

# Spink Quarry, Knockbaun, Abbeyleix, Co. Laois

## Spink Quarry

### Environmental Impact Assessment Report

#### Appendix 9

#### Natura Impact Statement

2021

## Natura Impact Statement

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### Appropriate Assessment

### Spink Quarry Development

Prepared by: Moore Group – Environmental Services

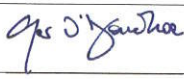
21 July 2021



On behalf of Lagan Materials Ltd

Laois County Council Planning Authority, Viewing Purposes Only

<b>Project Proponent</b>	Lagan Materials Ltd
<b>Project</b>	Spink Quarry Development
<b>Title</b>	Natura Impact Statement Appropriate Assessment of Spink Quarry Development

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## Abbreviations

AA	Appropriate Assessment
EEC	European Economic Community
EPA	Environmental Protection Agency
EU	European Union
GIS	Geographical Information System
NHA	Natural Heritage Area
NIS	Natura Impact Statement
NPWS	National Parks and Wildlife Service
OSI	Ordnance Survey Ireland
pNHA	proposed Natural Heritage Area
SAC	Special Area of Conservation
SPA	Special Protection Area
SuDS	Sustainable Drainage System

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## 1 NATURA IMPACT STATEMENT

### 1.1 INTRODUCTION

#### 1.1.1 GENERAL INTRODUCTION

This Natura Impact Statement (NIS) has been prepared by Moore Group – Environmental Services on behalf of Lagan Materials Ltd. This NIS report contains information to assist the competent authority in carrying out an Appropriate Assessment (AA) on the effects of the proposed continuation and deepening of the existing hard rock quarry at Knockbaun, Spink, Co. Laois (hereafter referred to as the Proposed Development), as well as the installation of a concrete batching plant on European sites, and to ascertain whether or not the Project would adversely affect European site integrity.

This NIS informs the Appropriate Assessment (AA) process in the determination of the significance of potential impacts on the conservation objectives of European sites. It is necessary that the proposed development has regard to Article 6 of the Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (as amended) (referred to as the Habitats Directive). This is transposed into Irish Law by Part XAB of the Planning and Development Act 2000 as amended and the European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. 477) (referred to as the Habitats Regulations). The focus of the assessment is on objectively assessing by reference to the evidence as to whether the Project will adversely affect the integrity of the European sites in light of their conservation objectives.

#### 1.1.2 LEGISLATIVE BACKGROUND: THE HABITATS AND BIRDS DIRECTIVES

The Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora) is the main legislative instrument for the protection and conservation of biodiversity in the EU. Under the Directive Member States are obliged to designate Special Areas of Conservation (SACs) which contain habitats or species considered important for protection and conservation in a European Union context.

The Birds Directive (Council Directive 79/409/EEC and Council Directive 2009/147/EC on the Conservation of Wild Birds) is concerned with the long-term protection and management of all wild bird species and their habitats in the EU. Among other things, the Directive requires that Special Protection Areas (SPAs) be established to protect migratory species and species which are rare, vulnerable, in danger of extinction, or otherwise require special attention.



Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs), designated under the Birds Directive, form a pan-European network of protected sites known as Natura 2000. The Habitats Directive sets out a unified system for the protection and management of SACs and SPAs.

Articles 6(3) and 6(4) of the Habitats Directive set out the requirement for an assessment of proposed plans and projects likely to affect Natura 2000 sites. Article 6(3) establishes the requirement to screen all plans and projects and to carry out a further assessment if required (Appropriate Assessment (AA)); Article 6(4) establishes requirements in cases of imperative reasons of overriding public interest:

*Article 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 subjected to an 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 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."*

*Article 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, Member States shall take all compensatory measures necessary to ensure that the overall coherence of the 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 a priority species the only considerations which may be raised are those relating to human health or public safety, to the beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest."*

### 1.1.3 METHODOLOGY

The Commission's methodological guidance (EC 2002) promotes a four-stage process to complete the AA and outlines the issues and tests at each stage. An important aspect of the process is that the outcome at each successive stage determines whether a further stage in the process is required.

Stages 1-2 deal with the main requirements for assessment under Article 6(3). Stage 3 may be part of Article 6(3) or may be a necessary precursor to Stage 4. Stage 4 is the main derogation step of Article 6(4).

**Stage 1 Screening:** This stage examines the likely effects of a project either alone or in combination with other projects upon a Natura 2000 site and considers whether it can be objectively concluded that there are not likely to be significant effects on a



Natura 2000 site. Mitigation measures (i.e., measures intended to avoid or reduce the harmful effects of the project on the site concerned) cannot be taken into account at this stage.

**Stage 2 Appropriate Assessment:** In this stage, there is a consideration of the impact of the project with a view to ascertain whether there will be any adverse effect on the integrity of the Natura 2000 site either alone or in combination with other projects or plans, with respect to the site's structure and function and its conservation objectives. Additionally, where there are predicted impacts, an assessment of the potential mitigation of those impacts is considered.

**Stage 3 Assessment of Alternative Solutions:** This stage examines alternative ways of implementing the project that, where possible, avoid any adverse impacts on the integrity of the Natura 2000 site.

**Stage 4 Assessment where no alternative solutions exist and where adverse impacts remain:** Where imperative reasons of overriding public interest (IROPI) exist, an assessment to consider whether compensatory measures will or will not effectively offset the damage to the sites will be necessary.

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#### 1.1.4 GUIDANCE

The NIS has been compiled in accordance with guidance contained in the following documents:

- Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities. (Department of Environment, Heritage and Local Government 2010 rev.);
- Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities. Circular NPWS 1/10 & PSSP 2/10;
- 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 Commission Environment Directorate-General 2002); hereafter referred to as the EC Article Guidance Document;
- Managing Natura 2000 Sites: The Provisions of Article 6 of the Habitats Directive 92/43/EEC (EC Environment Directorate-General 2000); hereafter referred to as MN2000;
- Managing Natura 2000 Sites: The Provisions of Article 6 of the Habitats Directive 92/43/EEC (EC 2018); and
- OPR Practice Note PN01 Appropriate Assessment Screening for Development Management (OPR 2021).

### 1.1.5 DATA SOURCES

Sources of information that were used to collect data on the Natura 2000 network of sites, and the environment within which they are located, are listed below:

- The following mapping and Geographical Information Systems (GIS) data sources, as required:
  - National Parks & Wildlife (NPWS) protected site boundary data;
  - Ordnance Survey of Ireland (OSI) mapping and aerial photography;
  - OSI/Environmental Protection Agency (EPA) rivers and streams, and catchments;
  - Open Street Maps;
  - Digital Elevation Model over Europe (EU-DEM);
  - Google Earth and Bing aerial photography 1995-2021;
- Online data available on Natura 2000 sites as held by the National Parks and Wildlife Service (NPWS) from [www.npws.ie](http://www.npws.ie) including:
  - Natura 2000 - Standard Data Form;
  - Conservation Objectives;
  - Site Synopses;
- National Biodiversity Data Centre records;
  - Online database of rare, threatened and protected species;
  - Publicly accessible biodiversity datasets.
- Status of EU Protected Habitats in Ireland. (National Parks & Wildlife Service 2019); and
- Relevant Development Plans in neighbouring areas;
  - Laois County Development Plan 2017-2023.

### 1.1.6 STATEMENT OF AUTHORITY

This report was compiled by Ger O'Donohoe (B.Sc. Applied Aquatic Sciences (GMIT 1993) & M.Sc. Environmental Sciences (TCD 1999)), who has over 25 years' experience in environmental impact assessment and has completed numerous reports for the purposes of Appropriate Assessment Screening and Natura Impact Statements.

Engineering and technical data was supplied by J Sheils Planning and Environmental Ltd. (JSPE). JSPE were commissioned on behalf of the client, Lagan Materials Ltd, to prepare the EIAR in respect of the quarry at Spink. Data on Water Quality, Hydrology and Hydrogeology included in Chapter 7 of the EIAR was provided by Dr. Pamela Bartley (Hydro-G) and Dr. Colin O'Reilly (Envirologic).

### 1.1.7 DESCRIPTION OF PROJECT

The development will consist of the continued use and operation of the existing quarry including deepening of the quarry. Extraction will be confined to the existing permitted quarry area (P.A. Ref. 10/383) comprising an extraction area of c. 14.5 ha within an overall application area of c. 19.6 ha. The development will include provision of new site infrastructure, including portacabin site office, canteen, toilets, concrete batching plant and truck washdown facility, hydrocarbon interceptors, mobile crushing and screening plant, upgrading of the water management system, provision of holding tank for wastewater, and other ancillaries. The proposed development will utilise/upgrade the existing insitu quarry infrastructure, including site access, internal roads, storeroom, wheel wash, weighbridge, aggregate storage bays, refuelling hard stand, water settlement pond system, and other ancillaries.

It is proposed that the quarry will be worked in a series of benches (typically 10 to 20 metres) down to a final depth of 200 m AOD in the western quarry area and 190 m AOD in the eastern quarry area.

A 50 m standoff from the extraction area to the R430 Regional Road will continue to be maintained. This standoff area includes the existing site access, store, wheel wash, weighbridge, refueling hard stand, final water settlement ponds, perimeter screening berms, and other ancillaries. The standoff also includes the northeastern constructed pond/wetland at the site entrance that feeds the headwaters of the Clogh stream. The rising of the Clogh River is in this zone and is thereby protected. This bank also acts to screen the development from views to the north.

There will be no changes to the method of extraction and processing as a result of this planning application. Drilling and blasting will continue to be utilised with processing of extracted rock using mobile crushing and screening plant located within the quarry void.

A wheeled loading shovel and/or backhoe excavator will be used to feed the blasted rock to the mobile crushing and screening plant that will be relocated close to the working face so as to reduce handling of materials.

The aggregates produced will then be stockpiled and subsequently loaded out by a front-end loader to road trucks for transport off-site to market and / or to the feed bins for the concrete batching plant.

It is proposed that surface/groundwater water accumulating within the processing and extraction area will be conveyed to the existing series of settlement ponds. This water will be utilised for dust suppression, if required, and/or discharged off-site to an external watercourse subject to a Discharge licence. The Water Management Plan, capacity of the settlement ponds and mechanisms of discharge are presented in the Project EIAR.

Figure 1 shows the Proposed Development location and Figure 2 shows a detailed view of the Proposed Development boundary on recent aerial photography. Figure 3 shows the layout of the Proposed Development.



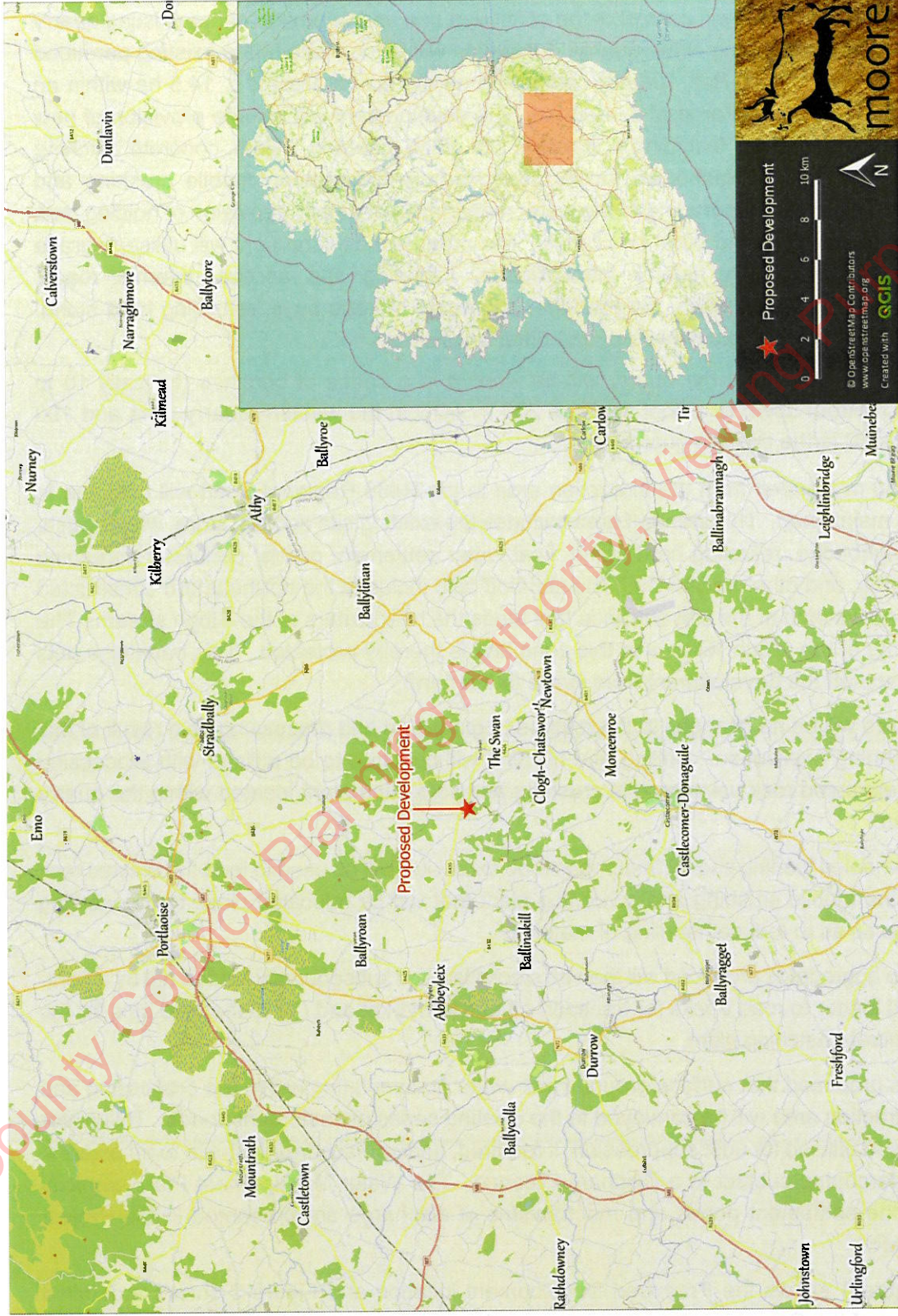


Figure 1. Showing the Project location at Spink, Co. Laois.





Figure 2. Showing the proposed development location encompassing the existing quarry on recent aerial photography.





Figure 3. Proposed layout with the boundary of the development shown in red.

## 1.2 STAGE 1 – SCREENING FOR APPROPRIATE ASSESSMENT

Screening determines whether appropriate assessment is necessary by examining:

1. Whether a plan or project can be excluded from AA requirements because it is directly connected with or necessary to the management of the site, and;
2. The potential effects of a project or plan, either alone or in combination with other projects or plans, on a Natura 2000 site in view of its conservation objectives and considering whether these effects will be significant.

If the effects are deemed to be significant, potentially significant, or uncertain, or if the screening process in certain circumstances, becomes overly complicated, then the process must proceed to Stage 2 (AA).

The Department of Housing, Planning and Local Government (previously DoEHLG)'s Guidance on Appropriate Assessment (2009) recommends an assessment of European sites within a Zone of Influence (Zoi) of 15 km. This distance is a guidance only and a zone of influence of a proposed development is the geographical area over which it could affect the receiving environment in a way that could have significant effects on the Qualifying Interests of a European site. This should be established on a case-by-case basis using the Source-Pathway-Receptor framework and not by arbitrary distances (such as 15 km).

The Zone of Influence may be determined by connectivity to the Proposed Development in terms of:

- Nature, scale, timing and duration of works and possible impacts, nature and size of excavations, storage of materials, flat/sloping sites;
- Distance and nature of pathways (dilution and dispersion; intervening 'buffer' lands, roads etc.); and
- Sensitivity and location of ecological features.

The potential for source pathway receptor connectivity is firstly identified and detailed information is then provided on sites with connectivity. European sites that are located within the potential Zone of Influence of the Proposed Development are listed in Table 1 and presented in Figures 4 and 5 below. Spatial boundary data on the Natura 2000 network was extracted from the NPWS website ([www.npws.ie](http://www.npws.ie)) on the 21 July 2021.



**Table 1 European Sites located within 15 km or the potential Zone of Influence<sup>1</sup> of the Proposed Development**

Site Code	Site name	Distance (km) <sup>2</sup>
000869	Lisbigney Bog SAC	8.80
002162	River Barrow and River Nore SAC	1.04
002256	Ballyprior Grassland SAC	10.14
004233	River Nore SPA	8.51

The nearest European sites to the Proposed Development are associated with the River Nore and includes the River Barrow and River Nore SAC (Site Code 002162) and the River Nore SPA (004233) which are located 1.04 km and 8.51 km respectively from the proposed development.

There are currently two active surface water outfalls from the site, one to the eastern catchment and one to the western catchment. These correspond with the mapped surface water divide that runs north-south through the centre of the site. This division separates the River Clogh catchment to the east and the River Owenbeg to the west. Both eventually lead to the River Nore with its associated European sites: the River Barrow and River Nore SAC (Site Code 002162) and the River Nore SPA (004233).

The Source-Pathway Connectivity model was examined in at the AA Screening Stage and there is no connectivity to any of the other European sites listed and they were screened out of the assessment at this stage.

There is no connectivity to any other European sites outside 15 km or the potential zone of influence.

A worst-case scenario may be considered whereby the proposed development would be the source of a significant detrimental change in water quality in the River Nore either alone or in combination with other projects or plans as a result of indirect pollution from contaminated discharge water (surface water and/or groundwater). The effect would have to be considered in terms of changes in water quality that would affect the species and/or habitats or food sources for which the River Nore European sites are designated.

<sup>1</sup> All European sites potentially connected irrespective of the nature or scale of the Proposed Development.

<sup>2</sup> Distances indicated are the closest geographical distance between the Proposed Development and the European site boundary, as made available by the NPWS. Connectivity along hydrological pathways may be significantly greater.

The potential for significant adverse effects on the River Barrow and River Nore SAC (Site Code 002162) and the River Nore SPA (004233) is uncertain in the absence of control of potential pollution of discharge water during operation.

The proposed development will require a Water Management Plan to avoid potential impacts on the receiving environment of the Owenbeg and Clogh Rivers and the River Nore downstream.

Thus, in line with Departmental Guidance and having regard to ECJ case law and the 'Precautionary Principle', a Stage 2 Appropriate Assessment of this Project has been prepared as follows.









Figure 5 Detail of designated conservation sites in the vicinity of the proposed development.

### 1.3 STAGE 2 – APPROPRIATE ASSESSMENT

This stage considers whether the Project, alone or in combination with other projects or plans, will have adverse effects on the integrity of a European site, and includes any mitigation measures necessary to avoid, reduce or offset negative effects. The Stage 2 Appropriate Assessment comprises a scientific examination of the plan / project and the relevant European site; to identify and characterise any possible implications for the site in view of the site's conservation objectives, structure and function; taking account of in combination effects.

#### 1.3.1 DESCRIPTION OF EUROPEAN SITES POTENTIALLY AFFECTED

Potential impacts on the following European sites have been identified:

- River Barrow and River Nore SAC (002162); and
- River Nore SPA (000261).

##### 1.3.1.1 RIVER BARROW AND RIVER NORE SAC [002162]

The NPWS provides the following Site Synopsis in relation to the River Barrow and River Nore SAC (Version date 9<sup>th</sup> February 2016, 002162\_Rev16.Docx):

This site consists of the freshwater stretches of the Barrow and Nore River catchments as far upstream as the Slieve Bloom Mountains, and it also includes the tidal elements and estuary as far downstream as Creadun Head in Waterford. The site passes through eight counties – Offaly, Kildare, Laois, Carlow, Kilkenny, Tipperary, Wexford and Waterford. Major towns along the edge of the site include Mountmellick, Portarlinton, Monasterevin, Stradbally, Athy, Carlow, Leighlinbridge, Graiguenamanagh, New Ross, Inistioge, Thomastown, Callan, Bennettsbridge, Kilkenny and Durrow. 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, Owenbeg, Munster, Arrigle and King's Rivers on the Nore.

Both rivers rise in the Old Red Sandstone of the Slieve Bloom Mountains before passing through a band of Carboniferous shales and sandstones. The Nore, for a large part of its course, traverses limestone plains and then Old Red Sandstone for a short stretch below Thomastown. Before joining the Barrow it runs over intrusive rocks poor in silica. The upper reaches of the Barrow also run through limestone. The middle reaches and many of the eastern tributaries, sourced in the Blackstairs Mountains, run through Leinster Granite. The southern end, like the Nore runs over intrusive rocks poor in silica. Waterford Harbour is a deep valley excavated by glacial floodwaters when the sea level was lower than today. The coast shelves quite rapidly along much of the shore.

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):



- Habitats:
  - [1130] Estuaries
  - [1140] Tidal Mudflats and Sandflats
  - [1170] Reefs
  - [1310] Salicornia Mud
  - [1330] Atlantic Salt Meadows
  - [1410] Mediterranean Salt Meadows
  - [3260] Floating River Vegetation
  - [4030] Dry Heath
  - [6430] Hydrophilous Tall Herb Communities
  - [7220] Petrifying Springs\*
  - [91A0] Old Oak Woodlands
  - [91E0] Alluvial Forests\*
- Species:
  - [1016] Desmoulin's Whorl Snail (*Vertigo moulinsiana*)
  - [1029] Freshwater Pearl Mussel (*Margaritifera margaritifera*)
  - [1092] White-clawed Crayfish (*Austropotamobius pallipes*)
  - [1095] Sea Lamprey (*Petromyzon marinus*)
  - [1096] Brook Lamprey (*Lampetra planeri*)
  - [1099] River Lamprey (*Lampetra fluviatilis*)
  - [1103] Twaite Shad (*Alosa fallax*)
  - [1106] Atlantic Salmon (*Salmo salar*)
  - [1355] Otter (*Lutra lutra*)
  - [1421] Killarney Fern (*Trichomanes speciosum*)
  - [1990] Nore Freshwater Pearl Mussel (*Margaritifera durrovensis*)

Good examples of alluvial forest (a priority habitat on Annex I of the E.U. Habitats Directive) are seen at Rathsnagadan, Murphy's of the River, in Abbeyleix estate and along other shorter stretches of both the tidal and freshwater elements of the site. Typical species seen include Almond Willow (*Salix triandra*), White Willow (*S. alba*), Rusty Willow (*S. cinerea* subsp. *oleifolia*), Crack Willow (*S. fragilis*) and Osier (*S. viminalis*), along with Iris (*Iris pseudacorus*), Hemlock Water-dropwort (*Oenanthe crocata*), Wild Angelica (*Angelica sylvestris*), Thin-spiked Wood-sedge (*Carex strigosa*), Pendulous Sedge (*C. pendula*), Meadowsweet (*Filipendula ulmaria*), Common Valerian (*Valeriana officinalis*) and the Red Data Book species Nettle-leaved Bellflower (*Campanula trachelium*).

A good example of petrifying springs with tufa formations occurs at Dysart Wood along the Nore. This is a rare habitat in Ireland and one listed with priority status on Annex I of the E.U. Habitats Directive. These hard water springs are characterised by lime encrustations, often

associated with small waterfalls. A rich bryophyte flora is typical of the habitat and two diagnostic species, *Palustriella commutata* and *Eucladium verticillatum*, have been recorded.

The best examples of old oak woodlands are seen in the ancient Park Hill woodland in the estate at Abbeyleix; at Kyleadohir, on the Delour, Forest Wood House, Kylecorragh and Brownstown Woods on the Nore; and at Cloghristic Wood, Drummond Wood and Borris Demesne on the Barrow, though other patches occur throughout the site. Abbeyleix Woods is a large tract of mixed deciduous woodland which is one of the only remaining true ancient woodlands in Ireland. Historical records show that Park Hill has been continuously wooded since the 16th century and has the most complete written record of any woodland in the country. It supports a variety of woodland habitats and an exceptional diversity of species including 22 native trees, 44 bryophytes and 92 lichens. It also contains eight indicator species of ancient woodlands. Park Hill is also the site of two rare plants, Nettle-leaved Bellflower and the moss *Leucodon sciuroides*. The rare Myxomycete fungus, *Licea minima* has been recorded from woodland at Abbeyleix.

Oak woodland covers parts of the valley side south of Woodstock and is well developed at Brownsford where the Nore takes several sharp bends. The steep valley side is covered by oak (*Quercus spp.*), Holly (*Ilex aquifolium*), Hazel (*Corylus avellana*) and Downy Birch (*Betula pubescens*), with some Beech (*Fagus sylvatica*) and Ash (*Fraxinus excelsior*). All the trees are regenerating through a cover of Bramble (*Rubus fruticosus* agg.), Foxglove (*Digitalis purpurea*), Great Wood-rush (*Luzula sylvatica*) and Broad Buckler-fern (*Dryopteris dilatata*).

On the steeply sloping banks of the River Nore, about 5 km west of New Ross, in Co. Kilkenny, Kylecorragh Woods form a prominent feature in the landscape. This is an excellent example of relatively undisturbed, relict oak woodland with a very good tree canopy. The wood is quite damp and there is a rich and varied ground flora. At Brownstown, a small, mature oak dominated woodland occurs on a steep slope. There is younger woodland to the north and east of it. Regeneration throughout is evident. The understorey is similar to the woods at Brownsford. The ground flora of this woodland is developed on acidic, brown earth type soil and comprises a thick carpet of Bilberry (*Vaccinium myrtillus*), Heather (*Calluna vulgaris*), Hard Fern (*Blechnum spicant*), Common Cow-wheat (*Melampyrum pratense*) and Bracken (*Pteridium aquilinum*).

Borris Demesne contains a very good example of a semi-natural broadleaved woodland in very good condition. There is quite a high degree of natural regeneration of oak and Ash through the woodland. At the northern end of the estate oak species predominate. Drummond Wood, also on the Barrow, consists of three blocks of deciduous woods situated on steep slopes above the river. The deciduous trees are mostly oak species. The woods have a well-established understorey of Holly, and the herb layer is varied, with Bramble abundant. The whitebeam *Sorbus devoniensis* has also been recorded here.

Eutrophic tall herb vegetation occurs in association with the various areas of alluvial forest and elsewhere where the floodplain of the river is intact. Characteristic species of the habitat include Meadowsweet, Purple Loosestrife (*Lythrum salicaria*), Marsh Ragwort (*Senecio aquaticus*), Ground Ivy (*Glechoma hederacea*) and Hedge Bindweed (*Calystegia sepium*). Indian Balsam (*Impatiens glandulifera*), an introduced and invasive species, is abundant in places.



Floating river vegetation is well represented in the Barrow and in the many tributaries of the site. In the Barrow the species found include water-starworts (*Callitriche* spp.), Canadian Pondweed (*Elodea canadensis*), Bulbous Rush (*Juncus bulbosus*), water-milfoils (*Myriophyllum* spp.), the pondweed *Potamogeton x nitens*, Broad-leaved Pondweed (*P. natans*), Fennel Pondweed (*P. pectinatus*), Perfoliated Pondweed (*P. perfoliatus*) and crowfoots (*Ranunculus* spp.). The water quality of the Barrow has improved since the vegetation survey was carried out (EPA 1996).

Dry heath at the site occurs in pockets along the steep valley sides of the rivers especially in the Barrow Valley and along the Barrow tributaries where they occur in the foothills of the Blackstairs Mountains. The dry heath vegetation along the slopes of the river bank consists of Bracken and Gorse (*Ulex europaeus*) with patches of acidic grassland vegetation. Additional typical species include Heath Bedstraw (*Galium saxatile*), Foxglove, Common Sorrel (*Rumex acetosa*) and Creeping Bent (*Agrostis stolonifera*). On the steep slopes above New Ross the Red Data Book species Greater Broomrape (*Orobanche rapum-genistae*) has been recorded. Where rocky outcrops are shown on the maps Bilberry and Great Wood-rush are present. At Ballyhack a small area of dry heath is interspersed with patches of lowland dry grassland. These support a number of clover species, including the legally protected Clustered Clover (*Trifolium glomeratum*) - a species known from only one other site in Ireland. This grassland community is especially well developed on the west side of the mud-capped walls by the road. On the east of the cliffs a group of rock-dwelling species occur, i.e. English Stonecrop (*Sedum anglicum*), Sheep's-bit (*Jasione montana*) and Wild Madder (*Rubia peregrina*). These rocks also support good lichen and moss assemblages with *Ramalina subfarinacea* and *Hedwigia ciliata*.

Dry heath at the site generally grades into wet woodland or wet swamp vegetation lower down the slopes on the river bank. Close to the Blackstairs Mountains, in the foothills associated with the Aughnabrisky, Aughavaud and Mountain Rivers there are small patches of wet heath dominated by Purple Moor-grass (*Molinia caerulea*) with Heather, Tormentil (*Potentilla erecta*), Carnation Sedge (*Carex panicea*) and Bell Heather (*Erica cinerea*).

Salt meadows occur at the southern section of the site in old meadows where the embankment has been breached, along the tidal stretches of in-flowing rivers below Stokestown House, in a narrow band on the channel side of Common Reed (*Phragmites australis*) beds and in narrow fragmented strips along the open shoreline. In the larger areas of salt meadow, notably at Carrickcloney, Ballinlaw Ferry and Rochestown on the west bank; Fisherstown, Alderton and Great Island to Dunbrody on the east bank, the Atlantic and Mediterranean sub types are generally intermixed. At the upper edge of the salt meadow in the narrow ecotonal areas bordering the grasslands where there is significant percolation of salt water, the legally protected species Borrer's Saltmarsh-grass (*Puccinellia fasciculata*) and Meadow Barley (*Hordeum secalinum*) are found. The very rare and also legally protected Divided Sedge (*Carex divisa*) is also found. Sea Rush (*Juncus maritimus*) is also present. Other plants recorded and associated with salt meadows include Sea Aster (*Aster tripolium*), Thrift (*Armeria maritima*), Sea Couch (*Elymus pycnanthus*), Spear-leaved Orache (*Atriplex prostrata*), Lesser Sea-spurrey (*Spergularia marina*), Sea Arrowgrass (*Triglochin maritima*) and Sea Plantain (*Plantago maritima*).

Glassworts (*Salicornia* spp.) and other annuals colonising mud and sand are found in the creeks of the saltmarshes and at the seaward edges of them. The habitat also occurs in small amounts on some stretches of the shore free of stones.

The estuary and the other E.U. Habitats Directive Annex I habitats within it form a large component of the site. Extensive areas of intertidal flats, comprised of substrates ranging from fine, silty mud to coarse sand with pebbles/stones are present. Good quality intertidal sand and mudflats have developed on a linear shelf on the western side of Waterford Harbour, extending for over 6 km from north to south between Passage East and Creadaun Head, and in places are over 1 km wide. The sediments are mostly firm sands, though grade into muddy sands towards the upper shore. They have a typical macro-invertebrate fauna, characterised by polychaetes and bivalves. Common species include *Arenicola marina*, *Nephtys hombergii*, *Scoloplos armiger*, *Lanice conchilega* and *Cerastoderma edule*. An extensive area of honeycomb worm biogenic reef occurs adjacent to Duncannon, Co. Wexford on the eastern shore of the estuary. It is formed by the polychaete worm *Sabellaria alveolata*. This intertidal *Sabellaria alveolata* reef is formed as a sheet of interlocking tubes over a considerable area of exposed bedrock. This polychaete species constructs tubes, composed of aggregated sand grains, in tightly packed masses with a distinctive honeycomb-like appearance. These can be up to 25cm proud of the substrate and form hummocks, sheets or more massive formations. A range of species are reported from these reefs including: *Enteromorpha* sp.; *Ulva* sp.; *Fucus vesiculosus*; *Fucus serratus*; *Polysiphonia* sp.; *Chondrus crispus*; *Palmaria palmate*; *Coralinus officinalis*; *Nemertea* sp.; *Actinia equine*; *Patella vulgate*; *Littorina littorea*; *Littorina obtusata* and *Mytilus edulis*.

The western shore of the harbour is generally stony and backed by low cliffs of glacial drift. At Woodstown there is a sandy beach, now much influenced by recreation pressure and erosion. Behind it a lagoonal marsh has been impounded which runs westwards from Gaultiere Lodge along the course of a slow stream. An extensive reedbed occurs here. At the edges is a tall fen dominated by sedges (*Carex* spp.), Meadowsweet, willowherbs (*Epilobium* spp.) and rushes (*Juncus* spp.). Wet woodland also occurs.

The dunes which fringe the strand at Duncannon are dominated by Marram (*Ammophila arenaria*) towards the sea. Other species present include Wild Clary/Sage (*Salvia verbenaca*), a rare Red Data Book species. The rocks around Duncannon ford have a rich flora of seaweeds typical of a moderately exposed shore and the cliffs themselves support a number of coastal species on ledges, including Thrift, Rock Samphire (*Crithmum maritimum*) and Buck's-horn Plantain (*Plantago coronopus*).

Other habitats which occur throughout the site include wet grassland, marsh, reedswamp, improved grassland, arable land, quarries, coniferous plantations, deciduous woodland, scrub and ponds.

Seventeen Red Data Book plant species have been recorded within the site, most in the recent past. These are Killarney Fern (*Trichomanes speciosum*), Divided Sedge, Clustered Clover, Basil Thyme (*Acinos arvensis*), Red Hemp-nettle (*Galeopsis angustifolia*), Borrer's Saltmarsh-grass, Meadow Barley, Opposite-leaved Pondweed (*Groenlandia densa*), Meadow Saffron/Autumn Crocus (*Colchicum autumnale*), Wild Clary/Sage, Nettle-leaved Bellflower, Saw-wort (*Serratula tinctoria*), Bird Cherry (*Prunus padus*), Blue Fleabane (*Erigeron acer*), Fly

Orchid (*Ophrys insectifera*), Ivy Broomrape (*Orobanche hederarum*) and Greater Broomrape. Of these, the first nine are protected under the Flora (Protection) Order, 2015. Divided Sedge was thought to be extinct but has been found in a few locations in the site since 1990. In addition plants which do not have a very wide distribution in the country are found in the site including Thin-spiked Wood-sedge, Field Garlic (*Allium oleraceum*) and Summer Snowflake. Six rare lichens, indicators of ancient woodland, are found including *Lobaria laetevirens* and *L. pulmonaria*. The rare moss *Leucodon sciuroides* also occurs.

The site is very important for the presence of a number of E.U. Habitats Directive Annex II animal species including Freshwater Pearl Mussel (both *Margaritifera margaritifera* and *M. m. durrovensis*), White-clawed Crayfish, Salmon, Twaite Shad, three lamprey species – Sea Lamprey, Brook Lamprey and River Lamprey, the tiny whorl snail *Vertigo moulinsiana* and Otter. This is the only site in the world for the hard water form of the Freshwater Pearl Mussel, *M. m. durrovensis*, and one of only a handful of spawning grounds in the country for Twaite Shad. The freshwater stretches of the River Nore main channel is a designated salmonid river. The Barrow/Nore is mainly a grilse fishery though spring salmon fishing is good in the vicinity of Thomastown and Inistioge on the Nore. The upper stretches of the Barrow and Nore, particularly the Owenass River, are very important for spawning.

The site supports many other important animal species. Those which are listed in the Irish Red Data Book include Daubenton's Bat, Badger, Irish Hare and Common Frog. The rare Red Data Book fish species Smelt (*Osmerus eperlanus*) occurs in estuarine stretches of the site. In addition to the Freshwater Pearl Mussel, the site also supports two other freshwater mussel species, *Anodonta anatina* and *A. cygnea*.

Three rare invertebrates have been recorded in alluvial woodland at Murphy's of the River. These are: *Neoascia obliqua* (Order Diptera: Syrphidae), *Tetanocera freyi* (Order Diptera: Sciomyzidae) and *Dictya umbrarum* (Order Diptera: Sciomyzidae). The rare invertebrate, *Mitostoma chrysomelas* (Order Arachnida), occurs in the old oak woodland at Abbeyleix and only two other sites in the country. Two flies (Order Diptera) *Chrysogaster virescens* and *Hybomitra muhlfeldi* also occur at this woodland.

The site is of ornithological importance for a number of E.U. Birds Directive Annex I species, including Greenland White-fronted Goose, Whooper Swan, Bewick's Swan, Bar-tailed Godwit, Peregrine and Kingfisher. Nationally important numbers of Golden Plover and Bar-tailed Godwit are found during the winter. Wintering flocks of migratory birds are seen in Shanahoe Marsh and the Curragh and Goul Marsh, both in Co. Laois, and also along the Barrow Estuary in Waterford Harbour. There is also an extensive autumnal roosting site in the reedbeds of the Barrow Estuary used by Swallows before they leave the country. The old oak woodland at Abbeyleix has a typical bird fauna including Jay, Long-eared Owl and Raven. The reedbed at Woodstown supports populations of typical waterbirds including Mallard, Snipe, Sedge Warbler and Water Rail.

Land use at the site consists mainly of agricultural activities – mostly intensive in nature and principally grazing and silage production. Slurry is spread over much of the area. Arable crops are also grown. The spreading of slurry and fertiliser poses a threat to the water quality of the salmonid river and to the populations of E.U. Habitats Directive Annex II animal species within the site. Many of the woodlands along the rivers belong to old estates and support many non-



native species. Little active woodland management occurs. Fishing is a main tourist attraction along stretches of the main rivers and their tributaries and there are a number of Angler Associations, some with a number of beats. Fishing stands and styles have been erected in places. Both commercial and leisure fishing takes place on the rivers. There is net fishing in the estuary and a mussel bed also. Other recreational activities such as boating, golfing and walking, particularly along the Barrow towpath, are also popular. There is a golf course on the banks of the Nore at Mount Juliet and GAA pitches on the banks at Inistioge and Thomastown. There are active and disused sand and gravel pits throughout the site. Several industrial developments, which discharge into the river, border the site. New Ross is an important shipping port. Shipping to and from Waterford and Belview ports also passes through the estuary.

The main threats to the site and current damaging activities include high inputs of nutrients into the river system from agricultural run-off and several sewage plants, over-grazing within the woodland areas, and invasion by non-native species, for example Cherry Laurel (*Prunus laurocerasus*) and Rhododendron (*Rhododendron ponticum*). The water quality of the site remains vulnerable. Good quality water is necessary to maintain the populations of the Annex II animal species listed above. Good quality is dependent on controlling fertilisation of the grasslands, particularly along the Nore. It also requires that sewage be properly treated before discharge. Drainage activities in the catchment can lead to flash floods which can damage the many Annex II species present. Capital and maintenance dredging within the lower reaches of the system pose a threat to migrating fish species such as lamprey and shad. Land reclamation also poses a threat to the salt meadows and the populations of legally protected species therein.

Overall, the site is of considerable conservation significance for the occurrence of good examples of habitats and of populations of plant and animal species that are listed on Annexes I and II of the E.U. Habitats Directive. Furthermore it is of high conservation value for the populations of bird species that use it. The occurrence of several Red Data Book plant species including three rare plants in the salt meadows and the population of the hard water form of the Freshwater Pearl Mussel, which is limited to a 10 km stretch of the Nore, add further interest to this site.

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#### 1.3.1.2 RIVER NORE SPA [004233]

The NPWS provides the following Site Synopsis in relation to the River Nore SPA (Version date 13<sup>th</sup> September 2011):

The River Nore SPA is a long, linear site that includes the following river sections: the River Nore from the bridge at Townparks, (north-west of Borris in Ossory) to Coolnamuck (approximately 3 km south of Inistioge) in Co. Kilkenny; the Delour River from its junction with the River Nore to Derrynaseera bridge (west of Castletown) in Co. Laois; the Erkina River from its junction with the River Nore at Durrow Mills to Boston Bridge in Co. Laois; a 1.5 km stretch of the River Goul upstream of its junction with the Erkina River; the Kings River from its junction with the River Nore to a bridge at Mill Island, Co. Kilkenny. The site includes the river channel and marginal vegetation.

For a large part of its course the River Nore traverses Carboniferous limestone plains; it passes over a narrow band of Old Red Sandstone rocks below Thomastown.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive of special conservation interest for the following species: Kingfisher.

A survey in 2010 recorded 22 pairs of Kingfisher (based on 16 probable and 6 possible territories) within the SPA. Other species which occur within the site include Mute Swan (35), Mallard (267), Cormorant (14), Grey Heron (45), Moorhen (14), Snipe (17) and Sand Martin (1,029) – all figures are peak counts recorded during the 2010 survey.

The River Nore SPA is of high ornithological importance as it supports a nationally important population of Kingfisher, a species that is listed on Annex I of the E.U. Birds Directive.

### 1.3.2 DESCRIPTION OF THE EXISTING ENVIRONMENT

The site was surveyed on 1 June 2021 and the quarry habitats are best described as active quarry with scrub and grassland mosaic identified as 'Rough pasture' and 'Scrubland' in Figure 3 above. The following Flora and Fauna were recorded.

#### 1.3.2.1 HABITATS & FLORA

##### Artificial Ponds (FL8)

This category refers to artificial water bodies present in the site including a number of holding ponds in the north-western corner and the south-western corner of the site. There is an overgrown pond to the east of the quarry entrance and the ponds contain floating sweet-grass, reed mace (*Typha latifolia*) and pondweed (*Potamogeton* spp.). Rushes are present around the margins. The quarry sump was full with water at the time of surveying and while it fits into this habitat category, it is devoid of flora and ephemeral in nature.

##### Dry calcareous and neutral grassland (GS1)

This category is used for unimproved or semi-improved dry grassland that may be either calcareous or neutral, but not acid. It is associated with low intensity agriculture and typically occurs on free-draining mineral soils of various depths. Calcareous grassland is restricted in its distribution and is now largely confined to the steep slopes of esker ridges and moraines in the midlands, and to other areas with shallow and rocky limestone soils.

This grassland type is found in the field outside of the application site on the western side of the site and is closely grazed. Typical grass species encountered include cock's foot (*Dactylis glomerata*), creeping bent (*Agrostis stolonifera*), perennial rye-grass (*Lolium perenne*), Yorkshire fog (*Holcus lanatus*), crested dog's tail (*Cynosurus cristatus*) and meadow grasses (*Poa* spp.). A variety of herbaceous species were recorded including include yarrow (*Achillea millefolium*), ribwort plantain (*Plantago lanceolata*), knapweed (*Centaurea nigra*), mouse-ear chickweed (*Cerastium fontanum*), self-heal (*Prunella vulgaris*), creeping buttercup (*Ranunculus repens*), red and white clover (*Trifolium pratense* and *Trifolium repens*), meadow buttercup (*Ranunculus acris*) and bird's foot trefoil (*Lotus corniculatus*). Commonly recorded weedy species include frequent ragwort (*Senecio jacobaea*), spear thistle (*Cirsium vulgare*),

broad-leaved dock (*Rumex obtusifolius*) and nettle (*Urtica dioica*). There are occasional stands of sot rush (*Juncus effusus*) in poorly drained areas.

This habitat type also occurs in drier sections of the eastern section of the site where wet flushes of wet grassland (GS4) and areas of poor fen and flush (PF2) are a feature.

#### Wet grassland (GS4)

Areas of wet grassland are found in the eastern side of the landholding and are underlain by poorly drained soils. This area is dominated by rushes (sharp-flowered rush (*Juncus acutiflorus*), compact rush (*Juncus conglomeratus*), jointed rush (*Juncus articulatus*), bulbous rush (*Juncus bulbosus*) and soft rush (*Juncus effusus*)), of which form dense stands. Purple moor-grass, tufted hair-grass, marsh thistle, devils-bit scabious, cuckooflower, Yorkshire-fog, creeping bent and lesser spearwort were all recorded. This area grades into an area of poor fen (PF2) and has scattered areas of gorse scrub (WSI) throughout.

#### Poor fen and flush (PF2)

A small area of wet grassland which is transitional to fen type vegetation is located in the south-east corner of the landholding and supports a small spring (FP2), which rises in this area. This area is species rich - a variety of rush species are present sharp-flowered rush (*Juncus acutiflorus*), compact rush (*Juncus conglomeratus*), jointed rush (*Juncus articulatus*), bulbous rush (*Juncus bulbosus*) and soft rush (*Juncus effusus*), and a rich Sphagnum moss cover occurs. A variety of sedges; carnation sedge (*Carex panicea*), glaucous sedge (*Carex flacca*), flea sedge (*Carex pulicaris*), and species such as sheep's sorrel (*Rumex acetosella*), ragged-robin (*Lychnis flos-cucuii*), tormentil, lousewort (*Pedicularis sylvatica*), tufted hair-grass (*Deschampsia cespitosa*) and occasional purple moor-grass, devils-bit scabious (*Succisa pratensis*), heath wood-rush (*Luzula multiflora*), great wood-rush (*Luzula sylvatica*) occur.

#### Hedgerows (WL1)

There are a number of remnant hedgerows within the site boundary to the east and west of the existing quarry. These hedgerows are gappy, unmanaged and are formed on an earth bank. The dominant species are hawthorn, blackthorn, ivy, bramble and gorse. More structurally intact hedgerows are found along the eastern boundary of the site and along the northern boundary of the site adjacent to the public road. These hedgerows contained a greater diversity of species and are more intact in their structure. Typical species include: eider, holly, willow, blackthorn, hawthorn, ivy and bramble with more rarely ash and spindle (*Euonymus europaeus*).

The ground flora below hedgerows was typically poor (with the exception of the hedgerow, which forms the eastern boundary of the site). Species recorded include bramble, ivy (*Hedera helix*), cleavers (*Galium aparine*), bush vetch (*Vicia sepium*), tufted vetch (*Vicia cracca*), wood sorrel (*Oxalis acetosella*), bracken (*Pteridium aquilinum*), bilberry (*Vaccinium myrtillus*), docks (*Rumex* sp.), nettle (*Urtica dioica*), male fern (*Dryopteris Nix-mas*), hares tongue fern (*Asplenium scolopendrium*) and herb Robert (*Geranium robertianum*).

### Scrub (WS1)

Patches of scrub are found interspersed with areas of wet grassland in the eastern section of the landholding. Remnants of gorse scrub also occur along the site boundary with the adjoining conifer plantation. Other species present in areas of scrub include bramble, bracken and hawthorn. An area of more dense mature scrub is found in the north eastern part of the site where blackthorn, hawthorn, ash, gorse and sally willow (*Salix cinerea*) occur. The ground flora beneath this scrub is poor and restricted to shade-tolerant species such as bracken, ivy, bramble and occasional hart's-tongue fern.

### Ornamental non-native shrub (WS3)

Linear planting of a variety of non-native species is found on the earthen berms constructed for screening purposes along the northern edge of the site, adjacent to the road. Typical species include, cypress (*Cupressus* sp.), privet (*Ligustrum* sp.), field maple (*Acer campestre*), and an ornamental variety of alder (*Alnus* sp.).

### Recolonising bare ground (ED3)

This category is used for any areas where bare or disturbed ground, derelict sites or artificial surfaces of tarmac, concrete or hard core have been invaded by herbaceous plants. Areas of earthen berms built for screening along the northern boundary of the site either side of the quarry entrance and soil rich areas adjoining the old trackway along the southern boundary of the site support a variety of plant species including; creeping bent, mouse-ear chickweed, cock's-foot, red and white clover, ribwort plantain, creeping buttercup, spear thistle, ragwort, groundsel, yarrow, knapweed, foxglove (*Digitalis purpurea*), hogweed (*Heracleum sphondylium*), docks, occasional rushes and colt's-toot. Some scattered gorse bushes also occur these areas, notably on the berm, which provides screening between the main access road to the quarry and the public road.

### Active quarries and mines (ED4)

The majority of the site is dominated by a worked quarry, where shales and sandstones are extracted, crushed and processed. The nature of this activity means a high level of disturbance, which prevents the colonisation of this area of the site by vegetation. A large area of loose stone and soil has been landscaped in the eastern section of the site and a number of tracks through the quarry allow access for machinery from this area to the upper bank along the southern boundary of the site.

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## 1.3.2.2 FAUNA

### Bats

There are no records of bats from a custom polygon encompassing the quarry site for a distance of up to 100 m from the site boundary from the National Biodiversity Database which was consulted on 20/07/2021.

The night time detector survey of the site recorded three contacts from two species of bats: Leisler's bats (*Nyctalus leisleri*) calls were heard from the forestry area to the south along with Common pipistrelle (*Pipistrellus pipistrellus*) in the general area to the west.



These species were also recorded by Brian Keely during a bat survey of the quarry site in June 2011. In general, the use of the quarry area by bats is generally low as would be expected over exposed areas of bedrock.

#### Badgers

No specific feeding signs or setts were found within the quarry site boundary and the soils present tend to be either waterlogged or very thin over the underlying rock. A survey of the upper southern boundary with the adjacent conifer plantation did not reveal any setts. A scat observed in this area was later determined to be from a wild goat observed emerging from the plantation at dusk.

#### Otters

There are no suitable habitats for otters on the proposed development site and no signs of otter were recorded within the site. Potential impacts on otters are considered under indirect impacts on water quality downstream.

#### Birds

Birds recorded during the site visit were typical of the wider countryside. The following species were recorded; blackbird (*Turdus merula*), robin (*Erithacus rubecula*), wren (*Troglodytes troglodytes*), blue tit (*Parus caeruleus*), great tit (*Parus major*), chaffinch (*Fringilla coelebs*), song thrush (*Turdus philomelos*), dunnoek (*Prunella modularis*), rook (*Corvus frugilegus*), hooded crow (*Corvus corone cornix*), starling (*Sturnus vulgaris*), magpie (*Pica pica*), jackdaw (*Corvus monedula*), wood pigeon (*Columba palumbus*), stonechat (*Saxicola rubicola*), coal tit (*Parus ater*), greenfinch (*Cardueis chloris*), bullfinch (*Pyrrhula pyrrhula*) and pied wagtail (*Motacilla alba*).

A single Peregrine Falcon (*Falco peregrinus*) was recorded nesting on the cliff face of the southwestern area of the site.

Approximately 50 Sand Martins (*Riparia riparia*) were recorded nesting in the face of a sand berm on the central northwest section of the site.

There are no suitable habitats for Kingfisher within the site boundary.

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#### 1.3.2.3 FRESHWATER ECOLOGY

The proposed development site is located in the Water Framework Directive Area 15; the River Nore Catchment. As previously mentioned, there are currently two active surface water outfalls from the site, one to the eastern catchment and one to the western catchment. These correspond with the mapped surface water divide that runs north-south through the centre of the site. This division separates the River Clogh catchment to the east and the River Owenbeg to the west. A sampling point on the Owenbeg River at the bridge west of the site indicates that this watercourse has a Q value of 4 in 2019, while a sampling point on the Clogh River, at Slatt Bridge east of the site indicates that this watercourse also has a Q value of 4, both indicating *Good* water quality status. This data is based on the information available from the EPA Maps website.

Unspecified species of lamprey have been recorded from the lower reaches of the River Dinin (to which the River Clogh discharges, c. 6 km directly southeast from the site) and there are

records of both sea lamprey (*Petromyzon marinus*) and brook lamprey (*Lampetra planeri*) from the River Nore catchment (Kurz and Costello (1999)). River lamprey (*Lampetra fluviatilis*) and brook lamprey are reported from the River Nore catchment by Kelly and King (2001), while Igoe et. Al. (2004) record all three lamprey species for the Nore. It is unknown as to whether or not lampreys occur in local watercourses in close proximity to the site, but brook lamprey is thought likely to occur. All three lamprey species that occur in Ireland are legally protected under the EU Habitats Directive where they are listed under Annex II.

The distribution of white-clawed crayfish (*Austropotamobius palipes*) from the Erkina, Gou' and Gully Rivers in the upper River Nore catchment is confirmed by Lyons & Kelly-Quinn (2003) where it has undergone recent declines that appear to coincide with a deterioration in water quality as indicated by the Q-value biotic index. The presence of the species in the River Nore catchment is also confirmed by Reynolds (1998), Demers et. al. (2005) and NPWS records. The White-clawed crayfish is legally protected under the EU Habitats Directive where it is listed under Annex II. The NPWS have records of White clayed crayfish in the River Owenbeg and River Dinin downstream.

Important populations of the freshwater pearl mussel (*Margaritifera margaritifera*) and the Nore freshwater pearl mussel (*Margaritifera margaritifera durrovensis*) occur in the River Barrow and River Nore SAC (Site Code: 002162). The River Nore is the only site in the world for the hard water form of the Pearl Mussel (*Margaritifera margaritifera durrovensis*). Both species of freshwater pearl mussel (*Margaritifera margaritifera* and *M. m. durrovensis*) are legally protected under the EU Habitats Directive where they are listed under Annex II. This long-lived species is particularly sensitive to any deterioration in water quality.

Atlantic Salmon (*Salmo salar*) and Trout (*Salmo trutta*) are present in the River Nore and Atlantic Salmon are a Qualifying interest of the River Barrow and River Nore SAC along with Twite Shad (*Alosa falax*). The freshwater stretches of the River Nore main channel is a designated salmonid river.

Freshwater Pearl Mussels (FWPM) and their associated links with Salmonids as life cycle hosts, may be affected by pollution events such as elevated suspended solids and/or chemical pollution.

There are no rare or protected habitats recorded in the study area inside the site boundary. The site may be considered of Low to Moderate Ecological Value at a Local level.

### 1.3.3 CONSERVATION OBJECTIVES OF EUROPEAN SITES

#### 1.3.3.1 RIVER BARROW AND RIVER NORE SAC [002162]

Specific Conservation Objectives and Target Notes are set by the NPWS (Version 1. 19<sup>th</sup> July 2011) for the River Barrow and River Nore SAC (002162) as follows.

#### 1016 Desmoulin's whorl snail *Vertigo moulinsiana*

To maintain the favourable conservation condition of Desmoulin's whorl snail in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: occupied sites	Number	No decline. Two known sites: Borris Bridge, Co. Carlow S711503; Boston Bridge, Kinaseer S338774, Co. Laois. See map 7	Data from NPWS rare and threatened species database
Population size: adults	Number per positive sample	At least 5 adults snails in at least 50% of samples	Attribute and target from Moorkens and Killeen (2011)
Population density	Percentage positive samples	Adult snails present in at least 60% of samples per site	Attribute and target from Moorkens and Killeen (2011)
Area of occupancy	Hectares	Minimum of 1ha of suitable habitat per site	Attribute and target from Moorkens and Killeen (2011)
Habitat quality: vegetation	Percentage of samples with suitable vegetation	90% of samples in habitat classes I and II as defined in Moorkens & Killeen (2011)	Attribute and target from Moorkens and Killeen (2011)
Habitat quality: soil moisture levels	Percentage of samples with appropriate soil moisture levels	90% of samples in moisture class 3-4 as defined in Moorkens & Killeen (2011)	Attribute and target from Moorkens and Killeen (2011)

#### 1029 Freshwater pearl mussel *Margaritifera margaritifera*

The status of the freshwater pearl mussel (*Margaritifera margaritifera*) as a qualifying Annex II species for the River Barrow and River Nore SAC is currently under review. The outcome of this review will determine whether a site-specific conservation objective is set for this species. Please note that the Nore freshwater pearl mussel (*Margaritifera durrovensis*) remains a qualifying species for this SAC. This document contains a conservation objective for the latter species.

**1092 White-clawed crayfish *Austropotamobius pallipes***

To maintain the favourable conservation condition of White-clawed crayfish in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Occurrence	No reduction from baseline. See map 7	The crayfish is present almost throughout this SAC. The records extend as far downstream as Thomastown on the Nore and Graiguenamanagh on the Barrow
Population structure: recruitment	Percentage occurrence of juveniles and females with eggs	Juveniles and/or females with eggs in at least 50% of positive samples	See Reynolds et al. (2010) for further details
Negative indicator species	Occurrence	No alien crayfish species	Alien crayfish species are identified as major direct threat to this species and as disease vector. See Reynolds (1998) for further details
Disease	Occurrence	No instances of disease	Disease is identified as major threat and has occurred in Ireland even in the absence of alien vectors. See Reynolds (1998) for further details
Water quality	EPA Q value	At least Q3-4 at all sites sampled by EPA	Target taken from Demers and Reynolds (2002). Q values based on triennial water quality surveys carried out by the Environmental Protection Agency (EPA)
Habitat quality: heterogeneity	Occurrence of positive habitat features	No decline in heterogeneity or habitat quality	Crayfish need high habitat heterogeneity. Larger crayfish must have stones to hide under, or an earthen bank in which to burrow. Hatchlings shelter in vegetation, gravel and among fine tree-roots. Smaller crayfish are typically found among weed and debris in shallow water. Larger juveniles in particular may also be found among cobbles and detritus such as leaf litter. These conditions must be available on the whole length of occupied habitat

**1095 Sea lamprey *Petromyzon marinus***

To restore the favourable conservation condition of Sea lamprey in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	% of river accessible	Greater than 75% of main stem length of rivers accessible from estuary	Artificial barriers can block or cause difficulties to lampreys' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas. See King (2006), Sullivan (2007) and CFB and Compass Informatics (2008) for further information on artificial barriers
Population structure of juveniles	Number of age/size groups	At least three age/size groups present	Attribute and target based on data from Harvey and Cowx (2003) and O'Connor, (2007). King (2007) provides survey information for the Barrow
Juvenile density in fine sediment	Juveniles/m <sup>2</sup>	Juvenile density at least 1/m <sup>2</sup>	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003)
Extent and distribution of spawning habitat	m <sup>2</sup> and occurrence	No decline in extent and distribution of spawning beds	Attribute and target based on spawning bed mapping by Inland Fisheries Ireland (IFI). Lampreys spawn in clean gravels. Artificial barriers are currently preventing lamprey from accessing suitable spawning habitat. See King (2006), Sullivan (2007) and CFB and Compass Informatics (2008) for further information
Availability of juvenile habitat	Number of positive sites in 3rd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Artificial barriers are currently preventing juvenile lampreys from accessing the full extent of suitable habitat. See King (2006), Sullivan (2007) and CFB and Compass Informatics (2008) for further information



**1096 Brook lamprey *Lampetra planeri***

To restore the favourable conservation condition of Brook lamprey in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	% of river accessible	Access to all watercourses down to first order streams	Artificial barriers can block lampreys' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas. See King (2006), Sullivan (2007) and CFB and Compass Informatics (2008) for further information on artificial barriers
Population structure of juveniles	Number of age/size groups	At least three age/size groups of brook/river lamprey present	Attribute and target based on data from Harvey and Cowx (2003). King (2007) provides survey information for the Barrow. It is impossible to distinguish between brook and river lamprey juveniles in the field, hence they are considered together in this target
Juvenile density in fine sediment	Juveniles/m <sup>2</sup>	Mean catchment juvenile density of brook/river lamprey at least 2/m <sup>2</sup>	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003) who state 10/m <sup>2</sup> in optimal conditions and more than 2/m <sup>2</sup> on a catchment basis
Extent and distribution of spawning habitat	m <sup>2</sup> and occurrence	No decline in extent and distribution of spawning beds	Attribute and target based on spawning bed mapping by Inland Fisheries Ireland (IFI). Lampreys spawn in clean gravels. Artificial barriers are currently preventing lamprey from accessing suitable spawning habitat. See King (2006), Sullivan (2007) and CFB and Compass Informatics (2008) for further information
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Artificial barriers are currently preventing juvenile lampreys from accessing the full extent of suitable habitat. See King (2006), Sullivan (2007) and CFB and Compass Informatics (2008) for further information

**1099 River lamprey *Lampetra fluviatilis***

To restore the favourable conservation condition of River lamprey in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	% of river accessible	Greater than 75% of main stem and major tributaries down to second order accessible from estuary	Artificial barriers can block lampreys' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas. See King (2006), Sullivan (2007) and CFB and Compass Informatics (2008) for further information on artificial barriers
Population structure of juveniles	Number of age/size groups	At least three age/size groups of river/brook lamprey present	Attribute and target based on data from Harvey and Cowx (2003). King (2007) provides survey information for the Barrow. It is impossible to distinguish between brook and river lamprey juveniles in the field, hence they are considered together in this target
Juvenile density in fine sediment	Juveniles/m <sup>2</sup>	Mean catchment juvenile density of brook/river lamprey at least 2/m <sup>2</sup>	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003) who state 10/m <sup>2</sup> in optimal conditions and more than 2/m <sup>2</sup> on a catchment basis
Extent and distribution of spawning habitat	m <sup>2</sup> and occurrence	No decline in extent and distribution of spawning beds	Attribute and target based on spawning bed mapping by Inland Fisheries Ireland (IFI). Lampreys spawn in clean gravels. Artificial barriers are currently preventing lamprey from accessing suitable spawning habitat. See King (2006), Sullivan (2007) and CFB and Compass Informatics (2008) for further information
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Artificial barriers are currently preventing juvenile lampreys from accessing the full extent of suitable habitat. See King (2006), Sullivan (2007) and CFB and Compass Informatics (2008) for further information



**1103 Twaité shad *Alosa fallax***

To restore the favourable conservation condition of Twaité shad in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	% of river accessible	Greater than 75% of main stem length of rivers accessible from estuary	In some catchments, artificial barriers block twaité shads' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas
Population structure: age classes	Number of age classes	More than one age class present	Regular breeding has been confirmed in the River Barrow in recent years, but not in the Nore
Extent and distribution of spawning habitat	m <sup>2</sup> and occurrence	No decline in extent and distribution of spawning habitats	
Water quality: oxygen levels	Milligrammes per litre	No lower than 5mg/l	Attribute and target based on Maas, Stevens and Briene (2008)
Spawning habitat quality: Filamentous algae; macrophytes; sediment	Occurrence	Maintain stable gravel substrate with very little fine material, free of filamentous algal (macroalgae) growth and macrophyte (rooted higher plants) growth	See Maitland and Hatton-Ellis (2003) for further information

**1106 Atlantic salmon (*Salmo salar*) (only in fresh water)**

To restore the favourable conservation condition of Salmon in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	% of river accessible	100% of river channels down to second order accessible from estuary	Artificial barriers block salmon's upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas. See Sullivan (2007) and CFB and Compass Informatics (2008) for further information on artificial barriers
Adult spawning fish	Number	Conservation Limit (CL) for each system consistently exceeded	A conservation limit is defined by the North Atlantic Salmon Conservation Organisation (NASCO) as "the spawning stock level that produces long-term average maximum sustainable yield as derived from the adult to adult stock and recruitment relationship". The target is based on the Standing Scientific Committee of the National Salmon Commission's annual model output of CL attainment levels. See SSC (2010). Stock estimates are either derived from direct counts of adults (rod catch, fish counter) or indirectly by fry abundance counts. The Nore is currently exceeding its CL, while the Barrow is below its CL
Salmon fry abundance	Number of fry/5 minutes electrofishing	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 min sampling	Target is threshold value for rivers currently exceeding their conservation limit (CL)
Out-migrating smolt abundance	Number	No significant decline	Smolt abundance can be negatively affected by a number of impacts such as estuarine pollution, predation and sea lice ( <i>Lepeophtheirus salmonis</i> )
Number and distribution of redds	Number and occurrence	No decline in number and distribution of spawning redds due to anthropogenic causes	Salmon spawn in clean gravels. Artificial barriers are currently preventing salmon from accessing suitable spawning habitat
Water quality	EPA Q value	At least Q4 at all sites sampled by EPA	Q values based on triennial water quality surveys carried out by the Environmental Protection Agency (EPA)

**1130 Estuaries**

To maintain the favourable conservation condition of Estuaries in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 2	Habitat area was estimated using OSI data and the defined Transitional Water Body area under the Water Framework Directive as 3856ha. See marine supporting document for further details
Community distribution	Hectares	The following sediment communities should be maintained in a natural condition: Muddy estuarine community complex; Sand to muddy fine sand community complex; Fine sand with <i>Fabulina fabula</i> community. See map 4	The likely area of sediment communities was derived from a combination of intertidal and subtidal surveys undertaken in 2008 (ARMS, 2008; ASU, 2008). See marine supporting document for further details
Community extent	Hectares	Maintain the natural extent of the <i>Sabellaria alveolata</i> reef, subject to natural process. See map 4	The likely area of this community is derived from a survey undertaken in 2010 (NPWS, 2010). See marine supporting document for further details

**1140 Mudflats and sandflats not covered by seawater at low tide**

To maintain the favourable conservation condition of the Mudflats and sandflats not covered by seawater at low tide in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 3	Habitat area was estimated using OSI data as 926ha. See marine supporting document for further details
Community distribution	Hectares	The following sediment communities should be maintained in a natural condition: Muddy estuarine community complex; Sand to muddy fine sand community complex. See map 4	The likely area of sediment communities was derived from a combination of intertidal and subtidal surveys undertaken in 2008 (ARMS, 2008; ASU, 2008). See marine supporting document for further details



**1310 *Salicornia* and other annuals colonizing mud and sand**

To maintain the favourable conservation condition of *Salicornia* and other annuals colonizing mud and sand in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For the one sub-site mapped: Ringville - 0.03ha. See map 5	Based on data from the Saltmarsh Monitoring Project (McCorry and Ryle, 2009). The Ringville sub-site was mapped and no additional areas of potential <i>Salicornia</i> mudflat were identified from an examination of aerial photographs, giving a total estimated area of 0.03ha. NB further unsurveyed areas maybe present within the site. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 5	See coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain or where necessary restore natural circulation of sediments and organic matter, without any physical obstructions	See coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	See coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain range of saltmarsh habitat zonations including transitional zones, subject to natural processes including erosion and succession. See map 5	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of area outside creeks vegetated.	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (McCorry & Ryle, 2009).	See coastal habitats supporting document for further details
Vegetation structure: negative indicator species: <i>Spartina anglica</i>	Hectares	No significant expansion of <i>Spartina</i> . No new sites for this species and an annual spread of less than 1% where it is already known to occur	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details

**1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)**

To restore the favourable conservation condition of Atlantic salt meadows in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Dunbrody Abbey - 1.25ha, Killowen - 2.59ha, Rochestown - 17.50ha, Ringville - 6.70ha. See map 5	Based on data from the Saltmarsh Monitoring Project (McCorry and Ryle, 2009). Four sub-sites were mapped and additional areas of potential saltmarsh were identified from an examination of aerial photographs, giving a total estimated area of Atlantic salt meadow of 35.07ha. NB further unsurveyed areas maybe present within the site. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 5	See coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions	See coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	See coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain range of saltmarsh habitat zonations including transitional zones, subject to natural processes including erosion and succession. See map 5	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of area outside creeks vegetated	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (McCorry & Ryle, 2009)	See coastal habitats supporting document for further details
Vegetation structure: negative indicator species: <i>Spartina anglica</i>	Hectares	No significant expansion of <i>Spartina</i> . No new sites for this species and an annual spread of less than 1% where it is already known to occur	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details

**1355 Otter *Lutra lutra***

To restore the favourable conservation condition of Otter in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Percentage positive survey sites	No significant decline	Measure based on standard otter survey technique. FCS target, based on 1980/81 survey findings, is 88% in SACs. Current range in south-east estimated at 73% (Bailey and Rochford, 2006)
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 122.8ha above high water mark (HWM); 1136.0ha along river banks / around ponds	No field survey. Areas mapped to include 10m terrestrial buffer along shoreline (above HWM and along river banks) identified as critical for otters (NPWS, 2007)
Extent of marine habitat	Hectares	No significant decline. Area mapped and calculated as 857.7ha	No field survey. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (HWM) (NPWS, 2007; Kruuk, 2006)
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 616.6km	No field survey. River length calculated on the basis that otters will utilise freshwater habitats from estuary to headwaters (Chapman and Chapman, 1982)
Extent of freshwater (lake) habitat	Hectares	No significant decline. Area mapped and calculated as 2.6ha	No field survey. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (NPWS, 2007)
Couching sites and holts	Number	No significant decline	Otters need lying up areas throughout their territory where they are secure from disturbance (Kruuk, 2006; Kruuk and Moorhouse, 1991)
Fish biomass available	Kilograms	No significant decline	Broad diet that varies locally and seasonally, but dominated by fish, in particular salmonids, eels and sticklebacks in freshwater (Bailey and Rochford, 2006) and wrasse and rockling in coastal waters (Kingston et al., 1999)



**1410 Mediterranean salt meadows (*Juncetalia maritimi*)**

To restore the favourable conservation condition of Mediterranean salt meadows in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Dunbrody Abbey - 0.08ha, Rochestown - 0.04ha, Ringville - 6.70ha. See map 5	Based on data from the Saltmarsh Monitoring Project (McCorry and Ryle, 2009). Three sub-sites were mapped and no additional areas of potential saltmarsh were identified from an examination of aerial photographs, giving a total estimated area of Mediterranean salt meadow of 6.82ha. NB further unsurveyed areas maybe present within the site. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 5	See coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain or where necessary restore natural circulation of sediments and organic matter, without any physical obstructions	See coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	See coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain range of saltmarsh habitat zonations including transitional zones, subject to natural processes including erosion and succession. See map 5	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of area outside creeks vegetated.	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (McCorry & Ryle, 2009)	See coastal habitats supporting document for further details
Vegetation structure: negative indicator species: <i>Spartina anglica</i>	Hectares	No significant expansion of <i>Spartina</i> . No new sites for this species and an annual spread of less than 1% where it is already known to occur	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details

**1421 Killarney fern *Trichomanes speciosum***

To maintain the favourable conservation condition of Killarney Fern in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Location	No decline. Three locations known, with three colonies of gametophyte and one sporophyte colony. See map 7	Data from NPWS rare and threatened species database
Population size	Number	Maintain at least three colonies of gametophyte, and at least one sporophyte colony of over 35 fronds	Data from NPWS rare and threatened species database
Population structure: juvenile fronds	Occurrence	At least one of the locations to have a population structure comprising sporophyte, unfurling fronds, 'juvenile' sporophyte and gametophyte generations	'Juvenile' sporophytes, which appear as small entire fronds, are known from this site. However, it is unknown whether they are due to apogamous growth or sexual reproduction. Based on Kingston and Hayes (2005) and Ni Dhuill (pers. Comm.)
Habitat extent	m <sup>2</sup>	No loss of suitable habitat, such as shaded rock crevices, caves or gullies in or near to, known colonies. No loss of woodland canopy at or near to known locations	Based on Kingston and Hayes (2005) and Ni Dhuill (pers. Comm.)
Hydrological conditions: visible water	Occurrence	Maintain hydrological conditions at the locations so that all colonies are in dripping or damp seeping habitats, and water is visible at all locations	Based on Kingston and Hayes (2005) and Ni Dhuill (pers. Comm.)
Hydrological conditions: humidity	Number of dessicated fronds	No increase. Presence of dessicated sporophyte fronds or gametophyte mats indicates conditions are unsuitable	Based on Kingston and Hayes (2005) and Ni Dhuill (pers. Comm.)
Light levels: shading	Percentage	No changes due to anthropogenic impacts	Based on Kingston and Hayes (2005) and Ni Dhuill (pers. Comm.)
Invasive species	Occurrence	Absent or under control	NPWS and EHS-NI (2008) provides further details

**1990 Nore freshwater pearl mussel *Margaritifera durrovensis***

To restore the favourable conservation condition of the Nore freshwater pearl mussel in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Kilometres	Maintain at 15.5km. See map 7	The population stretches from Poorman's Bridge (S407859) to Lismaine Bridge (S442660), with most of the population found between Poorman's Bridge and the Avonmore Creamery above Ballyragget (S 440 722) (Moorkens, 1996)
Population size: adult mussels	Number	Restore to 5,000 adult mussels	The extant wild population of Nore freshwater pearl mussel is estimated as 300 adult individuals (Moorkens, 2009)
Population structure: recruitment	Percentage per size class	Restore to at least 20% of population no more than 65mm in length; and at least 5% of population no more than 30mm in length	Mussels of no more than 65mm are considered 'young mussels' and may be found buried in the substratum and/or beneath adult mussels. Mussels of no more than 30mm are 'juvenile mussels' and are always buried in the substratum. This species is known not to have reproduced successfully in the River Nore since 1970 (Moorkens and Costello, 1994; Moorkens, 2004; Government of Ireland, 2009 [S.I. 272 of 2009])
Population structure: adult mortality	Percentage	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution	5% is considered the cut-off between the combined errors associated with natural fluctuations and sampling methods and evidence of true population decline. 1% of dead shells is considered to be indicative of natural losses
Habitat extent	Kilometres	Restore suitable habitat in length of river corresponding to distribution target (15.5km; see map 7) and any additional stretches necessary for salmonid spawning	The species habitat is a stretch of large lowland river and is a combination of 1) the area of habitat adult and juvenile mussels can occupy and 2) the area of spawning and nursery habitats the host fish can occupy. Fish nursery habitat typically overlaps with mussel habitat. Fish spawning habitat is generally adjacent mussel habitat, but may lie upstream of the generalised mussel distribution. Only those salmonid spawning areas that could regularly contribute juvenile fish to the areas occupied by adult mussels should be considered. The availability of mussel habitat and fish spawning and nursery habitats are determined by flow and substratum conditions. The habitat for the species is currently unsuitable for the survival of adult mussels or the recruitment of juveniles



**1990 Nore freshwater pearl mussel *Margaritifera durrovensis***

To restore the favourable conservation condition of the Nore freshwater pearl mussel in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Water quality: Macroinvertebrates and phytobenthos (diatoms)	Ecological quality ratio (EQR)	Restore water quality-macroinvertebrates: EQR greater than 0.90; phytobenthos: EQR greater than 0.93	These EQRs correspond to high ecological status for these two Water Framework Directive biological quality elements. They represent high water quality with very low nutrient concentrations (oligotrophic conditions). The habitat of the Nore pearl mussel failed both standards during 2009 sampling for the Sub-basin Management Plan (DEHLG, 2010). See also The European Communities Environmental Objectives (Surface Water Objectives) Regulations 2009
Substratum quality: Filamentous algae (macroalgae), macrophytes (rooted higher plants)	Percentage	Restore substratum quality-filamentous algae: absent or trace (<5%); macrophytes: absent or trace (<5%)	High abundance of macroalgae was recorded during 2009 sampling for the Sub-basin Management Plan (DEHLG, 2010). Recruitment of juvenile mussels is being prevented by the poor quality of the river substrate
Substratum quality: sediment	Occurrence	Restore substratum quality-stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment	The habitat for the species is currently unsuitable for the survival of adult mussels or the recruitment of juveniles owing to sedimentation of the substratum. Significant sedimentation has been recorded during all recent mussel monitoring surveys. Recruitment of juvenile mussels is being prevented by the poor quality of the river substrate
Substratum quality: oxygen availability	Redox potential	Restore to no more than 20% decline from water column to 5cm depth in substrate	Differences in redox potential between the water column and the substrate correlate with differences in oxygen levels. Juvenile mussels require full oxygenation while buried in gravel. In suitable habitat, there should be very little loss of redox potential between the water column and underlying gravels. The redox potential loss in 2009 was 58-64% at 5cm depth (DEHLG, 2010)
Hydrological regime: flow variability	Metres per second	Restore appropriate hydrological regimes	The availability of suitable Nore freshwater pearl mussel habitat is largely determined by flow (catchment geology being the other important factor). In order to restore the habitat for the species, flow variability over the annual cycle must be such that: 1) high flows can wash fine sediments from the substratum, 2) low flows do not exacerbate the deposition of fines and 3) low flows do not cause stress to mussels in terms of exposure, water temperatures, food availability or aspects of the reproductive cycle

**1990 Nore freshwater pearl mussel *Margaritifera durrovensis***

To restore the favourable conservation condition of the Nore freshwater pearl mussel in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Host fish	Number	Maintain sufficient juvenile salmonids to host glochidial larvae	Salmonid fish are host to the larval form of freshwater pearl mussels and thus, they are essential to the completion of the life cycle. 0+ and 1+ fish are typically used, both because of the habitat overlaps and the development of immunity with age in the fish. Fish presence is considered sufficient, as higher densities and biomass of fish is indicative of enriched conditions in mussel rivers. Geist et al. (2006) found that higher densities of host fish coincided with eutrophication, poor substrate quality for pearl mussels and a lack of pearl mussel recruitment, while significantly lower densities and biomass of host fish were associated with high numbers of juvenile mussels. Fish movement patterns must be such that 0+ fish in the vicinity of the mussel habitat remain in the mussel habitat until their 1+ summer. As native brown trout appear to be favoured by the Nore freshwater pearl mussel, it is particularly important that these are not out-competed by stocked fish

**3260 Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation**

To maintain the favourable conservation condition of Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat distribution	Occurrence	No decline, subject to natural processes	The full distribution of this habitat and its sub-types in this site is currently unknown. The basis of the selection of the SAC for the habitat is the presence of an excellent example of the vegetation community (nutrient-rich type) associated with extensive tufa deposits on the river bed in the Kings tributary of the Nore (Heuff, 1987). Other examples of this or other sub-types may be present within the SAC
Habitat area	Kilometres	Area stable or increasing, subject to natural processes	The full extent of this habitat in this site is currently unknown. See above
Hydrological regime: river flow	Metres per second	Maintain appropriate hydrological regimes	Due to regular disturbance (through variations in flow), river macrophytes rarely reach a climax condition but frequently occur as transient communities. A natural (relatively unmodified) flow regime is required for both plant communities and channel geomorphology to be in favourable condition, exhibiting typical dynamics for the river type (Hatton-Ellis and Grieve, 2003). For most of the sub-types of this habitat, high flows are required to maintain the substratum (see below) necessary for the characteristic species. Flow variation is particularly important, with high and flood flows being critical to the hydromorphology
Hydrological regime: groundwater discharge	Metres per second	The groundwater flow to the habitat should be permanent and sufficient to maintain tufa formation	This attribute refers to sub-types with tufa formations. Groundwater discharges to this habitat throughout the year
Substratum composition: particle size range	Millimetres	The substratum should be dominated by large particles and free from fine sediments	The tufaceous sub-types develop on relatively stable substrata such as bedrock, boulders and cobbles, where tufa can deposit and accumulate. Tufa deposition is believed to be biologically mediated, by algae and bryophytes. The substratum must remain free of fine sediments such as clay, silt and fine sand, which would adversely affect the growth of algae and mosses



**3260 Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation**

To maintain the favourable conservation condition of Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Water chemistry: minerals	Milligrammes per litre	The groundwater and surface water should have sufficient concentrations of minerals to allow deposition and persistence of tufa deposits	The tufaceous sub-types require mineral- (typically calcium-) rich groundwaters to allow deposition of tufa. Surface water must also be sufficiently base-rich to prevent chemical erosion. Alkalinity and/or total hardness data may also be relevant
Water quality: suspended sediment	Milligrammes per litre	The concentration of suspended solids in the water column should be sufficiently low to prevent excessive deposition of fine sediments	See substratum composition above. Turbidity data may also be relevant
Water quality: nutrients	Milligrammes per litre	The concentration of nutrients in the water column should be sufficiently low to prevent changes in species composition or habitat condition	Phosphorus (MRP) is typically the limiting nutrient, however increased nitrogen (NO <sub>3</sub> <sup>-</sup> ) negatively impacts upon the N-fixing blue-green algal communities that frequently contribute to tufa deposition. Nutrient enrichment of the habitat typically leads to increased filamentous-green-algal biomass, and consequent changes in other algae, bryophyte and macrophyte species composition and abundance. Water quality should reach a minimum of Water Framework Directive good status, in terms of nutrient standards, and macroinvertebrate and phytobenthos quality elements
Vegetation composition: typical species	Occurrence	Typical species of the relevant habitat sub-type should be present and in good condition	The sub-types of this habitat are poorly understood and their typical species have not yet been defined. Typical species and appropriate targets may emerge to be site-specific. The typical species of the tufaceous sub-type in the Kings tributary of the Nore are identified in Heuff (1987). The typical species may include higher plants, bryophytes, macroalgae and microalgae
Floodplain connectivity	Area	The area of active floodplain at and upstream of the habitat should be maintained	River connectivity with the floodplain is essential for the functioning of this habitat. The site of the tufaceous sub-type in the King's River is within an area of floodplain, with further large floodplains upstream. Floodplains regulate fine sediment deposition within the channel. See substratum composition above

**4030 European dry heaths**

To maintain the favourable conservation condition of European dry heaths in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat distribution	Occurrence	No decline from current habitat distribution, subject to natural processes	Spatial extent currently unmapped but indicated as occurring on the steep, free-draining, river valley sides especially the Barrow and tributaries in the foothills of the Blackstairs Mountains (based on NPWS NHA Survey - 1997/98 Site Notes; Natura 2000 Form Explanatory Notes - May 2006; The above NHA survey was prior to the extensions to the SAC that included river habitat and estuary at Ballyhack which may have incorporated additional dry heath habitat)
Habitat area	Hectares	Area stable or increasing, subject to natural processes. Habitat area is not known but estimated as less than 400ha of the area of the SAC, occurring in dispersed locations	Based on NPWS NHA Survey Site Notes (1997/98); Natura 2000 Form Explanatory Notes - May 2006
Physical structure: free-draining, acid, low nutrient soil; rock outcrops	Occurrence	No significant change in soil nutrient status, subject to natural processes. No increase or decrease in area of natural rock outcrop	Based on NPWS NHA Survey Site Notes - 1997/98; Natura 2000 Form Explanatory Notes - May 2006
Vegetation structure: sub-shrub indicator species	Percentage cover	Cover of characteristic sub-shrub indicator species at least 25%: gorse ( <i>Ulex europaeus</i> ) and where rocky outcrops occur bilberry ( <i>Vaccinium myrtillus</i> ) and woodrush ( <i>Luzula sylvatica</i> ). Some rock outcrops support English stonecrop ( <i>Sedum anglicum</i> ), sheep's bit ( <i>Jasione montana</i> ) and wild madder ( <i>Rubia peregrina</i> ) as well as important moss and lichen assemblages	Dry heath in this SAC occurs on free-draining nutrient poor soils and is often characterised by gorse and open acid grassland areas. A characteristic coastal dry heath of the southeast also occurs. Several rare plants occur including two species listed in the Red Data Book (Curtis and McGough, 1988). The species occurring on the site are listed in NPWS NHA Survey Site Notes - 1997/98. A brief overview of the principal characteristics of the dry heath habitat of this SAC is given in the Natura 2000 Explanatory Notes - May 2006
Vegetation structure: senescent gorse	Percentage cover	Cover of senescent gorse less than 50%	Based on NPWS NHA Survey Site Notes and Natura 2000 Form Explanatory Notes - May 2006 and on a modified version of the dry heath condition assessment methodology of Perrin et al. (2010)
Vegetation structure: browsing	Percentage cover	Long shoots of bilberry with signs of browsing collectively less than 33%	Based on NPWS NHA Survey Site Notes and Natura 2000 Form Explanatory Notes - May 2006 and on a modified version of the dry heath condition assessment methodology of Perrin et al. (2010)

**4030 European dry heaths**

To maintain the favourable conservation condition of European dry heaths in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Vegetation structure: native trees and shrubs	Percentage cover	Cover of scattered native trees and shrub less than 20%	Based on NPWS NHA Survey Site Notes - 1997/98; Natura 2000 Form Explanatory Notes - May 2006 and on a modified version of the dry heath habitat condition assessment methodology of Perrin et al. (2010). From the NHA survey notes the main threats appear to be reclamation or invasion by scrub woodland
Vegetation composition: positive indicator species	Number	Number of positive indicator species at least 2 e.g. gorse and associated dry heath/ acid grassland flora	Dry heath in this SAC occurs on free-draining nutrient poor soils and is characterised by gorse and acid grassland areas. It corresponds to Annex I sub-type "heaths rich in gorse ( <i>Ulex</i> ) of the Atlantic margins" (European Commission, 2007). Based on NPWS NHA Survey Site Notes -1997/98; Natura 2000 Form Explanatory Notes - May 2006 and a modified version of the dry heath habitat condition assessment methodology of Perrin et al. (2010)
Vegetation structure: positive indicator species	Percentage cover	Cover of positive indicator species at least 60%. This should include plant species characteristic of dry heath in this SAC including gorse, bilberry and associated acid grassland flora	Dry heath in this SAC is characterised by gorse and acid grassland areas and locally bilberry and woodrush. Based on NPWS NHA Survey Site Notes and Natura 2000 Form Explanatory Notes - May 2006 and a modified version of the dry heath habitat condition assessment methodology of Perrin et al. (2010)
Vegetation composition: bryophyte and non-crustose lichen species	Number	Number of bryophyte or non-crustose lichen species present at least 2	Based on NPWS NHA Survey Site Notes and Natura 2000 Form Explanatory Notes - May 2006 and on a modified version of the dry heath habitat condition assessment methodology of Perrin et al. 2010
Vegetation composition: bracken ( <i>Pteridium aquilinum</i> )	Percentage cover	Cover of bracken less than 10% - however see 'Notes'	Based on NPWS NHA Survey Site Notes and Natura 2000 Form Explanatory Notes - May 2006 and on a modified version of the dry heath habitat condition assessment methodology of Perrin et al. (2010). Bracken appears to be quite dense in places and before any management action is considered its rate of spread needs to be established as well as its threat, if any, to other dry heath species and its potential value to important fauna (e.g. Twite)

**4030 European dry heaths**

**To maintain the favourable conservation condition of European dry heaths in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Vegetation structure: weedy negative indicator species	Percentage cover	Cover of agricultural weed species (negative indicator species) less than 1%	Based on NPWS NHA Survey Site Notes and Natura 2000 Form Explanatory Notes - May 2006 and on a modified version of the dry heath habitat condition assessment methodology of Perrin et al. (2010)
Vegetation composition: non-native species	Percentage cover	Cover of non-native species less than 1%.	Based on NPWS NHA Survey Site Notes and Natura 2000 Form Explanatory Notes - May 2006 and on a modified version of the dry heath habitat condition assessment methodology of Perrin et al. (2010)
Vegetation composition: rare/scarce heath species	Location, area and number	No decline in distribution or population sizes of rare, threatened or scarce species, including Greater Broomrape ( <i>Orobanche rapum-genistae</i> ) and the legally protected clustered clover ( <i>Trifolium glomeratum</i> )	Broomrape is dependent on gorse at this site as it is parasitic on gorse roots. It is recorded as occurring on steep slopes above New Ross. A small area of excellent dry coastal heath at Ballyhack is interspersed with patches rock and of dry lowland grassland and has a high species diversity. Notably there is an excellent range of Clover ( <i>Trifolium</i> ) species including the legally protected clustered clover, a species known only from one other site in Ireland. Also <i>T. ornithopodioides</i> , <i>T. striatum</i> and <i>Torilus nodosa</i> . Based on Natura 2000 Form Explanatory Notes May 2006, Irish Red Data Book (Curtis and Mc Gough, 1988) and on the NPWS database of rare and threatened vascular plants. Other areas of coastal heath may also occur
Vegetation structure: disturbed bare ground	Percentage cover	Cover of disturbed bare ground less than 10% (but if peat soil less than 5%)	Based on NPWS NHA Survey Site Notes and Natura 2000 Form Explanatory Notes - May 2006 and on a modified version of the dry heath habitat condition assessment methodology of Perrin et al. (2010)
Vegetation structure: burning	Occurrence	No signs of burning within sensitive areas	Perrin et al. (2010) defines sensitive areas



**6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels**

To maintain the favourable conservation condition of Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat distribution	Occurrence	No decline, subject to natural processes	Distribution of this habitat in this site is currently unknown. Considered to occur in association with some riverside woodlands, unmanaged river islands and in narrow bands along the floodplain of slow-flowing stretches of river (Natura 2000 Form Explanatory Notes)
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Extent of this habitat in this site is currently unknown. See above
Hydrological regime: Flooding depth/height of water table	Metres	Maintain appropriate hydrological regimes	This habitat requires winter inundation, which results in deposition of naturally nutrient-rich sediment
Vegetation structure: sward height	Centimetres	30-70% of sward is between 40 and 150cm in height	Bare ground, due to natural inundation processes, may often be present. Attribute and target based on the Irish Semi-natural Grassland Survey (O'Neill et al., 2010)
Vegetation composition: broadleaf herb: grass ratio	Percentage	Broadleaf herb component of vegetation between 40 and 90%	Attribute and target based on O'Neill et al. (2010)
Vegetation composition: typical species	Number	At least 5 positive indicator species present	List of positive indicator species identified by O'Neill et al. (2010)
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control- NB Indian balsam ( <i>Impatiens glandulifera</i> ), monkeyflower ( <i>Mimulus guttatus</i> ), Japanese knotweed ( <i>Fallopia japonica</i> ) and giant hogweed ( <i>Heracleum mantegazzianum</i> )	Species listed as being present in the site (Natura 2000 Form Explanatory Notes)

**7220 \* Petrifying springs with tufa formation (*Cratoneurion*)**

To maintain the favourable conservation condition of Petrifying springs with tufa formation (*Cratoneurion*) in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Square metres	Area stable or increasing, subject to natural processes	Extent of this habitat in this site is currently unknown. An area ("Tens of square metres") has been described at one location (Natura 2000 Form Explanatory Notes; internal NPWS files), see below
Habitat distribution	Occurrence	No decline. See map 6 for recorded location	Full distribution of this habitat in this site is currently unknown. It has been described in woodlands at Dysart, between Thomastown and Inistioge (Natura 2000 Form Explanatory Notes; internal NPWS files). NB further areas are likely to occur within the site
Hydrological regime: height of water table; water flow	Metres; metres per second	Maintain appropriate hydrological regimes	Current hydrological regimes are unknown. Petrifying springs rely on permanent irrigation, usually from upwelling groundwater sources or seepage sources
Water quality	Water chemistry measures	Maintain oligotrophic and calcareous conditions	Water chemistry is currently unknown. Water supply to petrifying springs is characteristically oligotrophic and calcareous
Vegetation composition: typical species	Occurrence	Maintain typical species	The bryophytes <i>Cratoneurion commutatum</i> and <i>Eucladium verticillatum</i> are diagnostic of this habitat. Both are found at the location described above. Natura 2000 Form Explanatory Notes and internal NPWS files also list other typical species

**91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles**

To restore the favourable conservation condition of Old oak woodland with *Ilex* and *Blechnum* in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, at least 85.08ha for sub-sites surveyed: see map 6	Minimum area, based on 13 sites surveyed by Perrin et al. (2008) - site codes 14, 20, 49, 73, 125, 508, 509, 510, 514, 515, 518, 519, 521, and other sources. NB further unsurveyed areas maybe present within the site
Habitat distribution	Occurrence	No decline. Surveyed locations shown on map 6	Distribution based on Perrin et al. (2008). NB further unsurveyed areas maybe present within the site
Woodland size	Hectares	Area stable of increasing. Where topographically possible, "large" woods at least 25ha in size and "small" woods at least 3ha in size	The sizes of at least some of the existing woodlands need to be increased in order to reduce habitat fragmentation and benefit those species requiring 'deep' woodland conditions (Peterken, 2002). Topographical and land ownership constraints may restrict expansion
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and well-developed herb layer	Described in Perrin et al. (2008); Browne et al. (2000). See woodland habitats supporting document for further details
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Described in Perrin et al. (2008); Browne et al. (2000). See woodland habitats supporting document for further details
Woodland structure: natural regeneration	Seedling:sapling:pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Oak regenerates poorly. In suitable sites ash can regenerate in large numbers although few seedlings reach pole size
Woodland structure: dead wood	m <sup>3</sup> per hectare; number per hectare	At least 30m <sup>3</sup> /ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem.
Woodland structure: veteran trees	Number per hectare	No decline	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources

**91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles**

To restore the favourable conservation condition of Old oak woodland with *Ilex* and *Blechnum* in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Woodland structure: indicators of local distinctiveness	Occurrence	No decline	Includes ancient or long-established woodlands, archaeological and geological features as well as red-listed and other rare or localised species. Perrin and Daly (2010) list sites 14, 20, 73, 125, 508, 509, 510, 514, 515, 518, 521 as potential ancient/long established woodlands
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Species reported in Perrin et al. (2008); Browne et al. (2000)
Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including oak ( <i>Quercus petraea</i> ) and birch ( <i>Betula pubescens</i> )	Species reported in Perrin et al. (2008); Browne et al. (2000)
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	The following are the most common invasive species in this woodland type: beech ( <i>Fagus sylvatica</i> ), rhododendron ( <i>Rhododendron ponticum</i> ), cherry laurel ( <i>Prunus laurocerasus</i> )



**91E0 \* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)**

To restore the favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, at least 181.54ha for sites surveyed: see map 6	Minimum area, based on 16 sites surveyed by Perrin et al. (2008) - site codes 10, 15, 17, 126, 127, 262, 282, 287, 511, 516, 517, 518, 520, 608, 1021; Coillte LIFE project and other sources. NB further unsurveyed areas maybe present within the SAC
Habitat distribution	Occurrence	No decline. Surveyed locations shown on map 6	Distribution based on Perrin et al. (2008). NB further unsurveyed areas maybe present within the site
Woodland size	Hectares	Area stable of increasing. Where topographically possible, "large" woods at least 25ha in size and "small" woods at least 3ha in size	The sizes of at least some of the existing woodlands need to be increased in order to reduce habitat fragmentation and benefit those species requiring 'deep' woodland conditions (Peterken, 2002). Topographical and land ownership constraints may restrict expansion
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and well-developed herb layer	Described in Perrin et al. (2008); Browne et al. (2000). See woodland habitats supporting document for further details
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Described in Perrin et al. (2008); Browne et al. (2000). See woodland habitats supporting document for further details
Woodland structure: natural regeneration	Seedling:sapling:pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Alder and oak regenerate poorly. Ash often regenerates in large numbers although few seedlings reach pole size
Hydrological regime: Flooding depth/height of water table	Metres	Appropriate hydrological regime necessary for maintenance of alluvial vegetation	Periodic flooding is essential to maintain alluvial woodlands along river flood plains but not for woodland around springs/seepage areas
Woodland structure: dead wood	m <sup>3</sup> per hectare; number per hectare	At least 30m <sup>3</sup> /ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter (greater than 20cm diameter in the case of alder)	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem

**91E0 \* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)**

To restore the favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Woodland structure: veteran trees	Number per hectare	No decline	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources
Woodland structure: indicators of local distinctiveness	Occurrence	No decline	Includes ancient or long-established woodlands, archaeological and geological features as well as red-listed and other rare or localised species. Perrin and Daly (2010) list sites 10, 15, 17, 127, 282, 516, 517, 518, 608 as potential ancient/long established woodlands
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Species reported in Perrin et al. (2008); Browne et al. (2000)
Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including ash ( <i>Fraxinus excelsior</i> ) alder ( <i>Alnus glutinosa</i> ), willows ( <i>Salix</i> spp) and locally, oak ( <i>Quercus robur</i> )	Species reported in Perrin et al. (2008); Browne et al. (2000)
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	The following are the most common invasive species in this woodland type: sycamore ( <i>Acer pseudoplatanus</i> ), beech ( <i>Fagus sylvatica</i> ), rhododendron ( <i>Rhododendron ponticum</i> ), cherry laurel ( <i>Prunus laurocerasus</i> ), dogwood ( <i>Cornus sericea</i> ), Himalayan honeysuckle ( <i>Leycesteria formosa</i> ) and Himalayan balsam ( <i>Impatiens grandiflora</i> )

### 1.3.3.2 RIVER NORE SPA [004233]

Generic Conservation Objectives are set by the NPWS (Generic Version 6. 21<sup>st</sup> February 2018) for the River Nore SPA (004233) as follows.

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- 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.

Favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is 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.

Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

Bird Code	Common Name	Scientific Name
A229	Kingfisher	<i>Alcedo atthis</i>

### 1.3.4 CONSIDERATION OF IMPACTS ON EUROPEAN SITES

#### 1.3.4.1 ANNEX I HABITATS DIRECTIVE HABITATS

There are no Annex I habitats located under the footprint or in the vicinity of the downstream Special Area of Conservation. There will be no direct impacts on River Barrow and River Nore SAC and there will be no habitat loss or fragmentation as a result of the proposed development. Having considered direct impacts and ruling them out, indirect impacts are then considered in terms of source pathway vectors.

Potential impacts on the River Barrow and River Nore SAC are considered in terms of hydrological connectivity between the proposed Project and the River Owenbeg and River Clogh.

A worst-case scenario may arise were the project to result in a significant detrimental change in water quality in the River Owenbeg and River Clogh and downstream River Nore either alone or in combination with other projects or plans as a result of indirect pollution, the effect would have to be considered in terms of changes in water quality which would significantly affect the habitats or food sources for which River Barrow and River Nore SAC species is designated.

#### 1.3.4.2 ANNEX I BIRDS DIRECTIVE BIRDS

##### ***Kingfisher***

The proposed Project site is located over 8 km from the section of the River Nore which is designated as part of the River Nore SPA (Site Code 004233). The site does not have potential for nesting habitat for Kingfisher. There are no predicted impacts on commuting Kingfisher.

There will be no direct impacts on Kingfisher and so the main concern is with regard to water quality and indirect impacts on water quality and prey species.

#### 1.3.4.3 HABITATS DIRECTIVE ANNEX II SPECIES

##### ***Nore freshwater pearl mussel***

Records for Nore freshwater pearl mussels occur upstream on the River Nore and are linked hydrologically through the passage of salmonids in the River Nore and as such only indirect impacts are considered in terms of Atlantic salmon and the requirement for good water quality status in the River Nore downstream.

##### ***Atlantic Salmon***

The River Barrow and River Nore SAC is designated for Atlantic Salmon. 100% of river channels down to second order should be accessible from the estuary. A conservation limit is defined by the North Atlantic Salmon Conservation Organisation (NASCO) as "the spawning stock level that produces long term average maximum sustainable yield as derived from the adult to adult stock and recruitment relationship". The target is based on the Standing Scientific Committee of the National Salmon Commission's annual model output of CL



attainment levels. Stock estimates are either derived from direct counts of adults (rod catch, fish counter) or indirectly by fry abundance counts. The Nore is currently exceeding its CL, while the Barrow is below its CL. Smolt abundance can be negatively affected by a number of impacts such as estuarine pollution, predation and Sea lice (*Lepeophtheirus salmonis*). The conservation Limit (CL) for each system in regard to spawning fish should be consistently exceeded. The mean catchment-wide abundance threshold value should maintain or exceed 0+ fry (currently set at 17 salmon fry /5 min sampling). There should be no significant decline in out-migrating smolt. There should be no decline in number and distribution of spawning redds due to anthropogenic causes and a value of at least Q4 at all sites sampled by EPA should persist.

While direct impacts may be ruled out, impacts on water quality and indirect impacts on salmonids and salmonid habitats are a consideration in terms of supporting FWPM.

#### **Twaite Shad**

Greater than 75% of the main stem length of rivers should be accessible from the estuary. In some catchments, artificial barriers block twaite shads' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas. More than one age class should be present and there should be no decline in extent and distribution of spawning beds. Regular breeding has been recorded in the River Barrow in recent years, but not in the River Nore. Oxygen levels in water should be no lower than 5 mg/l. In terms of habitat quality, stable gravels with very little fine material, free of filamentous algal (macroalgae) growth and macrophyte (rooted higher plants) growth should be maintained.

There will be no direct impacts on Twaite Shad and so the main concern is with regard to water quality and indirect impacts on water quality and prey species.

#### **Lamprey Species**

All three species of Lamprey Sea Lamprey (*Petromyzon marinus*), River Lamprey (*Lampetra fluviatilis*) and Brook Lamprey (*Lampetra planeri*) have potential to occur in the River Nore downstream of the proposed Project site. There will be no direct impacts on Lamprey species and so the main concern is with regard to water quality and indirect impacts on water quality and prey species.

#### **White-clawed crayfish**

White-clawed crayfish have been recorded from the River Nore at Thomastown. There will be no direct impact in crayfish and so the main concern is with regard to water quality and indirect impacts on water quality.

#### **Otter**

The otter (*Lutra lutra*) is listed under Annex II of the EU Habitats Directive and under Annex II of the Berne Convention; it is also a legally protected species under the Wildlife Act, 1976 (and Wildlife (Amendment) Act, 2000). Otters are found throughout Ireland and tend to occupy linear territories along watercourses and are rarely found far away from water. There are records from the NBDC for otters from the vicinity of Garrintaggart Bridge on the River

Owenbeg to the west of Spink in 2005 and there is an historic record from Swan Bridge on the River Clogh.

There will be no direct impacts on Otters and so the main concern is with regard to water quality and indirect impacts on water quality and prey species.

Each of these species is listed as one of the qualifying interests of the River Barrow and River Nore SAC designation. However, there will be no direct impacts on these Annex II species as a result of the proposed project.

A worst-case scenario may be considered whereby the Project may result in a significant detrimental change in water quality in the River Nore either alone or in combination with other projects or plans as a result of indirect pollution. The effect would have to be considered in terms of changes in water quality which would affect the habitats or food sources for which the River Barrow and River Nore SAC species are designated.

It is unlikely that there would be a pollution event from fuel or chemical spillage. There will be no storage of fuel on site. Servicing of vehicles will take place off site. However, a continuous discharge of elevated suspended solids could significantly affect the sensitive aquatic species such as freshwater pearl mussels or salmon or the trophic status of the River Nore, which would be contrary to the conservation objectives of the River Barrow and River Nore SAC. However, best practice construction management measures to avoid potential impacts on the water quality of the River Nore will be put in place and will be employed for the operation of the quarry.

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#### 1.3.4.4 ECOLOGICAL NETWORK SUPPORTING NATURA 2000 SITES

An analysis of the proposed Natural Heritage Areas and designated Natural Heritage Areas in terms of their role in supporting the species using Natura 2000 sites was undertaken. These supporting roles mainly relate to mobile fauna such as mammals and birds which may use pNHAs and NHAs as “stepping stones” between Natura 2000 sites.

Article 10 of the Habitats Directive and the Habitats Regulations 2011 place a high degree of importance on such non-Natura 2000 areas as features that connect the Natura 2000 network. Features such as ponds, woodlands and important hedgerows were taken into account during the AA process.

There are no Natural Heritage Areas or proposed Natural Heritage Areas that will be affected by the proposed Project.

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### 1.3.5 IMPACTS ON THE QUALIFYING INTERESTS OF EUROPEAN SITES

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#### 1.3.5.1 DIRECT IMPACTS

There will be no direct impacts on the River Barrow and River Nore SAC or on the River Nore SPA as a result of the implementation of the proposed Project. Direct impact refers to physical impacts defined in the Departmental Guidance as ‘Loss of habitat area’ and/or ‘Habitat Fragmentation’. There are no direct impacts identified which may affect the Annexed habitats

or species of the SAC or SPA. The proposed development will have **no impacts** upon the integrity or the site structure of the River Barrow and River Nore SAC or the River Nore SPA.

Having established this, the assessment emphasis is placed on potential indirect and cumulative impacts.

The primary consideration in terms of source-vector-pathways for indirect impacts relates to surface water and potential indirect impacts on hydrologically linked habitats and aquatic species.

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#### 1.3.5.2 INDIRECT IMPACTS

The potential for impact is considered whereby the Project would result in a significant detrimental change in water quality either alone or in combination with other projects or plans as a result of indirect pollution of surface water. The effect would have to be considered in terms of changes in water quality which would affect the habitats or species for which the River Barrow and River Nore SAC or River Nore SPA are designated.

##### Consideration of impacts on Surface Water

The likelihood of impacts on hydrologically connected environmental sites is low and will be avoided by best practice management.

It is proposed that surface/groundwater water accumulating within the processing and extraction area will be conveyed to the existing series of settlement ponds. This water will be utilised for dust suppression, if required, and/or discharged off-site to an external watercourse subject to a Discharge licence.

A Water Management Plan is included in the operational phase of the proposed development, which will avoid potential adverse effects on downstream habitats and species.

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#### 1.3.6 MITIGATION MEASURES

There are currently two active surface water outfalls from the site, one to the eastern catchment and one to the western catchment. These correspond with the mapped surface water divide that runs north-south through the centre of the site. This division separates the River Clogh catchment to the east and the River Owenbeg to the west (Figure 5), with both rivers contributing to the River Nore later downstream. This natural catchment division will inform the evaluation of the surface water management plan for the site.

Historic planning reports, prior to the applicant's acquisition of the site, outlined how surface water from the entire site drained into the settlement pond system by a series of channels and drains. The design of the settlement ponds was such that overall pond capacity was sufficient to prevent overflowing of the Discharge Pond, even in the case of return period design floods, and this prevented flow of surface water from the site entrance onto the R430 (Byrne 2010a). All clarified water was reportedly discharged to ground in the Discharge Pond near the site entrance, and was restricted to a suspended solids level of < 25 mg/l. The Licence to Discharge Trade Effluent (ENV2, WP27) to ground appears to relate specifically to PA. Ref. 09/384.

Under PA. Ref. 10/383, planning condition 8 (Water Quality Protection) and 12 (Groundwater, Surface water and Water Table) relate to water management, while Condition No. 11 (Environmental Management & Monitoring) in part relates to monitoring of surface and groundwater. Laois County Council also sought clarity on collection of surface water, operation of settlement ponds, and prevention of overfilling of the Discharge Pond. All waters were pumped from the settlement ponds, via the silt and oil interceptors, to the Discharge Pond.

The following measures are included in the Water Management Plan:

- Lagan's SOPs have been designed to ensure responsible activity on their sites;
- All plant and machinery will be refuelled using refuelling tanker contractors that will attend at site as required. As such, no bulk fuels will be stored onsite;
- General waste will be stored in designated areas that are isolated from surface water drains or open waters (e.g., excavations). Hazardous wastes, such as waste oil, chemicals and preservatives, will be stored in sealed containers. Refuelling, lubrication and storage areas and site offices will not be located within 30 m of drainage ditches or settlement sumps;
- Drip trays used for drum storage must be capable of holding at least 25 % of the drum capacity. Where more than one drum is stored the drip tray must be capable of holding 25 % of the aggregate capacity of the drums stored. All oil drums will be stored within secure containers;
- A wheel wash facility exists near the site offices and the roads will have sprinkler systems;
- Regular monitoring and maintenance of silt traps will be undertaken in accordance with the manufacturer's specifications;
- Oil that accumulates within hydrocarbon interceptors shall be regularly removed by an appropriately licensed contractor. In addition, the hydrocarbon interceptor shall be appropriately maintained in accordance with the manufacturer's specifications; and
- An oil interceptor shall be fitted with sufficient capacity for the treatment of 1,500 m<sup>3</sup>/d of discharge water.

### 1.3.7 ASSESSMENT OF IN-COMBINATION EFFECTS

The Commission services' interpretation document 'Managing Natura 2000 sites', makes clear that the phrase 'in combination with other plans or projects' in Article 3(3) refers to cumulative effects caused by the projects or plans that are currently under consideration together with the effects of any existing or proposed projects or plans. When impacts are assessed in combination in this way, it can be established whether or not there may be, overall, an impact which may have significant effects on a Natura 2000 site or which may adversely affect the integrity of a site.

As part of the Appropriate Assessment, in addition to the proposed works, other relevant projects and plans in the region must also be considered at this stage. This step aims to identify at this early stage any possible significant in-combination or cumulative effects /



impacts of the proposed development with other such plans and projects on the Natura 2000 site.

A review of the National Planning Application Database was undertaken. The first stage of this review confirmed that there were no data outages in the area where the proposed Project is located. The database was then queried for developments granted planning permission within 500 m of the proposed Project within the last three years, these are presented in Table 2.

**Table 2 Planning Application granted permission in the vicinity of the proposed Project**

Planning Ref.	Description of development	Comments
16260 PL 11.248518	<p>construct 11 no. wind turbines, each with a maximum height of up to 136.5 metres, and all associated site development and ancillary works, including a 110kV electricity substation, switchroom and equipment compound; two single circuit strain towers with a maximum height of up to 26.5 metres; turbine foundations; crane hardstandings; 5.4 kilometres of site access tracks; underground electricity and communications cabling; site drainage works; 7 no. site entrances; a permanent meteorological mast with a maximum height of up to 85 metres; and temporary upgrade to the R430/L7800 road junction. The proposed development is part of a larger development which also extends onto lands in the townland of Crutt, Co. Kilkenny within the adjoining planning authority administrative jurisdiction of Kilkenny County Council. The proposed development as a whole will comprise 11 no. wind turbines, each with a maximum height of up to 136.5 metres, and all associated site development and ancillary works, including a 110kV electricity substation, switchroom and equipment compound; two single circuit strain towers with a maximum height of up to 26.5 metres; turbine foundations; crane hardstandings; 7.4 kilometres of site access tracks, underground electricity and communications cabling; site drainage works; 7 no. site entrances; a permanent meteorological mast with a maximum height of up to 85 metres; and temporary upgrade to the R430/L7800 road junction. This planning application is accompanied by an Environmental Impact Statement which includes an assessment of the likely impacts of the proposed development as a whole and in combination with the relevant off-site or secondary developments which will occur as a direct result of the proposed development, including connection to the national electricity grid. A Natura Impact Statement will also be submitted to the planning authority with the planning application.</p>	<p>Granted on appeal by An Bord Pleanala (ABP) on 03/09/19. The Board was satisfied that the proposed development would not adversely affect the integrity of the River Barrow and River Nore Special Area of Conservation (Site Code: 002162) in view of the site's conservation objective.</p>

Planning Ref.	Description of development	Comments
17380	construct a part single storey/part two storey dwelling. A septic tank and percolation area, a site entrance and avenue and associated site works	The report concludes that the proposed development, by itself or in combination with other developments in the vicinity, would not have a likely a significant effect on European sites, their qualifying interests or conservation objectives, directly, indirectly or in combination with other plans and projects in the vicinity of the site.
17683	retain partially constructed dwelling house granted permission under original plg. file 07/1988 and amended plg file 09/9 and PERMISSION to complete same, new septic tank treatment system and all associated site works	No potential of significant effects on any Natura 2000 site.
1877	The development will consist of the construction of a new dwelling house and garage, new treatment system and percolation area, new well, new site entrance and all associated site works	The closest European site is the River Barrow and River Nore SAC Site code: 002162, located approximately 500m southwest of the subject site. It is not considered that the proposed development is likely to have any negative impact on the conservation objectives of any European site.
19126	construct a slatted cubicle house extension and all associated site works	Having regard to the proximity of the nearest SAC/SPA and given the nature and extent of the proposed development, with no direct connections to the hydrology of the SAC/SPA, it is not considered there would be potential for significant effects on the Natura 2000 network.
19678	construct new storage shed and all associated site works	Having regard to the proximity of the nearest SAC/SPA and given the nature and extent of the proposed development, with no direct connections to the hydrology of the SAC/SPA, it is not considered there would be potential for significant effects on the Natura 2000 network.
20267	demolish existing dwelling house and permission to build a four bed dwelling house with a 2 bed granny flat attachment, new site entrance, new septic tank treatment system and all associated site works	Having regard to the proximity of the nearest SAC/SPA and given the nature and extent of the proposed development, with no direct connections to the hydrology of the SAC/SPA, it is not considered there would be potential for significant effects on the Natura 2000 network.
20386	for construction of a two storey dwelling house, detached garage, entrance, foul effluent treatment system and percolation area, bored well and all associated site works	Having regard to the proximity of the nearest SAC/SPA and given the nature and extent of the proposed development, with no direct connections to the hydrology of the SAC/SPA, it is not considered there would be potential for significant effects on the Natura 2000 network.
20510	for development. The development will consist of renovation, alterations and rear extension to existing dwelling house, demolition of existing shed, new treatment system with percolation area and all associated site works	Having regard to the proximity of the nearest SAC/SPA and given the nature and extent of the proposed development, with no direct connections to the hydrology of the SAC/SPA, it is not considered there would be potential for significant effects on the Natura 2000 network.

There are no predicted in-combination effects with the other development listed in Table 2, given that they have been screened for potential significant effects on European sites and/or granted permission.

#### 1.3.7.1 CONCLUSION OF IN-COMBINATION EFFECTS

Given the inclusion of strict Best Practice Measures to be included and enforced through a Water Management Plan, the proposed development will have no predicted impacts on local ecology and biodiversity or on hydrologically linked European sites, therefore in-combination impacts can be ruled out.

The Laois County Development Plan in complying with the requirements of the Habitats Directive requires that all Projects and Plans that could affect the Natura 2000 sites in the same zone of impact of the Project site would be initially screened for Appropriate Assessment and if requiring Stage 2 AA, that appropriate employable mitigation measures would be put in place to avoid, reduce or ameliorate negative impacts. In this way any, in-combination impacts with Plans or Projects for the development area and surrounding townlands in which the development site is located, would be avoided.

Any new applications for the Project area will be initially assessed on a case by case basis initially by Laois County Council, which will determine the requirement for AA Screening as per the requirements of Article 6(3) of the Habitats Directive.

### 1.4 NATURA IMPACT STATEMENT & CONCLUSIONS

The main risk associated with the proposed development, is the initially perceived potential adverse impact it could have on receiving surface and groundwaters. However, dewatering volumes will be relatively low, envisaged to range from 256 to 1,453 m<sup>3</sup>/d, approximately, in the course of development. Furthermore, the competent solid nature of the rock and the GSI's classification on groundwater recharge suggest that the site's potential interference in the wider groundwater catchment's water balance is insignificant. Groundwater enters the quarry primarily through accumulations at the base of the sandstones. There might be some small transition zone ingresses at times of heavy rainfall, but primarily, actual groundwater enters through the base of the sandstones. This groundwater will settle in the sump at the lowest level of the quarry and will be pumped to the water management ponds from which it will discharge to surface waters. Monitoring results suggest no potential to negatively affect groundwater or surface water quality.

The quarry floor will be lowered as part of the proposed development of the quarry. This could result in an increase in the volume of water in the quarry, but the same volume of rainfall-runoff will fall on a similar area—it will just be ground at a lower elevation.

Assimilation capacity simulations have been completed for a potential maximum envisaged discharge volume of 1,453 m<sup>3</sup>/d. However, that volume will not be encountered all at once. The planned extraction rate and lifetime of the quarry suggests that a maximum of 1,453 m<sup>3</sup>/d will be encountered in the future close to end of life of the site. The ELVs proposed for the discharge will meet the requirements of all local water receptors for the maximum discharge volume. The ELVs proposed are justifiable in the context that they are calculated to result in concentrations that comply with the Surface Water Regulation's EQS concentrations, and this ensures maintaining favourable habitat in local surface water receptors of groundwater. This is because the discharge quality will be good.

Excellent pond and settlement systems exist already at the site to ensure no change in resultant Suspended Solids concentrations at the point of mixing for the discharge in the Owveg\_010. It is worth noting that the discharge point is 20 km, approximately, upstream of the point of interest for the closest downstream pearl mussel populations to the site, which is in the vicinity of Ballyragget, Co. Kilkenny. The river at the approximate location of the pearl mussels has a land mass catchment area of ~1000 km<sup>2</sup> feeding to it. The catchment area in which the quarry sits and whose surrounding lands contribute also to the surface water system is ~1 km<sup>2</sup> land mass of the pearl mussels. It is clear, beyond scientific doubt, that there is so much land mass and recharge area between the site and the pearl mussels and there is such a level of engineering and control at the quarry site, there is no potential for impact and no special protection measures required other than those already prescribed in the design for the site.

This NIS has reviewed the predicted impacts arising from the Project and found that with the implementation of appropriate mitigation measures specifically with regard to surface water, significant effects on the integrity of the River Barrow and River Nore SAC and the River Nore SPA can be ruled out.

It is the conclusion of this NIS, on the basis of the best scientific knowledge available, and subject to the implementation of the mitigation measures set out under Section 1.3.6, that the possibility of any adverse effects on the integrity of the European Sites considered in this NIS, or on the integrity of any other European Site (having regard to their conservation objectives), arising from the proposed development, either alone or in combination with other plans or projects, can be excluded beyond a reasonable scientific doubt.

## 1.5 REFERENCES

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