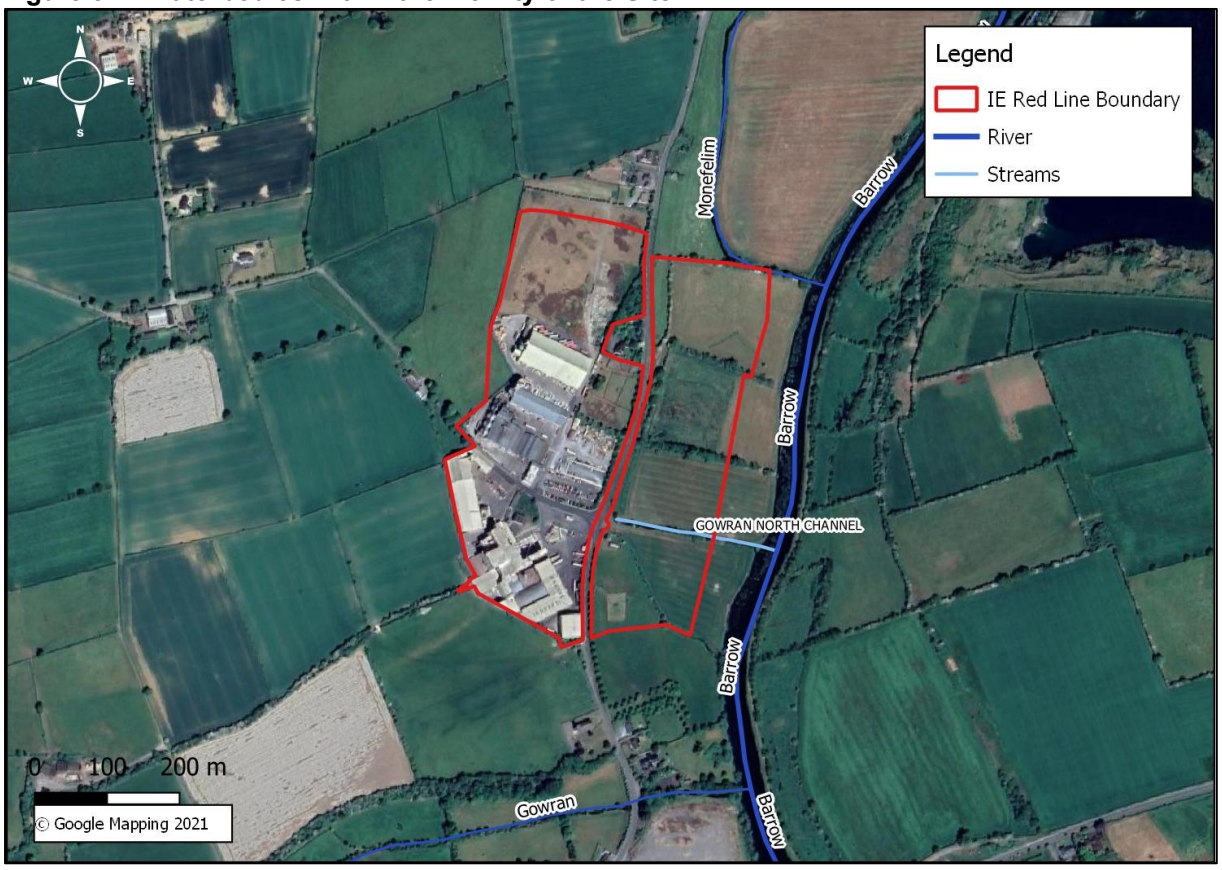
The Gowran North Channel as defined by the EPA and illustrated in Figure 3-1, is also known as the ‘Mill Race.’ To avoid confusion and to ensure consistency across all technical reports, this waterbody will be referred to as the Mill Race from this point onward.

The Monefelim river and Mill Race discharge to the River Barrow which is ca.45m east of the Site at its closest point. A small section of the Monefelim river runs along the northern Site boundary and the Mill Race flows out of a culvert to the east of L2639, through the eastern portion of the Site. It should be noted that the River Barrow is designated as a Special Area of Conservation (SAC).

Under the Water Framework Directive (WFD) 2000/60/EC, the EPA classifies the status and the risk of not achieving a good water quality status for all waterbodies in Ireland. According to the WFD Status 2013-2018, the most up-to-date data at the time of writing this report, the River Barrow, Monefelim river and Mill Race all have a ‘poor’ water quality status and are considered to be ‘at risk’ (EPA, 2021).

The waterbodies within the vicinity of the Site are presented in Figure 3-1.

Figure 3-1: Waterbodies within the vicinity of the Site



A network of drainage ditches was also noted within the eastern section of the Site. These drainage ditches are hydrologically connected to the ICW system and the River Barrow.

3.3 Description of the Existing Development

The Facility consists of:

- Grain Mill;
- Silos;
- Storage Buildings/Warehouses;
- Administration Block;
- Shop;
- Weighbridge;
- Grain and Seed Dryers;
- Car park; and
- Miscellaneous plant.

There are three distinct operations at the Red Mills Site. In summary, grain intake and drying occurs during the Harvest season (July to September). Following drying, grain is aerated and stored onsite in Grain Stores. During the short duration Harvest season (ca. 8weeks) which is weather, and amount and quality of grain received dependent, and subject to change each year. the Facility operates on a 24-hour basis and the onsite Dryers are operational.

The dried and aerated grain together with other raw materials undergo mechanical processes within the Feed Mill to produce peak performance nutrition for animals locally and worldwide. During the Non-harvest season (October to June), onsite Grain Dryers and associated activities (vehicle movement, tipping, Intake areas) do not operate. Seed is also taken in onsite and utilised in seed dressing, which occurs primarily in the Seed Plant.

3.3.1 Surface Water Drainage

An ICW system is in operation onsite. The purpose of this ICW is to provide a means of storm water treatment and polishing and, if required, to provide a means of capturing, isolating and managing any potential sources of pollution that may inadvertently or accidentally discharge to the storm water drainage system. The ICW system has been constructed in two phases, ICW1 (cells 1-4) were constructed in 2014-2015 and ICW2 (cells 5-7) constructed in 2020-2021. The ICW system was vegetated in two phases, with ICW1 vegetated in 2014-2015 and ICW2 vegetated during Quarter 1, 2022. ICW2 has been commissioned following a permeability test and is now connected to ICW1.

In addition, a new full retention interceptor, separator, monitoring chamber, shut off valve and discharge pipe from ICW2 have been installed in advance of the 2022 harvest season. Works are ongoing, refer to Section 3.4.5 below.

Currently the Facility discharges to the Mill Race, a field drain that flows directly into the River Barrow and the ICW system See Appendix A for details of the original drainage layout 'Existing' P705 and P705A'.

3.4 Description of Proposed Upgrade Works

3.4.1 Replacement Dryer 6

The new, twin-column, directly heated grain dryer has been installed externally, and it replaces the previous flatbed Alvan Blanch (Dryer 6).

The emissions from the replacement dryer will comply to the relevant BAT limits. Please refer to Emissions to Air Impact Assessment provided with this RFI response for further details on the emissions from the replacement dryer, which also contains air dispersion modelling results.

3.4.2 New Structures

Two (2No.) new Grain Stores were granted planning permission by Kilkenny County Council on the 22nd February 2022 (Pl Ref: 21/573).

There will be no point source emissions to air from the two new Grain Stores.

3.4.3 New Linkway Road

A new linkway road (Planning Ref: 21/633) development was granted by Kilkenny County Council (22nd November 2021) which will extend from a new junction onto the local road located adjacent to the northern end of the Red Mills site and extending approximately westwards to a new junction onto the L6688 public roadway. The development includes a new roadway ca. 470m long, new road junctions and associated sightlines, the provision of 1No. factory entrance, 5No. field entrances, associated drainage works, road signage, fencing, boundary hedgerow planting, landscaping and all associated works.

The new Linkway road is also described in the Non-Technical Summary provided with this IEL Review application.

3.4.4 Waste Grain

Red Mills during the peak of the harvest, depending on weather conditions and the ripening of grains can receive large amounts of grain over a 10–15-day period, which requires rapid drying to ensure that the grain does not deteriorate by developing mould growth (including generation of mycotoxins), sprouting, heating, decomposition etc. If the grain deteriorates it can become unsuitable for its intended use and therefore becomes a waste. The replacement Dryer 6 is integral to ensuring that waste grain will be avoided, and the grain onsite remains as fresh as possible. In the event of spoilt grain onsite, the grain has to be disposed offsite as a waste utilising an appropriately licenced contractor.

3.4.5 Surface Water Drainage

A comprehensive review of the onsite drainage was undertaken by MOR, the existing and proposed surface water drainage layouts were developed taking cognisance of the EPA requirements with regards surface water discharge.

Works have been commenced to enable all onsite surface water discharge from the Facility via a separator and interceptor to the ICW system. In March 2022, a separator, interceptor, monitoring chamber and emergency shut off valve have been installed at the outfall of the ICW prior to discharge at SW1A to the River Barrow. Works are ongoing to install a connecting pipe with the southern portion of the Site. Please refer to the IE consulting report and Appendix A 'P710 and P710A' submitted as part of this IEL application (30th November 2021) for more detail..

4 IDENTIFICATION OF NATURA 2000 SITES

In accordance with the European Commission Methodological Guidance (European Commission, 2002) a list of European sites that can be potentially affected by ongoing operations onsite alongside the proposed upgrade works has been compiled. Guidance for Planning Authorities prepared by the Department of Environment Heritage and Local Government (DoEHLG, 2009) states that defining the likely zone of impact for the screening and the approach used will depend on the nature, size, location and the likely effects of the project. The key variables determining whether or not a particular Natura 2000 site is likely to be negatively affected by a project are: the physical distance from the project to the site; the presence of impact pathways, the sensitivities of the ecological receptors; and the potential for in-combination effects.

Adopting the precautionary principle, all SAC and SPA sites within a 15km radius of the Site have been considered (Refer to Figure 4-1).

Four (4No.) Natura 2000 designated sites were identified within 15km of the Site (Table 4-1, Figure 4-1).

Figure 4-1: Natura 2000 Sites within 15km of the Site

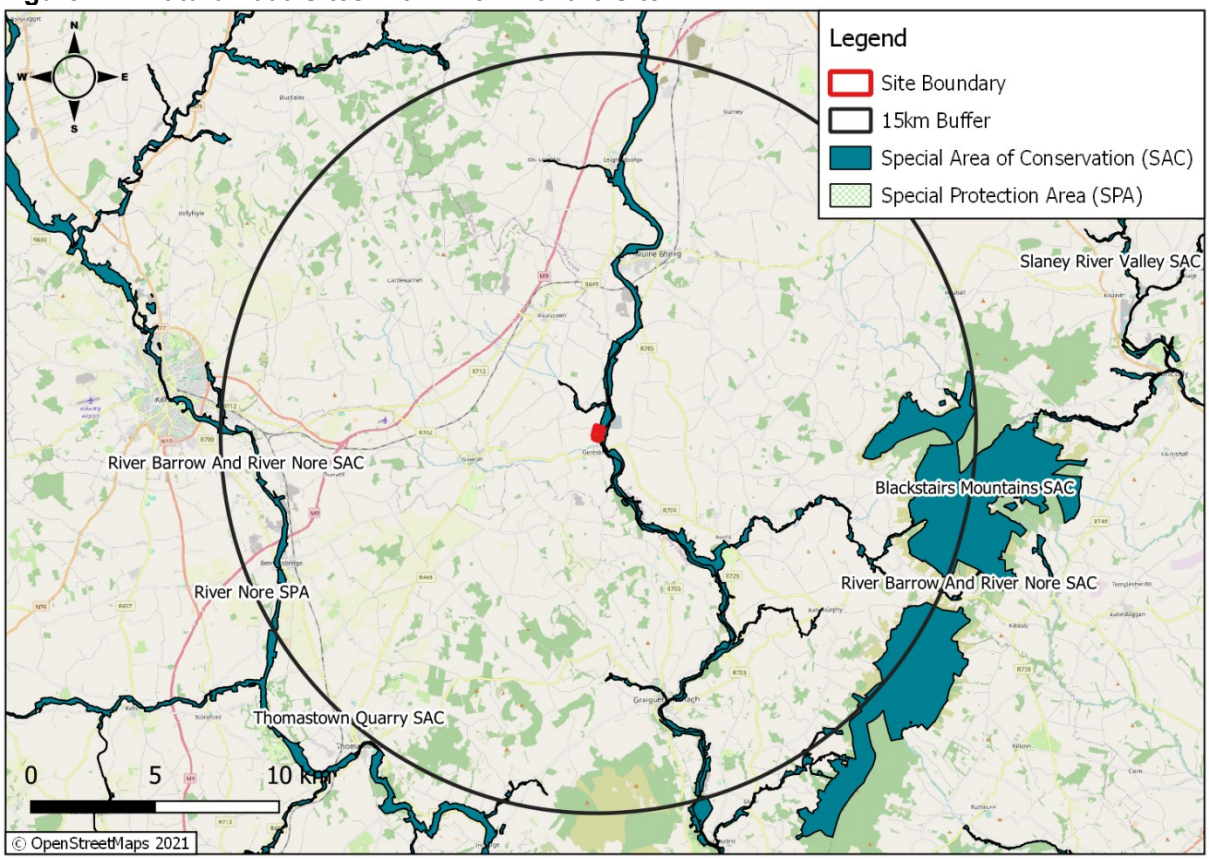


Table 4-1: Natura 2000 Designated Sites within 15km of the Site

Site Name	Site Code	Distance (km)	Direction from the Site
Special Area of Conservation (SAC)			
River Barrow and River Nore	002162	Within / Adjacent	NE
Blackstairs Mountains	000770	10.6km	E

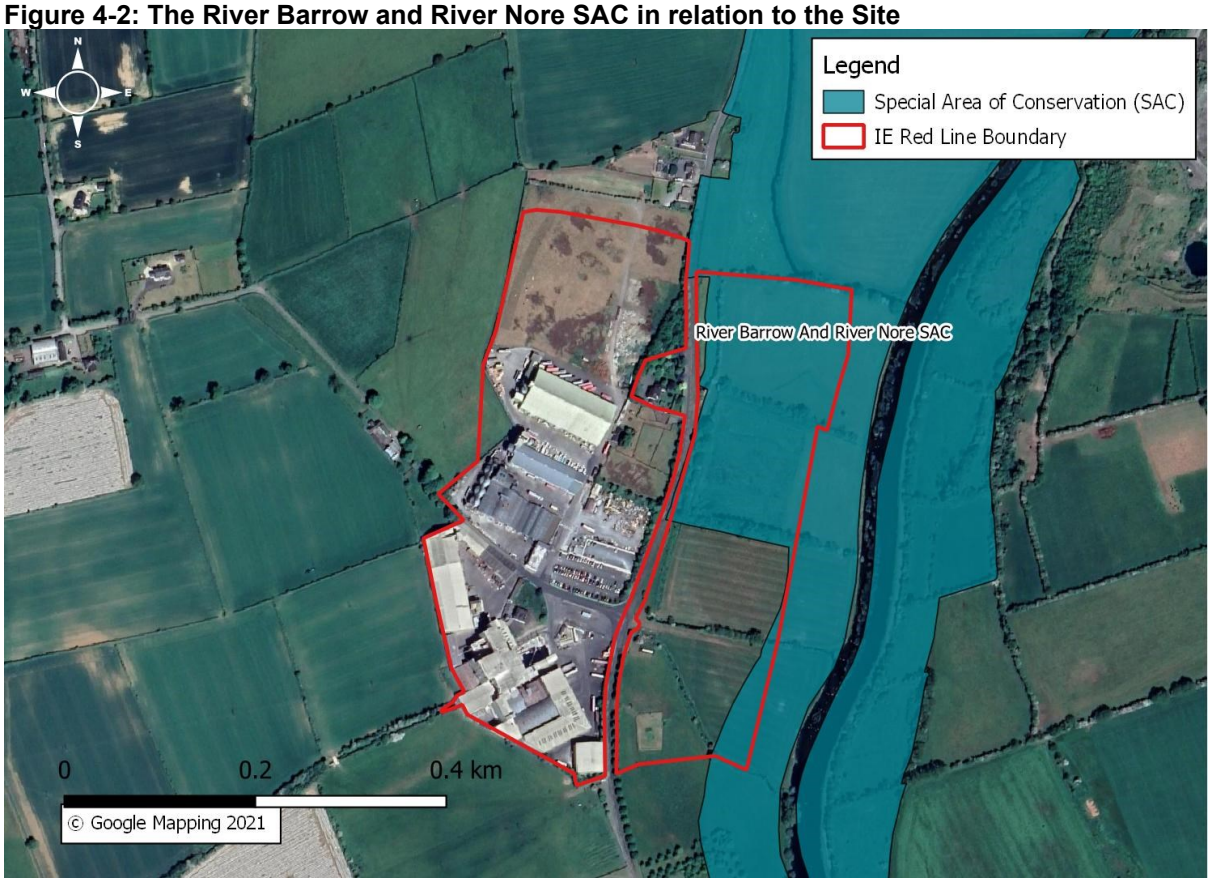
Site Name	Site Code	Distance (km)	Direction from the Site
Thomastown Quarry SAC	002252	14.8km	SW
Special Protected Area (SPA)			
River Nore	004233	12.8km	SW

Sections of the Site, including the integrated constructed wetland (ICW) system (Planning Reference No. PL19235) are within the River Barrow and River Nore SAC. Furthermore, the boundaries of three (3No.) additional Natura 2000 sites are located within 15km of the Site.

However, given the distance, intervening land and lack of impact pathways between the Site and the Blackstairs Mountains SAC, Thomastown Quarry SAC and the River Nore SPA, these three (3No.) Natura 2000 sites have been screened out from further consideration.

Given that part of the overall Site is located within a section of the River Barrow and River Nore SAC (refer to Figure 4-2) and the fact that there is a hydrological connection from the Site to the SAC via the current drainage network, further consideration will be given to assess the impacts resulting from the ongoing operations onsite and the proposed upgrade works on the River Barrow and River Nore SAC. Further details on this Natura 2000 site are provided below.

Figure 4-2: The River Barrow and River Nore SAC in relation to the Site



4.1 River Barrow and River Nore SAC

The River Barrow and River Nore SAC consists of the freshwater stretches of the Barrow and Nore River catchments extending from the Slieve Bloom Mountains to the estuary and tidal elements in Creadun Head, Waterford.

Species rich habitats (Annex I of the EU Habitats Directive) including estuaries, alluvial forests, petrifying springs, and intertidal mudflats and sandflats can be found within this SAC (Table 4-2).

This SAC is of considerable conservation significance for multiple reasons:

- Parts of the SAC comprises of a range of Annex I habitats (Table 4-2);
- This SAC supports multiple species listed on Annex II of the EU Habitats Directive, including Otter, River Lamprey and Salmon (Table 4-3); and,
- Ornithological importance: This SAC supports Kingfisher, a nationally important bird population listed in Annex I of the EU Birds Directive. One SPA (River Nore), designated under the EU Birds Directive, is also located within the SAC.

Land use within the SAC is primarily agricultural, principally grazing and silage production. Fishing is also a main tourist attraction along stretches of the main rivers and their tributaries. Other recreational activities such as boating, golfing and walking also occur within the SAC. The main threats to the SAC and current damaging activities include high inputs of nutrients into the river system from agricultural runoff and sewage plants, along with over-grazing, invasion of non-native species and land reclamation (NPWS, 2011).

Table 4-2 Qualifying Annex I Habitats for the River Barrow and River Nore SAC

Qualifying Habitats **(*denotes Priority Habitat)**	**Code**	**Site Specific Conservation Objective**
Estuaries	1130	Maintain favourable conservation condition
Reefs	1170	Maintain favourable conservation condition
Mudflats and Sandflats not covered by seawater at low tide	1140	Maintain favourable conservation condition
Salicornia and other annuals colonizing mud and sand	1310	Maintain favourable conservation condition
Atlantic salt meadows (*Glauco-Puccinellietalia maritimae)*	1330	Restore favourable conservation condition
Mediterranean salt meadows (*Juncetlaia maritimi)*	1410	Restore favourable conservation condition
Water courses of plain to montane levels with *the Ranunculion fluitantis* and *Callitricho - Batrachion* vegetation	3260	Maintain favourable conservation condition
European dry heaths	4030	Maintain favourable conservation condition
Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	6430	Maintain favourable conservation condition
Petrifying springs with tufa formation (Cratoneurion)*	7220	Maintain favourable conservation condition
Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	91A0	Restore favourable conservation condition
Alluvial forests with *Alnus glutinosa and Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicioncalbae*)*	91E0	Restore favourable conservation condition

Table 4-3 Qualifying Annex II Species for the River Barrow and River Nore SAC

Qualifying Species	Species Name	Code
Mammals listed on Annex II of the Habitats Directive	Otter *(Lutra lutra)*	1355
Molluscs listed on Annex II of the Habitats Directive	Freshwater pearl mussel (*Margaritifera margaritifera*)	1029
	Nore Freshwater pearl mussel (*Margaritifera durrovensis*)	1990
	Desmoulin's whorl snail (Vertigo moulinsiana)	1016
Crustaceans listed on Annex II of the Habitats Directive	White-clawed crayfish (*Austropotamobis pallipes)*	1092
Fish listed on Annex II of the Habitats Directive	Salmon (*Salmo salar)*	1106
	Sea Lamprey (*Petromyzon marinus*)	1095
	Brook Lamprey (*Lampetra planeri*)	1096
	River Lamprey (Lampetra fluviatilis)	1099
	Twaite *Shad (Alosa fallax)*	1103
Flora listed on Annex II of the Habitats Directive	Killarney Fern (*Trichomanes speciosum)*	1421

4.2 Conservation Objectives of Natura 2000 Sites

European and national legislation places a collective obligation on Ireland and its citizens to maintain a favourable conservation status at areas designated as candidate Special Areas of Conservation. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

According to the EU Habitats Directive, favourable conservation status of a habitat is achieved when:

- Its natural range, and area it covers within that range, is stable or increasing;
- The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future; and,
- The conservation status of its typical species is favourable as defined below.

The favourable conservation status of a species is achieved when:

- Population data on the species concerned indicate that it is maintaining itself;
- The natural range of the species is neither being reduced or likely to be reduced for the foreseeable future; and,
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Conservation objectives for all identified Natura 2000 SAC Sites are as follows:

> *'To maintain or restore the favourable conservation condition of the Annex I habitat(s) and the Annex II species for which the SAC has been selected.'*

The full reports for the conservation objectives for the River Nore and River Barrow SAC[1] can be found on the NPWS website.

[1] https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002162.pdf

5 STUDY RESULTS

5.1 Desk-based Study

Table 5-1 provides a summary of records of designated species protected under the River Barrow and River Nore SAC that occur within a 2km grid square of the Site boundary (NBDC, 2021).

Table 5-1: Annex II Designated Species within 2km of the Site

Common Name	*Scientific Name*	Date of last record	Designation
Designated Species			
European Otter	*Lutra lutra*	04/01/2018	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex II and IV Species
White-clawed crayfish	*Austropotamobius pallipes*	04/10/2014	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex II and V Species

*Note that only species recorded within the past 10 years were included in this table.

5.2 Field Studies

The following section provides details of field-based assessments that were undertaken at the Site.

5.3 Otter Survey Results

Evaluation

The evaluation considered information about the characteristics of the species' population and its distribution, the availability of suitable habitats, and the findings of the field studies.

Otter Habitat Preference

Otters are predominantly found in aquatic habitats along rivers, estuaries, canals and in still water bodies such as lakes. An individual otter usually maintains multiple Holts and Couches within its territory, which can extend up to 15km. Holts are located underground and can take many forms, they use natural crevices, associated with the roots of trees that grow along the river and lake banks or use burrows previously made from other animals. A holt will typically have multiple entrances which will allow otters to escape when disturbed. Couches are resting places above ground.

Otter can breed year-round, but primarily give birth in the spring and summer months with broods consisting of 2-3 cubs.

Otters are nocturnal animals and can be described as crepuscular. At night and in dark / silty water, the otter relies on their highly sensitive whiskers which detect their prey. In clear waters they utilise their strong eyesight to locate prey usually along the bottom of the waterbodies. Otters are described as opportunistic predators with a broad varied diet, such as salmonids, eel, small fish species and invertebrate.

Otter Survey Results

The otter survey conducted on the 15th of July 2021 identified two (2No.) otter spraints (TN1), one (1No.) old and one (1No.) fresh, along the River Barrow (see Figure 5-1). In addition, the survey identified otter prints (TN2) in two (2No.) areas along the riverbank.

The survey did not identify any otter holts or couches within the survey area. It should be noted that this survey also identified Himalayan balsam (*Impatiens glandulifera*) on the far banks of the Monefelim river, a tributary of the River Barrow bordering the Site to the north.

Full details of the otter survey results are found in Figure 5-2 and Table 5-2.

Section	Recent Weather	Otter Signs Recorded During the Survey					Habitat		Disturbance	Other Notable Species
		Otter Sighting	Spraints	Fresh / Recent / Old	Tracks	Holt / Couches	Habitat Description	Evaluation		
River Barrow (main channel)	Sunny, no recent showers.	0	2	Recent and old	1	0	Riverside ranges from low / flat banks with little to no vegetation separating the agricultural fields and the river to medium banks obscured by a thick riparian margin downstream. Slow to moderate river flow. The substrate, which is composed of silt, gravel and cobble, is currently covered by algae.	Optimal for commuting, foraging. Suitable prey species including Brown trout (*Salmo trutta*) and lamprey Sp. were identified in the Barrow. Limited opportunities for holt / couch construction	Disturbance from cattle	A common frog (*Rana temporaria*) was identified adjacent to the watercourse in the arable field.
Monefelim river	Sunny, no recent showers.	0	0	0	1	0	Steep vegetated banks lead down to the river. At the time of survey, earth banks of loose material were located within close proximity to the riverbank. Moderate to fast river flow, substrate predominantly gravel.	Optimal for commuting, foraging. Limited opportunities for holt / couch construction	Disturbance from ICW construction	Himalayan balsam *(Impatiens glandulifera*) noted along far bank.
Mill Race	Sunny, no recent showers.	0	0	0	0	0	A sewage fungus was recorded upstream at the culvert at the time of survey. A hedgerow / treeline runs along the riverbank, however, there were also multiple access points for cattle present. Slow river flow. Substrate consisted of silt.	Sub-optimal for hotl / couch construction. Suitable prey species identified near the confluence with the Barrow.	Disturbance from cattle	N/A

5.4 Aquatic Ecology Survey Results

The aquatic ecological assessment carried out by Sweeny Consultancy, and attached as Appendix B, concluded the following in relation to designated habitats and species protected under the River Barrow and River Nore SAC:

- Lamprey species were found to be present in the section of the River Barrow adjacent to the facility;
- Atlantic salmon pass by the Site in both upstream and downstream migrations, but the habitats adjacent to the Site are not suitable for spawning or for juveniles; and,
- Otters have been recorded in the vicinity of the Site, the habitats within the Barrow are considered suitable for otter and prey for this species is plentiful.

This assessment also concluded that the stretch of the River Barrow adjacent to the Site has a '*moderate*' water quality status with a Q-value of Q3-4. Although this is an '*unsatisfactory*' result, the report concluded that there was no evidence to suggest that the discharges from the facility were having a significant impact on the ecological quality of the stream. This is due to the similarities in Q-value scores both upstream and downstream of the Site.

In addition, this assessment did not find '*any signs of significant organic contamination or nutrient enrichment*,' in Mill Race or the small surface water drain sampled onsite.

5.5 Surface Water Monitoring Results

The surface water results of the River Barrow taken upstream and downstream (refer to Figure 5-1 below) before, during and after the harvest season are shown in Table 5-2 below.

Figure 5-1: Surface Water Monitoring Locations

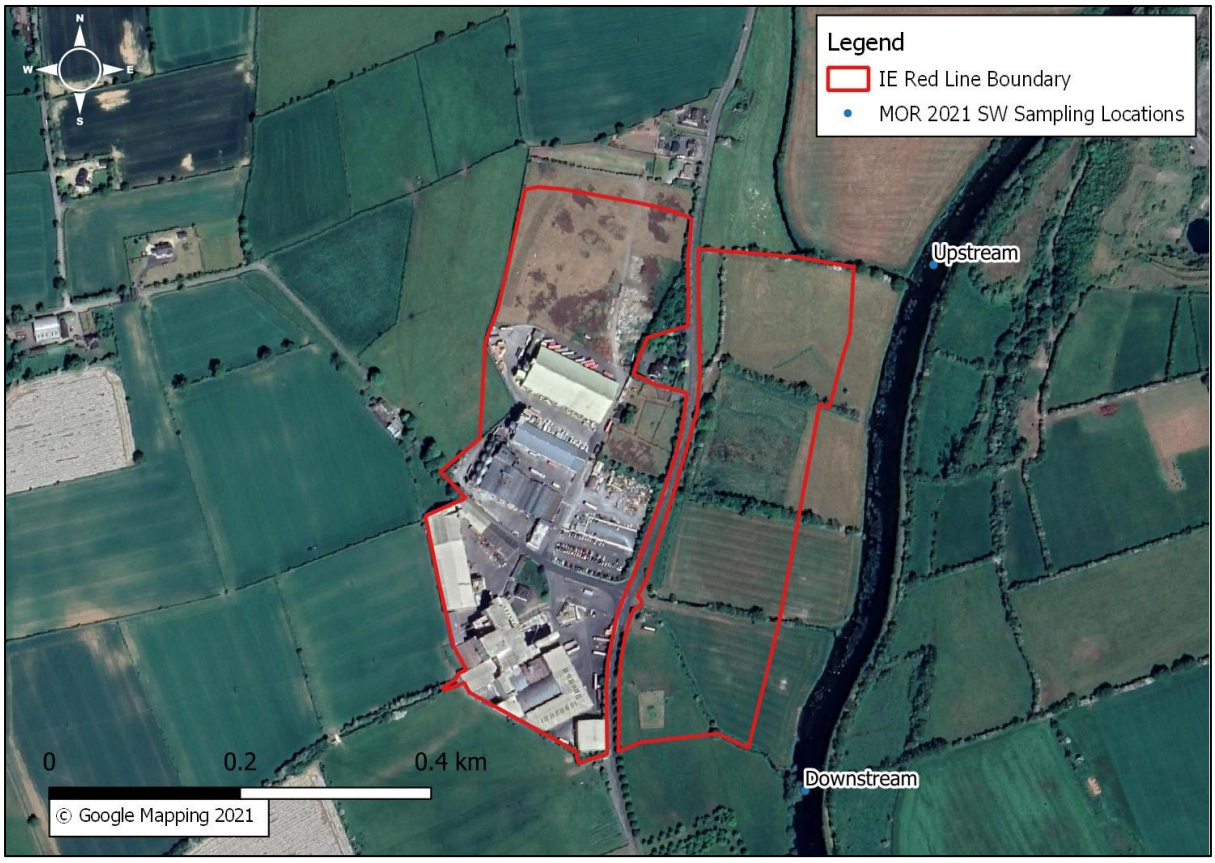


Table 5-2: Surface Water Results Upstream and Downstream River Barrow

Parameter	Units	EQS*	Downstream				Upstream			
Sampling Date:			**17/05/2021**	**15/07/2021**	**25/09/2021**	**22/09/2021**	**17/05/2021**	**15/07/2021**	**25/09/2021**	**22/09/2021**
pH	~	6.0< pH < 9.0	~	7.92	8.43	8.19	~	8.41	8.49	8.13
Dissolved O2	%	>80% ≤120% saturation (95%ile)	~	98.71	120.91	95.23	~	104.45	107.73	99.56
Biochemical Oxygen Demand (BOD)	mg O_2/l	*≤1.5 mean* or **≤2.6 (95%ile)**	*2*	<1	<1	<1	**4**	<1	1	<1
Ammonia (mg N/l)	mg N/l	*≤0.065 (mean)* and **≤0.14 (95%ile)**	0.033	0.04	0.03	0.04	<0.025	**0.11**	0.03	<0.03
Oils, Fats and Grease	mg/l	N/A	<4	<4	<4	<4	<4	<4	<4	<4
Orthophosphate as P	mg P /l	*≤0.035 (mean)* and **≤0.075 (95%ile)**	<0.02	<0.03	0.03	<0.03	<0.02	<0.03	<0.03	<0.03
Total Phosphorous	µg/l	≤ 0.025 (mean)	<4	43	42	30	-	23	118	10
Total Suspended Solids	mg/l	N/A	<10	<10	<10	<10	<10	<10	48	<10

**EQS = Good status in accordance with Surface Water Regulations 2009 (S.I. No. 272 of 2009) as amended (S.I. No.327 of 2012 and S.I. No.386 of 2015 and S.I. No. 77 of 2019)*

Bold indicates exceedance of EQS.

There was no flow into or out of the ICW observed during any of the site visits or monitoring events from May to September therefore there were no samples of the discharge taken.

The chemical surface water quality data, presented in Table 5-2 above, illustrates that there are marginal exceedances of Surface Water Regulation thresholds for good status upstream of the Site and slight improvements downstream:

- BOD upstream of the Site was 4mg/L on 17/05/2021, the threshold for Good Status is ≤1.5 mean or ≤2.6 (95%ile). On the same date the downstream BOD was 2mg/L indicating a slight improvement in water quality between the monitoring locations;
- Ammonia upstream of the Site was 0.11mg/L (as N) on 15/07/2021, the threshold for Good Status is ≤0.065 (mean) and ≤0.14 (95%ile). On the same date the downstream Ammonia concentration was 0.04mg/L (as N) indicating a slight improvement in water quality between the monitoring locations; and,
- There were no other exceedances of Surface Water Regulation thresholds upstream or downstream of the Site.

Given the slight improvement in river water quality between the samples taken upstream and downstream of the Facility, it can be concluded that discharges from the Facility are not impacting the quality in the receiving watercourse, the River Barrow.

6 STAGE 1 SCREENING: IDENTIFICATION OF POTENTIAL ADVERSE EFFECTS

Potential adverse effects, if any, on the River Barrow and River Nore SAC were considered further in this section. The key output of this stage of the assessment is the identification of the types of threats to the integrity of the Natura 2000 sites that may arise as a result of the current operations onsite and implementing the proposed upgrade.

A number of factors were examined at this stage and dismissed due to the very low risk associated with them. Table 6-1 and 6-2 presents further details and rationale of the screening assessment undertaken for each of the qualifying interests of the Natura 2000 sites identified as having the potential to be adversely affected.

These factors were screened in or out, based on whether or not it was concluded that they are likely to be affected by the ongoing operations onsite or the proposed upgrade works if no mitigation measures were applied, and if progression to Stage 2 is required. The rationale for these conclusions is based on results from the aforementioned desk study, literature search and field survey results.

Table 6-1 Screening Assessment: Annex I Habitats - River Barrow and River Nore SAC

Qualifying Feature of Interest	Baseline	Potential Adverse Effects	Screening Rationale	Screening Conclusion
Estuaries	According to the Conservation Objectives Report, the estuary's inner boundary is taken to be at New Ross and the outer boundary occurs between Creadan Head and Broomhill Point (NPWS, 2011). This habitat is considered stable and / or increasing due to natural processes. This habitat also supports different communities such as Fine Sand With *Fabulina Fabula* Community. The Conservation Objectives show that this designated habitat is not present within the immediate vicinity of the Site. The nearest designated estuary habitat is ca. 21km downstream of the Site (NPWS, 2011).	N/A	It is considered highly unlikely that the continued operation of the Site and proposed upgrade works will have any significant direct or indirect negative effects on this habitat. This conclusion is based on the absence of this habitat within the vicinity of the Site boundary and the distance separating this habitat from the Site. It is considered that should any potential pollutants enter the River Barrow, they will disperse, dilute or settle out of the river network before reaching the designated estuary habitat. Therefore, there is no potential for this habitat to be affected. No further assessment required.	**Screened Out**
Reefs	An extensive and expansive area of *Sabellaria alveolata* reef occurs intertidally in Duncannon Bay (NPWS, 2011). According to the Conservation Objectives Report, this habitat is limited to the intertidal reaches of the River Barrow and River Nore with the nearest record of this habitat located in excess of 68km downstream of the Site (NPWS, 2011).	N/A	As above as per estuaries	**Screened Out**
Mudflats and Sandflats not covered by seawater at low tide	According to the Conservation Objectives Report, expanses of sandflat are recorded in the southern margins of the SAC; from Creadan Head to Passage East on the western shore and from Black Point to Duncannon Fort on the eastern shore (NPWS, 2011). These mudflats are present as a narrow band on the western	N/A	As above as per estuaries	**Screened Out**

Qualifying Feature of Interest	Baseline	Potential Adverse Effects	Screening Rationale	Screening Conclusion
	shore and on the eastern shore broad areas occur at Shelbourne Bay and Fishertown Flats, thereafter it continues north as a narrow band (NPWS, 2011). This habitat is considered stable and / or increasing due to natural processes with the nearest record of this habitat located over 40km downstream of the Site (NPWS, 2011). It should be noted that this habitat also supports different communities such as Muddy Estuarine Community Complex and Sand to Muddy Fine Sand Community Complex.			
Salicornia and other annuals colonizing mud and sand	According to the Conservation Objectives Report, this habitat area is stable and / or increasing subject to natural processes including erosion and succession. However, the nearest recorded location of this habitat is over 50km downstream of the Site within the Barrow Estuary at New Ross Point (NPWS, 2011).	N/A	As above as per estuaries	**Screened Out**
Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) / Mediterranean salt meadows (*Juncetalia maritimi*)	This habitat area is stable and / or increasing subject to natural processes including erosion and succession. However, the nearest recorded location of this habitat is ca.50km downstream of the Site, where the Poulmaloe Stream enters the Barrow Estuary (NPWS, 2011).	N/A	As above as per estuaries	**Screened Out**
Water courses of plain to montane	The distribution of this habitat throughout this SAC is currently unknown (NWPS, 2011).	N/A	It is considered highly unlikely that the continued operation of the Site and proposed upgrade works will have any significant	**Screened Out**

Qualifying Feature of Interest	Baseline	Potential Adverse Effects	Screening Rationale	Screening Conclusion
levels with the *Ranunculion fluitantis* and *Callitricho - Batrachion* vegetation	However, this aquatic habitat was not identified within the River Barrow during the field survey.		direct or indirect negative effects on this habitat. This conclusion is based on the absence of this habitat within the vicinity of the Site boundary. In addition, no in-river works are proposed as part of the upgrade works and therefore, it is not considered that there is any potential for this habitat to be affected.	
Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	The Conservation Objectives show that this habitat is not present within the vicinity of the Site, instead the nearest known location is adjacent to Graiguenamanagh, town, Co. Kilkenny, ca.15km downstream of the Site (NWPS, 2011).	N/A	This terrestrial habitat is not located onsite or within the vicinity of the Site. There are no impact pathways connecting the Site to this habitat given its terrestrial nature and therefore, there are no potential adverse effects anticipated that could affect this habitat.	**Screened Out**
Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	According to the Conservation Objectives Report, this habitat is likely to occur in association with some riverside woodlands, unmanaged river islands and in narrow bands along the floodplain of slow-flowing stretches of river (NPWS, 2011). These habitat conditions are not present onsite. Furthermore, this habitat was not identified within the immediate vicinity of the Site during the field surveys.	N/A	As above as per water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho - Batrachion* vegetation	**Screened Out**
European dry heaths	The distribution of this habitat within the River Barrow and River Nore SAC is currently unknown, however, the field survey did not identify this habitat within or adjacent to the Site.	N/A	As above as per old sessile oak woods	**Screened Out**
Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior (Alno-Padion,*	The Conservation Objectives Report show that this habitat is not present onsite or within the immediate vicinity of the Site. The nearest recorded location of this habitat within the River	N/A	As above as per old sessile oak woods	**Screened Out**

Qualifying Feature of Interest	Baseline	Potential Adverse Effects	Screening Rationale	Screening Conclusion
*Alnion incanae, Salicion albae)**	Barrow and River Nore SAC is ca.6.9km downstream of the Site (NWPS, 2011).			
Petrifying springs with tufa formation (*Cratoneurion*)	This habitat has been identified within woodlands between Thomastown and Inistioge (NPWS, 2011). According to the Conservation Objectives Report, petrifying springs rely on permanent irrigation from groundwater or seepage sources (NPWS, 2011). These habitat conditions are not present onsite, and the field surveys did not identify any petrifying springs onsite or within the vicinity of the Site.	N/A	This habitat is not located onsite or within the vicinity of the Site. The conditions onsite are not considered suitable for the formation of this habitat.	**Screened Out**

Table 6-2: Screening Assessment: Annex 2 Species – River Barrow and River Nore SAC

Qualifying Feature of Interest	Baseline	Potential Adverse Effects	Screening Rationale	Screening Conclusion
Otter	Large river catchments including the River Barrow and River Nore catchment are considered to be among the more important SACs for otter. The NBDC holds records for otter within 2km of the Site (NBDC, 2021). The targeted otter survey did not identify any otter holts or couches. However, evidence, in the form of otter spraints and prints, were recorded along the stretch of the River Barrow adjacent to the Site.	• Effects associated with pollution i.e. a decrease in water quality; and, • Noise disturbance.	Otters are known to occur within the area and although no couches or holts were identified onsite during the targeted otter survey, evidence of otter was identified along the River Barrow. It is therefore reasonable to conclude that otter utilising the surrounding river network, are habituated to the current level of human activity and noise onsite. Although standard pollution prevention guidance will be followed during the proposed upgrade works and the current noise baseline or water quality onsite does not appear to be disturbing any otters in the area, Site-specific mitigation will be incorporated into the operation / future works onsite. Further assessment is required.	**Screened In**

Qualifying Feature of Interest	Baseline	Potential Adverse Effects	Screening Rationale	Screening Conclusion
Atlantic Salmon (*Salmo salar*)	The NBDC holds no records for Atlantic Salmon within 2km of the Site (NBDC, 2021) and the River Barrow is not a designated salmonoid waterbody under S.I. No. 293 / 1988. However, O'Reilly (2002) states that the River Barrow is a fair to good salmon river. According to the aquatic assessment carried out by Sweeny Consultancy, the Site and its surrounding waterbodies are not considered suitable as spawning habitats for salmon. However, migration up and downstream must occur within the stretch of the River Barrow adjacent to the Site.	• Effects associated with pollution i.e. a decrease in water quality.	As this species is known to be present within the River Barrow during parts of its life cycle, further consideration will be given to this species and in addition to the standard pollution prevention guidance, Site-specific mitigation will be incorporated into the proposed works / current operation of the Site to ensure no significant adverse effects occur to this highly sensitive species. Further assessment required.	**Screened In**
Sea Lamprey, Brook Lamprey and River Lamprey.	Although there are no records held by NBDC for the any lamprey species within 2km of the Site, the NBDC does hold records for Sea lamprey within the River Barrow and Nore SAC (NBDC, 2021). In addition, King (2006) recorded juvenile sea and brook / river lampreys throughout the Barrow. The aquatic assessment carried out by Sweeny Consultancy identified a juvenile lamprey species within the Barrow upstream of the current surface water discharge.	As above as per Atlantic Salmon	As above as per Atlantic Salmon	**Screened In**
Twaite Shad	The NBDC and Inland Fisheries Ireland (IFI) hold records for Twaite shad within the River Barrow catchment (NBDC, 2021; DEHLG, 2007). Rooney et al. (2014) recorded juvenile shad in the River Barrow over 20km downstream of the Site near St. Mullin's in 2013. According to the aquatic assessment report submitted by	N/A	It is considered highly unlikely that the continued operation of the Site and proposed upgrade works will have any significant direct or indirect negative effects on this species. This conclusion is based on the absence of records within close proximity to the Site, the preference of Twaite Shad for spawning grounds near the end of freshwater reaches so they can easily migrate to the sea for maturation, and the distance downstream to the nearest known sighting of a juvenile shad.	**Screened out**

Qualifying Feature of Interest	Baseline	Potential Adverse Effects	Screening Rationale	Screening Conclusion
	Sweeney Consultancy, there is no evidence of this species progressing farther upstream towards the Site.		It is considered that should any potential pollutants enter the River Barrow, they will disperse, dilute or settle out of the river network before reaching any potential spawning habitats for this species. Therefore, there is no potential for twaite shad to be affected. No further assessment required.	
Freshwater pearl mussel	The NBDC holds no records of this species within 2km of the Site (NBDC, 2021). According to the Conservation Objectives Report, the status of the freshwater pearl mussel is currently under review, therefore the current distribution of this species within the SAC is unknown. However, according to Lucey (1998), the freshwater pearl mussel is now extinct within the main channel of the Barrow with the last known record dated 1991. In addition, according to the aquatic assessment carried out by Sweeny Consultancy, the habitat in the watercourses surrounding the Site are not suitable for freshwater pearl mussels.	N/A	As this species is considered to be extinct from the River Barrow and no suitable habitats were identified within the vicinity of the Site over the course of the aquatic assessment carried out by Sweeney Consultancy, it can be concluded that there are no potential impact pathways from the Site to habitats that support freshwater pearl mussel. Therefore, there is no potential for freshwater pearl mussel to be affected by the continued operation of the Site or the proposed upgrade works. No further assessment is required.	**Screened out**
Nore Freshwater pearl mussel	The Nore Freshwater Pearl Mussel is confined to a 14km stretch of the main channel of the Nore (Moorkens, E.A., 1991) (Moorkens, E.A., 1995) and is therefore not within the potentially affected area of the SAC.	N/A	As above as per freshwater pearl mussel.	**Screened out**
White-clawed crayfish	The NBDC holds records of white-clawed crayfish within 2km of the Site and according to the Conservation Objectives Report, the nearest known location of this species is	N/A	As above as per freshwater pearl mussel.	**Screened Out**

Qualifying Feature of Interest	Baseline	Potential Adverse Effects	Screening Rationale	Screening Conclusion
	ca.2.3km downstream (NBDC, 2021; NPWS, 2011). However, crayfish plague has become widespread throughout the Barrow River network since it was identified first in 2017. No white-clawed crayfish were identified during the aquatic assessment carried out by Sweeney Consultancy and it is considered likely that the population of this species within the vicinity of the Site has become extinct.			
Desmoulins's whorl snail	The NBDC holds no records for this species within 2km of the Site (NBDC, 2021). The nearest known record of this species according to the Conservation Objectives Report, is ca.5.7km downstream (NPWS, 2011). In addition, this species' optimal habitat was not identified onsite or within the immediate vicinity of the Site.	N/A	As this species is terrestrial, favouring calcareous wetlands bordering rivers, lakes and fens, it is not considered that there are any potential impact pathways from the Site to this species or its supporting habitats. Therefore, no further assessment is required.	**Screened Out**
Killarney Fern	The NBDC holds no records for the species within 2km of the Site (NBDC, 2021). The nearest record of this species is over 14km downstream of the Site (NPWS, 2011). This species was not identified onsite.	N/A	As above as per Desmoulin's whorl snail.	**Screened Out**

7 STAGE 2: ASSESSMENT OF POTENTIAL ADVERSE EFFECTS

This section provides recommendations for measures which will mitigate against potential adverse effects of the proposed works on qualifying habitats and species throughout the duration of the project. The following effects, which have the potential to adversely affect the conservation objectives of the identified Natura 2000 sites, were considered:

- Potential Nuisance Impacts associated with Noise;
- Potential impairment of water quality; and,
- Potential Adverse Effects from Emissions to Air.

7.1 Potential Nuisance Impacts associated with Noise

Elevated noise can result in adverse effects on species such as disturbance, behavioural impacts, stress and displacement from feeding grounds.

As current operations onsite and the proposed upgrade works do not and will not involve in-river works, effects on designated fish and crustacean species associated with noise can be dismissed. It is considered highly unlikely that any noise associated with the Facility will enter the waterbody given the physical interaction of sound in air and the varying densities between air and water. However, otters, which fall under Annex II of the Habitats Directive and are listed under the qualifying species of the River Barrow and River Nore SAC, can disperse from the River Barrow. Therefore, this species was given further consideration.

A Noise Impact Assessment (NIA) report was prepared for the Site, to assess the current noise emissions from the facility and potential noise levels arising from the proposed upgrade works. This assessment found that the current baseline onsite was compliant with typical sound emission limits to the north, east and south of the facility i.e. in the direction of the River Barrow and River Nore SAC and the tributaries to the east.

Red Mills has been in operation since 1908 with a seasonal Harvest Season operating each year. The River Barrow and River Nore SAC was designated in 2000. Therefore, the current SAC conditions are indicative of any potential noise impacts on the Natura 2000 site. The L2639 roadway separates the Site, where noise emissions occur, from the SAC.

Evidence of otter activity was identified near the Site, which would suggest that this species is habituated to the current operations at the Facility and the surrounding road noise. This is further emphasised by the fact that the 2021 otter survey took place during the Harvest Season when the facility operates on a 24-hour basis and the onsite Dryers are operational for the Harvest Season. As otters are a crepuscular species, meaning they are most active at dawn, dusk or after dark, the identification of a recent otter spraint and prints along the River Barrow, indicates that otters are active along the River Barrow whilst the onsite Dryers are operational.

Irrespective of this habituation, management at the Facility have proactively commenced to either immediately implement or commenced the design of the following measures to reduce noise emissions arising from the Facility:

- Weekly site walkovers, to identify any malfunctioning equipment, plant and/or vehicles;
- More regular maintenance of mobile vehicles and plant onsite;
- Modifications to existing plant on-site to reduce the noise emissions;
- Increased the use of buildings to contain noisy fixed plant by undertaking noisy activities indoors, where practicable;

- Seek to design noise reducing technologies at key locations, such as attenuators or enclosures, where practicable;
- Will ensure that any noise control measures will be maintained as per the manufacturers' requirements;
- Started to use screens around plant or equipment,
- Have started to ensure that all enclosures and doors/windows are properly sealed and/or closed.
- Switching off idling engines where possible and preventing excessive revving;
- All yard surfaces will be maintained to ensure that they will be kept in good order;
- The use of alternative varieties of reversing alarms with reduced noise output where safety is not impacted;
- All drivers are being made of the potential for noise to cause annoyance/disturbance to local residents – to ensure that they will show due regard to this, particularly when entering and leaving the site (e.g. no unnecessary sounding of horn);
- Onsite speed limits are being more strictly enforce to ensure vehicles are compliant with speed limits and installed traffic calming devices; and,
- Seeking to reschedule onsite Heavy Goods Vehicles (HGVs) to outside key night-time hours (23:00-05:00) where possible.

The Facility will implement acoustic management procedures as part of their proposed new Environmental Management System (EMS), which will include:

- Prior to purchasing or hiring plant and equipment, noise emission data from the supplier or manufacturer will be obtained, to confirm that the noise emissions will be below the noise levels of the existing plant that has been replaced;
- Where the purchase of equipment involves installing more than one item in the same location, the combined noise level will not exceed the noise levels of the existing plant; and,
- Acoustic control measures will be integrated early in the design process to eliminate or minimise the risks associated with noise.

Agreements with contractors for the supply of goods or services on-site will be subject to the same noise exposure limits and requirements described in this procedure. It is not considered that the existing noise levels onsite are having a significant adverse effect on otter or any other designated species within the River Barrow and River Nore SAC. The addition of the above mitigation measures to the current operation of the Site will further reduce noise levels within the surrounding area and therefore, any potential impacts on otter. It can therefore be concluded that the ongoing operation of the Site and the proposed upgrade works will not have an adverse effect on otter in relation in noise.

Management at the facility are committed to implementing biodiversity enhancement measures which can be reflected in the extension to the ICW. It is considered that there is potential to explore other opportunities to enhance biodiversity as part of the ICW and adjoining lands. As part of these enhancement works further monitoring for otter along the stretch of the River Barrow adjacent to the Site will be undertaken. These surveys will take place during both stages of operation i.e. the non-harvest and harvest season.

7.2 Potential Impairment of Water Quality

Should pollutants from the Site enter the River Barrow, this could adversely affect the water quality within the River Barrow and River Nore SAC and subsequently affect the Annex I and II habitats and Annex I / II species protected under this Natura 2000 site.

Currently, the southern part of the Site discharges to the Mill Race, a field drain that flows directly into the River Barrow, and the northern part of the Site discharges to ICW system, refer to Appendix A.

The results of the biological and chemical water quality assessments do not indicate that the current operations onsite are having a significant adverse effect on water quality within the River Barrow and River Nore SAC. However, a comprehensive review of the current and proposed drainage system onsite identified measures that could improve the surface water drainage network in order to comply with the requirements of a future IE licence, refer to Appendix A 'P710 and P710A' These measures consist of the following:

- Discharge to the Mill Race will cease and these drainage lines will be decommissioned following the completion of ongoing works;
- IE Consulting have confirmed the capacity of the ICW system for the increased discharge to these areas (see report 'Integrated Constructed Wetland (ICW) System' prepared by IE Consulting submitted on the 30th November 2021);
- Prior to reaching the ICW system, discharge will pass through a new Class I by-pass oil / water interceptor and separator;
- A monitoring chamber and shut-off valve have been installed at the outfall of the ICW prior to discharging to the River Barrow to enable periodic surface water sampling; and,
- Visual inspections of storm water discharges will be carried out weekly and a log of these inspections will be maintained.

It should be noted that there will rarely, if ever, be a flow from the ICW outlet during the harvest season as this corresponds with the driest months of the year. This also corresponds with the months when river flow is at its lowest and therefore, rivers are more susceptible to contamination due to reduced assimilative capacity. Therefore, redirecting all surface water drainage onsite from the Mill Race to the ICW system will ensure the greatest protection to water quality during peak production periods when the river is most susceptible to contamination.

An updated assessment of the ICW capacity and the assimilative capacity of the River Barrow was undertaken by IE Consulting. This assessment concluded that "t*he impact of storm water discharge from the ICW system to the receiving watercourse (River Barrow) is not predicted to result in an adverse impact to the existing physico-chemical quality of the watercourse*". Refer to report 'Integrated Constructed Wetland (ICW) System' prepared by IE Consulting included with the RFI response to the EPA submitted on the 30th November 2021.

It can be concluded that with the addition of the above mitigation measures, the ongoing operation of the Site and the proposed upgrade works will not cause any adverse effects to water quality or any of the qualifying features of interest for which the River Barrow and River Nore SAC is designated. In addition, there will be no adverse effects on the integrity of any Natura 2000 sites in relation to their conservation objectives.

7.3 Potential Adverse Effects from Emissions to Air

Two comprehensive Air Dispersion Modelling Reports have been prepared in support of this IEL application (submitted via Eden on 30th November 2021 and 31st March 2022). Both

reports concluded that there will be no significant impacts from air-borne pollutants from the Red Mills facility on the River Barrow and River Nore SAC.

All modelling inputs and outputs, contour plots, and sensitive receptor locations are presented in these reports.

To assess potential impact on adjacent Natura 2000 area – River Barrow and Nore SAC, three sensitive receptors (SRs) located within this SAC, closest to the Site boundary, were selected, and impact of relevant pollutants NO_x and SO_2 was assessed.

Maximum NO_2 annual mean Predicted Environmental Concentration (PEC) is presented in Table 8-1 below, for the worst met conditions.

Table 7-1: SAC Receptors and NO2 concentrations relating to the protection of ecosystems

Receptor ID	Process Contribution (PC) (µg/Nm3)	Background (µg/Nm3)	Predicted Environmental Concentration (PEC) (µg/Nm3)	AQS for the Protection of Vegetation	% of AQS
SR6	1.68	5.7	7.384	30	24.61%
SR7	1.31	5.7	7.015	30	23.38%
SR8	0.69	5.7	6.394	30	21.31%

According to the EPA's Air Dispersion Modelling Guidance Note (AG4) (EPA, 2020), the protection of ecosystems for SO_2 should be assessed through an Annual and Winter limit of 20 µg/Nm^3. The Winter Period is between the 1st of October and the 31st of March.

The assessment of impacts to ecosystems from SO_2 for the Winter Period is not influenced by the Harvest season, as the Harvest season takes place in the summer. Table 8-2 below shows the predicted SO_2 concentrations at SRs for the Winter Period 2020-2021, which was determined to represent the worst met conditions.

Table 7-2: SO_2 Concentrations for the Winter Period at SAC Receptors

Receptor ID	Process Contribution (PC) (µg/Nm3)	Background (µg/Nm3)	Predicted Environmental Concentration (PEC) (µg/Nm3)	AQS for the Protection of Ecosystems	% of AQS
SR6	0.287	2.8	3.087	20	15.44%
SR7	0.188	2.8	2.988	20	14.94%
SR8	0.116	2.8	2.916	20	14.58%

Table 8-3 below presents SO_2 annual mean PEC for the worst met conditions.

Table 7-3: Annual SO_2 Concentrations at SAC Receptors

Receptor ID	Process Contribution (PC) (µg/Nm3)	Background (µg/Nm3)	Predicted Environmental Concentration (PEC) (µg/Nm3)	AQS for the Protection of Ecosystems	% of AQS
SR6	0.304	2.8	3.10	20	15.52%
SR7	0.238	2.8	3.04	20	15.19%

SR8	0.125	2.8	2.92	20	14.62%

NO_x PEC for the worst met year is ca. 24.6% of AQS at SR6. It is ca.3.4 times lower than background concentration.

Winter SO_2 PEC for the worst assessed period is ca. 154% of AQS at SR6. It is ca.10 times lower than background concentration.

SO_2 annual mean PEC for the worst met year is ca. 15.6% of AQS at SR6. It is ca.10 times lower than background concentration.

Emissions to air from Red Mill Site will have no significant impact on SAC and are insignificant in comparison to the background concentration of the same pollutants.

It is considered that any dust, NOx or SO_2 deposition into the SAC would be insignificant compared to input of suspended solids and nitrogen via surface water run-off, and therefore such impact has been screened out.

It can therefore be concluded that the ongoing operations onsite and the proposed upgrade works will not have any adverse effect on the River Barrow and River Nore SAC or any of the Annex I habitats or Annex I / II species for which they are designated.

7.4 Analysis of 'In-Combination' Effects

The Habitats Directive requires that an appropriate assessment of any plan or project takes into consideration effect alone or in-combination with other plans or projects.

Due to the large size of the River Barrow and River Nore SAC, there are numerous projects and activities which have the potential to affect the conservation interests of these sites. However, it is considered unlikely that the ongoing operation of the Red Mills facility alongside the proposed upgrade works will result in negative impacts on the SAC either alone or in-combination will result in negative impacts on the SAC. As described in Section 3.4, there are a few projects relating to the Site that have been granted planning, these projects include:

- An application for new grain stores and associated infrastructure (planning reference: 21/573);
- A new linkway road (planning reference 21/633); and,
- An additional ICW system (planning reference 19/235).

Given the proximity of the Site to the River Barrow and River Nore SAC, each of these planning applications included a Natura Impact Statement (NIS) as part of their submission. Therefore, each project was assessed for potential adverse effects to Natura 2000 sites and the accompanying reports concluded that each project will not have a significant effect on any habitats or species designated as conservation interests for any Natura 2000 sites following the implementation of specific mitigation measures.

Therefore, given the fact that the aforementioned projects will not result in any adverse effects to European Designated Sites, it can be concluded that the ongoing operation of the Site and the proposed upgrade works will not result in any in-combination contribution to adverse effects on the River Barrow and River Nore SAC or the integrity of any other Natura 2000 site. This conclusion is based on the best practice guidance and mitigation measures listed within this NIS and those already submitted for planning that will be implemented onsite. Subject to receipt of an IE licence, alll future emissions arising from the facility will be regulated by the EPA.

8 CONCLUSIONS

A detailed assessment of the layout and nature of the current operations onsite and the proposed upgrade works has been carried out and the potential for adverse effects on Natura 2000 sites and qualifying features of interest within a 15km radius of the Site has been examined in detail.

Of the Natura 2000 sites identified within a 15km radius, the River Barrow and River Nore SAC were taken forward for further detailed consideration due to their proximity and hydrological connection to the Site.

It is considered reasonable to conclude that the current operations at the Site are not impacting on the River Barrow and River Nore SAC based on the findings of detailed ecological, noise, air and water assessments. Regardless Red Mills are committed to implementing a wide range of upgrade works at the Site that will results in improvements to noise, air and water emissions arising from the facility.

Compliance with future emission limit values for water, air and noise as part of the IE licence will further protect the qualifying features of interest of the River Barrow and River Nore SAC.

The extension to the ICW offers real potential to implement enhanced biodiversity measures as part of an overall Biodiversity Management Plan, something that Red Mills are committed to pursuing over the next couple of years.

In terms of significance with regard to adverse effects on Natura 2000 sites, the NPWS Guidance (2009) uses an EC definition as follows:

> *"Any element of a plan or project that has the potential to affect the conservation objectives of a Natura 2000 Site, including its structure and function, should be considered significant (EC, 2006)".*

It can be concluded that the ongoing operation onsite and the proposed upgrade works, alone or in-combination with other projects, will not adversely affect the integrity, and conservation status of any of the qualifying interests of the River Barrow and River Nore SAC.

Accordingly, progression to Stage 3 of the Appropriate Assessment process (i.e. Assessment of Alternatives Solutions) is not considered necessary.

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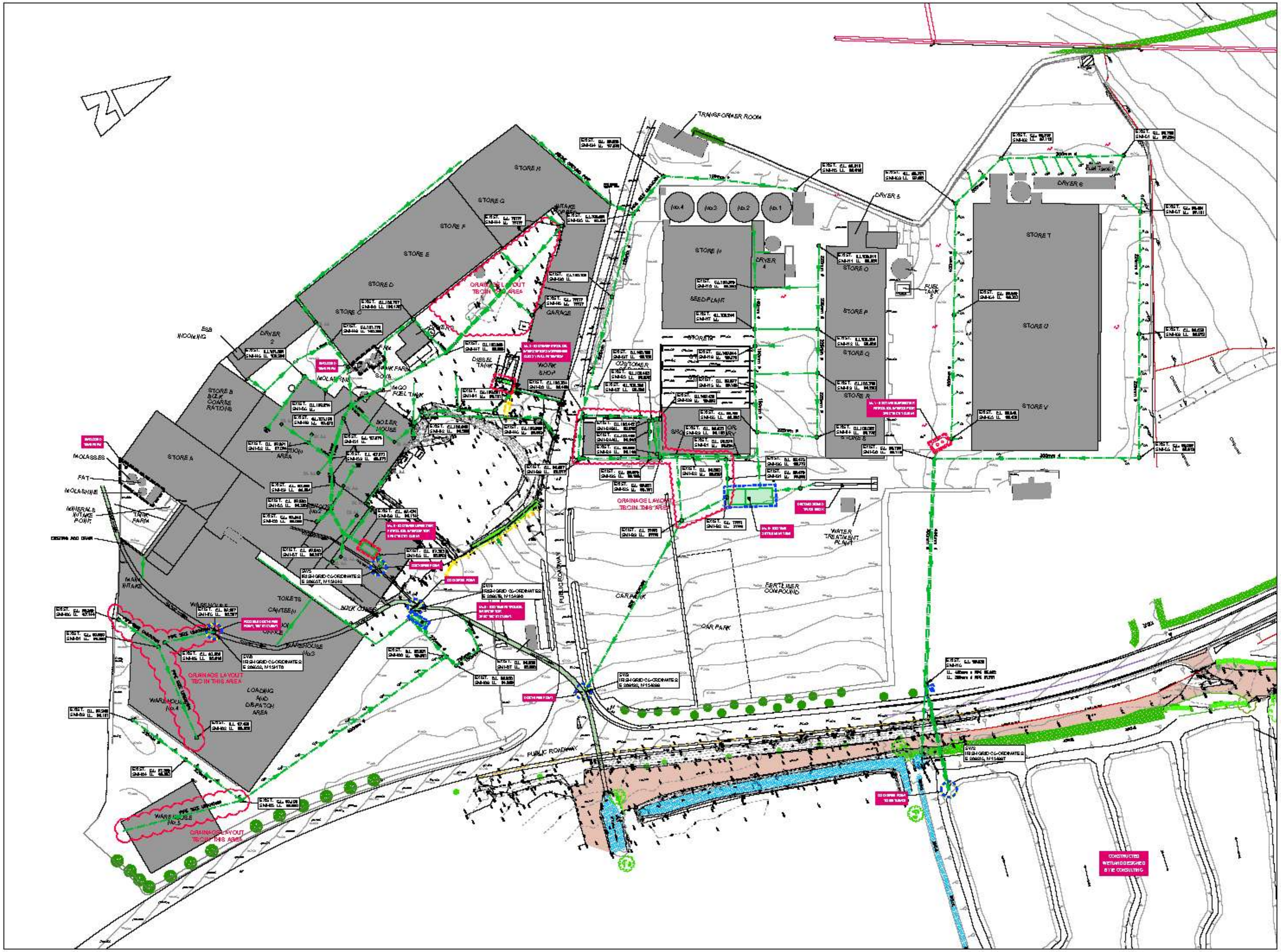
Appendices

Appendix A



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Notes:

DRAINAGE - LEGEND

LEGEND

NOTE:

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DATE: 11/08/2017

PRELIMINARY 26/11/21

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Job: ENVIRONMENTAL LICENCE APPLICATION

Drawing: EXISTING DRAINAGE LAYOUT SHEET 1 OF 2

Job No	Dwg No	Stage	Revision
W21064	P705	PP	PP

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DRAINAGE - LEGEND

EXISTING SURFACE WATER DRAINAGE

EXIST. C.L. 98.758
SW1-101 I.L. 97.284

DISCHARGE POINT

NOTE:
DRAINAGE LINES BASED ON SURVEY DATA PROVIDED BY CARDINAL SURVEYORS.

DRAWING REFERENCE: 17-121-01
DATE: 11/09/2017.

LEVELS SHOWN AROUND PLANT ARE TO TBM OF 100.00m. TO CONVERT TO MALIN HEAD DATUM SUBTRACT 98.408.

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3-4 Canada Street
Waterford
Co. Waterford.
X91 V62K
Tel: +353 51 876 866
Email: waterford@morc.ie
Web: www.malonearegan.com
Offices also in:
DUBLIN : Tel: +353 1 260 2666 Email: dublin@morc.ie
GALWAY : Tel: +353 91 561 069 Email: galway@morc.ie
LONDON: Tel: +44 208 528 1686 Email: london@morc.ie

Client: CONNOLLY'S REDMILLS

Job: ENVIRONMENTAL LICENCE APPLICATION

Drawing: EXISTING DRAINAGE LAYOUT
SHEET 2 OF 2

Job No.	Drg No.	Stage	Revision	Scale
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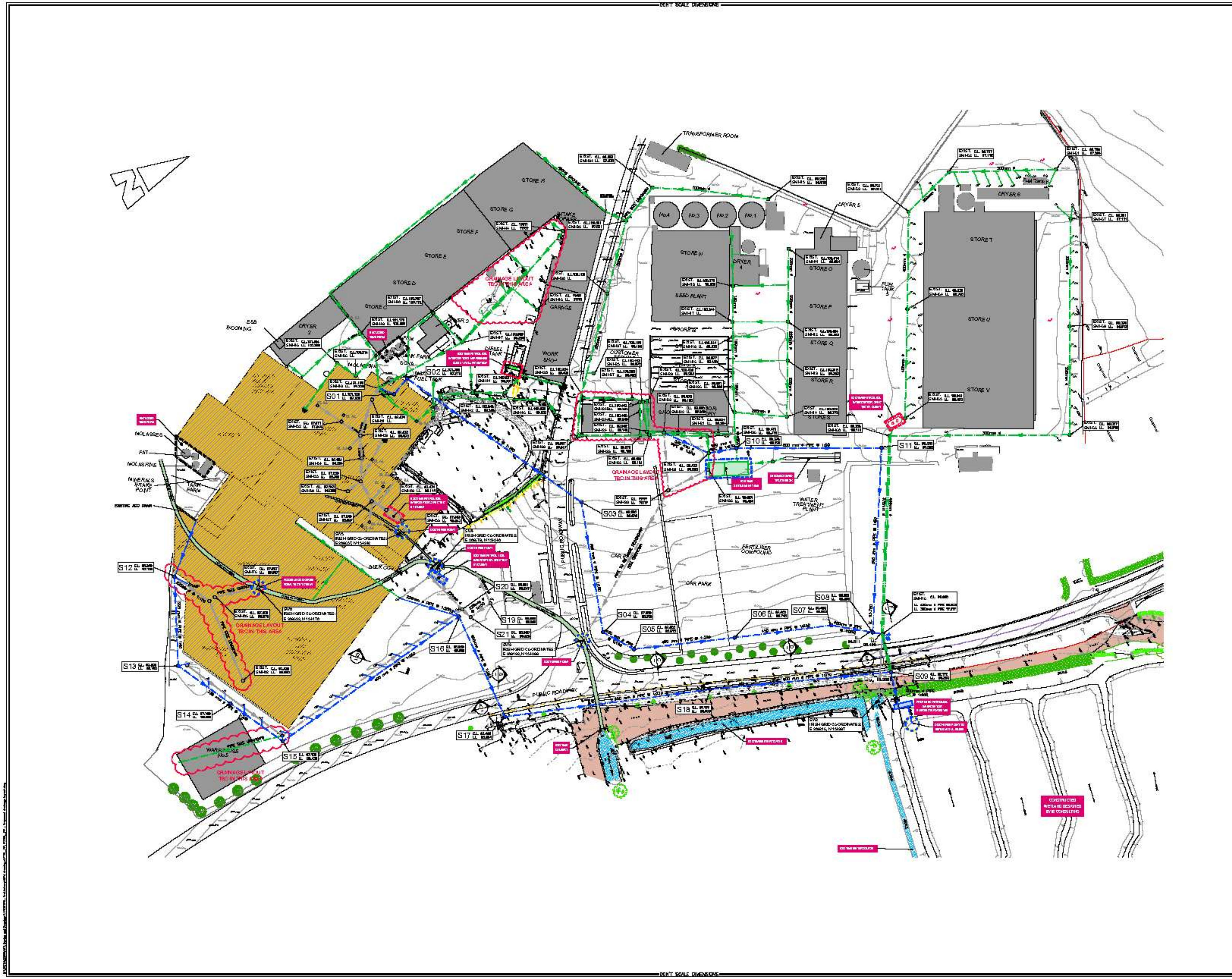

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26/11/21

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Drawing: PROPOSED DRAINAGE LAYOUT

Job No.	Dwg No.	Stage	Revision
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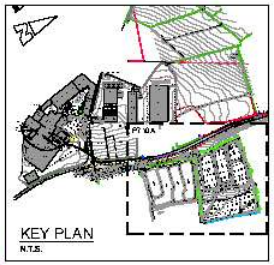

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- EXISTING SURFACE WATER DRAINAGE — EXIST. CL. 98.758 SWH01 IL. 97.384
- PROPOSED SURFACE WATER DRAINAGE — S06 CL. 97.400 IL. 95.745
- PROPOSED SURFACE WATER DRAINAGE TO BE MADE REDUNDANT
- DISCHARGE POINT
- PROPOSED MONITORING CHAMBER
- PROPOSED EMERGENCY SHUT OFF VALVE

NOTE:
DRAINAGE LINES BASED ON SURVEY DATA PROVIDED BY CARDINAL SURVEYORS.

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MALONE O'REGAN CONSULTING ENGINEERS
3-4 Canada Street
Waterford
Co. Waterford.
X91 V62K
Tel: +353 51 876 866
Email: waterford@morce.ie
Web: www.maloneoregan.com
Offices also in:
DUBLIN : Tel: +353 1 280 2666 Email: dublin@morce.ie
GALWAY : Tel: +353 91 561 069 Email: galway@morce.ie
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Job No	Drg No	Stage	Revision	Scale
W21084	P710A	PP	PP	A1 1:500 A3 1:1000

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Appendix B

Aquatic Ecological Assessments of Watercourses in the Vicinity of the Redmills Plant at Goresbridge

August 2021

Prepared by:
Pascal Sweeney, M.Sc. (Res.),
Sweeney Consultancy,
Rahan,
Mallow
Co. Cork.
Tel. 022/26780

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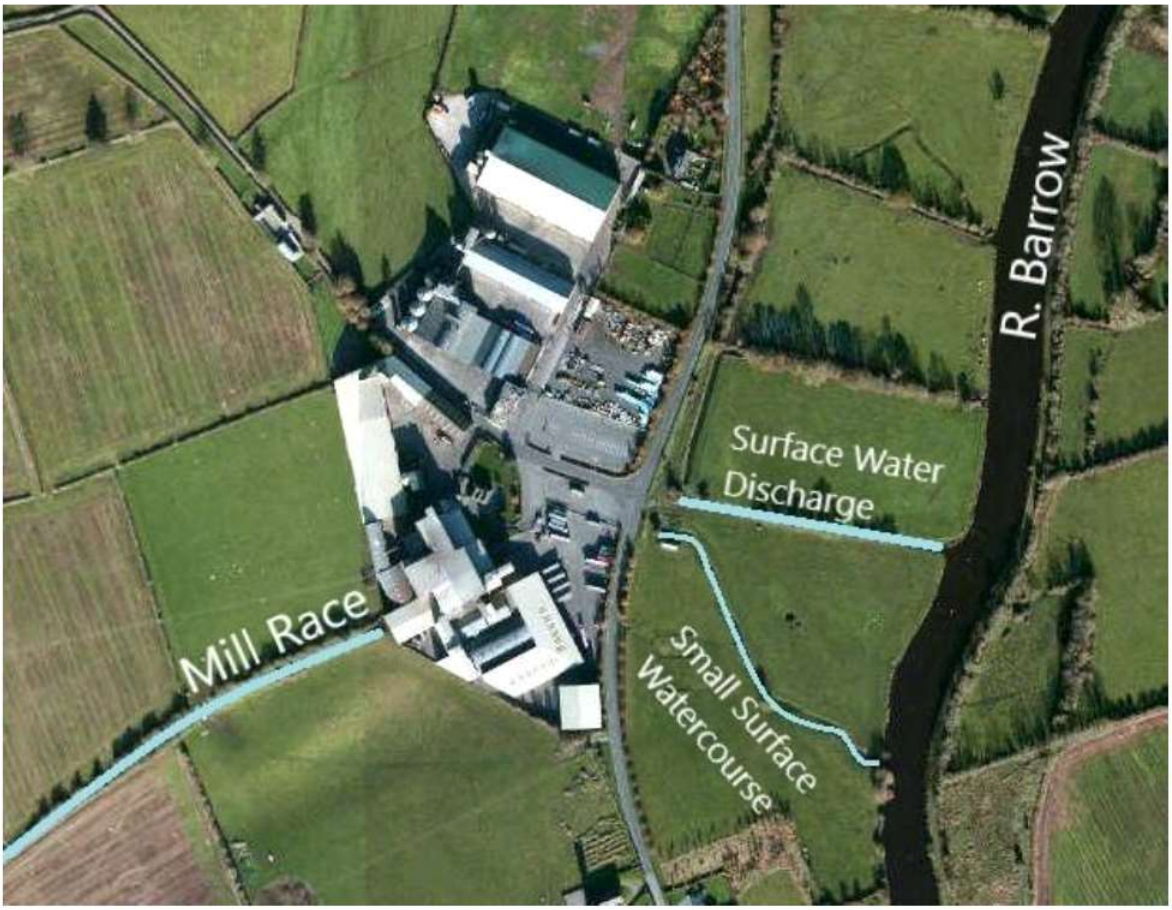
1. INTRODUCTION

Sweeney Consultancy was contracted to assess the ecological condition of watercourses in the vicinity of the Redmills Plant at Goresbridge, Co. Kilkenny(Figure 1). While the initial objective was an assessment of the River Barrow upstream and downstream of all possible influence of the Redmills plant, it was decided that an assessment of other watercourses that could possibly be influenced by the plant should also be assessed. These are a former mill race flowing into the plant to which surface water is discharged and a smaller surface watercourse originating at the opposite side of the road from the plant.

Figure 1: Redmills Site and Watercourses



2. METHODOLOGY

Field surveys were undertaken on 23 July and 26 August, 2021. The aquatic habitat quality was assessed, based on its physical nature and ecology. Grid reference of photographs were recorded using a hand-held GPS device and photographs were taken with a digital camera. Pond-net samples were taken at the six locations indicated in Figure 2.

Barrow Site 1 (B1) is upstream of all possible influences of the Redmills plant, both current and future.

Barrow Site 2 (B2) is immediately upstream of the current surface water discharge.

Barrow Site 3 (B3) is downstream of all possible influences of the Redmills plant.

Barrow Site 2 (B2) is immediately upstream of the current surface water discharge.

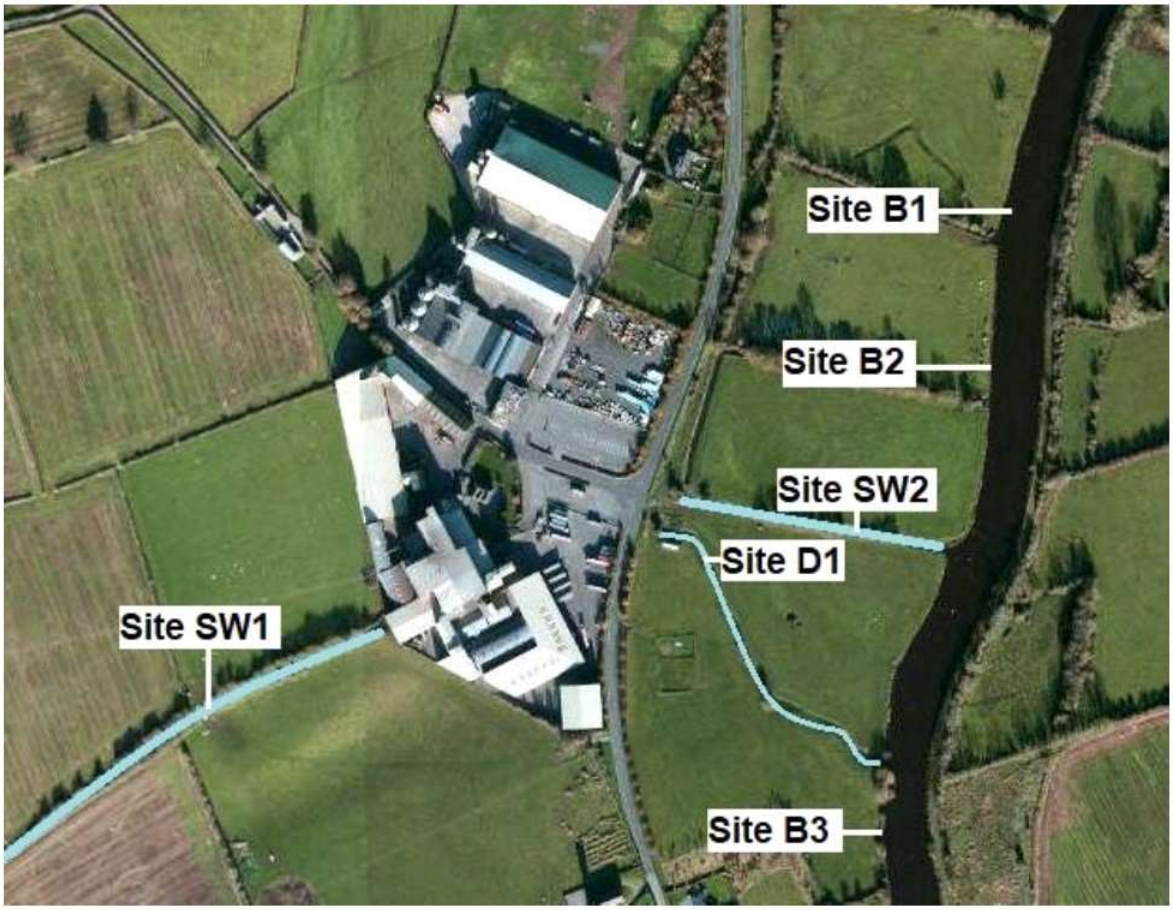
Mill Race/Surface Water Discharge Site 1 (SW1) is on the former mill race, upstream of the Redmills plant.

Mill Race/Surface Water Discharge Site 2 (SW2) is on the former mill race, downstream of the Redmills plant.

Small Surface Watercourse/Drain Site (D1) is towards the upstream end of the channel of the small surface watercourse to avoid the possible influence of runoff from slurry that was spread in the adjoining field to the south.

Invertebrates were identified on the bankside to the lowest taxonomic level possible with the naked eye. The biological water quality of the River Barrow sites was assessed following the most recent EPA Standard Operational Procedure for the Q-scheme methodology, which is based primarily on analysis of the aquatic invertebrate fauna. As the physical habitat conditions at Sites SW1, SW2 and D make them unsuitable for the application of the EPA Q-scheme methodology, the invertebrate fauna was assessed in comparison to that of other similar watercourses, based on previous experience and knowledge of the operator.

Figure 2: Sampling Sites



Records of protected aquatic and semi-aquatic species in the vicinity of the site were checked on the National Biodiversity Data Centre website and in other available unpublished databases. The likely status of aquatic species listed as Qualifying Interests of the River Barrow and River Nore Special Area of Conservation possibly occurring in or alongside the watercourses surveyed was assessed as follows:

- Contents of the pond net were first examined for protected species, prior to the invertebrate faunal assessment.
- The habitat quality for salmonids (*Salmo salar* and *Salmo trutta*) was assessed, based on the criteria outlined by Kennedy (1984) and by Bardonnet and Baglinière (2000) for the physical instream requirements of these species for spawning, nursery and adult habitat.
- The habitat quality for of lamprey species, was assessed, based on the criteria outlined by Maitland (1980) and by Johns (2002) for the physical instream requirements of these species for spawning, nursery and adult habitat.

- The habitat quality for crayfish (*Austropotamobius pallipes*) was assessed, based on the criteria outlined by Holdich (2003).
- The presence of the otter (*Lutra lutra*) was checked for by a survey of the riverbank for holts or couching sites and an examination of hard bankside surfaces for the presence of spraints and bankside mud/sand for imprints. The habitat quality for this species was assessed, based on the criteria outlined by Chanin (2003).

3. RESULTS

3.1.1 River Barrow Invertebrates and Biological Water Quality

Relevant sampling site information is presented in Appendix 1. The list of macroinvertebrate taxa identified to the level required for the Q-scheme and relative abundance of each taxon is presented in Appendix 2. Site photographs are presented in Appendix 3 (Photos 1 to 3).

The Q-scheme values range from Q1 (grossly polluted) to Q5 (pristine). Suffixes of /0, indicating a suspected toxic effect, and *, indicating a siltation effect may be added.

At all three sampling sites on the River Barrow, invertebrate taxa from EPA Indicator Group C (Relatively Pollution Tolerant) dominate the fauna. Group A (Very Pollution Sensitive) is absent, Group B (Relatively Pollution Sensitive) is represented by low numbers of the caddis family Limnephilidae at both sites. Group D (Very Pollution Tolerant) taxa are common, but less abundant than those from Group C. Group E (Most Pollution Tolerant) is absent from all three sites. Assessing these faunal communities by the methodology for slow-flowing reaches, the composition indicates a Q-value of **Q3-4** at all three sites, which corresponds to Moderate Ecological Water Quality, as defined by EPA.

3.1.2 Mill Race/Surface Water Discharge Channel Invertebrates.

Relevant sampling site information is presented in Appendix 1. The list of macroinvertebrate taxa and relative abundance of each taxon is presented in Appendix 2. Site photographs are presented in Appendix 3 (Photos 4 and 5).

At Site SW1, the New Zealand mud snail (*Potamopyrgus antipodarum*) completely dominates the fauna (Photo 7, Appendix 3). Six other species typical of small relatively slow-flowing watercourses are also present. The New Zealand mud snail, which was first recorded in Ireland in the 1890's is now ubiquitous throughout Irish freshwaters, but is rarely seen in such abundance. It is possible that its success at this site could be due to lack of predation by large fish or crayfish. The only fish species recorded here was three-spined stickleback (*Gasterosteus aculeatus*).

At Site SW2, the New Zealand mud snail is far less than at Site SW1, probably due to predation by fish. In addition to three-spined stickleback and minnow (*Phoxinus phoxinus*),

several small brown trout (*Salmo trutta*) were observed here. A total of 13 species typical of small relatively slow-flowing watercourses were recorded here.

Neither Site SW1 or Site SW2 exhibit signs of significant organic contamination or nutrient enrichment.

3.1.3 Southern Small Surface Watercourse/Drain Invertebrates.

The flow at Site D1 is very slow, through dense emergent vegetation (Photo 6, Appendix 3). The range of invertebrates found here is quite typical of the habitat and does not indicate significant organic contamination or nutrient enrichment.

3.1.4 Aquatic Species Protected under the EU Habitats Directive.

Freshwater Pearl Mussel (*Margaritifera margaritifera*) **(Habitats Directive Species Code 1029)**.

The freshwater pearl mussel is apparently now extinct in the main channel of the River Barrow (Lucey, 1998). A live specimen of freshwater pearl mussel was last found in the River Barrow in 1991, c. 5km upstream of Graiguenamanagh. This location is downstream of the confluence of the Mountain River, which supports a freshwater pearl mussel population and from which this specimen was probably washed into the River Barrow (E. Moorkens, *pers. comm.*). The habitat in watercourses in the vicinity of the Redmills site is unsuitable for freshwater pearl mussels.

Twaite Shad (*Alosa fallax*) **(Habitats Directive Species Code 1103) and Allis Shad** (*Alosa fallax*) **(Habitats Directive Species Code 1102)**.

Allis and Twaite shad are anadromous fish which enter large estuaries in early summer to spawn over gravels near the end of the freshwater reaches. As they spend little time in the spawning habitat as adults or juveniles, their presence in a river can be difficult to detect and needs targeted surveying. Rooney *et al.* (2014) recorded juvenile shad in the River Barrow downstream of St. Mullin's in summer 2013. There are no available more recent records and no evidence of either of these species progressing farther up the Barrow.

Sea Lamprey (*Petromyzon marinus*) **(Habitats Directive Species Code 1095)**, **Brook Lamprey** (*Lampreta planeri*) **(Habitats Directive Species Code 1096)** and **River Lamprey** (*Lampreta fluviatilis*) **(Habitats Directive Species Code 1099)**.

While the habitat in watercourses in the vicinity of the Redmills site is unsuitable for lamprey spawning, there is suitable habitat for the juvenile (ammocoete) stage. A single small ammocoete was found in the pond net sample at Site 2 (Photo 8, Appendix 3). The early juvenile stages of lamprey species are very difficult to tell apart. King (2006) recorded juvenile sea and brook/river lampreys throughout most of the River Barrow.

Atlantic Salmon (*Salmo salar*) **(Habitats Directive Species Code 1106)**.

O'Reilly (2002) states that the River Barrow is a fair to good salmon river. While the watercourses in the vicinity of the Redmills plant have no suitable salmon spawning or nursery habitat, adult salmon must migrate upstream and salmon smolts must migrate downstream in the Barrow, past the site. While small trout were observed in the surface water discharge, the habitat here is unsuitable for salmon.

White-Clawed Crayfish (*Austropotamobius pallipes*) **(Habitats Directive Species Code 1092)**.

Demers *et al.*, (2005) reported crayfish to be fairly well distributed in the River Barrow catchment, in suitable habitat. Crayfish plague was first recorded the lower part of the river in 2017 and has since been progressing upstream. It appears likely that the crayfish population in the vicinity of the Redmills plant has now been wiped out by plague, this includes the mill race, which is fed by the Gowran River, where plague has also been recorded.

Otter (*Lutra lutra*) **(Habitats Directive Species Code 1355)**.

Within the South Eastern River Basin District, which includes the River Barrow, Baily and Rochford (2006) recorded positive results at nearly 73% of sites surveyed, indicating a widespread distribution of the species. While no holt, couching site, or any other signs of otters were found in the vicinity of the site of the Redmills site at the times of fieldwork, the habitat is suitable for otters and prey items are plentiful. The National Biodiversity Data Centre website shows records for otter close to the Redmills site.

3. CONCLUSIONS

The aquatic invertebrate fauna shows the biological water quality of the stretch of the river Barrow, from upstream to downstream of the Redmills plant, to be unsatisfactory. However, as the faunal composition at all three sites is very similar and the same Q-value was recorded at all three, there is no indication of any significant impact on ecological quality by discharges from the Redmills plant.

The following aquatic species, which are Qualifying Interests of the River Barrow and River Nore SAC are known to be present, or thought likely to be present, even if only temporarily, in the Barrow adjacent to the Redmills plant:

- Lamprey species were found to be present in this stretch of river.
- Atlantic salmon must pass by in both upstream and downstream migrations, but the habitat is not suitable for spawning or for juveniles.
- Otters have been recorded in the vicinity.

APPENDIX 1
SAMPLING SITE DETAILS

Site Code	B1
Watercourse	River Barrow
Grid Reference (ITM)	668338 654515
Location	3rd field upstream of current surface water discharge. Upstream of proposed development. Sample between right bank and *Schoenoplectus lacustris* bed along centre
Photograph No.	1
Sampling depth (m)	1.3
Flow Type	Glide: 100%
Flow Speed	Slow
Substrate	1. Silt 2. Gravel 3. Cobble
Instream Vegetation	*Schoenoplectus lacustris* 20% *Sparganium erectum* 10% *Sparganium emersum* 10% *Glyceria maxima* <5%
Shade	None
Sampling Method	Long-handled net dredge

Site Code	B2
Watercourse	River Barrow
Grid Reference (ITM)	668330 654413
Location	2nd field upstream of current surface water discharge (bull in first field). Sample between right bank and *Schoenoplectus lacustris* bed along centre
Photograph No.	2
Sampling depth (m)	1.3
Flow Type	Glide: 100%
Flow Speed	Slow
Substrate	1. Silt 2. Gravel 3. Cobble
Instream Vegetation	*Schoenoplectus lacustris* 25% *Sparganium erectum* 15% *Sparganium emersum* 15% *Glyceria maxima* <5%
Shade	None
Sampling Method	Long-handled net dredge

Site Code	B3
Watercourse	River Barrow
Grid Reference (ITM)	668255 654082
Location	Downstream of confluence of small surface watercourse
Photograph No.	3
Sampling depth (m)	2.0
Flow Type	Glide: 100%
Flow Speed	Slow
Substrate	1. Silt
	2. Gravel
Instream Vegetation	*Cladophora sp.* 25%
	Ulva sp. <5%
	Schoenoplectus lacustris <5%
	Sparganium erectum <5%
	Sparganium emersum 5%
	Glyceria maxima <5%
Shade	None
Sampling Method	Long-handled net dredge

Site Code	SW1
Watercourse	Mill Race
Grid Reference (ITM)	667782 654176
Location	Former mill race, immediately downstream of farm bridge in first field corner upstream of Redmills plant.
Photograph No.	4
Sampling depth (m)	1.0
Flow Type	Glide: 100%
Flow Speed	Slow
Substrate	1. Silt
Instream Vegetation	*Lemna minor* 15%
	Agrostis stolonifera <5%
	Apium nodiflorum 25%
	Berula erecta 5%
	Callitriche sp. 15%
	Nitella sp. 10%
	Veronica beccabunga 5%
	Veronica anagallis aquatica 5%
Shade	None
Sampling Method	Net dredge

Site Code	SW2
Watercourse	Mill Race channel, with surface water discherge
Grid Reference (ITM)	668224 654302
Location	Just upstream of main cattle access point.
Photograph No.	5
Sampling depth (m)	0.6
Flow Type	Glide: 100%
Flow Speed	Slow
Substrate	1. Silt
Instream Vegetation	*Lemna minor* 5%
	Lemna trisulca 5%
	Apium nodiflorum 5%
	Callitriche sp. 25%
	Veronica anagallis aquatica <5%
Shade	None
Sampling Method	Net dredge

Site Code	D1
Watercourse	Small Surface Watercourse
Grid Reference (ITM)	668255 654082
Location	Opposite the entrance to the Redmills plant, 10 to 20m downstream of beginning of surface flow,
Photograph No.	6
Sampling depth (m)	0.5
Flow Type	Glide: 100% through dense vegetation
Flow Speed	Very slow
Substrate	1. Silt
Instream Vegetation	*Phalaris arundinacea* 80% *Apium nodiflorum* 10% *Lemna minor* 10%
Shade	None
Sampling Method	Net dredge

APPENDIX 2
INVERTEBRATES RESULTS

Relative abundance expressed as E: Excessive; D: Dominant; N: Numerous; C: Common; F: Few; S: Single

SITE	B1	B2	B3	SW1	SW2	D1
TAXON						
Group A (Sensitive) None Recorded						
Group B (Less Sensitive)						
Limnephilidae	F	F	F		F	F
Group C (Relatively Tolerant)						
Tricladida					F	F
Potamopyrgus antipodarum	S	F		E	F	
Bithynia tentaculata	C	C	C			
Valvata piscinalis	C	C	C		C	
Hydrachnidae	F	S		F	C	
Gammarus sp.	C	C	C	F	F	
Corixidae	S	F	C		F	
Baetis rhodani				F		
Dytiscidae	C	C	N		F	C
Haliplidae	C	F			C	
Chironomidae (ex. *Chironomus*)	F	C		F	C	
Group D (Very Tolerant)						
Glossiphonidae		S				
Helobdella stagnalis	S		S			
Crangonyx sp.	S				F	C
Asellus aquaticus	C	C	C	F	C	D
Sialidae			S			
Group E (Most Tolerant)						
Tubificidae				F	F	
Q-Value		**3-4**	**3-4**	**N/A**	**N/A**	**N/A**

APPENDIX 3

PHOTOGRAPHS

Photo 1: Site B1

Photo 2: Site B2

Photo 3: Site B3

Photo 4: Site SW1

Photo 5: Site SW2

Photo 6: Site D1

Photo 7: Excessive numbers of New Zealand Mud Snail at Site SW1

Photo 8: Lamprey Ammocoete at Site B3

APPENDIX 4
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