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NATURA IMPACT STATEMENT OF A DEVELOPMENT IN GRENAN, ATTANAGH, CO. LAOIS

PREPARED TO ACCOMPANY AN APPLICATION FOR LEAVE TO APPLY FOR
SUBSTITUTE CONSENT UNDER SECTION 177C(2)(B) OF THE PLANNING AND
DEVELOPMENT ACT 2000, AS AMENDED



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1 INTRODUCTION

1.1 REQUIREMENT FOR AN APPROPRIATE ASSESSMENT

Patrick Lalor is applying to An Bord Pleanála for leave to apply for Substitute Consent under Section 177C(2)(b) of the Planning and Development Act 2000 for a development previously constructed without planning consent on his farm at Grenan, Attanagh, Co. Laois. It has been determined by Laois County Council, that due to the connectivity of the application site to sites designated under the Natura 2000 network, and its subsequent activities, i.e., the land spreading of the manure produced at the farm, that an Appropriate Assessment of the proposed development would have been required prior to its completion.

Therefore, this Appropriate Assessment was prepared in support of the application to An Bord Pleanála. Having regard to the location of this application site and its potential connectivity to the River Nore, a designated Special Area of Conservation (SAC) and Special Protection Area (SPA), an Appropriate Assessment of the development was prepared in accordance with Article 6 of the Habitats Directive.

The purpose of the assessment is to determine the appropriateness of the project, in the context of the conservation status of the site or sites. In Ireland, an Appropriate Assessment takes the form of a Natura Impact Statement (NIS), which is a statement of the likely impacts of the plan or project on a Natura 2000 site. The NIS comprises a comprehensive ecological impact assessment of the plan or project and it examines the direct and indirect impacts that the plan or project might have on its own or in combination with other plans or projects on one or more Natura 2000 sites in view of the sites' conservation objectives.

Should An Bord Pleanála grant the applicant leave to apply for Substitute Consent, this NIS will be updated and revised with any new and revised supporting information pertaining to the application site and the subsequent activities arising from the operation of the farm.

1.2 THE AIM OF THE REPORT

This Natura Impact Statement (NIS) has been prepared in accordance with the current guidance (DoEHLG, 2009, Revised February 2010), and it provides an assessment of the potential effects of the existing agricultural development at Attanagh, Co. Laois on certain European sites.

An NIS should provide the information required in order to establish whether or not a development is likely to have a significant impact on certain Natura sites in the context of their conservation objectives and specifically on the habitats and species for which the

Natura 2000 conservation sites have been designated. In the case of this development at Attanagh, the Natura 2000 site is the River Barrow and River Nore SAC 002162.

Accordingly, a comprehensive assessment of the impacts (past/ongoing/future) of this existing development was carried out in June 2020 by Noreen McLoughlin, MSc, MCIEEM of Whitehill Environmental. This assessment allowed areas of potential ecological value and potential ecological constraints associated with this development to be identified and it also enabled potential ecological impacts associated with the development to be assessed and mitigated for.

1.3 REGULATORY CONTEXT

RELEVANT LEGISLATION

The Birds Directive (Council Directive 79/409/EEC) implies that particular protection is given to sites (Special Protection Areas) which support certain bird species listed in Annex I of the Directive and that surveys of development sites should consider the status of such species.

The EU Habitats Directive (92/43/EEC) gives protection to sites (Special Areas of Conservation) which support particular habitats and species listed in annexes to this directive. Articles 6(3) and 6(4) of this Directive call for the undertaking of an Appropriate Assessment for plans and projects likely to have an effect on designated sites. This is explained in greater detail in the following section.

The Wildlife Act 1976 (and its amendment of 2000) provides protection to most wild birds and animals. Interference with such species can only occur under licence. Under the act it is an offence to "wilfully interfere with or destroy the breeding place or resting place of any protected wild animal". The basic designation for wildlife is the Natural Heritage Area (NHA). This is an area considered important for the habitats present or which holds species of plants and animals whose habitat needs protection. Under the Wildlife Amendment Act (2000) NHAs are legally protected from damage. NHAs are not part of the Natura 2000 network and so the Appropriate Assessment process does not apply to them.

The Water Framework Directive (WFD) (2000/60/EC), which came into force in December 2000, establishes a framework for community action in the field of water policy. The WFD was transposed into Irish law by the European Communities (Water Policy) Regulations 2003 (S.I. 722 of 2003). The WFD rationalises and updates existing legislation and provides for water management on the basis of River Basin Districts (RBDs). RBDs are essentially administrative areas for coordinated water management and are comprised of multiple river basins (or catchments), with cross-border basins (i.e. those covering the territory of more

than one Member State) assigned to an international RBD. The aim of the WFD is to ensure that waters achieve at least good status by 2021 and that status doesn't deteriorate in any waters.

APPROPRIATE ASSESSMENT AND THE HABITATS DIRECTIVE

Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Fauna and Flora – the 'Habitats Directive' - provides legal protection for habitats and species of European importance. Article 2 of the Directive requires the maintenance or restoration of habitats and species of European Community interest, at a favourable conservation status. Articles 3 - 9 provide the legislative means to protect habitats and species of Community interest through the establishment and conservation of an EU-wide network of sites known as *Natura 2000*. *Natura 2000* sites are Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Conservation of Wild Birds Directive (79/409/EEC).

Articles 6(3) and 6(4) of the Habitats Directive sets out the decision-making tests for plans or projects affecting *Natura 2000* sites. Article 6(3) establishes the requirement for Appropriate Assessment:

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

Article 6(4) deals with the steps that should be taken when it is determined, as a result of appropriate assessment, that a plan/project will adversely affect a European site. Issues dealing with alternative solutions, imperative reasons of overriding public interest and compensatory measures need to be addressed in this case.

Article 6(4) states:

"If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the

Member States shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.

Where the site concerned hosts a priority natural habitat type and/or a priority species, the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest.”

THE APPROPRIATE ASSESSMENT PROCESS

The aim of Appropriate Assessment is to assess the implications of a proposal in respect of a site’s conservation objectives.

Appropriate Assessment is an assessment of the potential effects of a ****proposed***** plan - ‘in combination’ with other plans and projects - on one or more European sites. The ‘Appropriate Assessment’ itself is a statement which must be made by the competent authority which says whether the plan affects the integrity of a European site. The actual process of determining whether or not the plan will affect the site is also commonly referred to as ‘Appropriate Assessment’.

If adverse impacts on the site cannot be avoided, then mitigation measures should be applied during the Appropriate Assessment process to the point where no adverse impacts on the site remain (European Commission, 2000, 2001).

The conclusions of the appropriate assessment report should enable the competent authority to ascertain whether the proposal would adversely affect the integrity of the site (European Commission, 2000, 2001).

Under the terms of the directive (European Commission, 2000, 2001), consent can only be granted for a project if, as a result of the appropriate assessment either (a) it is concluded that the integrity of the site will not be adversely affected, or (b) where an adverse effect is anticipated, there is shown to be an absence of alternative solutions, and there exists imperative reasons of overriding public interest for the project should go ahead.

2 METHODOLOGY

2.1 STATEMENT OF COMPETENCY

This ecological assessment was carried out by Noreen McLoughlin, BA, MSc, MCIEEM, of Whitehill Environmental. Noreen has an honours degree in Zoology and an MSc in Freshwater Ecology from Trinity College, Dublin and she has been a full member of the Chartered Institute of Ecology and Environmental Managements for over twelve years. Noreen has over 15 years experience as a professional ecologist in Ireland.

2.2 APPROPRIATE ASSESSMENT

This Statement of Screening for Appropriate Assessment (Stage 1) has been prepared with reference to the following:

- European Commission (2000). Managing Natura 2000 Sites: The Provisions of Article 6 of the 'Habitats' Directive 92/43/EEC.
- European Commission (2002). 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 (2006). Nature and Biodiversity Cases: Ruling of the European Court of Justice.
- European Commission (2007). Clarification of the Concepts of: Alternative Solution, Imperative Reasons of Overriding Public Interest, Compensatory Measures, Overall Coherence, Opinion of the Commission.
- Department of Environment, Heritage and Local Government (2009). Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities.

The EC Guidance sets out a number of principles as to how to approach decision making during the process. The primary one is 'the precautionary principle' which requires that the conservation objectives of Natura 2000 should prevail where there is uncertainty.

When considering the precautionary principle, the emphasis for assessment should be on objectively demonstrating with supporting evidence that:

- There will be no significant effects on a Natura 2000 site;
- There will be no adverse effects on the integrity of a Natura 2000 site;
- There is an absence of alternatives to the project or plan that is likely to have an adverse effect to the integrity of a Natura 2000 site; and
- There are compensation measures that maintain or enhance the overall coherence of Natura 2000.

This translates into a four stage process to assess the impacts, on a designated site or species, of a policy or proposal.

The EC Guidance states that “each stage determines whether a further stage in the process is required”. Consequently, the Council may not need to proceed through all four stages in undertaking the Appropriate Assessment.

The four stage process is:

Stage 1: Screening – The process which identifies the likely impacts upon a Natura 2000 site of a project or plan, either alone or in combination with other projects or plans, and considers whether or not these impacts are likely to be significant;

Stage 2: Appropriate Assessment – The consideration of the impact on the integrity of the Natura 2000 site of the project or plan, 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 adverse impacts, an assessment of the potential mitigation of those impacts;

Stage 3: Assessment of Alternative Solutions – The process which examines alternative ways of achieving objectives of the project or plan that avoid adverse impacts on the integrity of the Natura 2000 site;

Stage 4: Assessment where no alternative solutions exist and where adverse impacts remain – An assessment of the compensatory measures where, in the light of an assessment of imperative reasons of overriding public interest (IROPI), it is deemed that the project or plan should proceed.

In complying with the obligations set out in Articles 6(3) and following the guidelines described above, this Appropriate Assessment has been structured as a stage by stage approach as follows:

- Description of the project;
- Identification of the Natura 2000 sites close to the development;
- Identification and description of any individual and cumulative impacts on the Natura 2000 sites likely to result from the project;
- Assessment of the significance of the impacts identified above on site integrity. Exclusion of sites where it can be objectively concluded that there will be no significant effects;
- Description of recommend mitigation measures.

2.3 DESK STUDIES & CONSULTATION

Information on the site and the area of the development was studied prior to the completion of this statement. The following data sources were accessed in order to complete a thorough examination of all impacts:

- National Parks and Wildlife Service - aerial photographs and maps of designated sites, information on habitats and species within these sites and information on protected plant or animal species; conservation objectives, site synopses and standard data forms for relevant designated sites.
- Environmental Protection Agency (EPA)- Information pertaining to water quality, geology and licensed facilities within the area;
- National Biodiversity Data Centre (NBDC) – Information pertaining to protected plant and animal species within the study area;
- Barnes Nolan and Associates, Patrick Lalor and Emma Pillion Planning – Information regarding the existing development including site plans, specifications, information on the planning history of the site.
- Laois County Council – Information on planning history in the area and the previous decisions of Laois County Council pertaining to this application site.

3 APPROPRIATE ASSESSMENT SCREENING (STAGE 1)

3.1 DEVELOPMENT DESCRIPTION

Patrick Lalor is applying to An Bord Pleanála for leave to apply for Substitute Consent under Section 177C(2)(b) of the Planning and Development Act 2000, as amended. The applicant is seeking leave to apply for substitute consent so that an application previously deemed as invalid by Laois County Council can ultimately be lodged to the Board.

The application seeks to apply for leave to apply for Substitute Consent for the following:

Permission is sought to retain and complete a slatted tank, animal housing which incorporates cubicle area, calving boxes, milking parlour, dairy, office, plant room, slatted feeding area, collecting area, steel uprights at slatted feeding area; and all associated ancillary works and services at Grenan, Attanagh, Co. Laois.

An extract from the planning drawings is shown in Figure 1.

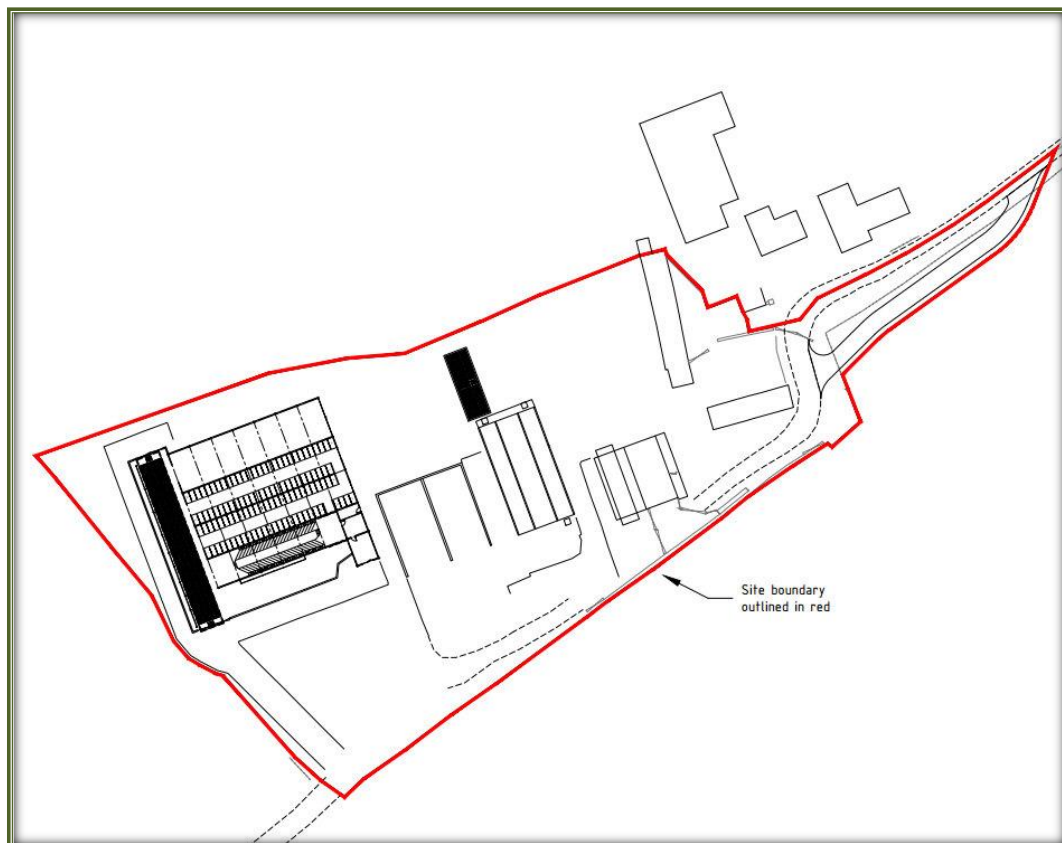


Figure 1 – Extract from Planning Drawings Submitted (as prepared by Barnes Nolan and Associates)

Patrick Lalor and his son operate a dairy and beef farm. The total land farmed is approximately 189 hectares, some of which is owned and some of which is rented. There are two farmyards – one in Grenan (current application site) and one in Ironmills.

An Effluent, Farm Yard Manure (FYM) and Soiled Water plan was prepared for the farmyard at Greannan by Barnes Nolan and Associates in 2019. This report presented data regarding the amount of slurry and farmyard manure produced on the farm in Grenan, along with the land available for the spreading of this slurry.

Slurry Spreading

- The total slurry produced is 973.19m³
- The acceptable rate of slurry for spreading is 20m³ per acre (Teagasc Rate)
- On this farm, slurry is applied at a rate of approximately 16.5m³
- The spreading area required is therefore 42 acres.

FYM Spreading

- The total FYM produced is 233m³
- The acceptable rate of FYM for spreading is 5.5m per acre (Teagasc Rate)
- The spreading area required is therefore 42 acres.

The total acreage required to spread the slurry and manure produced on the farm is therefore 84 acres. The applicant has a total area of 106 acres in Grenan, which therefore is an excess area over which is required for the proper use of the slurry and FYM produced on the farm.

Stock Numbers at Grenan

The maximum precise number, type and age of the animals to be accommodated at the Grenan farm, in the existing and new sheds are as follows:

- 100 dairy cows
- 10 sucker cows
- 76 cattle (0-6 months)
- 35-45 cattle (6 – 18 months)
- 2 cattle over 18 months

LAND-SPREADING

Land-spreading is the term generally given to the application of fertiliser (in this cattle / cow manure) to land. This activity is carried out by farmers to fertilise their lands for productive agricultural purposes in line with applicable legislative requirements and good practice.

Any assessment of the potential impact of the land-spreading of the manure arising from the proposed development must take heed that these are productive agricultural lands that have been subject to land-spreading in accordance with the relevant legislation and in accordance with the farm plans that are produced annually by the applicant. Evidence to demonstrate that applicant has a requirement for the manure produced on the farm has been provided and ample land exists for the proper use of this manure as per S.I. 605 of 2017.

The manure produced on the farm will be utilised on lands that are owned or rented by the applicant, and those which have an agronomic requirement for this fertiliser. These lands occur within the townlands of Grenan, Fermoye, Knockroe, Castlemarket, Ironmills or Kilrush and Jenkinstown. Manure will be spread on the land in accordance with the farm plan and within the confines of S.I. 605 of 2017.

S.I. 605 OF 2017

The European Union (Good Agricultural Practice for Protection of Waters) Regulations 2017 provides a basic set of measures to ensure the protection of waters, including drinking water sources, against pollution caused by nitrogen and phosphorus from agricultural sources, with the primary emphasis being on the management of livestock manures and other fertilisers. The purpose of these Regulations is to give effect to Ireland's Nitrates Action Programme. This directive outlines measures that must be followed during the land-spreading of manure. These measures are summarised in the points below.

- The amount of livestock manure applied in any year to land on a holding, together with that deposited to land by livestock, shall not exceed an amount containing 170 kg nitrogen per hectare.
- The spreading of any organic fertiliser during certain times of the year is prohibited (The prohibited spreading period, generally between Mid-October and Mid-January).
- Farmers must keep within the overall maximum fertilisation rates for nitrogen and phosphorus.
- Farmers must have sufficient storage capacity to meet the minimum requirements of the regulations.
- All storage facilities must be kept leak proof and structurally sound.
- Records for the movement of fertilisers must be kept.
- Chemical fertilisers, livestock manure and other organic fertilisers, effluents and soiled water must be spread as accurately and as evenly as possible.
- An upward-facing splash plate or sludge irrigator on a tanker or umbilical system must not be used for the spreading of organic fertiliser or soiled water.
- Chemical fertilisers, livestock manure, soiled water or other organic fertilisers must not be spread when:
 - The land is waterlogged;
 - The land is flooded, or it is likely to flood;
 - The land is frozen, or covered with snow;
 - Heavy rain is forecast within 48 hours;
 - The ground slopes steeply and there is a risk of water pollution, when factors such as surface run-off pathways, the presence of land drains, the absence of hedgerows to mitigate surface flow, soil condition and ground cover are taken into account.
- Chemical fertilisers must not be spread on land within 2 metres of a surface watercourse.

Table 1 shows the buffer zones for various water bodies (lakes, rivers, wells etc.). Soiled water, effluents, farmyard manures or other organic fertilisers must not be spread inside these buffer zones.

Water Feature	Buffer Zone
Any water supply source providing 100m ³ or more of water per day, or serving 500 or more people	200m (or as little as 30m where a local authority allow)
Any water supply source providing 10m ³ or more of water per day, or serving 50 people or more	100m (or as little as 30m where a local authority allows)

Any other water supply for human consumption	25m (or as little as 15m where a local authority allows)
Lake shoreline or a turlough likely to flood	20m
Exposed cavernous or karstified limestones features	15m
Any surface watercourse where the slope towards the watercourse exceeds 10%	10m
Any other surface waters	5m

Table 1 – Requirements for the Application of Fertilisers and Soiled Water as set out in S.I. 605 of 2017.

Prior to its implementation, S.I. 605 of 2017 was subjected to Appropriate Assessment (Natura Impact Statement - NIS) and a Strategic Environmental Assessment (SEA) Screening at draft stage (March 2017). At this stage, it was referred to as Ireland's Fourth Nitrates Action Programme (NAP). This draft NAP was assessed in terms of the likely significant effects of the programme and where it would adversely affect the integrity of European sites. The NIS identified that the existing and proposed measures would be predominantly positive for European sites. The measures of the NAP were influenced to avoid, as appropriate, measures that would have an adverse effect upon the integrity of the European sites. Any project falling under the requirements of the NAP will be required to conform to the mitigation measures contained within the NIS prepared and to any further regulatory provisions aimed at preventing pollution or other environmental effects. The applicant is fully aware of his obligations under S.I. 605 of 2017 and they will meet all the requirements under this Directive with the proposed application.

3.2 SITE LOCATION AND SURROUNDING ENVIRONMENT

The site in question is located in a rural area, within the townland of Grenan. Access to the site is via a private farm access road that is located just off a local, third class road. The site is approximately 1 hectare in area. It is 1.7km north of Attanagh and 2.3km east of Durrow

It is located in an area where agriculture is quite intensive and the dominant habitat is improved agricultural grassland. Other habitats close to the site include hedgerows, treelines and areas of broadleaved woodland. The River Nore and its riparian habitats is 1km west of the site. Site location maps are shown in Figures 2 and 3, whilst an aerial photograph of the site and its surrounding habitats is shown in Figure 4.

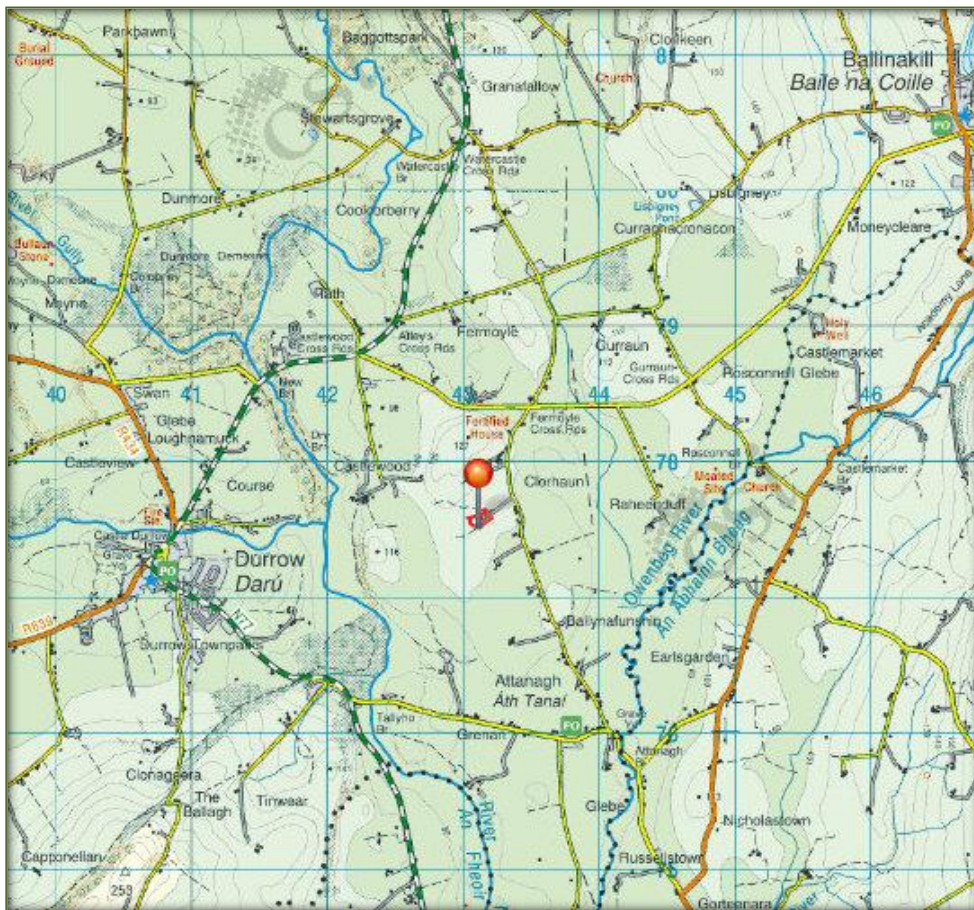


Figure 2 – Site Location Map (Site Pinned)



Figure 3 – Site Location Map (Site Outlined in Red)

HABITATS AND NOTABLE SPECIES

The site itself currently consists of buildings and artificial surfaces (the existing farm buildings and hard-core areas proposed for retention). There are also some small areas of improved agricultural grassland in the western section of the site. These are habitats of low biodiversity and conservation value. There are treelines present along part of the northern and southern site boundaries.

An examination of the website of the National Biodiversity Data Centre (Biodiversity Maps application), revealed that there are no records for the presence of any notable plant or mammal species from the relevant 1km squares (S4377) of this proposed development.

WATER FEATURES AND QUALITY

The application site is located within the Nore Hydrometric Area, Catchment and Sub-Catchment and the Owveg Sub-Basin. There are no drains or streams within or adjacent to the application site. There is a stream approximately 447m west of the application site. This stream flows southwards, until it meets the River Nore, at a point approximately 1.1km south-west of the application site. At its closest point, the River Nore is 954m south-west of the application site.

The EPA have defined the ecological status of the River Nore and its tributaries at points close to the application site as good. Under the requirements of the Water Framework Directive, this is satisfactory and this status must be maintained.



Figure 4 – Aerial Photograph of the Site (Outlined in Red) and its Surrounding Habitats. (© Bing Maps.)

3.3 NATURA 2000 SITES IDENTIFIED

In accordance with the guidelines issued by the Department of the Environment and Local Government, a list of Natura 2000 sites within 15km of the application site have been identified and described according to their site synopses, qualifying interests and conservation objectives. In addition, any other sites further than this, but potentially within its zone of interest were also considered. The zone of impact may be determined by an assessment of the connectivity between the application site and the designated areas by virtue of hydrological connectivity, atmospheric emissions, flight paths, ecological corridors etc.

For significant effects to arise, there must be a potential impact facilitated by having a *source*, i.e., the application site and the activities arising out of its construction or operation, a *receptor*, i.e., the European site and its qualifying interests and a subsequent *pathway* or *connectivity* between the source and receptor, e.g., a water course. The likelihood for significant effects on the European site will largely depend on the characteristics of the source (e.g., nature and scale of the construction works), the characteristics of the existing pathway and the characteristics of the receptor, e.g., the sensitivities of the Qualifying Interests (habitats or species) to changes in water quality.

There are five Natura 2000 designated sites within 15km of the application site. These designated areas and their closest points to the application site are summarised in Table 2 and a maps and an aerial photograph showing their locations relative to the application site are shown in Figures 5, 6 and 7. A full description of all these sites can be read on the website of the National Parks and Wildlife Service (npws.ie).

European Site	Distance	Qualifying Interests	Potential for Impacts
River Barrow and Nore SAC 002162	743m west Spread-Lands Within / Adjacent and Hydrologically Linked	<ul style="list-style-type: none"> • <i>Vertigo moulinsiana</i> • Freshwater pearl mussel (<i>Margaritifera margaritifera</i>) • White-clawed crayfish (<i>Austropotamobius pallipes</i>) • Sea lamprey (<i>Petromyzon marinus</i>) • Brook lamprey (<i>Lampetra planeri</i>) • River lamprey (<i>Lampetra fluviatilis</i>) • Allis shad (<i>Alosa alosa</i>) • Twaite shad (<i>Alosa fallax fallax</i>) 	Given the close proximity of the SAC to the application site, and using the basis of the precautionary principal, then potential direct and indirect impacts upon this SAC, its habitats and species arising from the application site must be considered further. Potential impacts may arise from inappropriate surface water management from the site and / or land spreading.

		<ul style="list-style-type: none"> • Salmon (<i>Salmo salar</i>) • Estuaries • Mudflats and sandflats not covered by seawater at low tide • Salicornia and other annuals colonizing mud and sand • Spartina swards • Atlantic salt meadows • Otter (<i>Lutra lutra</i>) • Mediterranean salt meadows • Killarney fern (<i>Trichomanes speciosum</i>) • Pearl mussel (<i>Margaritifera durrovensis</i>) • Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation • European dry heaths • Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels • Petrifying springs with tufa formation (Cratoneurion) • Old sessile oak woods with Ilex and Blechnum in British Isles • Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> 	
River Nore SPA 004233	1.1km west / Spreadlands Adjacent and Hydrologically Linked	<ul style="list-style-type: none"> • Kingfisher <i>Alcedo atthis</i> 	<i>Given the close proximity of the SPA to the application site, and using the basis of the precautionary principal, then potential direct and indirect impacts upon this SAC, its habitats and species arising from the application site must be considered further. Potential impacts may arise from inappropriate surface water management from the site and / or land spreading.</i>
Lisbigney Bog SAC 000869	1.9km north-east	<ul style="list-style-type: none"> • Calcareous fens with <i>Cladium mariscus</i> and species of the Caricion davallianae • Desmoulin's Whorl Snail <i>Vertigo moulinsiana</i> 	<i>There is no hydrological connectivity between the application site and this SAC, therefore impacts upon this SAC can be ruled out from further assessment. There will be no land-spreading within or adjacent to this SAC. No impacts likely upon this SAC.</i>

Galmoy Fen SAC 001858	14.2km south-west	<ul style="list-style-type: none"> Alkaline fen 	<i>There is no hydrological connectivity between the application site and this SAC, therefore impacts upon this SAC can be ruled out from further assessment. No impacts likely upon this SAC.</i>
Cullahill Mountain SAC 000831	10.2km south-west	<ul style="list-style-type: none"> Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] 	<i>There is no hydrological connectivity between the application site and this SAC, therefore impacts upon this SAC can be ruled out from further assessment. No impacts likely upon this SAC.</i>
Spahill And Clomantagh Hill SAC 000849	13.2km south-west	<ul style="list-style-type: none"> Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] 	<i>There is no hydrological connectivity between the application site and this SAC, therefore impacts upon this SAC can be ruled out from further assessment. No impacts likely upon this SAC.</i>

Table 2 – Designated Sites within 15km of the Application Site

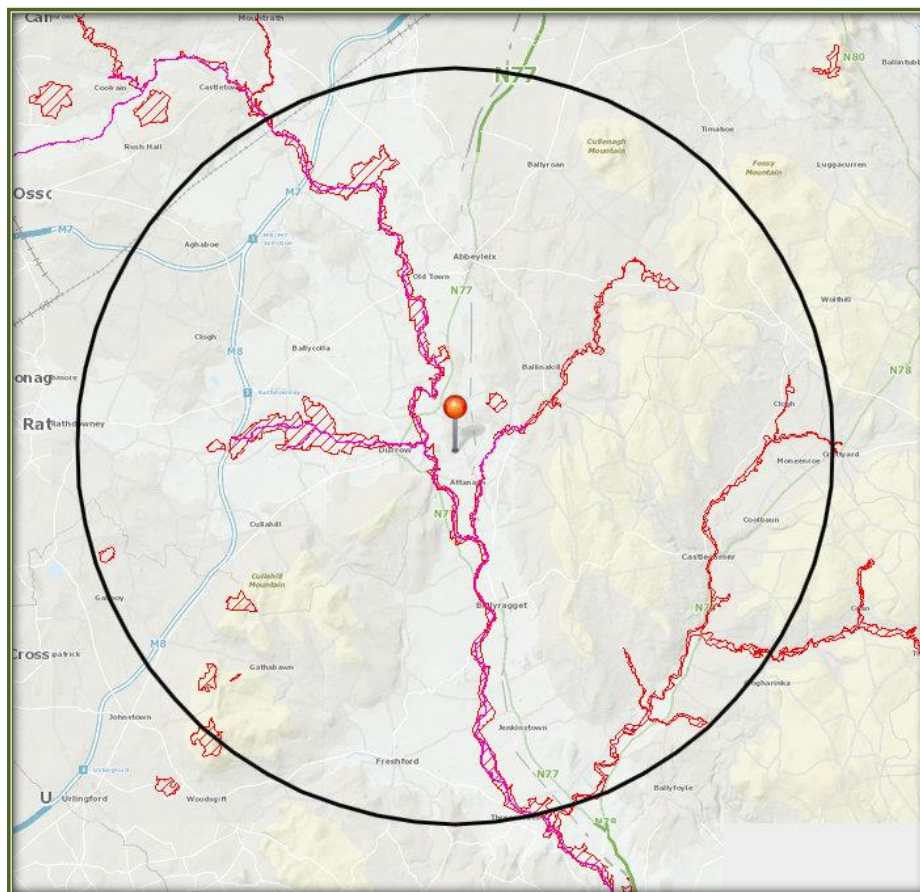


Figure 5 – The Application Site (Pinned) in relation to Natura 2000 Sites within 15km



Figure 6 – The Application Site (Outlined in Red) in relation to the River Barrow and Nore SAC (Red Hatched Areas).

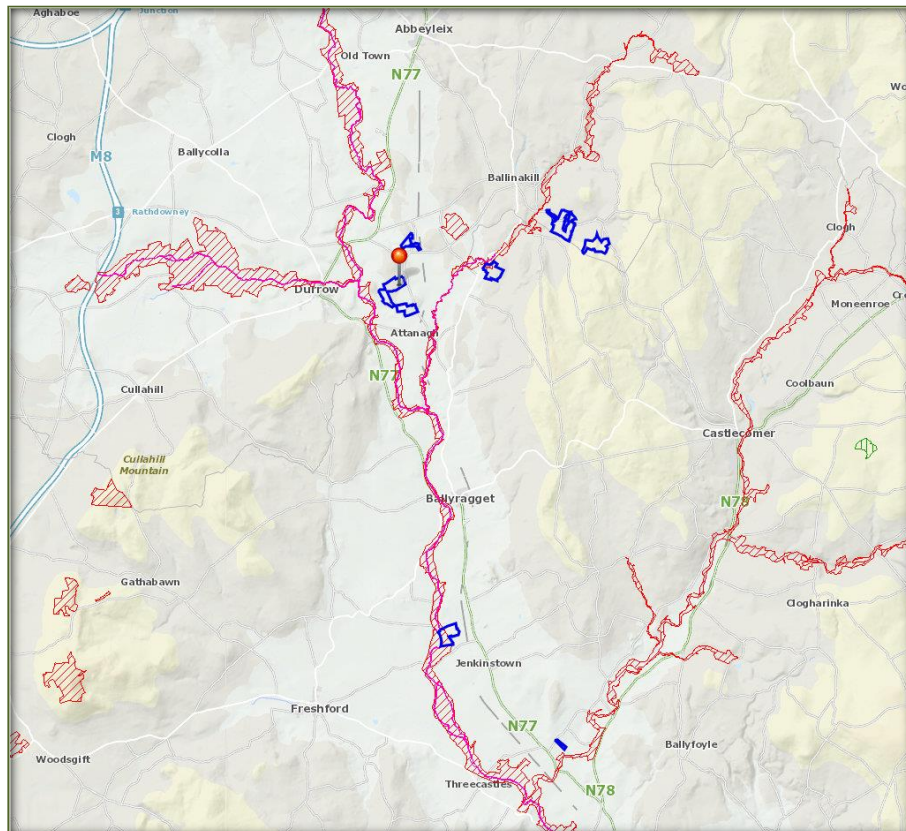


Figure 5 – The Application Site (Pinned) in relation to the River Barrow and Nore SAC (Red Hatched Areas), The River Nore SPA (Pink Hatching). Lands Being Owned / Rented are Highlighted in Blue.

3.4 IDENTIFICATION OF POTENTIAL IMPACTS

The application site at Grenan, Attanagh is potentially connected to the River Barrow and River Nore SAC and River Nore SPA, via activities that will occur in the yard as well as the lands that have been identified for the receipt of the manure that is produced on this farm. In the light of the recent AA screening report of Laois County Council and having regard to the tenets of the precautionary principal and how it guides the AA process, as this source-pathway-receptor model exists and in the absence of mitigation it cannot be ruled out that the proposed development will not have impacts upon these designated sites.

Only those features of the development that have the potential to affect the integrity and conservation objectives of the identified Natura 2000 sites and protected species have been considered. A number of factors were examined at this stage and dismissed or carried forward for Appropriate Assessment as relevant. The following areas were examined in relation to potential impacts from the proposed development on the Natura 2000 sites identified:

1. Deterioration in water quality in designated areas arising from pollution due to the continuation of farm activities within the application site itself. Inappropriate surface water management in the farm yard may lead to impacts upon the River Nore and Barrow SAC and the River Nore SPA. Negative impacts upon local groundwater resources and subsequent effects on the Natura 2000 sites have also been considered.
2. Potential impacts on water quality within the River Barrow and Nore SAC / River Nore SPA arising from the use of manure produced on the farm. Negative impacts upon local groundwater resources and subsequent effects on the Natura 2000 sites have also been considered.
3. Cumulative impacts.

3.5 ASSESSMENT OF SIGNIFICANCE

This section considers the list of sites identified in Section 3.3. It can be considered that with the exception of the River Barrow and Nore SAC and the River Nore SPA that the remainder of the sites identified in Section 3.3 can be excluded from the Appropriate Assessment process. This is based on their distance from the application site and the fact that they are outside of its Zone of Influence. The remaining concerns will therefore focus upon the protected habitats and species of the River Barrow and Nore SAC and the River Nore SPA.

3.6 SCREENING CONCLUSIONS

The application site is *not directly connected with or necessary to the nature conservation management of the designated site*. Therefore, following consideration of the location of the River Barrow and River Nore SAC and the River Nore SPA in relation to the application site at Grenan at Attanagh, and the potential impacts that may occur, this project must proceed to the next stage of Appropriate Assessment, namely the Natura Impact Assessment.

4 STAGE II – APPROPRIATE ASSESSMENT

4.1 INTRODUCTION

The main objective of this stage (Stage 2, Natura Impact Statement) in the Appropriate Assessment process is to determine whether the development and its associated activities at Grenan in Attanagh (either alone or in combination with other plans, programmes and projects) will result in significant adverse impacts to the integrity of the River Barrow and Nore SAC and the River Nore SPA, with respect to these site's structures, species, functions and/or conservation objectives. This stage also outlines the mitigation measures that should be taken in order to avoid any negative impacts of this application, should it receive consent.

In this section, the Natura 2000 site identified in the previous section will be described in greater detail in terms of their site characteristics and conservation objectives.

4.2 NATURA 2000 SITES IDENTIFIED

RIVER BARROW AND RIVER NORE (SAC SITE CODE 0002162)

This site consists of most of the freshwater stretches of the Barrow/Nore River catchments. The Barrow is tidal as far upriver as Graiguenamanagh, whilst the Nore is tidal as far upriver as Inishtioige. The site also includes the extreme lower reaches of the River Suir and the entire estuarine component of Waterford Harbour extending to Creadan Head. The larger of the many tributaries include the Lerr, Fushoge, Mountain, Aughavaud, Owenass, Boherbaun and Stradbally Rivers of the Barrow and the Delour, Dinin, Erkina, Owveg, Munster, Arrigle and King's Rivers on the Nore. Both rivers rise in the Old Red Sandstone of the Slieve Bloom Mountains. They traverse limestone bedrock for a good proportion of their routes, though the middle reaches of the Barrow and many of the eastern tributaries run through Leinster Granite. A wide range of habitats associated with the rivers are included within the site, including substantial areas of woodland (deciduous, mixed), dry heath, wet grassland, swamp and marsh vegetation, salt marshes, a small dune system and intertidal sand and mud flats. Areas of improved grassland, arable land and coniferous plantations are included in the site for water quality reasons.

The site supports many Annexed habitats including the priority habitats of alluvial woodland and petrifying springs. The quality of habitat is generally good. The site also supports a number of Annex II animal species - *Salmo salar*, *Margaritifera margaritifera*, *M.m. durrovensis*, *Alosa fallax fallax*, *Austropotamobius pallipes*, *Petromyzon marinus*, *Lutra lutra*, *Lampetra fluviatilis* and *L. planeri*. Annex I Bird species include *Anser albifrons flavirostris*, *Falco peregrinus*, *Cygnus cygnus*, *Cygnus columbianus bewickii*, *Limosa lapponica*, *Pluvialis*

apricaria and *Alcedo atthis*. A range of rare plants and invertebrates are found in the woods along these rivers and rare plants are also associated with the saltmarsh.

The main habitat types within this SAC include:

- Tidal rivers, Estuaries, Mud flats, Sand flats, Lagoons (20%)
- Salt marshes, Salt pastures, Salt steppes (1%)
- Shingle, Sea cliffs, Islets (1%)
- Inland water bodies (10%)
- Bogs, Marshes, Water fringed vegetation, Fens (10%)
- Heath, Scrub, Maquis and Garrigue, Phygrana (5%)
- Humid grassland, Mesophile grassland (17%)
- Improved grassland (15%)
- Other arable land (1%)
- Broad-leaved deciduous woodland (5%)
- Coniferous woodland (3%)
- Mixed woodland (5%)
- Inland rocks, Screes, Sands, Permanent Snow and ice (1%)
- Other land (1%)
- Coastal sand dunes, Sand beaches, Machair (1%)
- Extensive cereal cultures (4%)

The habitats within the SAC close to the application site include the River Barrow itself and its riparian grassland, woodland and treeline habitats. There is also a finger of broadleaved woodland extending south from the river towards the site and this woodland is 41m west of the site.

The Conservation Objective (Generic) of the River Barrow and River Nore SAC is:

To maintain / restore the favourable conservation status of the qualifying interests of this SAC.

In 2011, the NPWS published Site Specific Conservation Objectives (SSCOs) for this SAC. These conservation objectives were also supported by a number of other documents relating to the woodland and coastal habitats of this large SAC. These SSCO aim to define the favourable conservation condition for the particular habitats or species at that site. They outline certain attributes (e.g., distribution, population structure, water quality) for different species and habitats with targets, which define favourable condition for a habitat or species at a particular site. The maintenance of habitats and species within the Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at national level. For the River Barrow and

Nore SAC, these SSCOs can be downloaded on the NPWS website. Any potential threats to the attributes and targets as defined in these SSCOs were assessed and where necessary, mitigated for.

Favourable conservation status of a habitat is achieved when:

- Its natural range and area it covers within that range is 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;
- 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;
- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future;
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long - term basis.

For each Qualifying Interest of the SAC, the specific conservation objective is either to *maintain or restore* the favourable conservation condition of that interest, by defining a list of attributes and targets which are indicative of the conservation status of that interest. For habitats, the main attributes include habitat area; habitat and community distribution; vegetation structure/composition and physical structure. The main target is to ensure that the habitats are stable or increasing in area and that the other attributes are maintained or restored. For the Annex II species of the SAC, the main attributes are population trend and distribution, whilst the targets aim to ensure that the long term population trends of the species are stable or increasing and that there is no significant decrease in the numbers or range of areas used by the species, other than that occurring from natural patterns of variation.

NON-RELEVANT QUALIFYING INTERESTS OF THE SITE (SCREENED OUT)

The River Barrow and River Nore SAC covers an extensive area of the south-east of Ireland. It passes through eight counties, therefore there are certain features within this SAC that will not be potentially impacted upon from this development, either due to the distance involved or because they are features that are not sensitive to changes in water quality. Therefore, these features can be screened out from further AA assessment. These features and the reason for their exclusion are listed in Table 2.

Designated Feature	Reason for Exclusion
Allis shad (<i>Alosa alosa</i>)	It is considered that the Allis shad is an opportunistic spawner in Irish waters; and there is no evidence of an established breeding population being present in the Barrow system. It is generally considered a vagrant species (NPWS, 2013)
Desmoulin's Whirl Snail (<i>Vertigo moulinsiana</i>)	This species is found in wetlands (Swamps, marches and fens) on the verges or rivers, lakes, canals and ponds. The main threat to this species is drainage. The development at Grenan has not led to the drainage of any wetlands, nor will any be drained in the future. No impacts upon this species are predicted. In addition, there are no records for this species within the 10km square of this application site (S47). Records from this SAC for this species occur from Borris, Co. Kilkenny, which is on the Barrow River and not connected to the application site and from a wetland in Kilnaseer, Co. Laois, which is 10km west of the application site and not hydrologically downstream of it. Both these locations are outside of the zone of influence of this development and no impacts are anticipated.
Freshwater pearl mussel (<i>Margaritifera margaritifera</i>)	The habitat of <i>Margaritifera margaritifera</i> is acid/neutral waters which flow over non-calcareous rocks (Moorkins, 1999). While it remains listed as a feature of the River Barrow and River Nore SAC, this is being reviewed as suitable conditions for this species don't occur within the lime rich Barrow / Nore catchments (NPWS, 2008, 2011)
Killarney Fern (<i>Trichomanes speciosum</i>)	This is a terrestrial species that occurs in the southern reaches of the Barrow system. This species does not occur within the zone of influence of the application site and no impacts upon this species are likely.
Twaite shad (<i>Alosa fallax fallax</i>)	This species is found only downstream of St. Mullins, in south Co. Kilkenny. It potentially only occurs downstream of the confluence of the River Nore and Barrow, which is approximately 71km downstream of the River Nore at Attanagh. The main pressures on this species include invasive, non-native fish species such as dace, as well as fishing and harvesting. The populations of Twaite shad occur in the Barrow and are therefore outside of the zone of

	influence of this development.
Sea lamprey (<i>Petromyzon marinus</i>)	This species occurs in the lower reaches of the Barrow and Nore systems. It does not occur within the Zone of Influence of the application site.
Atlantic salt meadows	This is a coastal habitat and it is approximately 90km downstream of Attanagh. No impacts upon this habitat are predicted given the downstream distances involved.
Estuaries	This is a coastal habitat and it is approximately 90km downstream of Attanagh. No impacts upon this habitat are predicted given the downstream distances involved.
European dry heaths	Any change in water quality will not impact upon this habitat. This habitat is not within the zone of influence of the application site as it occurs on the steep, free draining river valley sides of the Barrow and its tributaries in the foothills of the Blackstairs Mountains.
Mediterranean salt meadows	This is a coastal habitat and it is approximately 90km downstream of Attanagh. No impacts upon this habitat are predicted given the downstream distances involved.
Mudflats and sandflats not covered by seawater at low tide	This is a coastal habitat and it is approximately 90km downstream of Attanagh. No impacts upon this habitat are predicted given the downstream distances involved.
Old sessile oak woods with Ilex and Blechnum in British Isles	Old sessile oak woodland is defined in the Habitats Directive interpretation manual as "acidophilous Quercus patraea woods, with low branched trees with many ferns, mosses, lichens and evergreen bushes". This habitat is not water dependent and potential changes in water quality will not impact this habitat. In addition, the Site Specific Conservation Objectives (SSCOs) for this SAC have not identified this habitat close to or within the zone of influence of the application site (Map 6) and potential impacts upon this habitat are not likely to occur.
Alluvial forests with Alnus glutinosa and Fraxinus excelsior	This habitat is not water dependent and potential changes in water quality will not impact this habitat. In addition, the Site Specific Conservation Objectives (SSCOs) for this SAC have not identified this habitat close to or within the zone of influence of the application site (Map 6) and potential impacts upon this habitat are not likely to occur.
Petrifying springs with tufa formation (Cratoneurion)	Petrifying springs occur where lime-rich water emerges from below ground and deposits calcium carbonate or 'tufa' on the ground surface. Tufa appears as a whitish, crunchy coating on plants and on the ground surface. It may become consolidated into a porous rock, often forming a cascade down a hillside. The SSCO for this site have mapped the distribution of this habitat within the SAC (Map 6). There are

	no records of this habitat type within the Zone of Influence of the application site.
Salicornia and other annuals colonizing mud and sand	This is a coastal habitat and it is approximately 60km downstream of Attanagh. No impacts upon this habitat are predicted given the downstream distances involved.
Spartina swards	This is a coastal habitat and it is approximately 60km downstream of Attanagh. No impacts upon this habitat are predicted given the downstream distances involved.

Table 2 – The Qualifying Interests of the River Barrow and River Nore SAC (Screened Out)

RELEVANT QUALIFYING INTERESTS OF THIS SITE (SCREENED IN)

Table 3 describes the qualifying interests of the River Barrow and River Nore SAC that have the potential to be impacted upon from the proposed development. These QIs have been screened into the AA process. The NPWS Site Specific Conservation Objectives (SSCOs) and Article 17 reports (2019) were consulted for the following information.

Designated Feature	Reason for Inclusion
Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	The distribution of this habitat type within the Barrow/Nore SAC is unknown. It is considered to occur in association with some riverside woodlands, unmanaged edges of slow moving rivers, river islands and in narrow bands along the floodplain of slow-flowing stretches of river. Nutrient levels may be naturally high. The community is dominated by tall hydrophilous herbs, for example <i>Angelica sylvestris</i> , <i>Filipendula ulmaria</i> , <i>Iris pseudacorus</i> , <i>Lysimachia vulgaris</i> , <i>Lythrum salicaria</i> and <i>Valeriana officinalis</i> . This habitat requires winter inundation, which results in the deposition of nutrient-rich silt laden waters. This habitat is sensitive to changes in the hydrological regime of its associated river. It is also sensitive to grazing, pollution and invasive species. As it is sensitive to pollution and mitigation may be required to protect this habitat, this QI has been screened in.
Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation	This habitat is also commonly known as floating river vegetation. Its definition is wide and <i>Ranunculus</i> , <i>Callitriche</i> , <i>Potamogeton</i> and <i>Myriophyllum</i> species are often present. Pressures on this habitat include eutrophication, overgrazing and alien species. River connectivity with the floodplain is essential for the functioning of this habitat. This habitat is sensitive to changes in the hydrological regime of its associated river. It is also sensitive to grazing, pollution and invasive species. As it is sensitive to pollution and mitigation may be required to protect this habitat, this QI has been screened in
River lamprey (<i>Lampetra fluviatilis</i>) and brook lamprey (<i>Lampetra planeri</i>)	A study by King (2006) on the status and distribution of lamprey in the River Barrow, found that the distribution of the <i>Lampetra</i> genus in the River Barrow to be sparse. However, the River Barrow at its confluence with the Figile River should be able to support these species. There is no scientific reason why lamprey species would

	<p>not occur in this area, therefore, their presence within the zone of influence of the application site should be assumed. In addition, the SSCO for both these species cite that the target for the distribution of these species should be 75% of the main stem length of the rivers accessible from the estuary. Therefore, it is an objective of this SAC to have lamprey distributed throughout the majority of this SAC therefore the targets required to achieve this objective must be met throughout the SAC.</p> <p>Lamprey require clean gravels for spawning, whilst the juveniles require fine sediments for burrowing. Free upstream migration to complete their life cycle is also important. Artificial barriers can block lampreys' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas. Although the threat to lampreys from this proposed development is slight, it is possible therefore mitigation measures to protect this genus will be included.</p>
<p>Salmon (<i>Salmo salar</i>)</p>	<p>The Atlantic salmon is known to occur throughout the Barrow system. In addition, the SSCO for the salmon cites that the target for the distribution of this species should be 100% of the river channels down to second order streams accessible from the estuary. Therefore, it must be assumed that salmon occur within the Zol of application, and if they do not presently occur then there should be no impediments arising from the development that would prevent the restoration of the favourable conservation condition of this species in the Nore River or its tributaries.</p>
<p>Otter (<i>Lutra lutra</i>)</p>	<p>The otter occurs throughout the Barrow system. The presence of this species is positively correlated with good water quality and deterioration of same will lead to impacts upon this species. Otters have two basic requirements – aquatic prey and safe refuges where they can rest. In freshwater areas, the diet of the otter comprises of a variety of fish from sticklebacks to salmon and eels, whilst crayfish and frogs can also be important. Impacts that reduce the availability or quality of, or cause disturbance to, their terrestrial or aquatic habitats are likely to affect otters. The main threats to otters in Ireland are thought to be: (1) habitat destruction, including river drainage and the clearance of bank-side vegetation; (2) pollution, particularly organic pollution resulting in fish kills, and (3) accidental deaths.</p> <p>In Ireland, the territory of female otters in mesotrophic rivers is approximately 7.5 +/- 1.5km in length (Ó Néill, L., 2008), whilst the territories of males otters in mesotrophic and oligotrophic rivers is approximately 13.2 +/- 5.3km in length, with a high degree of variability as territorial males respond quickly to social perturbation. Therefore, as otters exhibit a wide territory range overall, it is possible that application site and its surrounding lands fall into the territory of the otter.</p>
<p>White-clawed Crayfish (<i>Austropotamobius pallipes</i>)</p>	<p>Crayfish need at least a Q3-4 in the rivers they occupy. (Demers & Reynolds, 2002). It is generally considered to be an ecosystem keystone or heritage species rather than a bio-indicator, because of its traditional importance and its large size, longevity and position in the ecosystem (Matthews & Reynolds, 1992). 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 (NPWS, 2011). The greatest threat to this species is introduced non-native crayfish and disease, such as has been seen recently with the loss of crayfish populations</p>

	due to the crayfish plague. Crayfish are also sensitive to pollution. Records for the crayfish exist from the River Nore near Attanagh, and therefore as they are likely to occur within the Zone of Influence of the application site, mitigation measures will be recommended for the protection of this species.
Nore Freshwater pearl mussel (Margaritifera durrovensis)	This species only occurs within the Nore system, upstream and downstream of Durrow. Therefore, it occurs within the Zone of Influence of the application site and its spreadlands. This species is highly sensitive to changes in water quality.

Table 3 – The Qualifying Interests of the River Barrow and River Nore SAC (Screened In)

SSCOs of the Screened-In Qualifying Interests

In 2011, the NPWS published Site Specific Conservation Objectives (SSCOs) for this SAC. These conservation objectives were also supported by a number of other documents relating to the woodland and coastal habitats of this large SAC. The additional attributes and targets which define the SSCO of the qualifying interests of the River Barrow and Nore SAC which were screened into this AA are outlined below in Tables 4 – 11.

Hydrophilous Tall Herb Fringe Communities (6430)

The SSCO for this habitat is to *maintain* its favourable conservation condition which is defined by the following list of attributes and targets:

Attribute	Measure	Target
Habitat distribution	Occurrence	No decline, subject to natural processes.
Habitat area	Hectares	Area stable or increasing, subject to natural processes
Hydrological regime: Flooding depth/height of water table	Metres	Maintain appropriate hydrological regimes.
Vegetation structure: sward height	Cm	30-70% of sward between 40 and 150cm
Vegetation composition: broadleaf herb: grass ratio	Percentage	Broadleaf herb component of vegetation between 40% and 90%
Vegetation composition: typical species	Number	At least 5 positive indicator species present
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>).

Table 4 – SSCO for Hydrophilous Tall Herb Fringe Communities

Water Courses of Plain to Montaine Levels (3260)

The SSCO for this habitat is to *maintain* its favourable conservation condition which is defined by the following list of attributes and targets:

Attribute	Measure	Target
Habitat distribution	Occurrence	No decline, subject to natural processes
Habitat area	Km	Area stable or increasing, subject to natural processes
Hydrological regime: river flow	m/s	Maintain appropriate hydrological regimes
Hydrological regime: groundwater discharge	m/s	The groundwater flow to the habitat should be permanent and sufficient to maintain tufa formation
Substratum composition: particle size range	Mm	The substratum should be dominated by large particles and free from fine sediments
Water chemistry: minerals	Mg/l	The groundwater and surface water should have sufficient concentrations of minerals to allow deposition and persistence of tufa deposits
Water quality: suspended sediments	Mg/l	The concentration of suspended solids in the water column should be sufficiently low to prevent excessive deposition of fine sediments.
Water quality: nutrients	mg / l	The concentration of nutrients in the water column should be sufficiently low to prevent changes in species composition or habitat condition.
Vegetation composition: typical species	Occurrence	Typical species of the relevant habitat sub-type should be present and in good condition
Floodplain connectivity	Area	The area of active floodplain at and upstream of the habitat should be maintained.

Table 5 – Water Courses of Plain to Montaine Levels

River Lamprey (1099)

The SSCO for this habitat is to *restore* its favourable conservation condition which is defined by the following list of attributes and targets:

Attribute	Measure	Target
Distribution: extent of anadromy	% of river accessible	Greater than 75% of main stem and major tributaries down to second order accessible from estuary
Population: structure of juveniles	Number of age / size groups	At least three age / size groups of river / brook lamprey present
Juvenile density in fine sediment	Juveniles / m ²	Mean catchment juvenile density of brook / river lamprey at least 2/m ²
Extent and distribution of spawning habitat	M ² and occurrence	No decline in extent and distribution of spawning beds
Availability of juvenile habitat	Number of positive sites in 2ns order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive

Table 6 – SSCOs for River Lamprey

Brook Lamprey (1096)

The SSCO for this habitat is to *restore* its favourable conservation condition which is defined by the following list of attributes and targets:

Attribute	Measure	Target
Distribution	% of river accessible	Access to all watercourses down to first order streams
Population: structure of juveniles	Number of age / size groups	At least three age / size groups of brook lamprey present
Juvenile density in fine sediment	Juveniles / m ²	Mean catchment juvenile density of brook lamprey at least 2/m ²
Extent and distribution of spawning habitat	M ² and occurrence	No decline in extent and distribution of spawning beds
Availability of juvenile habitat	Number of positive sites in 2ns order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive

Table 7 – SSCOs for Brook Lamprey

Salmon (1106)

The SSCO for this habitat is to *restore* its favourable conservation condition which is defined by the following list of attributes and targets:

Attribute	Measure	Target
Distribution: extent of anadromy	% of river accessible	100% of river channels down to second order accessible from estuary
Adult spawning fish	Number	Conservation Limit (CL) for each system consistently exceeded
Salmon fry abundance	No of fry / 5 mins electrofishing	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry / 5 minute sampling
Out-migrating smolt abundance	Number	No significant decline
Number and distribution of reeds	Number and Occurrence	No decline in number and distribution of spawning redds due to anthropogenic causes
Water quality	EPA Q Value	At least Q ₄ at all sites sampled by the EPA.

Table 8 – SSCOs for Salmon

Otter (1355)

The SSCO for this species is to *restore* its favourable conservation condition which is defined by the following list of attributes and targets:

Attribute	Measure	Target
Distribution	% positive survey sites	No Significant Decline
Extent of Terrestrial Habitats	Hectares	No significant decline. Area mapped and calculated as 122.8ha above high water mark (HWM); 1136ha along riverbanks / around ponds
Extent of Marine Habitats	Hectares	No significant decline. Area mapped and calculated as 857.7ha
Extent of Freshwater (River) Habitat	Km	No significant decline. Length mapped and calculated as 616.6km
Extent of Freshwater (Lake) Habitats	Hectares	No significant decline. Area mapped and calculated as 2.6ha
Couching Sites and Holts	Number	No significant decline
Fish Biomass Available	Kg	No significant decline

Table 9 – SSCOs for Otter

White-clawed crayfish (1092)

The SSCO for this habitat is to *maintain* its favourable conservation condition which is defined by the following list of attributes and targets:

Attribute	Measure	Target
Distribution	Occurrence	No reduction from baseline
Population structure: recruitment	Percentage occurrence of juveniles and females with eggs	Juveniles and / or females with eggs in at least 50% of positive samples
Negative indicator species	Occurrence	No alien crayfish species
Disease	Occurrence	No instances of disease
Water quality	EPA Q value	At least Q3-4 at all sites sampled by the EPA
Habitat quality: heterogeneity	Occurrence of positive habitat features	No decline in habitat heterogeneity or habitat quality

Table 10 – SSCOs for Crayfish

Nore freshwater pearl mussel (1990)

The SSCO for this habitat is to *restore* its favourable conservation condition which is defined by the following list of attributes and targets:

Attribute	Measure	Target
Distribution	Km	Maintain at 15.5km (Map 7 of SSCOs)
Population size: adult mussels	Number	Restore to 5,000 adult mussels
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.
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
Habitat extent	Km	Restore suitable habitat in length of river corresponding to distribution target (15.5km) and any additional stretches necessary for salmonid spawning
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
Substratum quality: Filamentous algae (macroalgae), macrophytes (rooted higher plants)	Percentage	Restore substratum quality-filamentous algae: absent or trace (<5%); macrophytes: absent or trace (<5%)
Substratum quality: sediment	Occurrence	Restore substratum quality-stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment.
Substratum quality: oxygen availability	Redox potential	Restore to no more than 20% decline from water column to 5cm depth in substrate
Hydrological regime: flow variability	m/s	Restore appropriate hydrological regimes
Host fish	Number	Maintain sufficient juvenile salmonids to host glochidial larvae

Table 11 – SSCOs for Nore Freshwater Pearl Mussel

Potential Impacts

Potential impacts upon this SAC and its QIS have been considered and include:

- Pollution of water in the River Nore and its tributaries at points close to the application site arising from poor surface water management on the farm;
- Pollution of groundwater at points close to the farm yard due to inappropriate management of surface waters and farms structures;
- Pollution of surface water or groundwater arising from the land-spreading of the manure produced on the farm.

RIVER NORE (SPA 004233)

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.

The NPWS have not yet produced SSCOs for this SPA. However, the main target of this SPA would be to protect the numbers and habitats of the kingfisher. Records held by the National Biodiversity Data Centre for this species confirm its presence along the River Nore within the Zone of Influence of the application site and its spread lands. Therefore, impacts upon this species must be considered further. The main threat to this species would arise from deteriorations in water quality arising from poor surface water management on the farm yard and from inappropriate land-spreading. A deterioration in water quality further may affect the ecological integrity of the River Nore and subsequently on the food chain that this bird depends on.

4.3 IDENTIFICATION OF POTENTIAL IMPACTS

INTRODUCTION

The identification of impacts and the assessment of their significance typically requires the identification of the type and magnitude of the impacts. For example, will the impacts be short term or long term, direct, indirect or cumulative and will they occur during construction or operation. This section will establish whether the impacts of the application at Attanagh that were identified in the previous section, are likely to occur and whether or not they are significant. These potential impacts will be examined with respect to the conservation objectives of the Natura 2000 site identified.

In the screening section of this report, the following possible future impacts on the River Barrow and Nore SAC and River Nore SPA were listed. These concerns are again listed below and they will be dealt with in more detail in this section.

1. Deterioration in water quality in designated areas arising from pollution due to the continuation of farm activities within the application site itself. Inappropriate surface water management in the farm-yard may lead to impacts upon the River Nore and Barrow SAC and the River Nore SPA. Negative impacts upon local groundwater resources and subsequent effects on the Natura 2000 sites have also been considered.
2. Potential impacts on water quality within the River Barrow and Nore SAC / River Nore SPA arising from the use of manure produced on the farm. Negative impacts upon local groundwater resources and subsequent effects on the Natura 2000 sites have also been considered.
3. Cumulative impacts.

Deterioration in Water Quality in the Natura 2000 arising from the Farm Yard Operations

The continued operation of the farm yard will potentially result in the creation of contaminated surface water. In times of heavy rain fall and in the absence of mitigation, there is the possibility that excess surface water from the application site will run towards drains and watercourses that eventually lead to the River Barrow and Nore SAC and the River Nore SAC.

Therefore, possible direct impacts on the SAC / SPA include the pollution of the water with silt, oil, farm yard manure or slurry. This could potentially affect the Qualifying Interest habitats of the SAC and it could directly affect the habitat of protected species by causing

eutrophication and reducing water quality. These substances would also have a toxic effect on the ecology of the water in general, directly affecting certain species, such as the otter, salmon, lamprey, crayfish and kingfisher and their food supplies. An increase in the levels of silt in the water could also create barriers to the movement of these species.

However, as there are no watercourses or drains within or adjacent to the application site that lead to the SAC/SPA, overall, this risk is considered to be insignificant and it may only arise in the absence of mitigation and during periods of very heavy rainfall.

The application site was also assessed in terms of its groundwater vulnerability. An examination of the Groundwater Vulnerability maps produced by the Geological Survey of Ireland revealed that the farm yard is located within an area of high groundwater vulnerability. Areas of extreme groundwater vulnerability occur to the north, south and south-west of the site. Any structural weaknesses in the effluent tanks on the site, along with poor management of the surface water on the site could lead to impacts upon groundwater in the locality. Groundwater quality can impact upon surface water quality as these two resources mix at the hyporheic zone, which is the region just under a river or stream bed where there is a mixing of ground water and surface water. Therefore, in the absence of mitigation, risks to the SAC / SPA arising from deteriorations in groundwater locally cannot be excluded.

LAND-SPREADING

The land-spreading of the manure produced at the farm will occur on land within the Nore catchment, and the applicant has land-holdings within, adjacent and hydrologically connected to the SAC and SPA. General environmental impacts arising from inappropriate land-spreading of manure can lead to serious impacts upon the receiving waters in local catchments and it can result in eutrophication, algal blooms, fish kills and loss of biodiversity. Designated habitats and species can be impacted upon and it can take years for the eco-system to recover.

In addition, land-spreading in areas of high or extreme vulnerability or where bedrock occurs at the surface can also result in pollution of groundwater and subsequently on surface water resources. As the applicant has lands within areas that are of high – extreme vulnerability, therefore it cannot be ruled out that land-spreading in these areas would not lead to direct or indirect impacts upon the River Barrow and Nore SAC, the River Nore SPA, their qualifying interests and the targets and attributes that are required to either maintain or restore these interests in good conservation condition.

These potential impacts will need to be mitigated against.

CUMULATIVE IMPACTS

The potential for cumulative impacts arising from other significant existing or permitted infrastructure are assessed here. Cumulative impacts encompass the combined effects of multiple developments or activities on a range of receptors. Potential cumulative impacts associated with the existing and permitted significant infrastructure within the same water catchments as the development should be considered.

As part of the Appropriate Assessment, in addition to the existing development, other relevant projects and plans in the region must also be considered. This step aims to identify at this stage any possible significant in-combination or cumulative effects / impacts of the works on the Natura 2000 sites with other such plans and projects.

Laois County Development Plan

Planning policy at the local level is provided by the Laois County Development Plan 2017–2023. This plan contains a number of policies relevant to the ecology and nature conservation in Co. Laois. This plan was accompanied by a Natura Impact Report (Caas, 2017). The implementation of this plan will not lead to any cumulative impacts when considered in-combination with this current application at Attanagh.

Future Plans / Other Projects

The Laois County Council planning map tool was used to identify any future plans or projects in the Grenan / Attanagh areas which may potentially impact in-combination with the application on any Natura 2000 sites. A search was made for applications within the last five years. In this time, a number of planning applications were granted in the Attanagh area for domestic and agricultural developments, and where necessary these were accompanied by AA reports.

In relation to current and future planning applications, Laois County Council, as the competent authority, will screen each application for AA. Any new application will be examined and the requirement for screening for AA or NIS will be determined on a case by case basis to comply with the requirements of Article 6 of the Habitats Directive.

5 MITIGATION MEASURES

In order to avoid any reductions in water quality in the area surrounding the application site in Attanagh, a number of mitigation measures must be implemented and followed. These measures will protect the water quality and integrity of the River Barrow and Nore SAC and any other local watercourses. Measures have also been suggested that will help to protect the local biodiversity of the surrounding area and to ensure the protection of local wildlife. Although these are standard mitigation measures, their implementation will ensure the protection of Natura 2000 habitats and species, and the local non-designated ecological receptors. The primary parties responsible for the implementation of these measures include the applicants and the construction team (site manager, site workers). The local authority will be responsible for the enforcement of these measures.

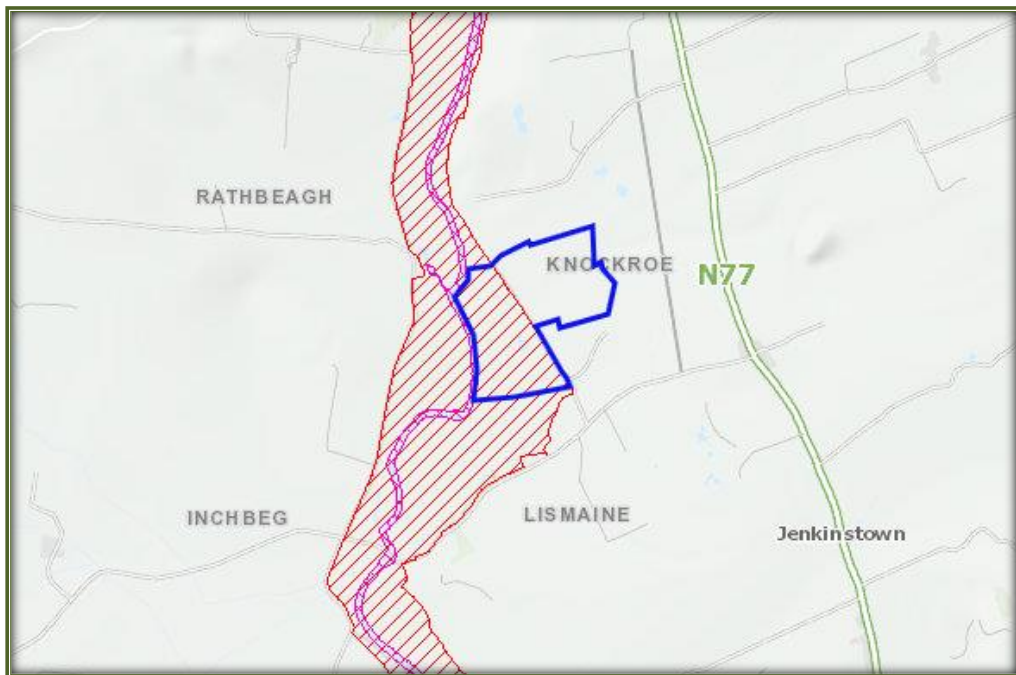
Continued Farm Yard Operation

- Guidelines within the Department of Agriculture's Explanatory Handbook for Good Agricultural Practice Regulations must be followed at all stages of the operation of the yard.
- It is recommended that the farm structures proposed for retention are inspected by an engineer to confirm that they adhere to the Department of Agriculture's Farm Building and Structures Specifications.
- A detailed Surface Water Management plan should be prepared for the farm, outlining the predicted volumes of waste that will be generated on the farm going forward.
- It is imperative that the surface water generated on the farm is managed appropriately. It is advised that it is directed to a suitably designed soakpit, via appropriate oil and silt interceptors.
- Manure, slurry and soiled water storage facilities should be constructed to Department of Agriculture, Food and The Marine specifications. They should be inspected regularly.

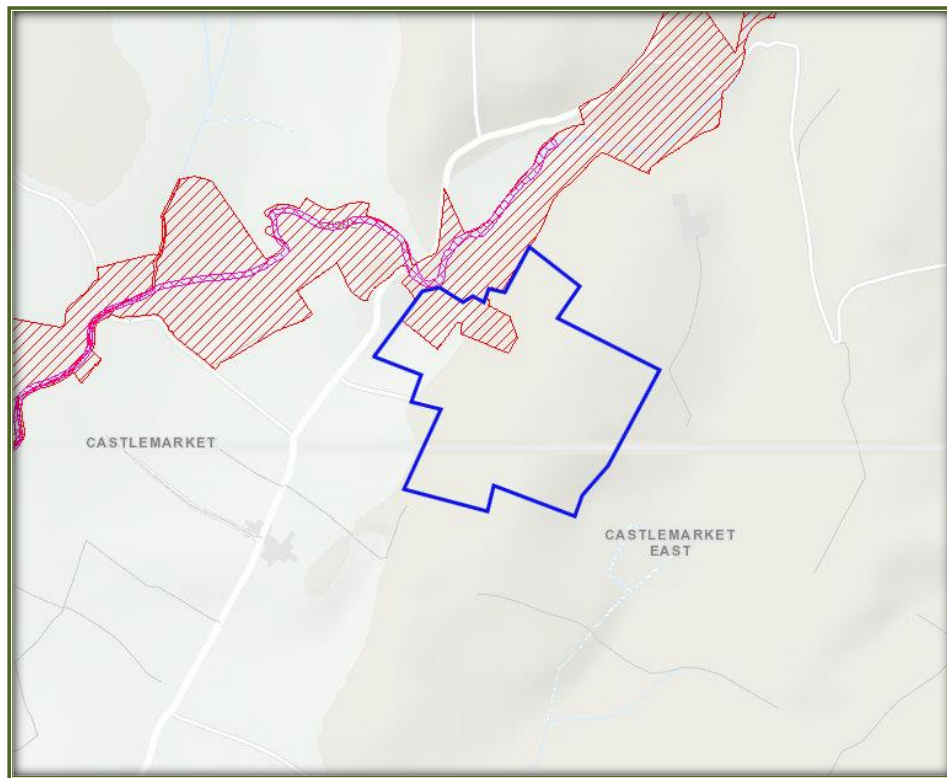
Land-Spreading and Farm Operation

In order to avoid any reductions in water quality within the catchment as a whole, all organic fertiliser must be used in accordance with S.I. 605 of 2017 European Communities (Good Agricultural Practice for Protection of Waters) Regulations, 2017). The following measures should be implemented at the applicant’s farm on an ongoing basis.

- Manure should only be spread in accordance with the Nutrient Management Plan for the farm and in accordance with S.I. 605 of 2017.
- The applicant has land-holdings within the River Barrow and Nore SAC, with 30 acres in Knockroe and 5 acres in Castlemarket. These areas should be excluded from land-spreading activities. Spreading should occur on alternate land-holdings within the farm. The areas that should be excluded are illustrated below.



Landholding at Knockroe, Land-Spreading within the SAC should not occur



Landholding at Castlemarket, Land-Spreading within the SAC should not occur

- All silt drains and farm yard discharge should be in accordance with the specifications within the Department of Agriculture’s “Minimum specification for Farmyard Drainage, Concrete Yards and Roads”.
- Manure should not be spread in areas where bedrock occurs at the surface. Manure should not be spread in areas of extreme groundwater vulnerability unless a consistent minimum thickness of soil and subsoil is demonstrated according to the Geological Survey Ireland Response Matrix for Landspreading.”
- The amount of livestock manure applied in any year to land on a holding, together with that deposited to land by livestock, shall not exceed an amount containing 170 kg nitrogen per hectare (250kg under derogation applied to this farm).
- To avoid contamination of the local watercourses in areas identified for land-spreading, a minimum buffer zone of 10m for any main river channels and 5m for smaller watercourses should be adhered to at all times during the application of effluent. Buffer zones should be increased depending on the gradient of the land. *In addition, when the waterbody is with 1km upstream of a water dependent designated site (SAC / SPA) the buffer for a river should be increased to 20m while a stream should be increased to 10m.*

- Manure should not be applied within 3m of open field drains or ditches in accordance with Good Agricultural Practice for Protection of Water 2017 S.I. 605 of 2017.
- Land spreading should only take place when suitable climatic and environmental conditions exist. Spreading should be avoided on:
 - wet or waterlogged soils
 - land sloping steeply towards water courses
 - frozen or snow covered soils
- Effluent should not be applied in proximity of hedgerows and field margins. This will maintain the biodiversity of these areas and allow for a more natural ecological corridor.
- The spreading of any organic fertiliser during certain times of the year is prohibited (The prohibited spreading period, generally between Mid-October and Mid-January).
- The applicant must keep within the overall maximum fertilisation rates for nitrogen and phosphorus.
- The applicant must have sufficient storage capacity to meet the minimum requirements of the regulations.
- All storage facilities must be kept leak proof and structurally sound.
- Records for the movement of fertilisers must be kept.
- Chemical fertilisers, livestock manure and other organic fertilisers, effluents and soiled water must be spread as accurately and as evenly as possible.
- An upward-facing splash plate or sludge irrigator on a tanker or umbilical system must not be used for the spreading of organic fertiliser or soiled water.
- Chemical fertilisers, livestock manure, soiled water or other organic fertilisers must not be spread when:
 - The land is waterlogged;
 - The land is flooded, or it is likely to flood;

- The land is frozen, or covered with snow;
- Heavy rain is forecast within 48 hours;
- The ground slopes steeply and there is a risk of water pollution, when factors such as surface run-off pathways, the presence of land drains, the absence of hedgerows to mitigate surface flow, soil condition and ground cover are taken into account.
- Chemical fertilisers must not be spread on land within 2 metres of a surface watercourse.
- Soiled water, effluents, farmyard manures or other organic fertilisers must not be spread inside the buffer zones specified in S.I. 605 of 2017, i.e.,
 - Any water supply source providing 100m³ or more of water per day, or serving 500 or more people – 200m;
 - Any water supply source providing 10m³ or more of water per day, or serving 50 people or more – 100m;
 - Any other water supply for human consumption – 25m;
 - Lake shoreline or a turlough likely to flow – 25m;
 - Exposed cavernous or karstified limestones features – 15m;
 - Any surface watercourse where the slope towards the watercourse exceeds 10% - 10m;
 - Any other surface waters – 5m.
- The applicant should liaise with National Parks and Wildlife Service in regards to the proper management of the callow habitats. It is recommended that in conjunction with the NPWS, that the applicant participates in the NPWS Farm Plan Scheme (<https://www.npws.ie/farmers-and-landowners/schemes/npws-farm-plan-scheme>).
- The applicant has land-holdings adjacent to a number of watercourses. The opportunity exists here for the creation of natural riparian buffer zones which will have positive impacts on biodiversity and water quality.

5.1 FINDING OF NO SIGNIFICANT EFFECTS

Finding of No Significant Effects Report Matrix	
Name of project	Application to An Bord Pleanála for leave to apply for Substitute Consent for an Application in Grenan, Attanagh, Co. Laois.
Name and location of Natura 2000 site	Application Site is 743m east of the River Barrow and Nore SAC and it is 1.1km east of the River Nore SAC. Land-spreading areas potentially within and adjacent to the application site.
Description of project	An Agricultural Development that needs planning regulation.
Is the project directly connected with or necessary to the management of the site?	No
Are there other projects or plans that together with project being assessed could affect the site?	No
The Assessment of Significance of Effects	
Describe how the project is likely to affect the Natura 2000 site	Without mitigation, potential affects upon water quality in the SAC / SPA exist, due to reductions in water quality.
Explain why these effects are not considered significant	With mitigation, the significance of these affects and the subsequent effects on the SAC / SPA will be reduced.
Describe how the project is likely to affect species designated under Annex II of the Habitats Directive.	Reductions in water quality locally may affect these species.
Data Collected to Carry out the Assessment	
Who carried out the assessment	Noreen McLoughlin, MSC, MCIEEM. Consultant Ecologist
Sources of data	NPWS, EPA, National Biodiversity Data Centre, Laois County Council,
Level of assessment completed	Stage II Appropriate Assessment (NIS)
Where can the full results of the assessment be accessed and viewed	Full results included

6 APPROPRIATE ASSESSMENT CONCLUSION

This current NIS has been undertaken to evaluate the potential impacts of the development with regard to the effects upon the conservation objectives and qualifying interests (including the habitats and species) of the River Barrow and Nore SAC and the River Nore SPA. It is considered that following mitigation, that the project does not have the potential to significantly affect the conservation objectives of these aforementioned Natura 2000 sites and the integrity of these sites as a whole will not be adversely impacted.

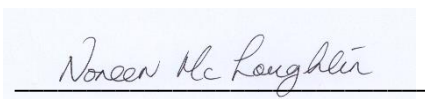
The qualifying interests of the site and their potential to be impacted upon from the potential development were listed in Section 4.2. It is considered that these potential impacts can be successfully mitigated against. With implementation of the mitigation measures there will be no deterioration in water quality or impacts upon any designated habitat or any species dependent on these designated habitats. The attributes and targets which have been set out in order to maintain or restore the favourable conservation condition of these interests in the SAC will not be impacted upon.

In light of the above, it is considered that with the implementation of the mitigation measures, that the development and its subsequent activities do not have the potential to significantly affect the conservation objectives or qualifying interests of the River Barrow and Nore SAC. The integrity of the site will not be adversely affected. Table 12 follows the integrity of the SAC / SPA checklist, which shows that the integrity of the site would not be affected by the development.

Conservation Objective: Does the project have the potential to:	Yes / No
Cause delays in progress towards achieving the conservation objectives of the site?	N
Interrupt progress towards achieving the conservation objectives of the site?	N
Disrupt those factors that help to maintain the favourable conditions of the site?	N
Interfere with the balance, distribution and density of key species that are the indicators of the favourable condition of the site?	N
Other Objectives: does the project have the potential to:	
Cause changes to the vital defining aspects (e.g. nutrient balance) that determine how the site functions as a habitat or ecosystem?	N

Change the dynamics of the relationships (between, for example, soil and water or plants and animals) that define the structure and/or function of the site?	N
Interfere with predicted or expected natural changes to the site (such as water dynamics or chemical composition)?	N
Reduce the area of key habitats?	N
Reduce the population of key species?	N
Change the balance between key species?	N
Reduce diversity of the site?	N
Result in disturbance that could affect population size or density or the balance between key species?	N
Result in fragmentation?	N
Result in loss or reduction of key features (e.g. tree cover, tidal exposure, annual flooding, etc.)	N

Table 5 – Integrity of Site Checklist (From NPWS, Information Checklist for AA, Box 6, EC (2002))



Noreen McLoughlin, MSc, MCIEEM.
Ecologist.

APPENDIX I - REFERENCES AND FURTHER READING

Bailey, M. & Rochford, J. (2006) Otter survey of Ireland 2004 / 2005. Irish Wildlife Manuals No. 23. National Parks & Wildlife Service. DoEHLG.

Bowers Marriott, B. (1997) Practical Guide to Environmental Impact Assessment: A Practical Guide. Published by McGraw-Hill Professional, 1997, 320 pp.

Cummins, S; Fisher, J; Gaj McKeever, R; McNaghten, L & Crowe, O. (2010) Assessment of the Distribution and abundance of Kingfisher *Alcedo atthis* and other riparian birds on six SAC river systems in Ireland. NPWS & Birdwatch Ireland.

Department of the Environment, Heritage and Local Government (2009) Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities.

Dwyer, (2000) *Protecting Nature in Ireland, The NGO Special Areas of Conservation Shadow List*. Published by the Irish Peatland Conservation Council, Dublin.

EPA (2001) Parameters of Water Quality - Interpretation and Standards. Environmental Protection Agency, Ireland.

EPA (2002) *Guidelines on the Information to be contained in Environmental Impact Statements*. Environmental Protection Agency, Ireland.

EPA (2003) *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements*. EPA, Wexford, Ireland.

EPA (2012) Guidance on the setting of trigger values for storm water discharges to off site surface waters at EPA licensed IPPC and waste facilities. EPA, Wexford.

Fossit, J.A. (2000) *A Guide to Habitats in Ireland*. The Heritage Council, Kilkenny.

Hayden, T. & Harrington, R. (2000) *Exploring Irish Mammals*. Dúchas the Heritage Service, Town House Dublin.

Institute of Environmental Assessment (1995) *Guidelines for Baseline Ecological Assessment*. Institute of Environmental Assessment, Great Britain.

Igoe, D.T., Quigley, G., Marnell, F., Meskill, E., O'Connor, W. and Byrne, C. (2004) The Sea Lamprey *Petromyzon marinus*(l.), River Lamprey *Lampetra fluviatilis*(l.) and Brook Lamprey *Lampetra planeri*(bloch) in Ireland: General Biology, Ecology, Distribution and Status with Recommendations for Conservation. Biology And Environment: Proceedings Of The Royal Irish Academy, Vol.104b, No.3, 43/56.

IUCN (2003) *Red List of Threatened Species*. International Council for Conservation of Nature and Natural Resources.

Kurz, I. and Costello, M.J. (1999) An Outline Of The Biology, Distribution And Conservation Of Lampreys In Ireland. F. Marnell (ed.), Irish Wildlife Manuals, No. 5.

Ó Néill L. (2008) Population dynamics of the Eurasian otter in Ireland. Integrating density and demography into conservation planning. PhD thesis. Trinity College, Dublin.

Natura Environmental Consultants (2005) Draft Habitat Survey Guidelines: A Standard Methodology for Habitat Survey and Mapping in Ireland. The Heritage Council, Kilkenny.

NPWS (2008) Conservation Status in Ireland of Habitats and Species listed in the European Council Directive on the Conservation of Habitats, Flora and Fauna 92/43/EEC

NPWS (2009) Otter Threat Response Plan 2009 – 2011. National Parks & Wildlife Service.

NPWS (2011) Conservation Objectives : River Barrow and Nore SAC. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NRA (2004) *Guidelines for Assessment of Ecological Impacts of National Road Schemes*. National Roads Authority, Dublin.

Whilde, A. (1993) *Threatened Mammals, Birds, Amphibians and Fish in Ireland*. Irish Red Data Book 2: Vertebrates. HMSO, Belfast.