NATURA IMPACT STATEMENT

September 2017

REMEDIAL NATURA IMPACT STATEMENT

Clonmelsh & Garyhundon

Prepared on behalf of:
Dan Morrissey Ireland Ltd. (In Receivership)

Report Number. 1784075.R02.B0

Golder Associates

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1.0 INTRODUCTION

This retrospective evaluation presents a Stage 2 Appropriate Assessment of the Clonmelsh Quarry and Lands at Garryhundon site (collectively referred to as the 'Site'). This assessment is required in support of applications for substitute consent to regularise operations that have occurred since 1997 to the present day. This retrospective NIS is titled a remedial NIS (rNIS) and referred to as NIS thought this document.

For the purposes of the NIS, the Site assessed is indicated in Figure 1. The landscape surrounding the Site can be characterised as rural in nature, with land uses in the area being generally agricultural and single-house residential. The M9 motorway runs north-east to south-west immediately adjacent to the west of the Site. There are three Natura 2000 sites within a 15 km radius of the Site and these are presented in Section 3.0.

1.1 Terms of Reference

The Appropriate Assessment is carried out in accordance with the requirements of the EU Habitats Directive (Directive 92/43/EEC).

Articles 6(3) and 6(4) of this Directive state the following:

> **6(3).** *Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications 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.*
>
> **6(4).** *If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.*
>
> *Where the site concerned hosts a priority natural habitat type and/or priority species, the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest.*
>
> The requirements of Articles 6(3) and 6(4) of the Habitats Directive have been transposed into Irish legislation by means of the Habitats Regulations, 1997 (S.I. No. 94 of 1997) and the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011).

1.2 Methods

This report has been prepared with reference to the following Habitats Directive documents:

- Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (European Communities, 2002);
- Managing Natura 2000 sites: the provisions of Article 6 of the 'Habitats Directive' 92/43/EC (European Communities, 2000);
- Waste Water Discharge Licensing. Note on Appropriate Assessments for the purposes of the Waste Water Discharge (Authorisation) Regulations, 2007 (S.I. No. 684 of 2007) (Environmental Protection Agency); and
- Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities (Dept. Environment Heritage and Local Government, December 2009).

The Appropriate Assessment process is carried out in stages, as recommended by the Guidance Documents. There are four stages as follows:

1.2.1 Stage 1: Screening

This initial stage aims to identify the likely impacts of the project on a Natura 2000 site, either alone or in combination with other projects or plans. The impacts are examined to establish whether these impacts are likely to be significant. Assessment of the significance of effects is carried out in consultation with the relevant nature agencies.

1.2.2 Stage 2 - Appropriate assessment

The aim of this stage is to identify the conservation objectives of the Natura 2000 site and to assess whether or not the project or plan, either alone or in combination with other projects or plans, will result in adverse effects on the integrity of the site, as defined by the conservation objectives and status of the site. Stage Two is carried out in consultation with the relevant nature agencies. Where it cannot be demonstrated that there will be no adverse effects on the site, it is necessary to devise mitigation measures to avoid, where possible, any adverse effects.

1.2.3 Stage 3 - Assessment of alternative solutions

This stage examines alternative ways of implementing the project or plan that, where possible, avoid any adverse impacts on the integrity of the Natura 2000 site. If alternative solutions have been identified that will either avoid any adverse impacts or result in less severe impacts on the site, it will be necessary to assess their potential impact by recommencing the assessment at Stage One or Stage Two as appropriate. However, if it can be reasonably and objectively concluded that there is an absence of alternatives, it will be necessary to proceed to Stage Four of this assessment methodology.

1.2.4 Stage 4 - Assessment where adverse impacts remain

For sites that host priority habitats and species, it is necessary to consider whether or not there are human health or safety considerations or environmental benefits flowing from the project or plan. If such considerations do exist, then it will be necessary to carry out the Stage Four assessments of compensatory measures. If no such considerations exist, then it is necessary to establish whether there are other Imperative Reasons of Overriding Public Interest (IROPI) before carrying out the Stage Four assessments. Where IROPI exist, an assessment to consider whether compensatory measures will or will not effectively offset the damage to the site will be necessary before the project or plan can proceed.

This report is for Appropriate Assessment Stage 2 only.

1.3 Study Limitations

Cumulative impact assessment is based upon available information. As there is insufficient quantitative information on all discharges from areas beyond the Application Site (e.g. diffuse discharges) and within the study area to make a quantitative cumulative impact assessment, the cumulative impacts are discussed in qualitative terms, based on available information, in this report.

1.4 Desktop Review and Data Collation

The desktop study reviewed existing information on surface and groundwater quality, ecological features of the River Barrow and River Nore SAC and potential pressures on the river.

Existing reports and data sets which were reviewed as part of the desk study include the following:

- South Eastern River Basin District Characterization Report (WFD,2010);
- Water Framework Directive Annex IV Protected Areas: Water Dependent Habitat and Species, and High Status Sites (Mayes, 2008);
- Geology of Carlow-Wexford: A Geological Description, with accompanying Bedrock Geology 1:100,000 Scale Map, Sheet 19, Carlow - Wexford (GSI), 1994;
- Environmental Protection Agency (EPA) Water Quality in Ireland 2004-2006, 2008;
- S.I. No. 9 - European Communities Environmental Objectives (Groundwater) Regulations 2010;

- S.I. No. 389 - European Communities Environmental Objectives (Groundwater) (Amendment) Regulations 2011;
- Geological Survey of Ireland interactive web maps;
- Environmental Protection Agency (EPA) interactive web maps;
- Hydrological / Hydrogeological Impact Assessment, SLR Consulting Ltd, April 2013; and
- Daly, E.P., 1981. Nitrate Levels in the Aquifers of the Barrow River Valley. Geological Survey of Ireland.

2.0 DESCRIPTION OF THE PROJECT TO DATE

The site the subject of this rNIS holds excavated lands and a plant area over a total area of 81 ha. [the site]. The site lands occurs in 2 no. land units named after the townlands within which they occur consisting of generally excavated land described as; *Clonmelsh* to the north (54 ha.) that includes the plant area and *Garyhundon* to the south (27 ha.).

The purpose of the rEIAR is to support two applications for substitute consent for a quarry and a plant area, both already in existence thus development here considered is retrospective. Development to date has consisted of the extraction of sand and gravel and rock from the lands beginning in 1947, joined by processing plant form the 1970s.

In summary the extant plant area the subject of the substitute consent application consists of:

A plant area over about 3.22 ha. containing; Readymix concrete batching plant (110 sqm) & shed (1,224 sqm); Mobile canteen (container) (27 sqm); Demountable Readymix concrete plant (219 sqm); Shipping Office (103 sqm) Container 1 (storage) (14.5 sqm); Container 2 (mobile office) (29 sqm); Weighbridge (53 sqm) originally permitted under Reg. Ref. 2981; Demountable asphalt production plant (Amman) (847 sqm) the subject of APL10/01 & control room (66.5 sqm); ESB Substation (50.6 sqm); Bunded fuel tanks (168 sqm) & Pumphouse (34.56 sqm); and Workshop (180 sqm). The development also holds supporting infrastructure consisting of; entrance onto the L3050 and water management system including septic tank; water holding tanks; well; settlement pond; discharge license DL7/233 and ancillary site works including aggregate and precast, concrete and cold asphalt product storage areas.

In summary the extant quarry area the subject of the substitute consent application consists of:

a quarry over two areas; 51 ha. in Clonmelsh to an average depth of approximately 25AOD and 27 ha. in Garyhundon to an average depth of approximately 57AOD. The development also holds supporting infrastructure consisting of; existing entrance to the L3045 at Garyhundon permitted under Reg. Ref. 2979; asphalt plant permitted under Reg. Ref. 92/137; 2 no. aggregate processing plants permitted under Reg. Refs. 76/3642 and 76/3842. Ancillary site development includes; water management system consisting of settlement ponds, mobile pump and underground pipeline crossing associated plant area at Garyhundon, mobile aggregate processing plant, storage containers and haul routes.

The two substitute consent application areas in pure volumetric terms at approx. 3.22 ha. for the plant area and 51 and 27 ha. for the quarry area together at 81.22 ha. slightly exceed the stated 81 ha. measurement for the rEAIR area for reason of part of the quarry infrastructure (water drainage pipe) crossing the plant area.

2.1 Description of Natura 2000 Sites

There are three (3) Natura 2000 sites located within 15 km of the Site (refer Figure 2 below):

- River Barrow and Nore SAC;
- Black Mountains SAC; and
- Slaney River Valley SAC.

2.1.1 River Barrow and Nore SAC

The closest Natura site is the River Barrow and Nore SAC which is ca. 900 m west of the Application Site.

The following summary of the River Barrow Nore SAC is included verbatim from the National Parks and Wildlife service website[1] .

> *"This site consists of most of the freshwater stretches of the Barrow/Nore River catchments. The Barrow is tidal as far upriver as Graiguenamanagh while the Nore is tidal as far upriver as Inishtioge. The site also includes the extreme lower reaches of the River Suir and all of the estuarine component of Waterford Harbour extending to Creadan Head. The larger of the many tributaries include the Lerr, Fushoge, Mountain, Aughavaud, Owenass, Boherbaun and Stradbally Rivers of the Barrow and the Delour, Dinin, Erkina, Owveg, Munster, Arrigle and King's Rivers on the Nore. Both rivers rise in the Old Red Sandstone of the Slieve Bloom Mountains. They traverse limestone bedrock for a good proportion of their routes, though the middle reaches of the Barrow and many of the eastern tributaries run through Leinster Granite. A wide range of habitats associated with the rivers are included within the site, including substantial areas of woodland (deciduous, mixed), dry heath, wet grassland, swamp and marsh vegetation, salt marshes, a small dune system, biogenic reefs and intertidal sand and mud flats. Areas of improved grassland, arable land and coniferous plantations are included in the site for water quality reasons.*
>
> *The site supports many Annexed habitats including the priority habitats of alluvial woodland and petrifying springs. Quality of habitat is generally good. The site also supports a number of Annex II animal species - Salmo salar, Margaritifera margaritifera, M.m. durrovensis, Alosa fallax fallax, Austropotamobius pallipes, Petromyzon marinus, Lutra lutra, Lampetra fluviatilis and L. planeri. Annex I Bird species include Anser albifrons flavirostris, Falco peregrinus, Cygnus cygnus, Cygnus columbianus bewickii, Limosa lapponica, Pluvialis apricaria and Alcedo atthis. A range of rare plants and invertebrates are found in the woods along these rivers and rare plants are also associated with the saltmarsh."*

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

- Estuaries [1130];
- Mudflats and sandflats not covered by seawater at low tide [1140];
- Reefs [1170];
- Salicornia and other annuals colonising mud and sand [1310];
- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330];
- Mediterranean salt meadows (*Juncetalia maritimi*) [1410];
- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260];
- European dry heaths [4030];
- Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430];
- Petrifying springs with tufa formation (Cratoneurion) [7220];
- Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0];

[1] https://www.npws.ie/protected-sites/sac/002162 Accessed 07/07/2017

- Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0];
- *Vertigo moulinsiana* (Desmoulin's Whorl Snail) [1016];
- *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029];
- *Austropotamobius pallipes* (White-clawed Crayfish) [1092];
- *Petromyzon marinus* (Sea Lamprey) [1095];
- *Lampetra planeri* (Brook Lamprey) [1096];
- *Lampetra fluviatilis* (River Lamprey) [1099];
- *Alosa fallax fallax* (Twaite Shad) [1103];
- *Salmo salar* (Salmon) [1106];
- *Lutra lutra* (Otter) [1355];
- *Trichomanes speciosum* (Killarney Fern) [1421]; and
- *Margaritifera durrovensis* (Nore Pearl Mussel) [1990].

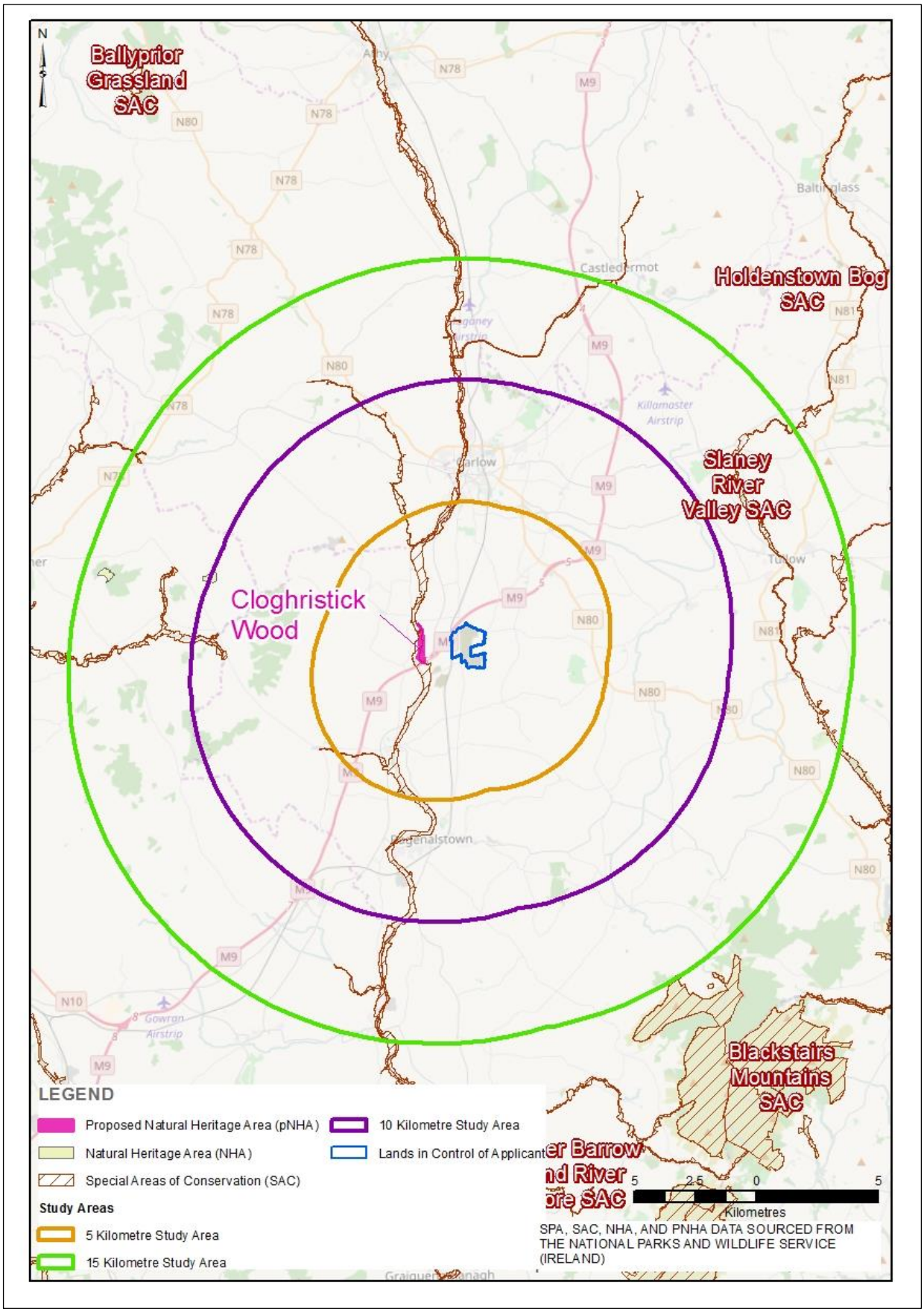

Figure 1: Natura 2000 sites (NPWS, 2012) within 15km of the Site.

2.1.2 Blackstairs Mountains SAC

The Blackstairs Mountains SAC is ca. 15 km to the south east of the Site. '*The Blackstairs Mountains are situated at the southern end of the Leinster Mountain Chain. They are composed primarily of granite, but also include, especially on their eastern side, some overlying Ordovician slates and sandstones. The range forms a roughly north-south orientated ridge some 22km long which includes six peaks over 520m. The dominant vegetation of the site is dry heath; this occurs throughout the site, but predominantly on the higher sections of the range. Bare rock and scree is found in the highest and steepest sections of the site. Molinia-dominated wet heath/bog vegetation is found in very small amounts at lower levels and by streams. The valley of the Urrin River on the north-east side of the site supports some deciduous woodland and incipient bog. Much of the site is flanked by coniferous forest; this is not confined to the lowlands, being found at over 640m north of Mount Leinster.*[2]

2.1.3 The Slaney River SAC

The Slaney River Valley SAC is ca. 12 km east of the Site. *'Estuaries and intertidal sand and mud flats are particularly well represented in this site, with salinity ranging from full freshwater to full seawater. The quality of these habitats is generally good. The Slaney River and its tributaries display good examples of floating river vegetation. An important area of alluvial forest is found at Macmine, while old oak woodlands occur at Toomnafinnoge, the latter being a remnant of the ancient oak woods of Shillelagh.*

The site is of high importance for the conservation of fish species, notably Salmo salar, Petromyzon marinus, Lampetra fluviatilis, L. planeri and the very localised Alosa fallax fallax. Lutra lutra is well distributed throughout, while a significant population of Margaritifera margaritifera occurs on the Derreen River. The site provides year-round haul-out habitat for the Annex II species Phoca vitulina, and includes regionally significant breeding and moulting sites.

The site has high ornithological importance, especially for wintering waterfowl with internationally important populations of Branta bernicla hrota, Cygnus olor, Limosa limosa and Limosa lapponica. There is at least a further 14 species of wintering waterfowl which occur in numbers of national importance. Wintering Larus gulls are well represented, especially Larus ridibundus and Larus fuscus. A nesting colony of Egretta garzetta has recently become established within the site and birds are present in the area throughout the year. The site supports one of the best breeding concentrations of Acrocephalus scirpaeus in the country. A range of flora and fauna species listed as Red Data Book species occur within the site.[3]*'*

3.0 REGIONAL AND LOCAL HYDROLOGICAL AND ECOLOGICAL CONNECTIVITY

As described in Chapter 6.0 (Water) of the rEIAr, The Site is located in the catchment area of the River Barrow, in a valley that lies between the foothills of the Leinster Mountains to the east and the Castlecomer Plateau to the west. From Carlow to beyond Bagenalstown, the valley is ca. 6.5 km wide, with natural ground levels at the Site varying from between 55 and 65 m OD. The Site itself undulates gently towards the River Barrow (to the west), which flows in a southerly direction towards Waterford Harbour.

The Site is located within the South-eastern River Basin District, Hydrometric Area 17. Within the well-drained superficial deposits of the Site, there are four significant drainage features (streams) within the vicinity of the Site (Figure 2):

- The Ballybannon Stream flows in a north-westerly direction to join the Powerstown Stream to the north of the Site (just east of the M9 motorway);
- The Powerstown Stream flows in a southerly direction along the north-western edge of the Site boundary before crossing back under the motorway and continuing south to join the River Barrow. The Clonmelsh Stream (also known as Nurney 14) joins the Powerstown Stream just before the Powerstown Stream

[2] https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF000770.pdf

[3] https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF000781.pdf

leaves the boundary of the Site and flows under the motorway (at SW02). This stream receives discharge waters from the Site under licence (DL7/233) at DW01, via a drainage channel;

- The Clonmelsh Stream is an ephemeral stream which flows westwards around the southern edge of the main quarry excavation, before continuing in a northerly direction along the western edge of the excavation. It joins the Powerstown Stream to the west of the quarry excavation at SW02. The Clonmelsh Stream has been diverted from its original course due to the extraction activities at the quarry. Much of the upper reaches of this stream (to the east of the Site) have been drained to provide improved farmland; and
- The Garryhundon Stream flows in a westerly direction before turning abruptly south to the southeast of the Site and continuing on to the River Barrow.

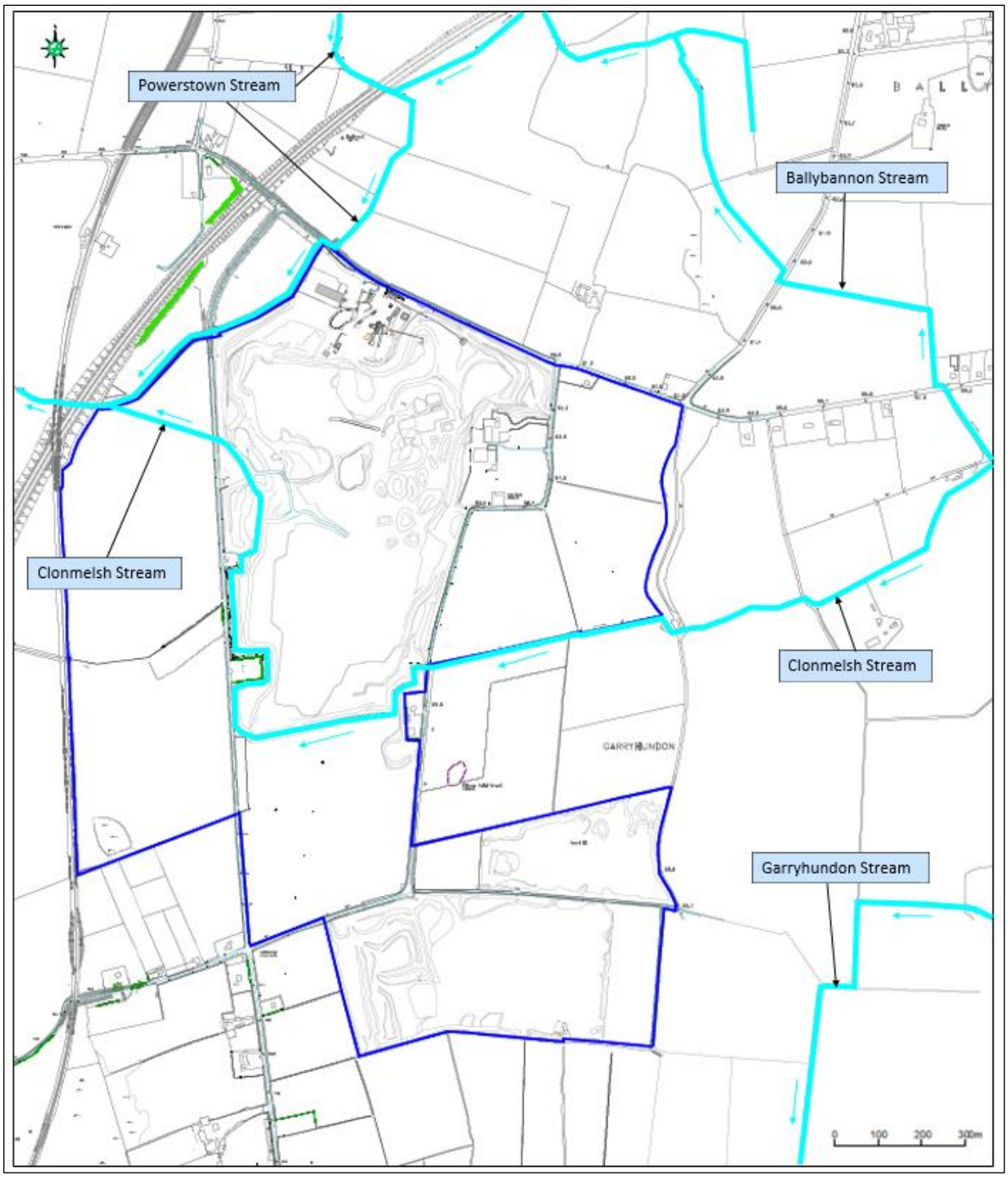

Figure 2: Main streams in proximity to the Site

The Clonmelsh Stream is the only stream of the four described above that has been diverted due to quarrying activities at the Site. Future development at the Site will likely necessitate the re-routing of the Clonmelsh Stream in an anti-clockwise direction around the Site to join the Powerstown Stream upstream of where the two streams currently meet. Re-routing (and lining) of part of the Clonmelsh Stream away from the quarry void will help to provide increased biodiversity, and ensure that quality and quantity of flow be maintained to the Powerstown Stream.

The thick deposits of relatively unconsolidated sands and gravels overlying the Site and its surrounding environment, coupled with a shallow groundwater table enables water to drain slowly, thereby providing high baseflows to the four streams surrounding the Site.

A number of residences are located within 500 m of the development, a number of which have private wells (surveyed in 2010). Wastewater discharging from local residences is treated in septic tank systems and soak pit/percolation areas.

4.0 NIS RATIONALE FOR INCLUSION OR EXCLUSION

All Natura sites that exist within 15 km of the Site are included in the following impact evaluation process. In all cases; evidence of hydrological connectivity, ecological connectivity and habitat/species synergies has been assessed.

4.1 River Barrow and Nore SAC

Hydrological connectivity exists between the Site and the River Barrow. The River Barrow is designated as an SAC and is situated approximately 900m west of the Site. This designated site is the subject of this NIS.

4.2 Slaney River SAC

No hydrological or ecological pathways or habitat / species synergies have been identified between this Natura site and the Site (Clonmelsh Quarry). The Slaney River SAC is situated some 12 km from the Site. The Slaney River SAC is scoped out of this NIS.

4.3 Blackstairs Mountains SAC

No hydrological or ecological pathways or habitat / species synergies have been identified between this Natura site and the Site (Clonmelsh Quarry). The Blackstairs Mountain SAC is situated some 15 km from the Site. The Blackstairs Mountain SAC is scoped out of this NIS.

5.0 WATER QUALITY

5.1 Water Framework Directive

In response to the increasing threat of pollution and the increasing demand from the public for cleaner rivers, lakes and beaches, the EU developed the Water Framework Directive (WFD). This Directive is unique in that, for the first time, it establishes a framework for the protection of all waters including rivers, lakes, estuaries, coastal waters and groundwater, and their dependent wildlife/habitats under one piece of environmental legislation.

The Directive aims to ensure the quality of EU waters and takes a holistic approach to water management. It updates existing water legislation through the introduction of a statutory system of analysis and planning based upon the river basin, the use of ecological as well as chemical standards and objectives, the integrated

consideration of groundwater and surface water quality and quantity, the introduction of some new regulatory factors, and the phased repeal of several older European Directives.

Item 7 of Article 16 (strategies against pollution water) of the WFD, states that the Commission shall submit proposals for quality standards applicable to the concentrations of the priority substances surface water, sediments or biota. Item 35 of Article 2 defines an Environmental Quality Standard (EQS) as the concentration of a particular pollutant or group of pollutants in water, sediment or biota that should not be exceeded in order to protect human health and the environment. Finally, in Annex 5 of the Directive, the procedure described for setting these EQSs by Member States.

The use of EQSs is currently under constant review and scientific study. Bioavailability corrections through the use of biotic ligand models (BLMs) allow a more accurate assessment to be made of potential metal toxicity. The Dissolved Organic Carbon (DOC) concentrations are particularly important in defining the bioavailability of copper and zinc and of other metals, such as nickel. Other parameters such as pH and calcium conditions may also affect bioavailability of metals.

For many substances, the main risk to plants and animals is through direct toxicity in water → water column EQS. But for lipophilic substances that bioaccumulate, the main risk is to predators exposed to the chemical via the food chain → biota EQS. The biota EQS is expressed as a concentration in body tissue of prey organism. Using bioaccumulation data, it can be converted to corresponding concentration in water. Biota standards potentially offer a more reliable measure of environmental exposure than water samples for substances that bioaccumulate. Biota can act as a composite sample. However, biota standards require serious attention before we can use them to assess waterbody status with confidence (Environment Agency, 2009). Therefore this report relies upon a combination of Q values and details provided in the water impact assessment (Chapter 6.0 of the rEIAR).

5.1.1 Water Framework Directive Status and Objectives

It is understood that the South Eastern River Basin District (SERBD) Management Plan (2009 – 2015) has been adopted by all local authorities in the SERBD. Its objectives, which have been considered in this assessment, include the following:

- Prevent deterioration and maintain a high status where it already exists;
- Protect, enhance and restore all waters with aim to achieve at least good status by 2015;
- Ensure waters in protected areas meet requirements; and
- Progressively reduce chemical pollution.

Regardless of their current quality, surface waters should be treated the same in terms of the level of protection and mitigation measures employed, i.e. there should be no negative change in status.

5.1.2 Surface Water Quality

Referencing the Water Chapter (6.0) of the rEIAR, it is understood that surface water monitoring locations SW01, SW02 and SW03 are situated on the Powerstown and Clonmelsh Streams, with SW04 being located on the Garryhundon Stream (no discharge takes place into this stream) as a baseline reference (refer to Figure 3). Surface water quality at the quarry is monitored on a quarterly basis at SW01, SW02, SW03 and SW04 as part of the quarry's discharge licence monitoring regime (DL7/233). Discharge Licence limits include 25 mg/l for both nitrates and suspended solids, and a limit of 2,000 m^3/d for flow.

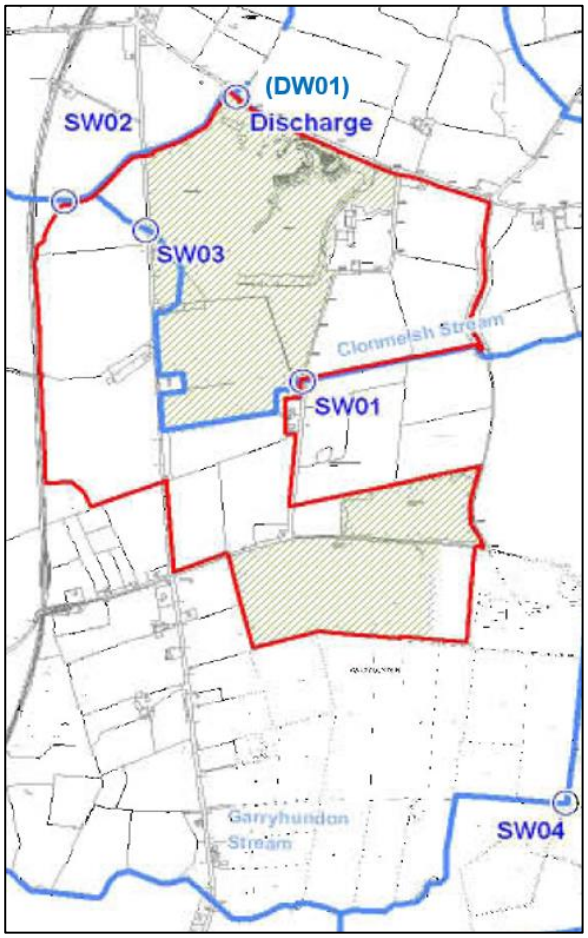

Figure 3: Surface water monitoring locations (SW01 to SW04)

SW01 is located upstream of the discharge point (DW01), while SW02 is located downstream of the discharge point (SW03 is an intermediate point upstream of the discharge). Importantly, biological surface water quality data available from the EPA for their station at Cardinal Moran Bridge (RS14B012680) (located downstream of the Site on the River Barrow) gives a quality value (Q) rating of 3-4, which represents water which is classed as being of 'moderate status', similar to other stations both upstream and downstream on the Barrow catchment. This indicates a negligible influence from the Site.

5.1.3 Groundwater Body Status

As described within Chapter 6.0, groundwater bodies have been defined by the GSI to determine the catchment areas and divides within areas, in a similar fashion to the river basins defined for surface water features. The Application Site occurs within the Bagenalstown Lower Groundwater Basin (GWB) (IE_SE_G_157), which is classified as a regionally-important *'karstified diffuse-flow aquifer'* (Rkd), receiving much of its recharge from the slopes of the Barrow Valley. It is not at risk of over-abstraction as determined by the EPA.

The Quaternary deposits within which the Application Site lies, is classified as a regionally important gravel aquifer, and is referred to as the Barrow Valley GWB (GSI). Due to the highly variable nature of the deposit it has limited development potential for drinking water schemes. The main importance of this aquifer is in providing storage, and allowing recharge to the underlying limestone bedrock.

The regional groundwater quality of the area is controlled by the limestone bedrock, the overlying Quaternary deposits of sands and gravels, and the impact of agricultural activities upon them. The waters are generally calcareous and very hard, with elevated nitrate levels having been detected at several locations within the Barrow Valley (one of the most intensely farmed/tilled regions in the country). There are no source protection zones or groundwater dependent ecosystems within the area of the existing quarry. The nearest source protection area to the development is located ca. 10 km to the south-east of the Site at Paulstown.

5.2 On-Site Waste Water Treatment

An existing septic tank treats foul water from the Site. The septic tank is emptied as required by licensed waste contractors. Historically, there have been no adverse issue with this on-site septic tank. A walkover of the Site (refer to Chapter 6.0) in the surrounding area did not highlight any signs of surface pollution from the septic tank. Given that the septic tank is located within a disused part of the quarry site (i.e. in close proximity to the edge of the quarry void) and with depths to groundwater of >20 m due to quarry de-watering, it is likely that the thickness of soils and overburden material (ca. 10 to 15 m) underlying the septic tank is sufficient to provide percolation. This does not present an environmental risk based on the current usage and there is no evidence of environmental pollution of the septic tank system due to past usage at the Site.

6.0 IMPACT ASSESSMENT METHODOLOGY

The potential impacts from the historical and present day quarrying at the Site relate to the impacts of activities at the Site on the Powerstown Stream downstream of the licenced discharge point (DW01). As this stream is a tributary of the Lower River Barrow the potential for residual effects focuses on this Natura 2000 receptor.

Given that the designated features of the SAC are all water dependant species and habitats, water quality is the main aspect under consideration in this Appropriate Assessment.

The assessment is carried out in accordance with the guidance provided below:

- *Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland* (CIEEM, 2016); and
- Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (European Communities, 2002).

6.1.1 Evaluation Criteria

The evaluation, impact and significance criteria used in this Impact Assessment are given below in Table 1.

Table 1: Criteria for Establishing Receptor Sensitivity/Importance

Importance	Ecological Valuation
International	Sites, habitats or species protected under international legislation e.g. Habitats and Birds Directive. These include, amongst others: SAC's, SPA's, Ramsar Sites, Biosphere Reserves, including sites proposed for designation, plus undesignated sites that support populations of internationally important species.
National	Sites, habitats or species protected under national legislation e.g. Wildlife Act 1976 and amendments. Sites include designated and proposed NHAs, Statutory Nature Reserves, National Parks, plus areas supporting resident or regularly occurring populations of species of national importance (e.g. 1% national population) protected under the Wildlife Acts, and rare (Red Data List) species.
Regional	Sites, habitats or species which may have regional importance, but which are not protected under legislation (although Local Plans may specifically identify them) e.g. viable areas or populations of Regional Biodiversity Action Plan habitats or species.

Importance	Ecological Valuation
High Local/County	Areas supporting resident or regularly occurring populations of protected and red data listed-species of county importance (e.g. 1% of county population), Areas containing Annex I or II habitats or species not of international/national importance, County important populations of species or habitats identified in county plans, Areas of special amenity or subject to a Tree Preservation Order.
Moderate Local	Areas supporting resident or regularly occurring populations of protected and red data listed-species of local importance (e.g. 1% of local population), Undesignated sites or features which enhance or enrich the local area, Sites containing viable area or populations of local Biodiversity Plan habitats or species, local Red Data List species etc.
Low Local	Undesignated sites or features, which enhance or enrich the wildlife resource at a Parish or neighbourhood level.

6.1.2 Significance Criteria

An impact's significance is measured bearing in mind the site's evaluation for nature conservation. An impact of severe significance is one which is likely to cause a considerable drop in the biodiversity value of a site that is extremely important for nature conservation. An impact of major significance will also impinge on an important nature conservation site or species but the impact will be less marked. An impact of moderate significance will cause a significant loss in biodiversity on a site but is unlikely to impinge on statutory sites or species. A minor impact will have only a very limited impact on biodiversity whereas an impact that is termed negligible/not significant is one that is most unlikely to impact in any way on biodiversity.

CIEEM (2016) define an ecologically significant impact as an impact (negative or positive) on the integrity of a defined site or ecosystem and / or the conservation status of habitats or species within a given geographic area. The integrity of a site is the coherence of its ecological structure and function, across its whole area, which enables it to sustain the habitat, complex of habitats and / or the levels of populations of the species for which it was classified.

Best scientific professional judgement has been used in some cases, to assess the significance of predicted effects. The significance criteria are expressed on a six point scale, including both adverse and beneficial effects, as described in Table 2.

Table 2: Criteria for Assessing Significance of Predicted Impacts

Impact Level	Description
Severe Impact	Ecological effects of a scale or magnitude which would result in permanent, total loss of an irreplaceable species or habitat of international or national importance (occasionally of local importance), or which would result in the substantial loss of a protected/rare habitat or a population of a protected/rare species. They represent key factors in the decision-making process. Typically, mitigation measures would be unlikely to remove such effects.
Major Impact	These effects are likely to relate to permanent impacts at a regional or local level, or temporary impacts at an international or national level, and could be potential concerns to the project depending upon the relative importance attached to the issue during the decision making process. The effects are likely to be large in scale or magnitude, and result in substantial medium term loss of protected/rare species or habitats. Mitigation and detailed design work are unlikely to entirely eliminate all ecological effects.

Impact Level	Description
Moderate Impact	These effects are usually only at local or regional level, and may be short or medium term only, or temporary impacts on a small part of an international site. However, the cumulative effects of such issues may lead to an increase in the overall effect on ecological features. They represent issues where effects will be experienced, but mitigation measures and detailed design work may ameliorate/enhance some of the consequences upon affected interests, but some residual effects will still arise.
Minor Impact	These effects are likely to be local issues only; or small magnitude impacts at the regional and national level, they are usually temporary, and are unlikely to be of importance in the decision making process. However, they are of relevance in enhancing the subsequent design of the development and consideration of mitigation measures.
Not Significant/No Impact	No perceivable impacts on ecological features (habitat or species). Impacts may be beneath levels of perception, within normal bounds of variation, within the margin of forecasting error, or impacting on exceptionally poor baseline conditions.
Beneficial/Positive Impact	These effects are those, which through implementation, would be anticipated to benefit the ecology of the site. They may advance the objectives of local, national or international species or habitats.

6.1.3 Impact Characteristics

Direct and Indirect Impacts: An impact can be caused either as a direct or as an indirect consequence of a project.

Magnitude: Magnitude measures the size of an impact, which is described as high, medium, low or very low.

Extent: The area of which the impact occurs, where the receptor is a habitat, magnitude and extent may become synonymous.

Level: An impact is assessed based on whether it is of international, national, regional or local importance (Refer to Table 1). This has a direct bearing on its magnitude and significance.

Duration: The time for which the impact is expected to last prior to recovery or replacement of the resource or feature.

- Short Term: The effects would be of short duration and would not last more than 2-5 years from the commencement of development;
- Medium Term: The effects would take 5-15 years to be mitigated; and
- Long Term: The effects would be reasonably mitigated over a long period of time (15 years or more).

Reversibility: An irreversible/permanent impact is one from which recovery is not possible within a reasonable timescale, while a reversible/temporary impact is one from which spontaneous recovery is possible.

Likelihood:

- Near Certain: >95% chance of occurring as predicted;
- Probable: 50-95% chance as occurring as predicted;
- Unlikely: 5-50% chance as occurring as predicted; and

- Extremely Unlikely: <5% chance as occurring as predicted.

6.2 Site Evaluation

The Site lies within the river catchment of the River Barrow and Nore SAC. The quarrying work at the Site has the potential to affect receiving water quantity and quality due to discharge (under licence) to the receiving drainage channel which flows into the Powerstown Stream (a tributary of the River Barrow), and subsequently affect designated species present in the river and also aquatic habitats of the river. The River Barrow and Nore SAC is of 'International' ecological value according to the criteria outlined in Table 1.

6.3 Potential Impacts

The main impact under consideration in this report is that of water quality within the discharge drainage ditch (from licenced discharge point DW01) which could influence change in water quality and subsequent impacts on protected species of the Powerstown Stream and subsequently the River Barrow and Nore SAC.

Potential direct and indirect impacts of the discharge are as follows:

- Direct effect on SAC qualifying species due to water quality, resulting in changes in the vegetation community of the river;
- Direct effect on SAC designated aquatic species such as fish, from potential water quality deterioration; and
- Indirect effect on other Annexed species such as Otter. Otter prey species have specific water quality requirements and any decline in water quality in the river could potentially have significant indirect impact on their populations using the river.

Other protected species not listed for the River Barrow and Nore SAC that occur in the river catchment are considered in the Biodiversity chapter of the accompanying rEIAr.

6.4 In Combination Effects

The 'in combination effects' (cumulative impacts) are discussed in this section in order to address Article 6(3) of the Habitats Directive which states the following:

6(3). *Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon,* ***either individually or in combination with other plans or projects****, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives*.

The main pathways for the cumulative impact of water quality on ecological receptors are through; the water column, sediments and biota (through bioaccumulation / bioconcentration / biomagnification). For example, biota that bioaccumulate heavy metals from the water or sediments may be prey items for other biota. Invertebrates are prey items for fish and fish are prey items for Otter. The cumulative impacts from various projects and plans both past, present and future should be considered.

A number of plans and projects that are considered relevant to the potential cumulative impacts of water quality in the Barrow river catchment are known. However, given the absence of quantitative data on some discharges e.g. diffuse runoff, the effects cannot be fully assessed. Therefore, the past / current ecological condition of the rivers downstream of the Site and upstream of the SAC is taken as an indicator of the potential cumulative effects on the designated features of the SAC.

The closest WFD classification of surface water in the context of the Site is the River Barrow at Carlow which is classified as of '*Moderate*' quality[4]. As such, it is important to ensure that any potential impacts from the Site, will not contribute significantly to cumulative impacts to the important ecological features within the river catchment of the River Barrow and Nore SAC.

[4]http://www.wfdireland.ie/docs/1_River%20Basin%20Management%20Plans%202009%20-%202015/SERBD%20RBMP%202010/Water%20Management%20Unit%20Action%20Plans/Barrow%20Main%20WMU%20Mar%202010.pdf

6.4.1 Management Plans and Projects

The following management plans are relevant to the cumulative assessment of effects and conservation goals in the region.

- Barrow Main Water Management Unit Action Plan; and
- The status and distribution of lamprey in the River Barrow SAC. Irish Wildlife Manuals No. 21. National Parks and Wildlife Service.

The Barrow Main Water Management Unit Action Plan identifies quarries, mines, landfill and agriculture as the main threats to the Barrow catchment.

7.0 IMPACT ASSESSMENT

7.1 Predicted Impacts of Proposed Works

Impacts associated with the quarrying process have been defined and their significance assessed in relation to their implications on ecological designating features of the SAC, defined in terms of geographic extent (Table 1). The key operational and closure impacts assessed are impacts on water quality and quantity. The potential for ecological impact to receiving surface and groundwater receptors, in the absence of mitigation focuses on the following factors:

- Groundwater effects;
- Surface water effects;
- Direct effects on the River Barrow and the Powerstown Stream, due to water quality deterioration from sediment release or accidental spills – in particular, on aquatic species that are reliant on high water quality;
- Pollution spills – potential oil, fuel or other pollutant spillages may to impact aquatic animal species within receiving waters, causing mortality or other sub-lethal effects such as reduced birth rates and/or juvenile survival;
- Siltation - suspended solids have the potential to damage the gills of aquatic fauna including, salmon, lamprey and white-clawed crayfish;
- Sedimentation - deposition of silt can smother fish eggs, fry and benthic invertebrate communities (food sources for fish and crayfish);
- Interference with fish migration - anadromous species must be able to reach suitable spawning areas upstream and even a small stretch of poor water quality can block or interfere with migration;
- Other indirect impacts may occur on species that forage in the stream downstream such as Otter and Kingfisher;
- Potential Release of Hydrocarbons/Chemicals;
- Potential Release of Cement-Based Products; and
- Groundwater and Surface Water Contamination from Wastewater Disposal.

7.1.1 Groundwater

The main impacts associated with quarrying operations is the introduction of hydrocarbons to the underlying groundwater. Given the level of activity at the Site, as long as mobile plant (and any other machinery brought on Site) is properly maintained it is considered very unlikely that hydrocarbon pollution will become an issue at the Site. A number of other factors also indicate that the likelihood of negatively impacting the groundwater will be very low. These include:

- The continuation of groundwater monitoring using existing boreholes;

- The development area of the Site is not located within a Source Protection Area of a public water supply scheme;
- The level of activity at the Site is in keeping with the level of activity having previously taken place at the Site; and
- Monitoring information demonstrates that the bedrock aquifer remains fully saturated until within a short distance from the quarry (conservatively assumed in calculations at 200 m, but so far measured at less than 50 m).

The existing development may result in a small increase in the depth to the water-table over parts of the adjoining landholdings. However, this will not cause crop dehydration. The water demand of crops where the water-table is not close to the surface, is entirely met by water extracted from the soils which is supplied by rainfall.

7.1.2 Surface Water

A review of likely impacts, mitigation measures and residual effects within Chapter 6.0 demonstrates that there will be no increase in any of the quality parameters in the downstream River Barrow in congruence with the quarrying operation. Therefore, no significant surface water impacts on the Lower River Barrow and Nore SAC are anticipated as a result of the existing quarry discharges. Suspended solids are also consistently very low and therefore there is no potential for water quality impacts form this parameter. As such, it is considered highly unlikely that a residual effect would be afforded to species such as the white-clawed crayfish, lamprey, atlantic salmon and Eel.

Accidental spillage during refuelling of quarry plant with petroleum hydrocarbons is a significant pollution risk to groundwater, surface water and associated freshwater and terrestrial ecosystems. Hydrocarbon has a high toxicity to all flora and fauna, including fish, and is persistent in the environment. Chemicals such as paints and detergents also pose a threat to the aquatic environment.

Concrete and other cement-based products are highly alkaline and corrosive and can have significant negative impacts on surface water quality. They generate very fine, highly alkaline silt (pH 11.5) that can physically damage fish by burning their skin and blocking their gills. A pH range of ≥ 6 ≤ 9 is set in S.I. No. 293 of 1988 Quality of Salmonid Water Regulations, with artificial variations not in excess of ± 0.5 of a pH unit. Entry of cement based products into the Site drainage system, into surface water runoff, and hence to surface watercourses or directly into watercourses represents a risk to the aquatic environment.

An existing wastewater system is located at the quarry Site which discharges to a septic tank. Release of effluent from domestic wastewater treatment systems has the potential to impact on groundwater and surface waters if Site conditions are not suitable for an on-site disposal of treated effluent.

Characterisation of unmitigated impact on the feature

The characterisation of unmitigated impacts uses the ‘worst case’ impact magnitude scenario in all cases. Impacts would potentially be mitigated by dilution e.g. hydrocarbon spills and effects could be considered to be reversible depending on the severity of a pollution incident.

Rationale for prediction of effect

Surface water quality modelling has indicated that the baseline quality parameters will be maintained during the present operations at the quarry. There is no evidence to suggest that water quality has been adverse or non-compliant over the last two decades. As previously alluded to, the results of the qualitative modelling within Chapter 6.0 indicate that there will be no decrease in any of the quality parameters in the downstream River Barrow SAC as a result of the existing operations.

Therefore, no significant surface water impacts on the River Barrow and Nore are anticipated as a result of the quarry operation. As such, the rationale for defining the effects to aquatic species in the absence of mitigation are focussed on ‘incident events’ such as hydrocarbon or cement based pollution issues.

Effect without mitigation

The unmitigated effect to this feature would result in a **minor** short, medium and potentially long-term (operational, closure and post closure of the quarry) impact to a site of **International** sensitivity and importance.

7.2 Cumulative Impacts

As described in Chapter 6.0 (Water) of the rEIAr there is no significant impact on the water quality of the ephemeral stream (Clonmelsh Stream) or indeed the Powerstown Stream or on the groundwater at the various stages of the quarry operation, either alone or cumulatively. It is considered in the water impact assessment, that the current water treatment processes in place at Site are sufficient to treat the water discharge to surface water quality standards.

As previously stated, the closest WFD quality data is sourced from the River Barrow at Carlow which is classified as of '*Moderate*' quality. As such, it is imperative that quarrying operations at the Site do not significantly impact on the river in combination with other sources of impact. For this reason, a number of mitigation measures have been proposed aimed at reducing the potential cumulative impacts e.g. in combination with Powerstown Landfill.

7.3 Mitigation, Compensation and Enhancement Measures

The principal objectives of ecological mitigation are to take measures to minimise adverse impacts of the project upon the existing nature conservation value of the study area. The output of the assessment is to determine the significance of residual effects on the various ecological features.

Committed mitigation, compensation and enhancement measures are provided as follows:

Hydrocarbons/Chemicals

Mitigation measures that are already implemented at the existing quarry site are as follows:

- All plant and machinery will continue to be regularly serviced before being used on Site;
- Refuelling will be completed in a controlled manner using drip trays at all times;
- Only designated trained operators will be authorised to refuel mobile plant on Site; and
- An emergency spill kit with oil boom, absorbers etc. will be kept on-Site for use in the event of an accidental spill in the quarry floor.

Potential Release of Dust Suppression

Dust suppression will continue to be implemented in accordance with best practice guidance (Environmental Management in the Extractive Industry (2006), and Quarries and Ancillary Activities Guidelines for Planning Authorities (Department of Environment, Heritage and Local Government, 2004)).

Surface Water Monitoring

The following measures will be undertaken:

- As part of the compliance with the discharge licence for the quarry (DL7/233), regular water quality monitoring of the discharge point and the Powerstown and Clonmelsh Streams takes place, with results being submitted to Carlow Co. Council;
- The quarry discharge considerably dilutes the levels of nitrate in the Powerstown Stream (Chapter 6.0). This is considered to be a positive impact;
- Surface water channels constructed within the quarry to collect surface water runoff and any perched groundwater seepage. These channels are cleaned out regularly, with the fine materials used on site in remediation works;
- Measures implemented within the quarry to ensure that adequate settlement time is available to discharge water to mitigate against an excessive suspended solids load;

- All soil / overburden stockpiles to be covered (i.e. vegetated) to minimise the risk of rain / wind erosion and reduce TSS;
- Restoration with topsoil and overburden will be carried out on an *'rolling-basis'* (on-going basis) to reduce the vulnerability of the bedrock aquifer to possible contamination;
- Most mobile plant will use the existing concrete apron at the current quarry garage for refuelling. Static plant or tracked excavators will refuel over a drip tray with an absorbent mat;
- Any processing plant and/or mobile plant on the Application Site will be regularly maintained, and where plant is damaged or leaking it will be fixed or replaced immediately, as part of the ongoing operational management of the quarry to reduce the risk of leaks;
- Drainage from the smaller roofs of the proposed office, the existing workshop, and ESB sub-station will be / is channelled into the overall site drainage system for the site facilities area; and
- The water management system set out under the existing discharge licence (DL7/233) includes provision for settlement ponds and provides for a hydrocarbon interceptor.

Groundwater Monitoring

Ongoing monitoring of groundwater levels in the vicinity of the proposed development will continue on a regular basis from monitoring wells installed on the Application Site. In addition:

- The Applicant has provided an undertaking to carry out appropriate remedial measures to restore water well supplies in the event that it is demonstrated that quarry operations are having an adverse impact on private wells;
    - Data loggers (divers) will be placed in selected monitoring boreholes and private wells to monitor fluctuations in groundwater levels on an ongoing basis;
    - Data loggers will also act as an early warning system should a dramatic drawdown in groundwater levels occur;
- No excavation shall take place below +25 m OD; and
- Monthly monitoring of quarry specific groundwater monitoring boreholes and private wells within a 500 m wide radius to monitor possible drawdown and groundwater quality will occur.

Habitat Creation

Extant permissions for the Site do not contain references or commitments for habitat creation at restoration. However, the post-closure condition of the Site will include the provision of freshwater habitats, marginal aquatic plants and shallow drawdown areas. These marginal aquatic and terrestrial transitional habitats will be planted with native hedgerows to compensate for the historical losses if these features. Within the Garryhundon are of the Site the original field boundaries will be reinstated but at the levels they are now at (ca. 5m below original pre-extractive levels).

7.4 Residual Impacts

Residual ecological impacts are those that remain once the development proposals have been implemented. The main aim of ecological mitigation, compensation, and enhancement is to minimise or eliminate residual impacts. The quarrying operation at the Site is not expected to have a residual impact on the surrounding environment, specifically the River Barrow and Nore SAC.

The results of the water quality assessment demonstrate that there will be no decrease in any of the water quality parameters as a result of the quarry operation. Therefore, no surface water impacts on the River Barrow and Nore SAC are anticipated as a result of the proposed quarry discharges (Chapter 6.0 of the rEIAR). As such, it is considered that no negative change to existing WFD status will be afforded to waterbodies pertinent to this assessment.

In the absence of mitigation, compensation and enhancement detailed, **Minor** effects to a site of **International** value were realised. However, consideration of the measures outlined in Section 7.3 has resulted in residual effects being considered to be **Not Significant**. In essence this can be described as having no perceivable impacts on designating ecological features (habitat or species). Impacts may be beneath levels of perception, within normal bounds of variation, within the margin of forecasting error, or impacting on exceptionally poor baseline conditions.

7.5 Conclusions

When cumulatively considering the mitigation, compensation and enhancement measures outlined within this report it is considered that a net gain for biodiversity will be afforded over the long term (closure and post-closure). As presented in Chapter 6.0 (Water) of the rEIAr) it is predicted that surface and groundwater quality and quantity will not be adversely affected by the Site operation. Most pertinently, the implementation of the committed mitigation measures outlined herewith will ensure that no significant impacts are considered likely on ecological features present on receiving waters that extend downstream to the River Barrow and Nore SAC.

Many new species may appear during the evolution and eventual closure of the Site. As natural succession and planned restoration takes place, a variety of different habitats will occur. Where extraction has continued below the water-table, succession to wetland type habitats will occur. This will provide important habitat for a variety of species. Woodland and scrub will eventually develop providing structural ecological connectivity that extends toward the SAC site.

The Applicant will continue to carryout environmental monitoring in compliance with current Discharge and Planning conditions while meeting EPA and Department of Environment (now Department of Housing, Planning & Local Government) Guidelines.

8.0 REFERENCES

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Websites

National Biodiversity Data Centre Mapping System: http://maps.biodiversityireland.ie/#/Map

National Parks and Wildlife Service Mapviewer: http://webgis.npws.ie/npwsviewer/

Inland Fisheries Ireland Water Framework Directive Map Viewer: http://www.ifigis.ie/WFDFishMap/

EPA Envision Environmental Data Mapviewer: http://maps.epa.ie/InternetMapViewer/mapviewer.aspx

Water Framework Directive *Water Maps*:

http://watermaps.wfdireland.ie/NsShare_Web/Viewer.aspx?Site=NsShare&ReloadKey=True

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