[redacted]

From: O'Malley Vincent
Sent: Monday 23 May 2022 16:38
To: Nea Christian
Cc: Phelan Sarah-Jane; Watt Robbie
Subject: RE: Re. Borrisokane Mill Race – AA Screening

Christian,
I accept the reasoned determination set out below.
Sincerely
Vincent

From: Nea Christian <[redacted]>
Sent: Thursday 19 May 2022 10:08
To: O'Malley Vincent [redacted]
Cc: Phelan Sarah-Jane <[redacted]>; Watt Robbie <[redacted]>
Subject: FW: Re. Borrisokane Mill Race – AA Screening

Vincent,

Please find attached copies (Word and PDF) of the revised screening report that resolve comments provided by both Robbie and myself previously (which you were carbon-copied on and will be aware of). Robbie has reviewed Paul's responses to these comments and indicates that it can be excluded on the basis of objective scientific information following the screening done that the proposed works, individually or in combination with other plans or projects, will have a significant effect on any European site.

Having reviewed the information referred to in the email chain below and having regard to the minor nature and extent of the works, I recommend that the following reasoned determination can be made:

> *"Having performed screening for Appropriate Assessment in respect of the proposed reactive maintenance works detailed in the email (and attached reports) received from Paul O'Donoghue dated the 5th of May 2022, and entitled '*RE: Re. Borrisokane Mill Race – AA Screening'*, I accept the recommendations of Atkins that the proposed reactive maintenance works, individually or in combination with other plans or projects, would not be likely to have a significant effect on any European site in view of the best scientific knowledge and the site's conservation objectives. I determine that an Appropriate Assessment of these proposed works is not required, as it can be excluded on the basis of objective scientific information following the screening done that the proposed works, individually or in combination with other plans or projects, will have a significant effect on any European site."*

Kind regards,

Christian.

From: Watt Robbie <[redacted]>
Sent: Thursday 12 May 2022 14:20
To: Nea Christian <[redacted]>
Cc: Phelan Sarah-Jane <[redacted]>
Subject: RE: Re. Borrisokane Mill Race – AA Screening

Hi Christian,

I have reviewed the amended AA Screening in response to our comments. All comments have been addressed with the key comments discussed below:

- More information provided on the potential for water ingress into the mill race, and therefore hydrological connectivity with the Ballyfinboy River and SAC/SPA. No inflow is anticipated from the Ballyfinboy River (via the old inflow to the mill race) and run-off from the adjacent roads no longer drains into the mill race following the works in 2017. Water currently pooling in sections of the mill race is likely to originate from rainwater ingress during heavy rainfall events or via groundwater flow during periods of high river levels. To minimise the possibility of water ingress from these sources during works the works will be undertaken during dry weather in the summer, when the river level will be low. Based on the above no flow of water is anticipated through the mill race during the works.
- Site specific conservation objectives are now mentioned in the text and listed in an Appendix

The above information can support a conclusion that the works will not result in likely significant effects on any European sites.

Thanks,
Robbie

From: Nea Christian <[redacted]>
Sent: Monday 9 May 2022 10:08
To: Watt Robbie <[redacted]>
Cc: Phelan Sarah-Jane <[redacted]>
Subject: FW: Re. Borrisokane Mill Race – AA Screening

Hi Robbie,
Could you have a look at below and get back to me when you have a chance?

Kind regards,

Christian.

From: O'Donoghue, Paul <[redacted]>
Sent: Thursday 5 May 2022 13:20
To: Nea Christian <[redacted]>
Cc: Watt Robbie <[redacted]>; O'Malley Vincent <[redacted]>; Phelan Sarah-Jane <[redacted]>; kwilson <[redacted]>; Duffy Liam <[redacted]>; Gilsenan, Mark <[redacted]>; Daly, Vincent <[redacted]>; Jennings, Martin <[redacted]>
Subject: RE: Re. Borrisokane Mill Race – AA Screening

Christian

Thanks for sending on comments on Borrisokane. I've addressed comments from you and Robbie. Attached is an MS Word document with changes tracked so you can quickly find the updated sections. I've then attached a fully revised Revision 1.0 pdf.

Don't hesitate to give me a call if you have any questions.

Regards

Paul

Paul O' Donoghue *BSc PhD CEnV MCIEEM*
Associate Director, Ecology
Ireland

[redacted]

From: Nea Christian <[redacted]>
Sent: 2022-04-20 14:12
To: O'Donoghue, Paul <[redacted]>
Cc: Watt Robbie <[redacted]>; O'Malley Vincent <[redacted]>; Phelan Sarah-Jane [redacted]>; kwilson <[redacted]>; Duffy Liam <[redacted]>
Subject: FW: Re. Borrisokane Mill Race – AA Screening

Paul,
Please find below and attached Robbie's comments. I also include my comments embedded in the screening report. I would share Robbie's comments, including the one relating to uncertainty as to the hydrological connectivity between the culvert/millrace and river.

Kind regards,

Christian.

From: Watt Robbie <[redacted]>
Sent: 14 April 2022 10:57
To: Nea Christian <[redacted]>
Subject: RE: Re. Borrisokane Mill Race – AA Screening

Morning,

I've been through this. Main point is the uncertainty as to the hydrological connectivity between the culvert and the Ballyfinboy River. Lots of measures described to limit potential of water quality effects that could be construed as mitigation. May be more appropriate to determine LSE then introduce mitigation at AA stage. Either that or more detail required to rule out LSE from water quality effects (including detail on potential 'worst case scenarios' etc).

Notes attached but above is the main point.

Regards,

Robbie

From: Nea Christian [redacted]
Sent: Monday 11 April 2022 09:53
To: Watt Robbie <[redacted]>
Subject: FW: Re. Borrisokane Mill Race – AA Screening

From: O'Donoghue, Paul <[redacted]>
Sent: Monday 4 April 2022 20:58
To: Nea Christian [redacted]
Cc: Gilsenan, Mark <[redacted]>; Daly, Vincent <[redacted]>; Jennings, Martin <[redacted]>; kwilson <[redacted]>
Subject: Re. Borrisokane Mill Race – AA Screening

Christian

Re. Borrisokane Mill Race – AA Screening

Please find attached a Screening for Appropriate Assessment for proposed works at Borrisokane, Co. Tipperary. Don't hesitate to give me a call if you have any questions.

Regards

Paul

Paul O' Donoghue *BSc PhD CEnV MCIEEM*
Associate Director, Ecology
Ireland

[redacted]

De réir pholasaí BIÉ An Ceart gan a bheith Ceangailte, má tá an ríomhphost seo á fháil agat lasmuigh de na gnáthuaireanta oibre, nílim ag súil le freagra ná le gníomh uait lasmuigh de do ghnáthuaireanta oibre féin mura bhfuil sé ráite go soiléir go bhfuil gá gníomhú go práinneach.

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ATKINS

Member of the SNC-Lavalin Group

Borrisokane Mill Race Culvert

Screening for Appropriate Assessment

Transport Infrastructure Ireland

05/05/22

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Document history

Revision	Purpose description	Origin-ated	Checked	Reviewed	Authorised	Date
Rev 0.0	Revision 0.0	POD	POD	POD	MJ	04-04-22
Rev 1.0	Revision 1.0	POD	POD	POD	MJ	05-05-22

Client signoff

Client	Transport Infrastructure Ireland
Project	Borrisokane Mill Race Culvert
Job number	5162555
Client signature / date	

Contents

Tables

Figures

Plates

1. Introduction

Atkins Ireland have been commissioned by Transport Infrastructure Ireland to prepare a Screening for Appropriate Assessment report for proposed repair works to Borrisokane Mill Race Culvert, in Borrisokane, Co. Tipperary.

1.1. Site Location

Borrisokane Mill Race Culvert (see Figure 1-1) is located on the junction of the N65 and the N52 in the town of Borrisokane, Co. Tipperary. The structure consists of a masonry arch culvert (2.4m span) with a concrete extension on the west side (3.2m span) and a precast concrete pipe outfall, (1.2m internal diameter). The structure commences approximately 20-50m east of the junction and runs parallel to the N52 before crossing under the N52 at the junction and outfalls approximately 100m west of the junction in the adjoining park area (from RPS, Eirspan. Borrisokane Mill Race Culvert Stage 1 Assessment Report; RPS, 2017).

1.2. Proposed Development

1.2.1. Previous Works

Works were previously undertaken at this location in 2017 and were subject to Screening for Appropriate Assessment (Arup, 2017). The site of these works was located in the town of Borrisokane which is located approximately 18km north of Nenagh. The length of proposed carriageway works was approximately 2.2km.

The proposed development involved road resurfacing works, undergrounding of overhead services, culvert remedial works, upgrading of public lighting system, drainage works, street landscaping (including planting of trees), footpath modification & replacement as well as provision of informal crossings and upgrading of existing zebra crossing to signalised puffin crossing.

It was concluded in the Screening for Appropriate Assessment that the proposed works would not result in any significant impacts on the Lough Derg, North-East Shore SAC or the Lough Derg (Shannon) SPA, or any other Natura 2000 site, resulting from the proposed works.

1.2.2. Proposed Works

The proposed development relates to the completion of the repair works to Borrisokane Mill Race Culvert, which have been partially completed to date with the installation of 1.8m diameter precast concrete pipe units at the collapsed section of the structure and the construction of a reinforced concrete overslab over the structure. It is anticipated that the repair works will take 2 months to complete on site.

The proposed works to complete the repairs comprise the following: -

- Debris and silt clearance through the structure
- Masonry repair and repointing to the arch barrel sections
- Grouting of any voids behind the arch barrels
- Installation of a concrete invert to the masonry arch sections (only in areas where no existing stonework invert present) (75m^2 total area, minus any areas containing existing stonework floor; works will take approximately 1 week after culvert has been cleared out).
- Concrete repairs to the interface between the recently installed reinforced concrete pipe units and the masonry arch sections (replacing the temporary sand bags which were left in place following previous works in the culvert).
- Removal of timber formwork propping from the interface between the precast pipe units and masonry arch sections

- Demolition of the existing manhole access chamber with the construction of a new larger manhole access chamber.
- Replacement of 4 no. existing precast pipe units at the outlet of the new manhole chamber.

A site compound will be located off the structure, in an area proposed by the appointed contractor but not within 50m of the watercourse. It may be necessary to store small amounts of fuel within the site compound and thus away from the bridge. Any refuelling to be done will be restricted to within the site compound area with drip trays in place. Furthermore, any chemical, fuel and oil stores will be located on an impervious base within a secured bund with a storage capacity 110% of the stored volume. The appointed Contractor will determine the need for welfare facilities. If required, these will also be located away from the bridge within the site compound, as will the need to park any vehicles.

Access to the works area shall be achieved through the existing manhole access which is to be demolished as part of the works. The structure shall be dewatered prior to works commencing in order to remove the build-up of silt and debris within the structure. All material will be then removed to a licenced tip off site.

Masonry Repairs and Repointing

All masonry repairs and repointing works to the existing masonry arches shall be carried out using similar materials and methods to the existing with existing stone and NHL5 mortar to be used throughout. Any additional imported stone required shall match the existing masonry in terms of size and appearance.

Grouting of the Arches

With respect to pressure grouting, this will be used to fill voids where evident behind stonework – on arch barrels and abutments. It is anticipated that the volume to be used would be over an area of 50m2 or a volume of approximately 25m3. Grout will be delivered to the works area via a pipe running from a cement truck parked on or close to the bridge above the works area. Grout will be directed into void spaces using a nozzle with a cut-off switch. The grout to be used is Portland cement. The grout will be finished recessed to the existing masonry and finished with NHL mortar pointing in order to respect the protected nature of the structure. The final strength of the grout shall not exceed that of the limestone masonry of the culvert and shall be low in shrinkage and have a good flow rate for effective penetration. Prior to appointment, the contractor shall provide a written methodology and specification for the grout for agreement with the Conservation Architect.

Installation of a concrete invert

A concrete invert is to be installed through the masonry sections of the structure with the concrete to be kept entirely separate from any historic masonry through the use of separation membranes where the new concrete construction abuts the historic masonry abutments. No concrete invert will be constructed where the culvert has an existing stonework invert with any existing stone surfaces to be retained in situ, consolidated using lime mortar and/or limecrete, and isolated from any new concrete slabs which will be laid to existing levels. The extent of works is 75m^2 (total area), minus any areas containing existing stonework floor. Works will take approximately 1 week after culvert has been cleared out.

1.3. Biosecurity protocols

While no invasive plant species listed on the 3rd Schedule of the Natural Habitats Regulations (SI No. 477/2011) have been recorded on site (TCC, 2017; Design Engineer *pers comm*), biosecurity protocols will be implemented during the construction phase of the proposed project to prevent the introduction of any such invasive species to the site.

All equipment intended to be used at the site shall be dry, clean and free from debris prior to being brought to site.

Options for cleaning of equipment that can be used by the appointed Contractor include: -

i. power steam washed at a suitably high temperature or at least 65 degrees, or

ii. disinfected with an approved disinfectant, e.g. Virkon or an iodine-based product. It is important that the manufacturer's instructions are followed and if required, the correct contact times are allowed for during the disinfection process. Items that are difficult to soak should be sprayed or wiped down with disinfectant.

During the duration of the proposed project, if equipment is removed off-site to be used elsewhere, the said equipment shall be cleaned and disinfected prior to being brought back to the works area of the proposed project.

Appropriate facilities shall be used for the containment, collection and disposal of material and/or water resulting from washing facilities of vehicles, equipment and personnel where such works are undertaken.

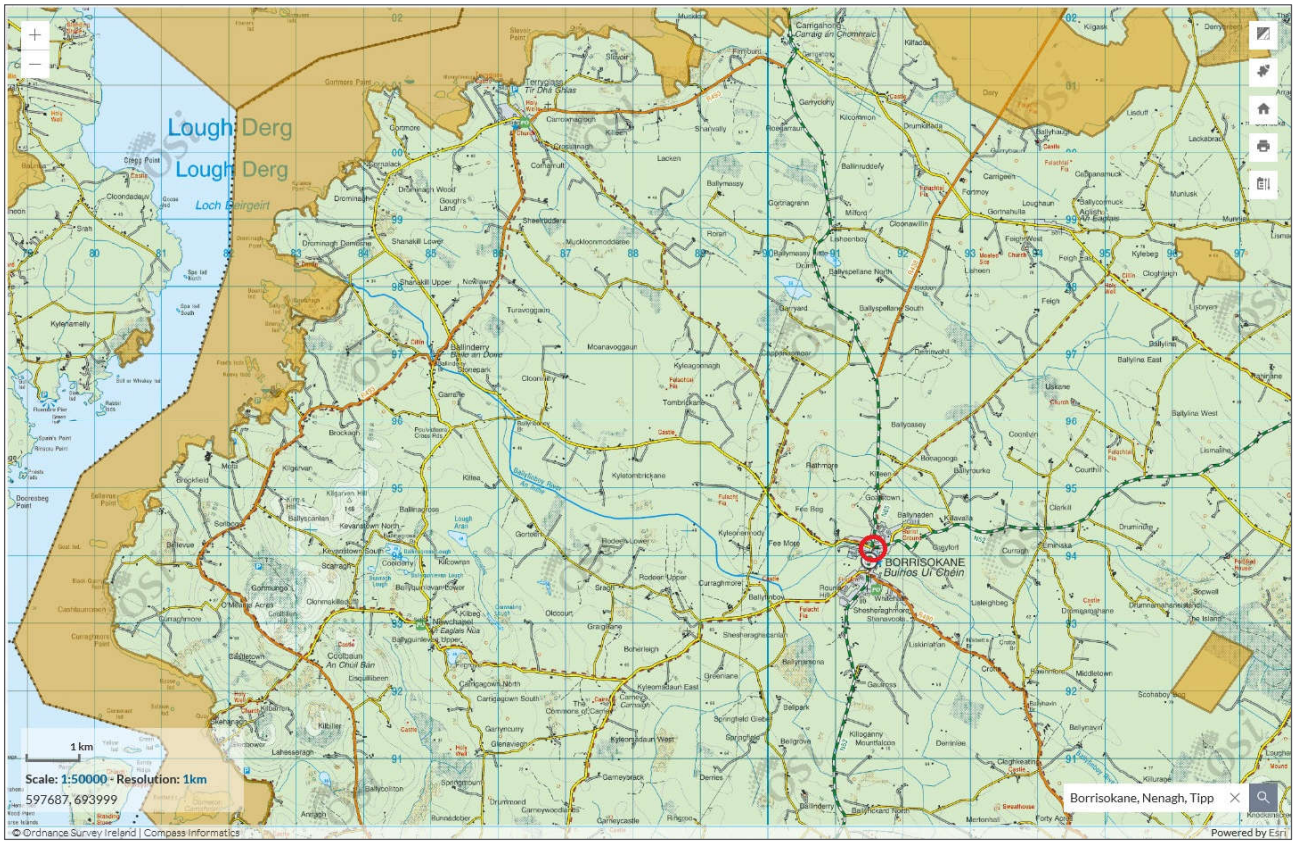

Figure 1.1 **Location of Borrisokane Mill race (red circle) and Lough Derg, North-east Shore SAC (brown)** (Source: NBDC mapviewer).

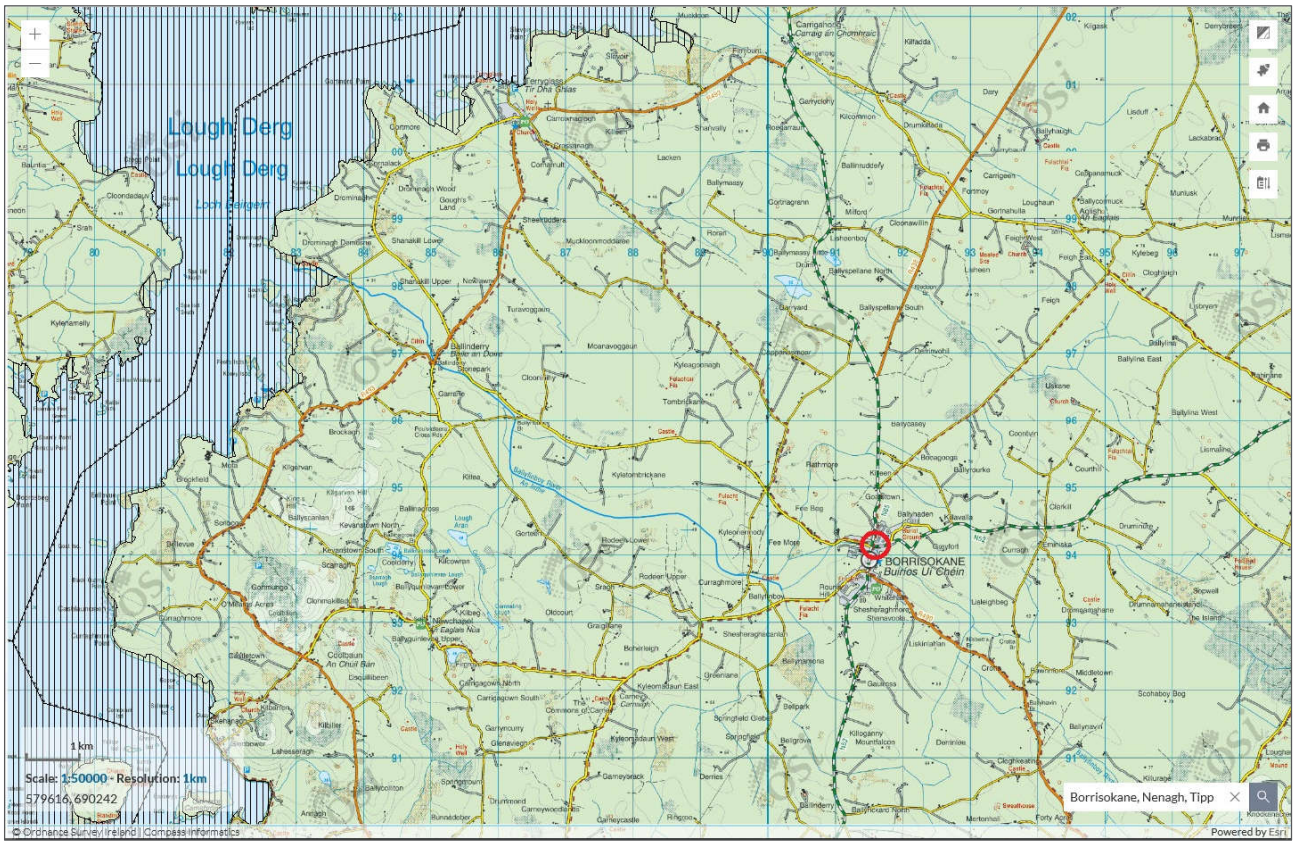

Figure 1.2 **Location of Borrisokane Mill race (red circle) and Lough Derg (Shannon) SPA (hatched)** (Source: NBDC mapviewer).

2. Scope of Study

The aim of this report is to provide supporting information to assist the competent authority to carry out an Appropriate Assessment determination with respect to the proposed project.

2.1. Legislative Context

Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Fauna and Flora, known as 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 conservations of an EU-wide network of sites known as European sites. European 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 set out the decision-making tests for plans or projects that could potentially affect European 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 or project will adversely affect a European site. Alternative solutions, imperative reasons of overriding public interest (IROPI) 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 State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.*
>
> *Where the site concerned hosts a priority natural habitat type and/or 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."*

2.2. Appropriate Assessment Process

Guidance on the AA process was produced by the European Commission (EC, 2018; 2021), which was subsequently used to develop guidance for Ireland by the Department of Environment, Heritage and Local Government in 2009 (DEHLG, 2009), National Parks and Wildlife Service in 2018[1] (NPWS, 2018) and the Office of the Planning Regulator (2021). These guidance documents set out a staged approach to complete the AA process and outline the issues and tests at each stage. The stages outlined below are taken from the guidance document Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities (DEHLG, 2009).

[1] https://www.npws.ie/development-consultations

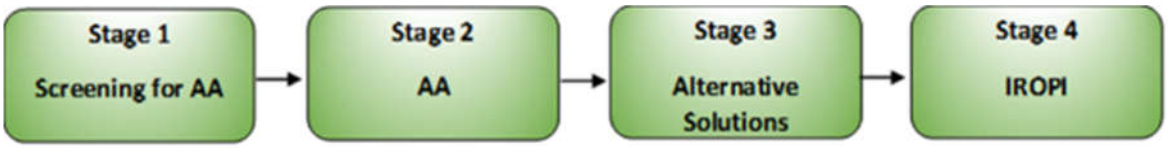

Figure 2.1 Appropriate Assessment Process (Source: DEHLG, 2009).

2.2.1. Screening for Appropriate Assessment

Screening is the process that addresses and records the reasoning and conclusions in relation to the first two tests of Article 6(3):

i. Whether a plan or project is directly connected to or necessary for the management of the site; and
ii. Whether a plan or project, alone or in combination with other plans and projects, is likely to have significant effects on a European site in view of its conservation objectives.

If the effects are deemed to be significant, potentially significant, or uncertain, then the process must proceed to Appropriate Assessment.

2.2.2. Appropriate Assessment

Appropriate Assessment considers whether the plan or project, alone or in combination with other projects or plans, will have adverse effects on the integrity of a European site, and includes any necessary mitigation measures.

The competent authority can only agree to the plan or project after having ascertained that it will not adversely affect the integrity of the site(s) concerned. If this cannot be determined, and where sufficient mitigation cannot be achieved, the alternative solutions need to be considered and the process proceeds to the consideration of alternative solutions.

2.2.3. Alternative Solutions

This examines any alternative solutions or options that could enable the plan or project to proceed without adverse effects on the integrity of a European site. The process must return to AA as alternatives will require assessment in order to proceed. Demonstrating that all reasonable alternatives have been considered and assessed, and that the least damaging option has been selected, it is necessary to examine whether there are imperative reasons of overriding interest (IROPI).

2.2.4. IROPI

This examines whether there are imperative reasons of overriding public interest for allowing a plan or project that will have adverse effects on the integrity of a European site to proceed in cases where it has been established that no less damaging alternative solution exists. Compensatory measures must be proposed and assessed, of which the Commission must be informed.

The AA process only progresses through the full process for certain plans and projects. For example, for a project not connected with the management of a European site and where no likely significant effects on a European site in view of its conservation objectives are identified, the process stops at Screening for AA. Throughout the process the precautionary principle must be applied, which requires that the conservation objectives of Natura 2000 should prevail where there is uncertainty (EC, 2018; 2021).

3. Methods

3.1. Legislation & Guidance Documents

This report was prepared with reference and due consideration to the following documents and due regard for relevant case law, including but not limited to: -

- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild flora and fauna (Habitats Directive);
- Statutory Instrument No. 477/2011 — European Communities (Birds and Natural Habitats) Regulations 2011;
- National Parks and Wildlife Service - Development Consultations[2] (NPWS, 2018);
- European Commission (2018). Managing Natura 2000 sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC;
- European Commission (2021). Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Articles 6(3) and (4) of the Habitats Directive 92/43/EEC;
- Department of the Environment, Heritage and Local Government (2009). Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities;
- Office of the Planning Regulator (2021). Appropriate Assessment Screening for Development Management. OPR Practice Note PN01; and,
- Case C-323/17 People Over Wind & anor V. Coillte and other relevant court rulings and case law.

3.2. Desk Study

A desk study was carried out to collate information available on European sites in the vicinity of the proposed project. These areas were viewed using Google Earth, Google maps[3] and Bing maps[4] (last accessed on (15/03/2022).

The National Parks and Wildlife Service (NPWS) online databases were reviewed concerning European sites and their features of interest in the vicinity of the proposed project. The Environmental Protection Agency (EPA) mapping[5] system was used to identify any hydrological connection between the proposed project and European sites, this information was supported by photographs from walkover surveys.

Locations and boundaries of all European sites within the potential zone of influence of the proposed project were identified and reviewed using the NPWS online map viewer. Boundary shapefiles were also downloaded from this site to facilitate the preparation of project graphics.

Desktop information on relevant European sites was reviewed on the NPWS website, including the site synopsis for each SAC/SPA, the conservation objectives, the site boundaries as shown on the NPWS online map viewer, the standard Natura 2000 Data Form for the SAC/SPA which details conditions and threats of the sites, and published information and unpublished reports on the relevant European sites.

Relevant planning information for the surrounding area was reviewed using the planning enquiry systems of Tipperary County Council. Search criteria were implemented to determine whether such projects or plans

[2] https://www.npws.ie/development-consultations

[3] https://www.google.ie/maps

[4] http://www.bing.com/maps/

[5] https://gis.epa.ie/EPAMaps/

would be relevant to this study and this information was used to determine potential cumulative impacts from other plans / projects with the proposed project.

3.3. Statement of Authority

The Screening for Appropriate Assessment report was prepared by Paul O' Donoghue.

Paul O'Donoghue has a BSc (Zoology), MSc (Behavioural Ecology) and a PhD in avian ecology and genetics. His is a chartered member of the Society for the Environment (CEnv) and a full member of the Chartered Institute of Ecology and Environmental Management (MCIEEM). Paul has over 20 years' experience in ecology; including extensive experience in the preparation of Habitat Directive Assessments / Natura Impact Statements (i.e. Appropriate Assessment under Article 6(3) of the EU Habitats Directive).

4. Existing Environment

4.1. Desk Study

Borrisokane Mill Race Culvert (see Figure 1.1) is located on the junction of the N65 and the N52 in the town of Borrisokane, Co. Tipperary. The structure number on the Eirspan Bridge Management System is TN-N52-004.01. The structure consists of a masonry arch culvert (2.4m span) with a concrete extension on the west side (3.2m span) and a precast concrete pipe outfall, (1.2m internal diameter). The structure commences approximately 20-50m east of the junction and runs parallel to the N52 before crossing under the N52 at the junction and outfalls approximately 100m west of the junction in the adjoining park area (from RPS, Eirspan. Borrisokane Mill Race Culvert Stage 1 Assessment Report; 2017).

It should be noted that the works area on Borrisokane Mill Race is within the urban fabric of Borrisokane rather than on the bank of the Ballyfinboy River.

The culvert is located close to the upper reaches (3rd order stream) of the Ballyfinboy River (EPA Code - 25B02; Ballyfinboy_040), which flows westwards and discharges to Lough Derg in the bay to the south of the townland of Drominagh Demesne. As noted it discharges to Lough Derg, North-east Shore SAC and Lough Derg (Shannon) SPA. Lough Derg is also designated as a Natural Heritage Area (000011).

Water quality at Ballyfinboy Bridge in Borrisokane was recorded to be 'Moderate' (Q3-4) in 2015 (Source: EPA Maps). River Waterbody WFD Status 2013-2018 was recorded to be of Moderate status, and At Risk of not reaching ecological good status.

There are no records of invasive species such as Japanese knotweed (*Reynoutria (Fallopia) japonica*), Indian balsam (*Impatiens glanduliforia*), Giant hogweed (*Heracleum mantegazzianum*) or Giant rhubarb (Gunner *Gunnera* sp.) from the works area.

White-clawed crayfish (*Austropotamobius pallipes*) have been recorded from the Ballyfinboy River, at a bridge just upstream of Lough Derg (R838980) (Source: NBDC; River Biologists' Database, EPA)

Otter (*Lutra lutra*) has been recorded from the Ballyfinboy River; a road kill was recorded in Borrisokane (R914941) in 2014 (Source: NBDC; Atlas of Mammals in Ireland 2010-2015). Otter spraints were recorded downstream from the Ballyfinboy River near Borrisokane (R897937) in 1980 (Source: NBDC; Otter survey of Ireland 1982 - Vincent Wildlife Trust). Otter were also recorded in the Otter survey of Ireland 1982 from upstream of Borrisokane on the Ballyfinboy River (R938916). Movement is assumed to be along the Ballyfinboy River and not through the Borrisokane Mill race culvert.

The Ballyfinboy River is not within a Freshwater pearl mussel (*Margaritifera margaritifera*) sensitive area.

4.2. Borrisokane Mill race

Previous works in the environs of the mill race involved road resurfacing works, undergrounding of overhead services, culvert remedial works, upgrading of public lighting system, drainage works, street landscaping (including planting of trees), footpath modification & replacement as well as provision of informal crossings and upgrading of existing zebra crossing to signalised puffin crossing. These works were subject to Ecological Assessment and Screening for Appropriate Assessment in 2017 (Arup, 2017). This Screening is discussed in Section 1.2.1, above.

Arup (2017) described the works area as comprising a section of carriageway on the N52 which includes the Main street of Borrisokane. Semi-natural habitats noted included: - buildings and artificial surfaces (BL3) and amenity grassland (GA2). It also noted the potential to impact Ballyfinboy River (FW1). Furthermore, it noted that an outlet from culvert, which was to have remedial works undertaken, is to the Ballyfinboy River. Arup (2017) noted no evidence of protected species being present.

Arup (2017) included no records of invasive species listed on the 3rd Schedule of the Natural Habitats Regulations (SI 477/2011). There are no recent records of invasive species form the environs of the works

area (NBDC Mapviewer; Design Engineer *pers comm*).

Plate 4.1 River upstream of works area.

Plate 4.2 Ballyfinboy River (February, 2022).

Plate 4.3 West elevation of main bridge, Ballyfinboy River (February, 2022).

Plate 4.4 West outlet of Mill Race (February, 2022).

The following photos of the culvert and environs were taken by RPS in 2017 and are extracted from the Inspection Report prepared by RPS (RPS, 2017).

Plate 4.5 **Existing manhole access to the culvert** (from RPS, 2017).

Plate 4.6 **View through the culvert looking at West Elevation of Masonry Section** (from RPS, 2017).

Plate 4.7 **West face of box culvert at interface with outfall pipe** (from RPS, 2017).

Plate 4.8 **West face of box culvert at interface with outfall pipe** (from RPS, 2017).

Plate 4.9 **View through the culvert** (from RPS, 2017).

Plate 4.10 **View through outfall pipe. Failed pipe units to be replaced** (from RPS, 2017).

Plate 4.11 **Ductile iron watermain crossing through the crown of the arch barrel** (from RPS, 2017).

5. Appropriate Assessment Screening

5.1. Connectivity of Proposed Project to European Sites

The 'zone of influence' (ZoI) for a project is the area over which ecological features may be subject to significant effects as a result of the proposed project and associated activities. This is likely to extend beyond the project site, for example where there are ecological or hydrological links beyond the site boundaries. The zone of influence will vary for different ecological features depending on their sensitivity to an environmental change (CIEEM, 2018).

A distance of 15km is recommended in the case of plans, as a potential zone of influence and this distance is derived from UK guidance (Scott Wilson *et al*., 2006). However, for projects the distance could be much less, and in some cases less than 100m. National Parks and Wildlife Service and Office of the Planning Regulator guidance advises that this must be evaluated on a case-by-case basis with reference to the nature, size and location of the project, the sensitivities of the ecological receptors, and the potential for in-combination effects (DoEHLG, 2009; OPR, 2021).

Thus, given the nature, scale and extent of the proposed project, the potential zone of influence will consider European sites with regard to the location of a European site, the QIs of the site and their potential mobility outside that European site, the Cause-Pathway-Effect model and potential environment effects of the proposed project.

There are 10 no. Special Areas of Conservation (SAC) within the potential zone of influence of the proposed project at Borrisokane (Table 5.1).

There are 2 no. Special Protection Areas (SPAs) within the potential zone of influence of the proposed project (Table 5.2).

Due to the nature of the proposed project, geographical location and nature of hydrological connectivity, the only European sites within the zone of influence of the proposed project is the Lough Derg, North East Shore SAC (002241) and Lough Derg (Shannon) SPA (004058).

Table 5.1 SACs within ZoI of the proposed project.

Site Name	Site Code	Approximate distance	Features of Interest	Within ZoI
Barroughter Bog SAC[6]	000619	14.4km NW	• Active raised bogs [7110] * • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150]	No
Cloonmoylan Bog SAC[7]	000248	13.3km NW	• Active raised bogs [7110] * • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150] • Bog woodland [91D0] *	No
Lough Derg, North-east Shore SAC[8]	002241	11.3km along the Ballyfinboy River	• *Juniperus communis* formations on heaths or calcareous grasslands [5130] • Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae [7210] * • Alkaline fens [7230] • Limestone pavements [8240] * • Alluvial forests with *Alnus glutinosa* and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0] * • *Taxus baccata* woods of the British Isles [91J0] *	Yes
Scohaboy (Sopwell) Bog SAC[9]	002206	5km SE	• Degraded raised bogs still capable of natural regeneration [7120]	No
Sharavogue Bog SAC[10]	000585	12.5km E	• Active raised bogs [7110] * • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150]	No
Liskeenan Fen SAC[11]	001683	5.6km NE	• Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae [7210] *	No
Ballyduff (Clonfinane) Bog SAC[12]	00641	11.1km NE	• Active raised bogs [7110] * • Degraded raised bogs still capable of natural regeneration [7120]	No

[6] NPWS (2015). Conservation Objectives: Barroughter Bog SAC 000231. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

[7] NPWS (2016). Conservation Objectives: Cloonmoylan Bog SAC 000248. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

[8] NPWS (2019) Conservation Objectives: Lough Derg, North-east Shore SAC 002241. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

[9] NPWS (2022). Conservation objectives for Scohaboy (Sopwell) Bog SAC [002206]. Generic Version 9.0. Department of Housing, Local Government and Heritage.

[10] NPWS (2015). Conservation Objectives: Sharavogue Bog SAC 000585. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

[11] NPWS (2018). Conservation Objectives: Liskeenan Fen SAC 001683. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

[12] NPWS (2015). Conservation Objectives: Ballyduff/Clonfinane Bog SAC 000641. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

Site Name	Site Code	Approximate distance	Features of Interest	Within ZoI
			• Depressions on peat substrates of the Rhynchosporion [7150] • Bog woodland [91D0] *	
Arragh More (Derrybreen) Bog SAC[13]	002207	8.7km NE	• Degraded raised bogs still capable of natural regeneration [7120]	No
Kilcarren-Firville Bog SAC[14]	000647	6.6km NE	• Active raised bogs [7110] * • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150]	No
River Shannon Callows SAC[15]	000216	11km NW	• Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410] • Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*) [6510] • Alkaline fens [7230] • Limestone pavements [8240] * • Alluvial forests with *Alnus glutinosa* and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0] * • *Lutra lutra* (Otter) [1355]	No

Note: * refers to Priority Annexed habitats.

[13] NPWS (2022). Conservation objectives for Arragh More (Derrybreen) Bog SAC [002207]. Generic Version 9.0. Department of Housing, Local Government and Heritage.

[14] NPWS (2016). Conservation Objectives: Kilcarren-Firville Bog SAC 000647. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

[15] NPWS (2022). Conservation Objectives: River Shannon Callows SAC 000216. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.

Table 5.2 SPAs within ZoI of the proposed project.

Site Name	Site Code	Approximate distance	Features of Interest	Within ZoI
Middle Shannon Callows SPA[16]	004096	10.5km NW	• Whooper Swan (*Cygnus cygnus*) [A038] • Wigeon (*Anas penelope*) [A050] • Corncrake (*Crex crex*) [A122] • Golden Plover (*Pluvialis apricaria*) [A140] • Lapwing (*Vanellus vanellus*) [A142] • Black-tailed Godwit (*Limosa limosa*) [A156] • Black-headed Gull (*Chroicocephalus ridibundus*) [A179] • Wetland and Waterbirds [A999]	No
Lough Derg (Shannon) SPA[17]	004058	11.3km along the Ballyfinboy River	• Cormorant (*Phalacrocorax carbo*) [A017] • Tufted Duck (*Aythya fuligula*) [A061] • Goldeneye (*Bucephala clangula*) [A067] • Common Tern (*Sterna hirundo*) [A193] • Wetland and Waterbirds [A999]	Yes

[16] NPWS (2022). Conservation objectives for Middle Shannon Callows SPA [004096]. Generic Version 9.0. Department of Housing, Local Government and Heritage.

[17] NPWS (2022). Conservation objectives for Lough Derg (Shannon) SPA [004058]. Generic Version 9.0. Department of Housing, Local Government and Heritage.

5.2. Brief Description of Lough Derg, North-East Shore SAC

A synopsis of the SAC, as detailed by NPWS, is summarised as follows (NPWS, 2014[18]): -

> *"Lough Derg, the lowest order lake on the River Shannon, is one of the largest bodies of freshwater in Ireland. This SAC, however, only includes the northern shore of the lake from the mouth of the Cappagh River in the north-west to just below Black Lough at the north-eastern shore. The greater part of this site lies on Carboniferous limestone, although there is Old Red Sandstone on the southern shores of the eastern section.*
>
> *The geology of the lake shore is principally limestone and in places this protrudes at the surface in the form of boulders and rubble, and can be classified as limestone pavement. These are often bryophyte-rich surfaces or else support a calcareous grassland or heath flora, as well as some woody species, such as Yew (*Taxus baccata*) and Juniper (*Juniperus communis*). Examples occur at Cornalack, Kylenamelly and Portumna. The last two named areas were partly afforested but are proposed for restoration under a Coillte E.U. LIFE Programme. The geographical location of these examples of limestone pavement within the country is notable.*
>
> *A second priority Annex I habitat,* Cladium *fen, occurs occasionally along the lake margins, mainly in association with alkaline fens, Common Reed (*Phragmites australis*) and other swamp vegetation.*
>
> *Yew woods in Ireland are mostly confined to the west of the country. However, a substantial area of Yew is located on limestone at Cornalack, where Yew forms a scrub woodland along the east shore of Lough Derg.*
>
> *Juniper occurs throughout this site in a range of habitats, associated with calcareous grasslands, heath and limestone outcrops. Some of the finest examples of Juniper formations in Ireland occur along the lake edge where upright, bushy Juniper shrubs up to 3 m tall are found.*
>
> *Deciduous woodlands are also a notable feature of the site, dominated by oak (*Quercus *spp.), as at Bellevue, and Hazel/Ash at many of the examples along the north-eastern shore.*
>
> *The only known site in the country for the Red Data Book plant Irish Fleabane (*Inula salicina*) occurs along the lake shore. This plant is legally protected under the Flora (Protection) Order, 1999. Other Red Data Book species present within this site are Marsh Pea (*Lathyrus palustris*) and Ivy Broomrape (*Orobanche hederae*). The Red Data Book stonewort* Chara tomentosa *has its stronghold in Lough Derg.*
>
> *The lake is rated as nationally important for waterfowl. The entire lake, including all of the islands, is a designated SPA (Special Protection Area). Lough Derg is also of conservation interest also for its fish and freshwater invertebrates. The lake contains an apparently self-sustaining landlocked population of Sea Lamprey (Petromyzon marinus). The endangered fish species Pollan (*Coregonus autumnalis pollan*) is recorded from Lough Derg, one of only three sites in Ireland and in western Europe."*

5.2.1. Features of Interest

The qualifying interests of Lough Derg, North-east Shore SAC are as follows (NPWS, 2019): -

- *Juniperus communis* formations on heaths or calcareous grasslands [5130]
- Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae [7210]
- Alkaline fens [7230]

[18] NPWS (2014). Lough Derg, North-east Shore SAC. Site Synopsis - https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY002241.pdf

- Limestone pavements [8240]
- Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0]
- *Taxus baccata* woods of the British Isles [91J0]

5.2.2. Conservation Objectives of Lough Derg, North-east Shore SAC

The Habitats Directive defines when the conservation status of the listed habitats and species is considered as favourable. The definitions it uses for this are specific to the Directive. In summary, they require that the range and areas of the listed habitats, and the range and population of the listed species, should be at least maintained at their status at the time of designation. Site-specific conservation objectives aim to define favourable conservation conditions for a particular habitat or species at that site.

Article (1) of the Habitats Directive (92/43/EEC) describes favourable conservation status for habitats and species as follows (refer to NPWS, 2019).

Favourable conservation status of a habitat is achieved when: -

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

The 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; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

The site specific conservation objectives for Lough Derg, North-east Shore SAC are set out in *Conservation Objectives: Lough Derg, North-east Shore SAC 002241 (Version 1)* (NPWS, 2019). They can be summarised as follows: -

- To restore the favourable conservation condition of *Juniperus communis* formations on heaths or calcareous grasslands in Lough Derg, North-east Shore SAC, which is defined by the list of attributes and targets set out in NPWS (2019);
- To maintain the favourable conservation condition of Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae* in Lough Derg, North-east Shore SAC, which is defined by the list of attributes and targets set out in NPWS (2019);
- To maintain the favourable conservation condition of Alkaline fens in Lough Derg, Northeast Shore SAC, which is defined by the list of attributes and targets set out in NPWS (2019);
- To restore the favourable conservation condition of Limestone pavements* in Lough Derg, North-east Shore SAC, which is defined by the list of attributes and targets set out in NPWS (2019);
- To restore the favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)* in Lough Derg, North-east Shore SAC, which is defined by the list of attributes and targets set out in NPWS (2019);

- To maintain the favourable conservation condition of *Taxus baccata* woods of the British Isles* in Lough Derg, North-east Shore SAC, which is defined by the list of attributes and targets set out in NPWS (2019).

As noted, site specific conservation Objectives for Lough Derg, North-east Shore SAC are set out in NPWS (2019) Conservation Objectives: Lough Derg, North-east Shore SAC 002241 (Version 1). The relevant Conservation Objectives and associated Attributes are also set out in full in Appendix B (extracted from NPWS, 2019).

5.2.3. Potential Threats

The site synopsis for the Lough Derg, North-East Shore SAC describes the land use and threats to the SAC as follows: -

> "*The main threats to the quality of the site are water polluting activities resulting from intensification of agricultural activities around the lake shore, uncontrolled discharge of sewage, which is causing eutrophication of the lake, and housing and boating development which has resulted in the destruction of lakeshore habitats. There is also significant fishing and shooting pressure on and around the lake. Forestry can result in the loss of some areas of wetland habitat. The spread of Zebra Mussel (*Dreissena polymorpha*) in Lough Derg also poses a threat the ecology of the lake".*

5.3. Brief Description of Lough Derg (Shannon) SPA

A synopsis of lough Derg (Shannon) SPA, as detailed by NPWS, is summarised as follows (NPWS, 2014[19]): -

> *"Lough Derg is of importance for both breeding and wintering birds. The site supports a nationally important breeding colony of Common Tern (55 pairs recorded in 1995). Management of one of the islands used for nesting has increased the area of suitable habitat available and prevented nests being destroyed by fluctuating water levels. Large numbers of Black-headed Gull have traditionally bred on the many islands (2,176 pairs in 1985) but the recent status of this species is not known. The islands in the lake also support a nationally important Cormorant colony - 167 pairs were recorded in 1995; a partial survey of the lake in 2010 recorded 113 pairs. Lough Derg is also a noted breeding site for Great Crested Grebe (47 pairs in 1995) and Tufted Duck (169 pairs in May 1995).*
>
> *In winter, the lake is important for a range of waterfowl species, including nationally important populations of Tufted Duck (776) and Goldeneye (157) – all figures are mean peaks for 4 of the 5 seasons between 1995/96 and 1999/2000. Other species which occur in winter include Mute Swan (164), Whooper Swan (18), Wigeon (249), Teal (301), Mallard (376), Little Grebe (14), Cormorant (90), Coot (173), Lapwing (922), Curlew (66) and Black-headed Gull (732). Areas to north and south west of Lough Derg have been utilised in the past by small numbers of Greenland White-fronted Goose – 19 geese were recorded on callowland near Portumna in 1996/97. A relatively small flock based in the Lough Derg-Lough Graney area and possibly further afield have been recorded in the Scarriff Bay area – 20 geese recorded in 2004. Few sightings, at either location have been made in recent years. Hen Harrier are also known to roost in the reedbeds on the margins of the site during the winter.*
>
> *Lough Derg (Shannon) SPA is of high ornithological importance as it supports nationally important breeding populations of Cormorant and Common Tern. In winter, it has nationally important populations of Tufted Duck and Goldeneye, as well as a range of other species including Whooper Swan. The presence of Whooper Swan, Greenland White-fronted Goose, Hen Harrier and Common Tern is of particular note as these are listed on Annex I of the E.U. Birds Directive. Parts of Lough Derg (Shannon) SPA are a Wildfowl Sanctuary."*

5.3.1. Conservation Objectives of Lough Derg (Shannon) SPA

Only generic conservation objectives have been published by NPWS for Lough Derg (Shannon) SPA. These are published by NPWS in *Conservation objectives for Lough Derg (Shannon) SPA [004058]. Generic Version 9.0* (NPWS, 2022); and are as follows: -

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.

The 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

[19] NPWS (2014). Lough Derg (Shannon) SPA. Site Synopsis - https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004058.pdf

- 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.

To acknowledge the importance of Ireland's wetlands to wintering waterbirds, "*Wetland and Waterbirds*" may be included as a Special Conservation Interest for some SPAs that have been designated for wintering waterbirds and that contain a wetland site of significant importance to one or more of the species of Special Conservation Interest. Thus, a second objective is included as follows:

Objective: To maintain or restore the favourable conservation condition of the wetland habitat at Lough Derg (Shannon) SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.

5.4. Likelihood of Significant Effects on European sites

The available information on European sites was reviewed to establish whether or not the proposed development is likely to have a significant effect on the conservation objectives of the designated sites. The likelihood of impacts on the qualifying interests of the European sites identified in this report is based on information collated from the desk study, site plans and other available existing information.

The likelihood of impacts occurring are established in light of the type and scale of the proposed works, the location of the proposed works with respect to European sites and the features of interest and conservation objectives of the European sites.

This report is prepared following the Cause – Pathway – Effect model. The potential impacts are summarised into the following categories for screening purposes.

- Direct impacts refer to habitat loss or fragmentation arising from land-take requirements for development or agricultural purposes. Direct impacts can be as a result of a change in land use or management, such as the removal of agricultural practices that prevent scrub encroachment. There are no direct impacts associated with the proposed works.

- Indirect and secondary impacts do not have a straight-line route between cause and effect. It is potentially more challenging to ensure that all the possible indirect impacts of the project – in combination with other plans and projects - have been established. These can arise, for example, when a development alters the hydrology of a catchment area, which in turn affects the movement of groundwater to a site and the qualifying interests that rely on the maintenance of water levels. Deterioration in water quality can occur as an indirect consequence of development, which in turn changes the aquatic environment and reduces its capacity to support certain plants and animals. The introduction of invasive species can also be defined as an indirect impact. Disturbance to fauna can arise directly through the loss of habitat (e.g. displacement of qualifying interest species) or indirectly through noise, vibration and increased activity associated with construction and operation.

The proposed project is not directly connected with or necessary to the management of the SAC or SPA. Therefore, it is necessary for the competent authority to assess whether the proposed project, either individually or in combination with other plans or projects, would be likely to have significant effects on the European site.

5.4.1. Identification of potential impacts

The proposed development does not lie within any European sites. Lough Derg, North-East Shore SAC is located to the west of the site approximately 11.3km from Borrisokane along the Ballyfinboy River. While there is no direct overlap with the SAC, there is a hydrological link between the proposed development site and Lough Derg, North-East Shore SAC. However, due to the scale of the Lough Derg, North-East Shore SAC, not all habitats or species are within the potential zone of influence of the proposed works.

The qualifying interests have been considered in turn in Table 5.4 to determine if they might be within the zone if influence of the proposed works. The distribution of habitats and species was reviewed against information presented in the Conservation Objective document for the Lough Derg, North-East Shore SAC (NPWS, 2019).

Table 5.4 Summary of whether SAC qualifying interests are within the ZoI of the proposed project.

Habitat	Comment	Likely to be within the Zone of Influence
Juniperus communis formations on heaths or calcareous grasslands [5130]	Juniper formations are not located within the proposed works area; nor are they located close to where the Ballyfinboy River enters Lough Derg (see Map 3 of NPWS, 2019).	No
Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae [7210]	Calcareous fens are not located within the proposed works area; nor are they located close to where the Ballyfinboy River enters Lough Derg. This habitat is particularly well developed at the sheltered bays of Lough Derg around the Portumna Forest Park area and immediately north of Kilgarvan Quay.	No
Alkaline fens [7230]	Alkaline fens are not located within the proposed works area; nor are they located close to where the Ballyfinboy River enters Lough Derg. The habitat is particularly well-represented at the edge of Portumna Forest Park.	No
Limestone pavements [8240]	Limestone pavements are not located within the proposed works area; nor are they located close to where the Ballyfinboy River enters Lough Derg (see Map 3 of NPWS, 2019).	No
Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0]	Alluvial woodland is not located within the proposed works area (see Map 4 of NPWS, 2019). The nearest such site (labelled NSNW (National Survey of Native Woodland) site no. 1950) is located at Illannanagh and Bounla Island to the north of where the Ballyfinboy River discharges into Lough Derg (ca. 300m from the mouth of the river). However, as noted no instream works are proposed and works to be undertaken are contained within the mill race at a distance and isolated from the river.	No
Taxus baccata woods of the British Isles [91J0]	Yew woodland is not located within the proposed works area; nor are they located close to where the Ballyfinboy River enters Lough Derg (see Map 4 of NPWS, 2019). The nearest such site (labelled NSNW (National Survey of Native Woodland) site no. 1693) is to the north of where the Ballyfinboy River discharges. However, as noted no instream works are proposed and works to be undertaken are at a distance from the river.	No

Table 5.4 Summary of whether SPA qualifying interests are within the ZoI of the proposed project.

Habitat	Comment	Likely to be within the Zone of Influence
Cormorant (*Phalacrocorax carbo*) [A017]	Lough Derg supports important numbers of breeding Cormorant. These nest on islands within the lake. Cormorant feed on fish within the lake and surrounding watercourses. The distance from works to the nesting sites in the lake is such that works at Borrisokane would not disturb nesting birds. There appears to be a limited hydrological link between the mill race and Ballyfinboy River and hence to Lough Derg. There is therefore the potential for pollutants from the mill race to reach Ballyfinboy River / Lough Derg.	Yes
Tufted Duck (*Aythya fuligula*) [A061]	Tufted duck occur as a wintering bird withing Lough Derg. It is envisaged works will take place in the winter months. The distance from works to the lake is such that works at Borrisokane would not disturb wintering birds on Lough Derg. There appears to be a limited hydrological link between the mill race and Ballyfinboy River and hence to Lough Derg. There is therefore the potential for pollutants from the mill race to reach Ballyfinboy River / Lough Derg.	Yes
Goldeneye (*Bucephala clangula*) [A067]	Goldeneye occur as a wintering bird withing Lough Derg. It is envisaged works will take place in the winter months. The distance from works to the lake is such that works at Borrisokane would not disturb wintering birds on Lough Derg. There appears to be a limited hydrological link between the mill race and Ballyfinboy River and hence to Lough Derg. There is therefore the potential for pollutants from the mill race to reach Ballyfinboy River / Lough Derg.	Yes
Common Tern (*Sterna hirundo*) [A193]	Lough Derg supports important numbers of breeding Common tern. These nest on islands within the lake, especially Goat Island at the northern end of the lake. Common tern feed on aquatic prey and would not occur at Borrisokane. The distance from works to the nesting sites in the lake is such that works at Borrisokane would not disturb nesting birds. There appears to be a limited hydrological link between the mill race and Ballyfinboy River and hence to Lough Derg. There is therefore the potential for pollutants from the mill race to reach Ballyfinboy River / Lough Derg.	Yes
Wetland and Waterbirds [A999]	There will be no direct impact on habitats within Lough Derg used by Cormorant, Common tern, Tufted Duck or Goldeneye. Refer to comments on Lough Derg, North-East Shore SAC above.	No

5.4.1.1. Direct Impacts

None of the works area is within the Lough Derg, North-East Shore SAC or Lough Derg SPA. At its nearest the SAC / SPA is 11.3km downstream of the works area. None of the habitats that the Lough Derg, North-East Shore SAC has been designated for are located within the works area.

None of the wetland habitats within Lough Derg SPA which are used by species for which the SPA has been designated are found within the works area. The works area does not support any habitats that wetland birds from SPA might use at any stage of their life cycle.

5.4.1.2. Indirect Impacts

As noted, the project comprises repair works to a section of an historic mill race on the northern side of the Ballyfinboy River. As noted there are no works within the river, but the potential for connection between the mill race (works area) and the Ballyfinboy River must be considered.

In the past the mill race took water from the Ballyfinboy River to a series of corn mills along Mill Street on the northern side of the Ballyfinboy River. In its current state the mill race commences approximately 20-50m east of the junction of the N65 / N52 and runs parallel to the N52 before crossing under the N52 at the junction. It outfalls to a drainage channel approximately 100m west of the junction in the adjoining park area (see Plate 4.4).The mill race consists of a masonry arch culvert (2.4m span) with a concrete extension on the west side (3.2m span) and a precast concrete pipe outfall (1.2m internal diameter).

The project engineers have walked the riverbank and have confirmed that there appears to be no direct link which allows water to currently flow from the river into the old mill race (K. Wilson, MWRDO *pers comm*; M. Gilsenan, Atkins *pers comm*). The location of the intake into the mill race was identified at the weir upstream from historic mapping. There is no longer any intake evident at this location. The outfall from the mill race is dry with no flow towards the main river, even at times of high flow.

Historically, surface waters within the town did drain to the mill race. However, during recent road works (2017; Arup, 2017) surface water drainage from adjoining streets was upgraded and no longer flows to the mill race. It would therefore appear that there are currently no surface water inputs to the mill race.

A structural assessment of the mill race was originally undertaken by RPS in June 2015 (June, 2017). Based upon visual observations at the time it was assumed that water level in the culvert is related to groundwater or the adjoining river level (this is in line with recent observations (K. Wilson, MWRDO *pers comm*). While it is possible that there might be some ingress of water during periods of heavy rainfall and / or high river levels it is proposed to undertake works over the summer period when river flows are anticipated to be at their lowest, thus avoiding periods where there may be a higher water table. Significant ingress of groundwater to the works area is not therefore anticipated. Any water sitting in the works area at the commencement of works will be pumped out and disposed of appropriately offsite. Therefore, it is not expected that there would be any significant flow of groundwaters through the culvert that would need to be controlled during works; and as a result, no risk to water quality in the Ballyfinboy River or in any downstream European sites.

In the absence of any known surface waters inputs, it is not anticipated that water levels within the culvert would be recharged by surface waters. Therefore, it is not expected that there would be any flow of surface waters through the culvert that would need to be controlled during works; and as a result, no risk to water quality in the Ballyfinboy River or in any downstream European sites.

Where it is necessary to pour new areas of concrete floor – a concrete truck will be parked on the public road adjoining the works area and cement will be pumped (piped) directly to the area to be refloored within the works area. Pumping will be supervised at all times by an operator on the cement truck and on the delivery pipe, with an emergency shut off at the delivery end of the pipe. The area into which cement is to be pumped with be set out with over-sized shuttering. However, as noted no pumping of cement will occur close to the Ballyfinboy River and all cement works will occur in the dry.

As can be seen from Plate 4.9 and 4.10 a large amount of silt has accumulated within the mill race. As with any standing water, this material must be removed for safe disposal at an appropriately licenced facility. If power washing is used to fluidise the silt or to clean the stonework within the mill race, then all such material and arisings will be removed from the works area and safely disposed of at an appropriately licenced facility.

It is not permitted to allow any such waters to flow downstream along the channel of the mill race to the river. These works should also be undertaken in a period of dry weather.

Whilst grout and cement are to be used, as noted the works area will be maintained dry for the duration of such works. The area where cement is to be poured will be contained within the mill race and is not close to the Ballyfinboy River.

A site compound location is to be identified by the Contractor. This will not be placed within 50m of any watercourse. All refuelling and storage of fuel and works materials shall be within the site compound and thus will be kept to a distance of greater than 50m from any watercourses.

No invasive species listed under the Third Schedule of the Natural Habitats Regulations, 2011 have been recorded along the works area (as listed on NBDC webpage; and based on review of site photos and video from 2021). As noted above, however, strict biosecurity measures will be in place to prevent the introduction of any invasive species to the site during works; or in the event that any invasive species should be encountered during works once a Contractor is appointed.

All works will be undertaken during daylight hours, with no overnight lighting on site. The current condition of the culvert is such that it is not a viable route for use by otter.

It is not anticipated therefore that the works would result in a deterioration of water quality within the Ballyfinboy River or downstream in Lough Derg. Thus, no negative impacts to water dependant habitats within Lough Derg, North-East Shore SAC or Lough Derg SPA are anticipated. As a result, no knock on impacts bird species for which Lough Derg SPA has been designated are anticipated

5.5. Cumulative impacts

Cumulative impacts with the following plans and projects were considered during the preparation of this report. The search of Tipperary County Council was based on a map-based search (MyPLan.ie).

The North Tipperary County Development Plan 2010 sets out strategies and objectives to provide sustainable development within north Co. Tipperary. The Plan contains a number of Biodiversity objectives. A Natura Impact Report was prepared for the Plan, which assessed the Plan regarding its potential to adversely affect the integrity of European sites. The findings of the AA were integrated into the Plan, ensuring that potential adverse effects have been and will be avoided, reduced or offset. Thus, an AA determination was made by North Tipperary County Council that the Plan is not foreseen to have any likely significant effects on the ecological integrity of any European Site. As outlined in the Plan, this AA Screening was prepared to ensure that the proposed works would not have an adverse impact on European sites. Given the elements outlined above, the North Tipperary County Development Plan 2010 is not anticipated to act in-combination with the proposed project.

The Draft Tipperary County Development Plan 2022-2028 is currently in the consultative phase. Volume 5 of this Plan includes the Appropriate Assessment – Natura Impact Report (CAAS, 2021). Consultation closed in November 2021.

Farmers and landowners may also undertake general agricultural operations in areas adjacent to the proposed works and along the river, which could potentially give rise to impacts of a similar nature to those arising from the proposed works. This could potentially result in additional an increased risk to water quality. Many agricultural operations are periodic, not continuous in nature, and qualify as a Notifiable Action that requires consultation with National Parks and Wildlife Service in advance of the works e.g. reclamation, infilling or land drainage within 30m of the river, removal of trees or any aquatic vegetation within 30m of the river, and harvesting or burning of reed or willow (NPWS, 2018). Agricultural operations must also comply with the EC (Environmental Impact Assessment) (Agriculture) Regulations 2011 and amendment 2017 S.I. No. 456/2011 and 407/2017 in relation to activities covered by the regulations;

- restructuring of rural land holdings,
- commencing use of uncultivated land or semi-natural areas for intensive,
- land drainage works on lands used for agriculture.

A Natura Impact Statement (NIS) is required under Regulation 9 if it is likely to have a significant effect on a European designated site. The drainage or reclamation of wetlands is controlled under the Planning and Development (Amendment) (No. 2) Regulations 2011 and the European Communities (Amendment to Planning and Development) Regulations 2011. Therefore, the in-combination effects of agricultural operations and the proposed works are not likely to be significant.

Near the proposed works developments, the bulk of applications are small sale residential or commercial properties or are old and no longer relevant. The main exception is an application south of the river (Ref. no. 21/149) for the provision of an all-weather training facility and associated site works etc. for which conditional permission was granted in 2021. All such urban developments have conditions attached to their planning permission relating to sustainable development, such as siting of foul surface water and effluent drainage facilities, and clean surface water run-off drainage facilities, etc. Therefore, it is not anticipated that the developments that have been granted permission will act in-combination with the proposed works.

5.6. Likelihood of Significant Effects on European Sites

As noted, the project comprises repairs to a mill race in Borrisokane, Co. Tipperary. It is not within or close to a European site. All works will be isolated within the mill race for the duration of the proposed project. Given the design, scale and duration of proposed works, is not considered that the proposed works would give rise to significant effects, alone or in combination with other works, on European sites or more specifically on the qualifying features of interest of the Lough Derg, North-East Shore SAC / Lough Derg SPA.

5.7. Consideration of Findings

This screening report for Appropriate Assessment is based on the best available scientific information. It is concluded by the authors of this report that the proposed project will not result in negative impacts to European sites, or to Lough Derg, North-East Shore SAC / Lough Derg SPA. Thus, it is recommended that it is not necessary for the proposed project to proceed to stage 2 of the Appropriate Assessment process.

Should the scope of the proposed project change, a new screening report for Appropriate Assessment shall be required.

6. Appropriate Assessment Screening Matrix

6.1. Matrix

Presented below is a summary screening matrix for the proposed works to the mill race in Borrisokane, Co. Tipperary. As discussed above this summarises the assessment of potential for impacts on Lough Derg, North-East Shore SAC / Lough Derg SPA. All other sites have been screened out in the report above.

1. Description of the project or plan	
Location	Mill race in Borrisokane, Co. Tipperary
Distance from designated site	11.3km upstream of Lough Derg, North-East Shore SAC / Lough Derg SPA See Figures 1.1 and 1.2 for location of works & European sites.
Brief Description of the project or plan	See Chapter 1.0
Is the plan directly connected with or necessary to the site management for nature conservation?	No

2. Brief Description of the Natura 2000 site(s)	
Name	Lough Derg, North-East Shore SAC (002241) Lough Derg SPA (004058)
Site designation status	SAC / SPA
Qualifying interests	Refer to Tables 5.1 & 5.2
Unit size	Lough Derg, North-East Shore SAC – Area: 3,652.80ha; of which 80.7% is aquatic Lough Derg SPA Area: 12,709.92ha; of which 92.5% is aquatic

3. Assessment Criteria	
Other plans or projects which may have a cumulative impact	A planning search was conducted on the Tipperary County Council websites to determine if there were any projects which could interact with the proposed works. The search revealed planning applications / permissions for a range of small scale and / or historic developments, in the wider environs, but no current applications directly relevant to the proposed works areas. There are no plans and projects identified in the immediate environs of the proposed works areas that could provide a pathway for other plans and projects to act in-combination and to give rise to cumulative impacts on the Lough Derg, North-East Shore SAC / Lough Derg SPA.
Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the Natura 2000 sites.	See Chapter 1.0 & Table 5.1 & 5.2.
Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the Natura 2000 site by virtue of:	There are no instream works within the Ballyfinboy River. The project engineers have walked the riverbank and have confirmed that there appears to be no direct link which allows water to currently flow from the river into the old mill race. Historically, surface waters within the town did drain to the mill race . However, during recent road works (2017; Arup, 2017) surface water drainage from adjoining streets

3. Assessment Criteria	
- *Size and scale* - *Land-take* - *Distance from Natura 2000 site or key features of the site* - *Resource requirements* - *Emissions* - *Excavation requirements* - *Transportation requirements* - *Duration of construction, operation etc.* - *Others*	was upgraded and no longer flows to the mill race. It would therefore appear that there are currently no surface water inputs to the mill race. In the absence of any known surface waters inputs, it is not anticipated that water levels within the culvert would be recharged by surface waters. Therefore, it is not expected that there would be any flow of surface waters through the culvert that would need to be controlled during works; and as a result, no risk to water quality in the Ballyfinboy River or in any downstream European sites. A structural assessment of the mill race was originally undertaken by RPS in June 2015 (June, 2017). Based upon visual observations at the time it was assumed that water level in the culvert is related to groundwater or the adjoining river level. While it is possible that there might be some ingress of water during periods of heavy rainfall and / or high river levels it is proposed to undertake works over the summer period when river flows are anticipated to be at their lowest, thus avoiding periods where there may be a higher water table. Significant ingress of groundwater to the works area is not therefore anticipated. Where it is necessary to pour new areas of concrete floor – a concrete truck will be parked on the public road adjoining the works area and cement will be pumped (piped) directly to the area to be refloored within the works area. Pumping will be supervised at all times by an operator on the cement truck and on the delivery pipe, with an emergency shut off at the delivery end of the pipe. The area into which cement is to be pumped with be set out with over-sized shuttering. However, as noted no pumping of cement will occur close to the Ballyfinboy River. As can be seen from Plate 4.9 and 4.10 a large amount of silt has accumulated within the mill race. As with any standing water, this material must be removed for safe disposal at an appropriately licenced facility. If power washing is used to fluidise the silt or to clean the stonework within the mill race, then all such material and arisings will be removed from the works area and safely disposed of at an appropriately licenced facility. It is not permitted to allow any such waters to flow downstream along the channel of the mill race to the river. These works should also be undertaken in a period of dry weather. Whilst grout and cement are to be used, as noted the works area will be maintained dry for the duration of such works. The area where cement is to be poured will be contained within the mill race and is not close to the Ballyfinboy River. A site compound location is to be identified by the Contractor. This will not be placed within 50m of any watercourse. All refuelling and storage of fuel and works materials shall be within the site compound and thus will be kept to a distance of greater than 50m from any watercourses. The site compound location will be confirmed by the appointed Contractor but cannot be located closer than 50m to any watercourse. Any storage of materials or refuelling is restricted to within the site compound.
Describe any likely changes to the site arising as a result of: - *Reduction of habitat area* - *Disturbance of key species* - *Habitat or species fragmentation* - *Reduction in species density* - *Changes in key indicators of conservation value* - *Climate change*	There are no likely direct changes to European sites as a result of the proposed works. The works area does not overlap with a European site. There are no likely indirect changes to the sites as a result of the proposed works with respect to the key relationships that define the structure or function of the SAC. There shall be no reduction of habitat area as a result of the proposed project. There shall be no habitat or species fragmentation or reduction in species density as a result of the works. Given the nature, scale and location of works negative impacts are not anticipated.
Describe any likely impacts on the Natura 2000 site as a whole in terms of:	There are no likely changes to the sites as a result of the proposed works with respect to the key relationships that define the structure or function of the SAC.

3. Assessment Criteria	
- *Interference with the key relationships that define the structure of the site* - *Interference with key relationships that define the function of the site.*	
Provide indicators of significance as a result of the identification of effects set out above in terms of: - *Loss* - *Fragmentation* - *Disruption* - *Disturbance* - *Change to key elements of the site*	There are no likely changes to the site as a result of the proposed works.
Describe from the above those elements of the project or plan, or combination of elements, where the above impacts are likely to be significant or where the scale of magnitude of impacts is not known.	There are no likely changes to the sites as a result of the proposed works.

Data collected to carry out the assessment			
Who carried out the assessment	*Sources of data*	*Level of assessment completed*	*Where can the full results of the assessments be accessed and viewed?*
Atkins Unit 2B 2200 Cork Airport Business Park, Cork	Desktop data derived from the NPWS – Natura 2000 form, site synopsis, SAC reports etc. National Biodiversity Date Centre online data. EPA Envision Mapping system; Google maps; Bing Maps etc. Laois County Council Planning Enquiry System	Screening	Atkins, Unit 2B 2200 Cork Airport Business Park, Cork

6.2. Finding of No Significant Effects

Finding of No Significant Effects	
Name and location of Natura site(s)	Lough Derg, North-East Shore SAC (002241) Lough Derg SPA (004058)
Brief description of the project or plan	See Section 1.
Is the project or plan directly connected with or necessary to the site management for nature conservation?	No
Are there other projects or plans that together with the project or plan being assessed could affect the site?	No

Assessment of significance of effects	
Describe how the project (either alone or in combination with other plans or projects) is likely to affect the Natura 2000 site.	There are no likely direct changes to European sites as a result of the proposed works. The works area does not overlap with a European site. There are no likely indirect changes to the sites as a result of the proposed works with respect to the key relationships that define the structure or function of the SAC. There shall be no reduction of habitat area as a result of the proposed project. There shall be no habitat or species fragmentation or reduction in species density as a result of the works. Given the nature, scale and location of works negative impacts are not anticipated. Therefore, in light of the proposed design, scale and duration of proposed works, it is considered that the proposed works would give rise to significant effects, alone or in combination with other works, on features of interest of the Lough Derg, North-East Shore / Lough Derg SPA or to other European sites.
Explain why the effects are not considered significant	Refer to Section 5.4 and explanations presented above.
List the Agencies consulted	Formal consultation with NPWS via the Development Applications Unit has not been under taken at this time.
Response to Consultation	N/A

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Appendix A. Site Synopsis

SITE SYNOPSIS

Site Name: Lough Derg, North-east Shore SAC

Site Code: 002241

Lough Derg, the lowest order lake on the River Shannon, is one of the largest bodies of freshwater in Ireland. This SAC, however, only includes the northern shore of the lake from the mouth of the Cappagh River in the north-west to just below Black Lough at the north-eastern shore. The greater part of this site lies on Carboniferous limestone, although there is Old Red Sandstone on the southern shores of the eastern section.

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):

[5130] Juniper Scrub
[7210] *Cladium* Fens*
[7230] Alkaline Fens
[8240] Limestone Pavement*
[91E0] Alluvial Forests*
[91J0] Yew Woodlands*

The geology of the lake shore is principally limestone and in places this protrudes at the surface in the form of boulders and rubble, and can be classified as limestone pavement. These are often bryophyte-rich surfaces or else support a calcareous grassland or heath flora, as well as some woody species, such as Yew (*Taxus baccata*) and Juniper (*Juniperus communis*). Examples occur at Cornalack, Kylenamelly and Portumna. The last two named areas were partly afforested but are proposed for restoration under a Coillte E.U. LIFE Programme. The geographical location of these examples of limestone pavement within the country is notable.

A second priority Annex I habitat, *Cladium* fen, occurs occasionally along the lake margins, mainly in association with alkaline fens, Common Reed (*Phragmites australis*) and other swamp vegetation. Typically, Great Fen-sedge (*Cladium mariscus*), which can be up to 2 m in height, forms dense stands. Associated species include Common Reed, Black Bog-rush (*Schoenus nigricans*), Water Horsetail (*Equisetum fluviatile*), Bottle Sedge (*Carex rostrata*) and occasional Slender Sedge (*Carex lasiocarpa*). This community generally merges with alkaline fen dominated by Black Bog-rush, with Purple Moor-grass (*Molinia caerulea*), Marsh Horsetail (*E. palustre*), Meadowsweet (*Filipendula ulmaria*) and scattered tussocks of Greater Tussock-sedge (*Carex paniculata*).

Yew woods in Ireland are mostly confined to the west of the country. However, a substantial area of Yew is located on limestone at Cornalack, where Yew forms a scrub woodland along the east shore of Lough Derg. Here, Yew is found in association with small amounts of Juniper, which forms protection against grazing for the young Yew. Other notable species present include Hawthorn (*Crataegus monogyna*), Hazel (*Corylus avellana*), Holly (*Ilex aquifolium*), Small-leaved Cotoneaster (*Cotoneaster microphyllus*), along with occasional Ivy (*Hedera helix*), Wild Strawberry (*Fragaria vesca*), Bramble (*Rubus fruticosus* agg.) and Wood-sorrel (*Oxalis acetosella*). Elsewhere, small stands of Yew up to 5 m high occur with Spindle (*Euonymus europaeus*), Blackthorn (*Prunus spinosa*), Gorse (*Ulex europaeus*) and Ash (*Fraxinus excelsior*). Due to shading, and in places cattle trampling, the ground flora supports few herbs. However, the bryophyte layer is well developed with many moss covered rocks present.

Juniper occurs throughout this site in a range of habitats, associated with calcareous grasslands, heath and limestone outcrops. Some of the finest examples of Juniper formations in Ireland occur along the lake edge where upright, bushy Juniper shrubs up to 3 m tall are found. Typically, Juniper forms dense hedges with Ash, Hawthorn, Gorse, Hazel and Bramble, and occasional Yew. These tall Juniper shrubs are a unique feature in Ireland, where it is more typically found growing in prostrate form. In places along the lake shore Juniper forms a mosaic with Black Bog-rush and Great Fen-sedge fen. The best examples are seen at the north and north-east of the site. On drier ground above the flood level, Juniper occurs in association with species-rich calcareous grassland with Mouse-ear Hawkweed (*Hieracium pilosella*), Daisy (*Bellis perennis*), Lady's Bedstraw (*Galium verum*), Wild Thyme (*Thymus praecox*) and Blue Moor-grass (*Sesleria albicans*). An extensive area of this vegetation is seen north of Kilgarvan Quay. Many of the islands also support significant Juniper cover. This is particularly evident on Bounla Island. Juniper generally occurs as fringing vegetation around the islands, which typically have wooded centres. At Cornalack, along the eastern shore of Lough Derg, tall Juniper is found in association with loose limestone rubble with a significant cover of Yew.

Deciduous woodlands are also a notable feature of the site, dominated by oak (*Quercus* spp.), as at Bellevue, and Hazel/Ash at many of the examples along the north-eastern shore. Typically the ground layer includes Early-purple Orchid (*Orchis mascula*), violets (*Viola* spp.), Ivy, Lesser Celandine (*Ranunculus ficaria*), Bluebell (*Hyacinthoides non-scripta*), Wood Anemone (*Anemone nemorosa*), Wood-sorrel, Primrose (*Primula vulgaris*), Bramble, Ground Ivy (*Glechoma hederacea*), Pignut (*Conopodium majus*) and Honeysuckle (*Lonicera periclymenum*). Wet woodland is frequent along the lake shore, and in some areas this conforms well with the E.U. Annex I habitat, alluvial woodland. At Kylenamelly wood, where some planting of commercial forestry has occurred, there are extensive areas of alluvial woodland which are subject to flooding. These woods are dominated by willows (*Salix* spp.) and Alder (*Alnus glutinosa*), with Downy Birch (*Betula pubescens*) and Ash also present. The ground flora of the undisturbed alluvial sites is often dominated by Yellow Iris (*Iris pseudacorus*), with a range of other species commonly present, including Bogbean (*Menyanthes trifoliata*), Marsh-marigold (*Caltha palustris*),

Meadowsweet, Purple Loosestrife (*Lythrum salicaria*), horsetails (*Equisetum* spp.), Wild Angelica (*Angelica sylvestris*), Greater Tussock-sedge and Remote Sedge (*Carex remota*). Further examples of alluvial woodland occur at Portumna. Beech (*Fagus sylvatica*) and Scots Pine (*Pinus sylvestris*) are often present at the lake edge along areas which were once parts of estates. Some areas of coniferous forestry have been included within the site.

The only known site in the country for the Red Data Book plant Irish Fleabane (*Inula salicina*) occurs along the lake shore. This plant is legally protected under the Flora (Protection) Order, 1999. Other Red Data Book species present within this site are Marsh Pea (*Lathyrus palustris*) and Ivy Broomrape (*Orobanche hederae*). The Red Data Book stonewort *Chara tomentosa* has its stronghold in Lough Derg.

The lake is rated as nationally important for waterfowl. The entire lake, including all of the islands, is a designated SPA (Special Protection Area). Counts from 1995/96 carried out at seven locations on the lake indicate that the lake holds nationally important numbers for Mute Swan, Cormorant, Mallard, Teal, Tufted Duck and Goldeneye. The lake also supports a number of Greenland White-fronted Goose, a bird species listed on Annex I of the E.U. Birds Directive. There is a Wildlife Sanctuary at the north western edge of the lake.

Lough Derg is of conservation interest also for its fish and freshwater invertebrates. Lampreys, listed under Annex II of the E.U. Habitats Directive, are known to occur and the lake contains an apparently self-sustaining landlocked population of Sea Lamprey (*Petromyzon marinus*). A landlocked population, where the fish are feeding and not completing a seaward migration, is unique in an Irish context, though there are several such populations in the U.S. and one is known from Loch Lomond in Scotland. Brook Lamprey (*Lampetra planeri*) is known to be common in the lower Shannon catchment where all three lamprey species breed.

The endangered fish species Pollan (*Coregonus autumnalis pollan*) is recorded from Lough Derg, one of only three sites in Ireland and in western Europe. The Pollan is a landlocked species of Coregonid or 'White Fish', thought to have colonised Irish waters after the last Ice Age. Its nearest relative, the Arctic Cisco, is found as far away as Alaska, Northern Canada and Siberia. Although it is anadromous throughout most of its northern range, the Irish population are all non-migratory and purely freshwater. Lough Derg is also a well known fishing lake with a good Trout (*Salmo trutta*) fishery. Atlantic Salmon (*Salmo salar*) also use the lake as a spawning ground. Although this species is still fished commercially in Ireland, it is considered to be endangered or locally threatened elsewhere in Europe and is listed on Annex II of the E.U. Habitats Directive.

Otter and Badger have been recorded within the site. Both of these species are listed in the Irish Red Data Book and are legally protected by the Wildlife Act, 1976.

Land use within the site is mainly of a recreational nature with many boat hire companies, holiday home schemes and angling clubs located at the lake edge.

Recreational disturbance may pose a threat to the wintering wildfowl populations, though tourism is scaled down during the winter. The water body is surrounded mainly by improved pastoral farmland to the south and east, with areas of bog to the south-west and west. Coniferous plantations are present along the west and north-west shore and small areas of these are included within the site. If these areas are felled no further planting should take place as afforestation damages the wetland habitats between the plantation and lake edge.

The main threats to the quality of the site are water polluting activities resulting from intensification of agricultural activities around the lake shore, uncontrolled discharge of sewage, which is causing eutrophication of the lake, and housing and boating development which has resulted in the destruction of lakeshore habitats. There is also significant fishing and shooting pressure on and around the lake. Forestry can result in the loss of some areas of wetland habitat. The spread of Zebra Mussel (*Dreissena polymorpha*) in Lough Derg also poses a threat the ecology of the lake.

This is a site of significant ecological interest, with six habitats listed on Annex I of the E.U. Habitats Directive. Four of these are priority habitats - *Cladium* fen, alluvial woodland, limestone pavement and Yew woodland. Other annexed habitats present include alkaline fen and Juniper scrub formations on heath and calcareous grasslands. In addition, the lake itself is an SPA that supports important numbers of wintering wildfowl, Greenland White-fronted Goose, Common Tern and Cormorant, a number of which are listed under Annex I of the E.U. Birds Directive.

SITE SYNOPSIS

SITE NAME: LOUGH DERG (SHANNON) SPA

SITE CODE: 004058

Lough Derg lies within counties Tipperary, Galway and Clare and is the largest of the River Shannon Lakes, being some 40 km long. Its maximum breadth across the Scarriff Bay -Youghal Bay transect is 13 km but for most of its length it is less than 5 km wide. The lake is relatively shallow at the northern end being mostly 6 m in depth but in the middle region it has an axial trench and descends to over 25 m in places. The narrow southern end of the lake has the greatest average depth, with a maximum of 34 m. The greater part of the lake lies on Carboniferous limestone but the narrow southern section is underlain by Silurian strata. Most of the lower part of the lake is enclosed by hills on both sides, the Slieve Aughty Mountains to the west and the Arra Mountains to the east. The northern end is bordered by relatively flat, agricultural country. The lake shows the high hardness levels and alkaline pH to be expected from its mainly limestone catchment basin, and it has most recently been classified as a mesotrophic system. The lake has many small islands, especially on its western and northern sides. The shoreline is often fringed with swamp vegetation. Aquatic vegetation includes a range of charophyte species, including the Red Data Book species, *Chara tomentosa*. The shoreline is often fringed by swamp vegetation, comprised of such species as Common Reed (*Phragmites australis*), Great Fen-sedge (*Cladium mariscus*) and Bottle Sedge (*Carex rostrata*).

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Cormorant, Tufted Duck, Goldeneye and Common Tern. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

Lough Derg is of importance for both breeding and wintering birds. The site supports a nationally important breeding colony of Common Tern (55 pairs recorded in 1995). Management of one of the islands used for nesting has increased the area of suitable habitat available and prevented nests being destroyed by fluctuating water levels. Large numbers of Black-headed Gull have traditionally bred on the many islands (2,176 pairs in 1985) but the recent status of this species is not known. The islands in the lake also support a nationally important Cormorant colony - 167 pairs were recorded in 1995; a partial survey of the lake in 2010 recorded 113 pairs. Lough Derg is also a noted breeding site for Great Crested Grebe (47 pairs in 1995) and Tufted Duck (169 pairs in May 1995).

In winter, the lake is important for a range of waterfowl species, including nationally important populations of Tufted Duck (776) and Goldeneye (157) – all figures are mean peaks for 4 of the 5 seasons between 1995/96 and 1999/2000. Other species which occur in winter include Mute Swan (164), Whooper Swan (18), Wigeon (249), Teal (301), Mallard (376), Little Grebe (14), Cormorant (90), Coot (173), Lapwing

(922), Curlew (66) and Black-headed Gull (732). Areas to north and south west of Lough Derg have been utilised in the past by small numbers of Greenland White-fronted Goose – 19 geese were recorded on callowland near Portumna in 1996/97. A relatively small flock based in the Lough Derg-Lough Graney area and possibly further afield have been recorded in the Scarriff Bay area – 20 geese recorded in 2004. Few sightings, at either location have been made in recent years.

Hen Harrier are also known to roost in the reedbeds on the margins of the site during the winter.

Lough Derg (Shannon) SPA is of high ornithological importance as it supports nationally important breeding populations of Cormorant and Common Tern. In winter, it has nationally important populations of Tufted Duck and Goldeneye, as well as a range of other species including Whooper Swan. The presence of Whooper Swan, Greenland White-fronted Goose, Hen Harrier and Common Tern is of particular note as these are listed on Annex I of the E.U. Birds Directive. Parts of Lough Derg (Shannon) SPA are a Wildfowl Sanctuary.

Appendix B. Conservation Objectives

[From: NPWS (2019). *Conservation Objectives: Lough Derg, North-east Shore SAC 002241 (Version 1).* National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.]

Conservation Objectives for : Lough Derg, North-east Shore SAC [002241]

7230 Alkaline fens

To maintain the favourable conservation condition of Alkaline fens in Lough Derg, North-east Shore 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	Alkaline fen has not been mapped in detail for Lough Derg, North-east Shore SAC and thus the total current area of the qualifying habitat in the SAC is unknown. The habitat occurs frequently along lake margins in the SAC, often in association with the Annex I habitat Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae (7210*), common reed (*Phragmites australis*) beds and other swamp vegetation. The habitat is particularly well-represented at the edge of Portumna Forest Park (NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See the notes for Habitat area above
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil pH and nutrient status within natural ranges	Relevant nutrients and their natural ranges are yet to be defined. However, nitrogen deposition is noted as being relevant to this habitat in NPWS (2013). See also Bobbink and Hettelingh (2011)
Ecosystem function: peat formation	Percentage cover of peat-forming vegetation and water table levels	Maintain active peat formation, where appropriate	In order for peat to form, water levels need to be slightly below or above the soil surface for c.90% of the time
Ecosystem function: hydrology - groundwater levels	Water levels (centimetres); duration of levels; hydraulic gradients	Maintain, or where necessary restore, appropriate natural hydrological regimes necessary to support the natural structure and functioning of the habitat	Fen habitats require high groundwater levels (i.e. water levels at or above the ground surface) for a large proportion of the calendar year (i.e. duration of mean groundwater level). Fen groundwater levels are controlled by regional groundwater levels in the contributing catchment area (which sustain the hydraulic gradients of the fen groundwater table). Regional abstraction of groundwater may affect fen groundwater levels
Ecosystem function: hydrology - surface water flow	Drain density and form	Maintain, or where necessary restore, as close as possible to natural or semi-natural drainage conditions	Drainage, either within or surrounding the fen habitat, can result in the drawdown of the alkaline fen groundwater table. The depth, geometry and density of drainage (hydromorphology) will indicate the scale and impact on fen hydrology. Drainage can result in loss of characteristic species and transition to drier habitats
Ecosystem function: water quality	Water chemistry measures	Maintain appropriate water quality, particularly pH and nutrient levels, to support the natural structure and functioning of the habitat	Fens receive natural levels of nutrients (e.g. iron, magnesium and calcium) from water sources. However, they are generally poor in nitrogen and phosphorus, with the latter tending to be the limiting nutrient under natural conditions. Water supply should also be relatively calcium-rich
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	The entire diversity of alkaline fen vegetation communities present in the SAC is currently unknown. Information on the vegetation communities associated with alkaline fens in the uplands is presented in Perrin et al. (2014). See also the Irish Vegetation Classification (Perrin, 2018; www.biodiversityireland.ie/projects/national-vegetation-database/irish-vegetation-classification)
Vegetation composition: brown mosses	Percentage cover at a representative number of 2m x 2m monitoring stops	Maintain adequate cover of typical brown moss species	Typical brown moss species include *Bryum pseudotriquetrum, Calliergonella cuspidata, Calliergon giganteum, Campylium stellatum, Cratoneuron filicinum, Ctenidium molluscum, Fissidens adianthoides, Palustriella commutata, Scorpidium cossonii, S. revolvens* and *S. scorpioides*. Many brown moss species are present in the alkaline fen in Lough Derg, North-east Shore SAC, including *Campylium stellatum, Calliergonella cuspidata, Ctenidium molluscum* and *Fissidens adianthoides* (NPWS internal files)

Vegetation composition: typical vascular plants	Percentage cover at a representative number of 2m x 2m monitoring stops	Maintain adequate cover of typical vascular plant species	For lists of typical plant species see the Article 17 conservation status assessment for alkaline fens (NPWS, 2013) and the fen habitats supporting document (Kimberley, 2013). See also Perrin et al. (2014) and JNCC (2004). In this SAC, black bog-rush (*Schoenus nigricans*) typically dominates the habitat, along with a rich vascular plant flora including other typical species such as purple moor-grass (*Molinia caerulea*), carnation sedge (*Carex panicea*), devil's-bit scabious (*Succisa pratensis*) and meadow thistle (*Cirsium dissectum*) (NPWS internal files)
Vegetation composition: native negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of native negative indicator species at insignificant levels	Negative indicators include species not characteristic of the habitat and species indicative of undesirable impacts such as overgrazing, undergrazing, nutrient enrichment, agricultural improvement or impacts on hydrology. Native negative indicators may include graminoids such as reed canary-grass (*Phalaris arundinacea*) and reed sweet-grass (*Glyceria maxima*), tall herbs such as great willowherb (*Epilobium hirsutum*), bracken (*Pteridium aquilinum*), bramble (*Rubus fruticosus*) and common nettle (*Urtica dioica*), and bryophytes such as *Brachythecium rutabulum* and *Kindbergia praelonga*
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014). Non-native species can be invasive and have deleterious effects on native vegetation. A low target is set as non-native species can spread rapidly and are most easily dealt with when still at lower abundances
Vegetation composition: native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 10%	Attribute and target based on Perrin et al. (2014). Scrub and trees will tend to invade if fen conditions become drier
Vegetation composition: soft rush and common reed cover	Percentage cover in local vicinity of a representative number of monitoring stops	Total cover of soft rush (*Juncus effusus*) and common reed (*Phragmites australis*) less than 10%	Attribute and target based on Perrin et al. (2014)
Vegetation structure: litter	Percentage cover in local vicinity of a representative number of monitoring stops	Total cover of litter not more than 25%	Attribute and target based on JNCC (2004). More than 25% litter cover may indicate insufficient removal of biomass by grazing and/or undesirable water table levels
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground not more than 10%	Attribute and target based on Perrin et al. (2014). While grazing may be appropriate in this habitat, excessive areas of disturbed bare ground may develop due to unsuitable grazing regimes. Disturbance can include hoof marks, wallows, human footprints, vehicle and machinery tracks. Excessive disturbance can result in loss of characteristic species and presage erosion for peatlands
Physical structure: tufa formations	Percentage cover in local vicinity of a representative number of monitoring stops	Disturbed proportion of vegetation cover where tufa is present is less than 1%	Attribute and target based on Perrin et al. (2014)
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat; maintain features of local distinctiveness, subject to natural processes	This includes species on the Flora (Protection) Order, 2015 and/or Red Lists (Byrne et al., 2009; Regan et al., 2010; Lockhart et al., 2012; Wyse Jackson et al., 2016, etc.). Lough Derg, North-east Shore SAC contains the only known population of the FPO listed and Critically Endangered Irish fleabane (*Inula salicina*) (Wyse Jackson et al., 2016) which occurs in the alkaline fen habitat along the lakeshore (NPWS internal files)

Conservation Objectives for : Lough Derg, North-east Shore SAC [002241]

8240 Limestone pavements

To restore the favourable conservation condition of Limestone pavements* in Lough Derg, North-east Shore 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	The exact total area of Limestone pavements* in Lough Derg, North-east Shore SAC is currently unknown. Small amounts of limestone outcrops occur around the edges of Lough Derg, particularly at Portumna and Cornalack, and also at Kylenamelly, where there are large blocks and smaller boulders of limestone scattered along the woodland floor by the lakeshore, intermixed with wet marshy inlets (NPWS internal files). While there is no limestone pavement with the typical clint and grike formation in the SAC, the type that does occur is akin to the 'shattered pavement' type containing loose limestone rubble (European Commission, 2013). The limestone outcrops in the SAC occur in association with the Annex I habitats *Juniperus communis* formations (5130), *Taxus baccata* woods (91J0*) and Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (91E0*). Conservation objectives for all these habitats should be used in conjunction with each other as appropriate
Habitat distribution	Occurrence	No decline	See the notes for Habitat area above. This habitat is split into exposed pavement and wooded pavement
Vegetation composition: positive indicator species	Number at a representative number of monitoring stops	At least seven positive indicator species present	Positive indicator species for exposed and wooded pavement are listed in Wilson and Fernandez (2013). Typical species of wooded pavement recorded at Kylenamelly include ivy (*Hedera helix*), bramble (*Rubus fruticosus*), violets (*Viola* spp.) and enchanter's-nightshade (*Circaea lutetiana*). Typical species recorded on the limestone rubble/pavement at Cornalack include juniper (*Juniperus communis*), yew (*Taxus baccata*), burnet rose (*Rosa spinosissima*), bloody crane's-bill (*Geranium sanguineum*), herb-robert (*G. robertianum*), wild thyme (*Thymus polytrichus*), blue moor-grass (*Sesleria caerulea*), dog violet (*Viola riviniana*) and rusty-back spleenwort (*Asplenium ceterach*) (NPWS internal files)
Vegetation composition: bryophyte layer	Percentage at a representative number of monitoring stops	Bryophyte cover at least 50% on wooded pavement	Attribute and target based on Wilson and Fernandez (2013)
Vegetation composition: negative indicator species	Percentage at a representative number of monitoring stops	Collective cover of negative indicator species on exposed pavement not more than 1%	Negative indicator species are listed in Wilson and Fernandez (2013). Negative indicator species for wooded pavement overlap with non-native species (below)
Vegetation composition: non-native species	Percentage at a representative number of monitoring stops	Cover of non-native species not more than 1% on exposed pavement; on wooded pavement not more than 10% with no regeneration	Attribute and target based on Wilson and Fernandez (2013). Cotoneaster (*Cotoneaster* sp.) has been recorded in the habitat in the SAC (NPWS internal files). Parts of the habitat have been planted with conifers; however, Portumna and Kylenamelly are managed for restoration by Coillte which involves removal of exotic species (Flanagan and Browne, 2002; NPWS internal files)
Vegetation composition: scrub	Percentage at a representative number of monitoring stops	Scrub cover no more than 25% of exposed pavement	Attribute and target based on Wilson and Fernandez (2013)
Vegetation composition: bracken cover	Percentage at a representative number of monitoring stops	Bracken (*Pteridium aquilinum*) cover no more than 10% on exposed pavement	Attribute and target based on Wilson and Fernandez (2013)
Vegetation structure: woodland canopy	Percentage at a representative number of monitoring stops	Canopy cover on wooded pavement at least 30%	Attribute and target based on Wilson and Fernandez (2013)

Vegetation structure: dead wood	Occurrence in a representative number of monitoring stops	Sufficient quantity of dead wood on wooded pavement to provide habitat for saproxylic organisms	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem
Physical structure: disturbance	Occurrence in a representative number of monitoring stops	No evidence of grazing pressure on wooded pavement	Attribute and target based on Wilson and Fernandez (2013)
Indicators of local distinctiveness	Occurrence	Indicators of local distinctiveness are maintained	This includes species on the Flora (Protection) Order, 2015 and/or Red Lists (Byrne et al., 2009; Regan et al., 2010; Lockhart et al., 2012; Wyse Jackson et al., 2016, etc.) and other rare or localised species, as well as archaeological and geological features, which often support distinctive species

Conservation Objectives for : Lough Derg, North-east Shore SAC [002241]

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 Lough Derg, North-east Shore 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. See map 4	Alluvial forests with *Alnus glutinosa* and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)* in Lough Derg, North-east Shore SAC is known to occur on the lakeshore at Kylenamelly, in parts of Portumna Forest Park and around Bounla Island (NPWS internal files). As part of the National Survey of Native Woodlands (NSNW), Perrin et al. (2008) surveyed and mapped the habitat within the sub-sites Bounla Island (NSNW site code 1950), including the island and adjacent lakeshore, and Rinmaher Wood (1614), which is within Portumna Forest Park. The area of alluvial woodland mapped by Perrin et al. (2008) is 11.15ha. As part of the Native Woodland Scheme (NWS), the habitat was surveyed and mapped at Kylenamelly (Flanagan and Browne, 2002), comprising 6.57ha. Map 4 shows the surveyed areas classified as 91E0* (17.72ha). Note that further unsurveyed areas of the habitat may be present within the SAC, particularly along low-lying areas of the lakeshore
Habitat distribution	Occurrence	No decline. The surveyed woodland areas at Bounla Island (NSNW site code 1950), Rinmaher (NSNW site code 1614) and Kylenamelly are shown on map 4	Distribution based on Perrin et al. (2008) and Flanagan and Browne (2002). It is important to note that further unsurveyed areas may be present within the SAC
Woodland size	Hectares	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and "small" woods at least 3ha in size	The target areas for individual woodlands aim to reduce habitat fragmentation and benefit those species requiring 'deep' woodland conditions (Peterken, 2002). In some cases, topographical constraints may restrict expansion
Woodland structure: cover and height	Percentage; metres; centimetres	Total canopy cover at least 30%; median canopy height at least 7m; native shrub layer cover 10-75%; native herb/dwarf shrub layer cover at least 20% and height at least 20cm; bryophyte cover at least 4%	The target aims for a diverse structure with a canopy containing mature trees, shrub layer with semi-mature trees and shrubs, and well-developed field layer (herbs and dwarf shrubs) and ground layer (bryophytes). Assessment criteria are described in Daly et al. (in prep.) and O'Neill and Barron (2013)
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Described in Perrin et al. (2008) and NPWS internal files. See also the Irish Vegetation Classification (Perrin, 2016; www.biodiversityireland.ie/projects/national-vegetation-database/irish-vegetation-classification)
Woodland structure: natural regeneration	Seedling:sapling:pole ratio	Seedlings, saplings and pole age-classes of target species for 91E0* woodlands and other native tree species occur in adequate proportions to ensure survival of woodland canopy	The target species for 91E0* are alder (*Alnus glutinosa*), ash (*Fraxinus excelsior*) and willows (*Salix* spp.). Assessment criteria are described in Daly et al. (in prep.) and O'Neill and Barron (2013)
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 and lake floodplains, but not for woodland around springs/seepage areas

Woodland structure: dead wood	Number per hectare	At least 19 stems/ha of dead wood at least 20cm diameter	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem. Dead wood comprises old senescent trees, standing dead trees, fallen dead wood (including large branches) and rotten stumps of any tree species. Assessment criteria are described in Daly et al. (in prep.) and O'Neill and Barron (2013)
Woodland structure: veteran trees	Number per hectare	No decline	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 disctinctiveness	Occurrence	No decline	Includes ancient or long-established woodlands (see Perrin and Daly, 2010), archaeological and geological features as well as red listed and other rare or localised species
Woodland structure: indicators of overgrazing	Occurrence	All five indicators of overgrazing absent	There are five indicators of overgrazing within 91E0*: topiary effect on shrubs and young trees, browse line on mature trees, abundant dung, severe recent bark stripping, and trampling (Daly et al., in prep.). In this SAC, grazing/browsing by deer is limiting regeneration in this habitat (NPWS internal files)
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover at least 90% of canopy; target species cover at least 50% of canopy	The target species for 91E0* are alder (*Alnus glutinosa*), ash (*Fraxinus excelsior*) and willows (*Salix* spp.) (Daly et al., in prep.; O'Neill and Barron, 2013)
Vegetation composition: typical species	Occurrence	At least 1 target species for 91E0* woodlands present; at least 6 positive indicator species for 91E0* woodlands present	A variety of typical native species should be present, depending on woodland type. The target species for 91E0* are alder (*Alnus glutinosa*), ash (*Fraxinus excelsior*) and willows (*Salix* spp.). Positive indicator species for 91E0* are listed in Daly et al. (in prep.) and O'Neill and Barron (2013)
Vegetation composition: negative indicator species	Occurrence	Negative indicator species cover not greater than 10%; regeneration of negative indicator species absent	Negative indicator species (i.e. any non-native species, including herbaceous species) absent or under control. Some of the areas at Kylenamelly and Portumna Forest Park were planted with exotic conifers such as Norway spruce (*Picea abies*). However, these sites are managed by Coillte through the Native Woodland Conservation Scheme, which involves removal of exotic species (Flanagan and Browne, 2002)
Vegetation composition: problematic native species	Percentage	Cover of common nettle (*Urtica dioica*) less than 75%	Common nettle (*Urtica dioica*) is a positive indicator species for 91E0* but, in some cases, it may become excessively dominant. Increased light and nutrient enrichment are factors which favour proliferation of common nettle (Daly et al., in prep.)

Conservation Objectives for : Lough Derg, North-east Shore SAC [002241]

91J0 Taxus baccata woods of the British Isles

To maintain the favourable conservation condition of *Taxus baccata* woods of the British Isles* in Lough Derg, North-east Shore 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. See map 4	*Taxus baccata* woods of the British Isles* in Lough Derg, North-east Shore SAC occurs on the east shore of Lough Derg at Cornalack, where it occurs in association with *Juniperus communis* formations (5130) on shattered Limestone pavement (8240*) and partly within a disused quarry. As part of the National Survey of Native Woodlands (NSNW), Cornalack (NSNW site code 1963) was surveyed by Perrin et al. (2008). Cornalack has also been included in national monitoring surveys (Cross and Lynn, 2013; Daly et al., in prep.). The minimum area of yew (*Taxus baccata*) woodland in the SAC is estimated to be 2.24ha (Daly et al., in prep.). Map 4 shows the surveyed area classified as 91J0* (2.24ha). There is a yew-rich stand of mixed high forest at Kylenamelly on the west shore of Lough Derg within the SAC, but this is not true yew woodland (Cross and Lynn, 2013). It is important to note that further unsurveyed areas of the habitat may be present within the SAC
Habitat distribution	Occurrence	No decline. The surveyed yew woodland at Cornalack is shown on map 4	Distribution based on Daly et al. (in prep.). Note that further unsurveyed areas of the habitat may be present within the SAC
Woodland size	Hectares	Area stable or increasing. Where topographically possible,"large" woods at least 25ha in size and "small" woods at least 3ha in size	The target areas for individual woodlands aim to reduce habitat fragmentation and benefit those species requiring 'deep' woodland conditions (Peterken, 2002). In some cases, topographical constraints may restrict expansion. The area of yew (*Taxus baccata*) woodland at Cornalack within the SAC boundary is estimated to be 2.24ha (Daly et al., in prep.)
Woodland structure: cover and height	Percentage; metres; centimetres	Total canopy cover at least 30%; median canopy height at least 10m; native shrub layer cover 10-75%; native herb/dwarf shrub layer cover at least 20% and height at least 20cm; bryophyte cover at least 4%	The target aims for a diverse structure with a canopy containing mature trees, shrub layer with semi-mature trees and shrubs, and well-developed field layer (herbs and dwarf shrubs) and ground layer (bryophytes). Assessment criteria are described in Daly et al. (in prep.) and Cross and Lynn (2013). The mature yew stand at Cornalack reaches 8-12m in height. Ash (*Fraxinus excelsior*) is constant in the canopy and holly (*Ilex aquifolium*) is the principal understorey species with some rowan (*Sorbus aucuparia*) and occasional purging buckthorn (*Rhamnus cathartica*) and spindle (*Euonymus europaeus*). Ivy (*Hedera helix*) is the principal species of the herb layer with small amounts of other species. Bryophyte cover ranges from 50-80% (Cross and Lynn, 2013)
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	See Perrin et al. (2008), Cross and Lynn (2013), Daly et al. (in prep.) and NPWS internal files for further details. See also the Irish Vegetation Classification (Perrin, 2016; www.biodiversityireland.ie/projects/national-vegetation-database/irish-vegetation-classification)
Woodland structure: natural regeneration	Seedling:sapling:pole ratio	Seedlings, saplings and pole age-classes of yew (*Taxus baccata*) and other native tree species occur in adequate proportions to ensure survival of woodland canopy	Yew (*Taxus baccata*) regenerates poorly under its own canopy, but can regenerate under a canopy of other species or in the open if competition from the field layer is not too strong. The Cornalack site is unusual in that abundant yew regeneration is occurring within an adjacent juniper (*Juniperus communis*) formation (Cross and Lynn, 2013)

Woodland structure: dead wood	Number per hectare	At least 19 stems/ha of dead wood at least 20cm diameter	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem. Dead wood comprises old senescent trees, standing dead trees, fallen dead wood (including large branches) and rotten stumps of any tree species. Assessment criteria are described in Daly et al. (in prep.) and Cross and Lynn (2013)
Woodland structure: veteran trees	Number per hectare	No decline	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 disctinctiveness	Occurrence	No decline	Includes ancient or long-established woodlands (see Perrin and Daly, 2010), archaeological and geological features as well as red-listed and other rare or localised species
Woodland structure: indicators of overgrazing	Occurrence	All four indicators of overgrazing absent	Yew (*Taxus baccata*) is highly susceptible to browsing and bark strippping (Thomas and Polwart, 2003). There are four indicators of overgrazing within 91J0*: topiary effect on shrubs and young trees, browse line on mature trees, abundant dung, and severe recent bark stripping (Daly et al., in prep.). No signs of grazing were observed at Cornalack by Cross and Lynn (2013)
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover at least 90% of canopy; yew (*Taxus baccata*) cover at least 50% of canopy	Species reported in Perrin et al. (2008), Cross and Lynn (2013), Daly et al. (in prep.) and NPWS internal files
Vegetation composition: typical species	Occurrence	Yew (*Taxus baccata*) present; at least 6 positive indicator species for 91J0* woodlands present	A variety of typical native species should be present. Yew (*Taxus baccata*) is the only target species for 91J0*. Positive indicator species for 91J0* are listed in Daly et al. (in prep.) and Cross and Lynn (2013)
Vegetation composition: negative indicator species	Occurrence	Negative indicator species cover not greater than 10%; regeneration of negative indicator species absent	Negative indicator species (i.e. any non-native species, including herbaceous species) absent or under control. In this SAC, small-leaved cotoneaster (*Cotoneaster microphyllus*) has been recorded at Cornalack (NPWS internal files)

Appendix C. Drawings

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