Ground Investigation for N65 Carrigahorig to Balleiragh Bridge Road Improvement Scheme

AA Screening Report (Final)

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Tipperary County Council
Civic Offices
Limerick Road
NENAGH

JBA Project Manager

Niamh Burke
Block 660, Unit 8
Greenogue Business Plaza
Greenogue Business Park
Rathcoole
DUBLIN

Revision History

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Contract

This report describes work commissioned by Michael Woulfe, on behalf of Tipperary County Council, by a letter dated 20th December 2019. Malin Lundberg of JBA Consulting carried out this work.

Prepared by ..... Malin Lundberg BSc MSc

Assistant Ecologist

Reviewed by ..... Niamh Burke BSc (Hons) PhD CEnv MCIEEM

Principal Ecologist

Purpose

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Abbreviations

AA	Appropriate Assessment
CIEEM	Chartered Institute if Ecology and Environmental Management
DoEHLG	Department of Environment, Heritage and Local Government
EC	European Communities
EPA	Environmental Protection Agency
IROPI	Imperative Reasons of Over-riding Public Interest
NBDC	National Biodiversity Data Centre
NPWS	National Parks and Wildlife Service
QI	Qualifying Interest
SAC	Special Area of Conservation
SPA	Special Protection Area
WFD	Water Framework Directive
ZoI	Zone of Influence

1 Introduction

1.1 Background

JBA Consulting Ireland Ltd. has been commissioned by Tipperary County Council to undertake a Screening for Appropriate Assessment (AA) in relation to the proposed ground investigations for N65 Carrigahorig to Balleiragh Bridge Road Improvement Scheme.

A previous Flood Risk Assessment (JBA, 2017a) and Ecological Constraints Report (JBA, 2017b) was conducted by JBA Consulting in 2017. The Ecological Constraints Report identified that a section of the N65 lies directly adjacent to the Lough Derg, North-East Shore SAC. To inform the constraints reports, a desktop review and Phase 1 ecology survey was conducted by JBA Consulting Ecologists in 2017 on the section of road identified as being adjacent to the SAC. This survey and constraints report identified potential ecological constraints and the need for AA screening to the impacts of the proposed scheme.

Further, JBA conducted a high-level appraisal on three design options for the proposed scheme in April 2019 (JBA, 2019). The appraisal was based on identified ecological receptors which are connected to qualifying interests (QIs) of Natura 2000 sites and potential pathways for impact.

This AA Screening Report assesses potential impact on Natura 2000 sites from the ground investigations for Design Option 2.

1.2 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 conservation of an EU-wide network of sites known as Natura 2000 sites. Natura 2000 sites are Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Conservation of Wild Birds Directive (79 / 409 / EEC).

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

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

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

Article 6(4) states:

"*If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member States shall take all compensatory measures necessary to ensure that the overall*

coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.

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

The requirements of Articles 6(3) and 6(4) of the Habitats Directive have been transposed into Irish legislation by means of the Habitats Regulations, 1997 (S.I. No. 94 of 1997) and the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 / 2011).

1.3 Appropriate Assessment Process

Guidance on the Appropriate Assessment (AA) process was produced by the European Commission in 2002, which was subsequently developed into guidance specifically for Ireland by the Department of Environment, Heritage and Local Government (DoEHLG) (2009). These guidance documents identify a staged approach to conducting an AA, as shown Figure 1-1.

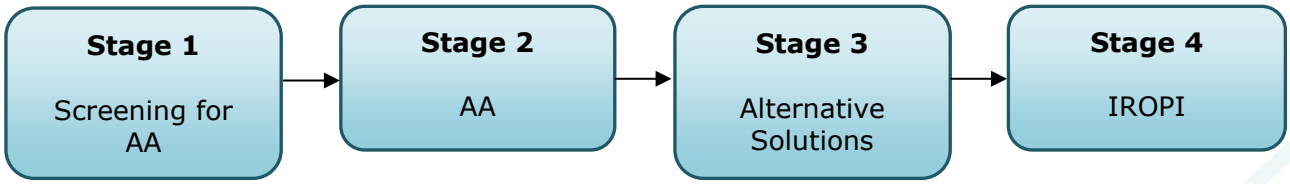


Figure 1-1: The Appropriate Assessment Process (from: Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities, DoEHLG, 2009)

1.3.1 Stage 1 - Screening for AA

The initial, screening stage of the Appropriate Assessment is to determine:

- whether the proposed plan or project is directly connected with or necessary for the management of the European designated site for nature conservation
- if it is likely to have a significant adverse effect on the European designated site, either individually or in combination with other plans or projects

For those sites where potential adverse impacts are identified, either alone or in combination with other plans or projects, further assessment is necessary to determine if the proposals will have an adverse impact on the integrity of a European designated site, in view of the sites conservation objectives (i.e. the process proceeds to Stage 2).

1.3.2 Stage 2 - AA

This stage requires a more in-depth evaluation of the plan or project, and the potential direct and indirect impacts of them on the integrity and interest features of the European designated site(s), alone and in-combination with other plans and projects, taking into account the site's structure, function and conservation objectives. Where required, mitigation or avoidance measures will be suggested.

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 mitigation cannot be achieved, then alternative solutions will need to be considered (i.e. the process proceeds to Stage 3).

1.3.3 Stage 3 - Alternative Solutions

Where adverse impacts on the integrity of Natura 2000 sites are identified, and mitigation cannot be satisfactorily implemented, alternative ways of achieving the objectives of the

plan or project that avoid adverse impacts need to be considered. If none can be found, the process proceeds to Stage 4.

1.3.4 Stage 4 - IROPI

Where adverse impacts of a plan or project on the integrity of Natura 2000 sites are identified and no alternative solutions exist, the plan will only be allowed to progress if imperative reasons of overriding public interest can be demonstrated. In this case compensatory measures will be required.

The process only proceeds through each of the four stages for certain plans or projects. For example, for a plan or project, not connected with management of a site, but where no likely significant impacts are identified, the process stops at stage 1. Throughout the process, the precautionary principle must be applied, so that any uncertainties do not result in adverse impacts on a site.

This report is for Stage 1 Screening for Appropriate Assessment.

1.4 Methodology

The Screening for Appropriate Assessment has been carried out with reference to the following documents:

- DoEHLG (2009 rev 2010) Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities. Department of the Environment, Heritage and Local Government (DoEHLG 2009).
- European Communities (EC) (2000) Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg. European Commission (European Commission 2000).
- EC (2002) Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg. European Commission (European Commission et al. 2002).
- EC (2007) Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission. European Commission (European Commission 2007).
- CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland - Terrestrial, Freshwater and Coastal, Second Ed. (Chartered Institute of Ecology and Environmental Management, 2018)
- Fossitt, J., (2000). A Guide to Habitats in Ireland. The Heritage Council, Kilkenny (Fossitt 2000).

Data has been collected from a range of sources, including:

- Ecological survey (JBA Consulting 2017);
- Ecological Constraints Report (JBA, 2017a);
- NPWS website (www.npws.ie);
- EPA website (https://gis.epa.ie/EPAMaps/);
- Catchments (www.catchments.ie);
- River Basin Management Plan (RBMP) (www.wfdireland.ie);
- Planning website (www.myplan.ie);

- National Biodiversity Data Centre (NBDC) Biodiversity Maps (http://maps.biodiversityireland.ie/#/Map)

1.4.1 Limitations and Constraints

The screening assessment necessarily relies on some assumptions and it was inevitably subject to some limitations. These would not affect the conclusion, but the following points are recorded in order to ensure the basis of the assessment is clear:

- Information on the works and conditions on site are based on current knowledge at the time of writing.
- Some slight variation in the works methodology may occur, but these will only be minor changes. Where changes to methodology could impact on ecological features, an ecologist will be consulted to determine if the project needs re-screening.
- Adverse weather can cause delays to the schedule and alter the timing of works. This has been accounted for using a worst-case scenario where necessary.

2 Project Description

2.1 The 'Project'

The proposed development meets the criteria of a 'Project' as defined in the Habitats Directive and is not directly connected with or necessary to the management of any Natura 2000 site. Therefore, the Project is subject to the requirements of the Appropriate Assessment process.

2.2 Site location

The ground investigation works proposed will take place located in Ballyquirk, between Carrigahorig and Balleiragh Bridge and include sections of road N65, road L-5059-0 and L-1082-0 (Figure 2-1). Lough Derg is located approximately 1 km west of the site and Barrisokane town is approximately 9 km south of the site. The two Natura 2000 sites Lough Derg, North-east Shore SAC and Lough Derg (Shannon) SPA are located adjacent to the proposed project. Parts of the Natura 2000 sites boundaries are along road N65. The wider area surrounding the site is dominated by agricultural grasslands and a forestry plantation to the south.

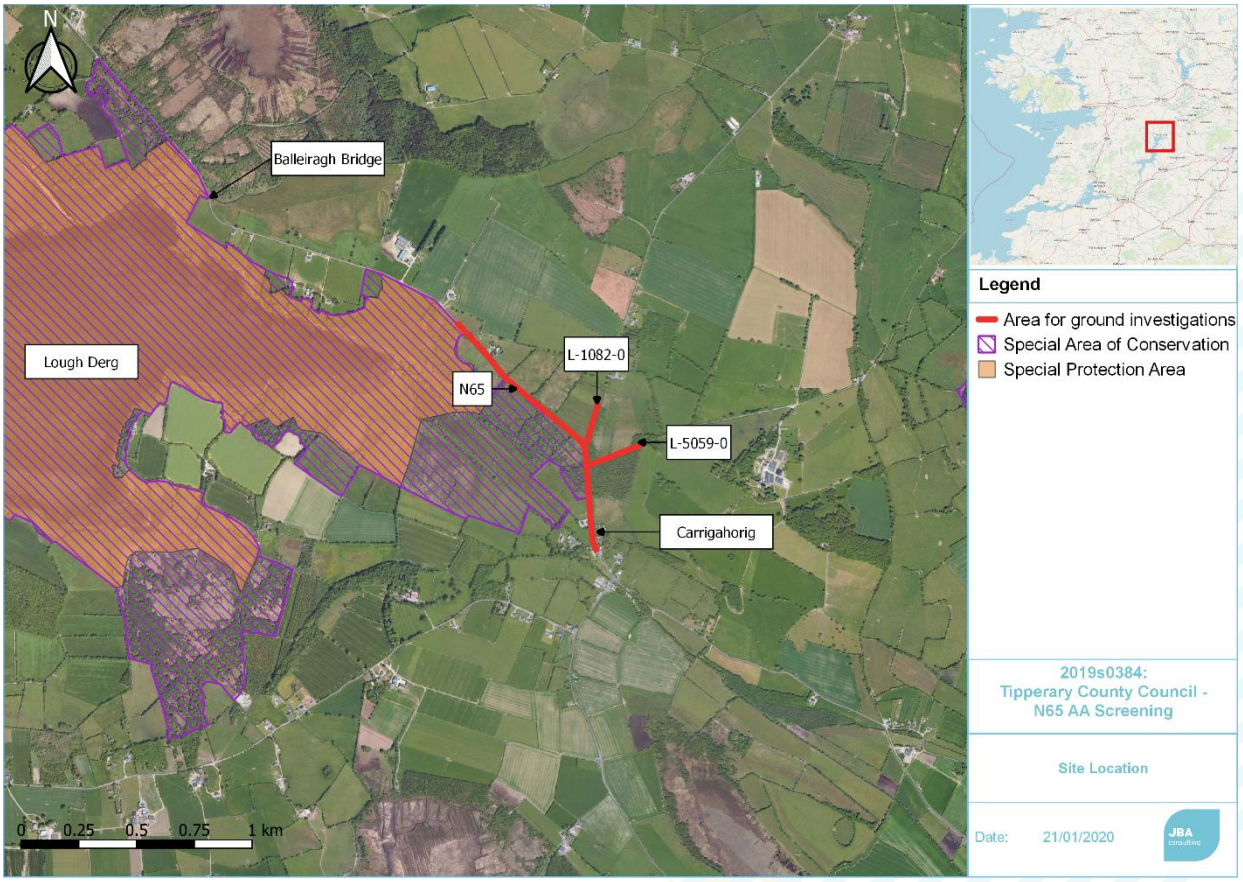


Figure 2-1: Site location.

2.3 Proposed project

The proposed ground investigations will provide information on the extent of soft ground along the road alignment and below the existing road. The works will comprise of 2 No. phases.

Phase 1

DPH Dynamic Probes (Heavy): 46 No. Dynamic Probe Heavy (DPH probes) driven to refusal in soft ground areas carried out at regular intervals on alternating sides of the road (estimated depth = 10m, however, they could extend to deeper depths).

Window Samples: 19 No. Window Samples including sample recovery and storage driven to refusal in soft ground areas carried out at regular intervals on alternating sides of the road (estimated depth = 10m, however, they could extend to deeper depths).

Phase 2

Depending on the findings from Phase 1 of the ground investigation, the following site investigation points may also be specified at specific locations as part of a second phase of the ground investigation to provide further information on the ground conditions:

Trial Pits: Trial pits mechanically excavated to a depth of 4.5 m or refusal at shallower depths with a minimum 13 tonne mechanical tracked excavator. Locations to be determined following completion of Phase 1.

Boreholes: 200 mm diameter cable percussion boreholes through peat, glacial till (boulder clay, glacial gravels or soft to firm fine-grained alluvium), to be taken to refusal on rock or boulders in the glacial till. A piezometer may be required to be installed in the boreholes to provide information on the groundwater conditions in the area.

Overview of the investigation methods

DPH Dynamic Probes (Heavy)

Dynamic probes are used in ground investigations for determining the depths to the bottom of soft ground strata and to obtain information on the strength of the soft material.

The apparatus for the dynamic probes comprises a driving rod with a cone fitted at the base which has a slightly greater diameter than the rod, a hammer and a steel anvil. The diameter of the upper rod is 32mm and the diameter of the cone is 42mm.

The operating procedure for the dynamic probe involves driving the rod/cone into the ground by dropping a mass (i.e. the hammer) on the rod a distance of 0.5m. This is usually achieved using a mechanical latch to release the hammer.

Window Samples

Window sampling or windowless sampling is a technique used to bore through shallow soft soils to obtain a profile of the ground conditions and to facilitate soil sampling for chemical and geotechnical analysis.

The window sampling method involves driving cylindrical steel tubes into the ground using a hydraulic hammer. The dynamic probe equipment mentioned in Section 3.1 can be used to take the window samples.

The steel sample tubes are usually 75mm in diameter and 1m long and include a broad slot, or window, cut down one side. The soil is pushed into the sample tube as it is driven into the ground.

On reaching the required depth, the sample tube and drill rods are extracted manually or using a hydraulic jack. Where the ground is unstable, steel casing can be installed to prevent the sides of the borehole from collapsing when the tubes are extracted. After the sample tubes are withdrawn from the ground, the soil core is logged and sampled from the window.

Window sample holes shall be backfilled with sand.

Trial Pits

Trial pits comprise the excavation of pits up to 4.5m depth using a hydraulic excavator to determine the soil profile and allow for bulk soil sampling for testing. Both tracked mounted

and rubber-tired excavators are used to access a variety of ground conditions. A tracked excavator would be required in soft ground conditions where access would be difficult. Bog mats (i.e. large steel plates) are sometimes also required to distribute the load over particularly difficult soft ground areas. After completion of the pit, the hole is immediately backfilled with the arisings and compacted in layers typically using the excavator bucket.

Boreholes

Boreholes are used to obtain a profile of the ground conditions and to facilitate soil sampling for chemical and geotechnical analysis. Standard penetration tests can be carried out using this investigation method to provide information on the strength/density of the soil.

Standard light-cable percussion boring uses a two-tonne capacity winch driven by a diesel engine and a tripod derrick approximately 7m in height. The derrick folds down so that the rig can be towed by a four-wheel drive vehicle. The borehole is formed using a 'clay cutter' for cohesive soils or a 'shell' (or bailer) for non-cohesive materials. A chiselling tool can be employed to penetrate very hard ground or obstructions. The sides of the borehole are supported using steel casing which is lowered into the ground as the boring proceeds. If the exploratory borehole is constructed in sands or gravels, the casing is used to support the borehole sides to allow in-situ testing and sampling.

Depending on the ground conditions, the borehole can extend to considerable depths in the overburden (e.g. greater than 60m), however, they would typically refuse on boulders which is estimated to be between 5m and 10m. Cable percussion boreholes would not be capable of penetrating through rock.

All boreholes of dynamic probes shall be backfilled with bentonite pellets or by tremie-grouting with a cement/bentonite grout (1:4 ratio). The top surface of boreholes shall be made good similar to the state that existed prior to the formation of the boreholes.

Neither of the proposed methods require the addition of water in the works, nor disposal of water or spoils outside the site.

The DPH, Window Samples and boreholes will not produce any spoil. The trial pits include excavation of soil, however, the soil will be returned into the pit as soon as possible, the process taking approximately one hour.

The works will take 3-5 weeks to complete.

2.3.1 Project Area of Influence

The project will primarily affect the site only, but a wider area of influence is used for impacts relating to noise disturbance (1km), air pollution (5km), surface water (5km).

2.4 Existing Environment

An ecological walkover survey was conducted by ecologist Tanya Slattery and Sean Dowling of JBA Consulting on 11 April 2017, to inform on which ecological features were present near the site. The Fossitt habitats identified during the ecological walkover survey located adjacent to the N65, are listed in

Table 2-1 and shown in Figure 2-2. In general, many of the habitats present are adapted to a high level of inundation by water and the present flora highlights this adaptation. Many of the fields have drainage ditches and are planted with woodland or have naturally transitioned to wet woodland. The remaining habitats are improved agricultural land, houses and roads. More detailed descriptions of the habitats present are in the following section.

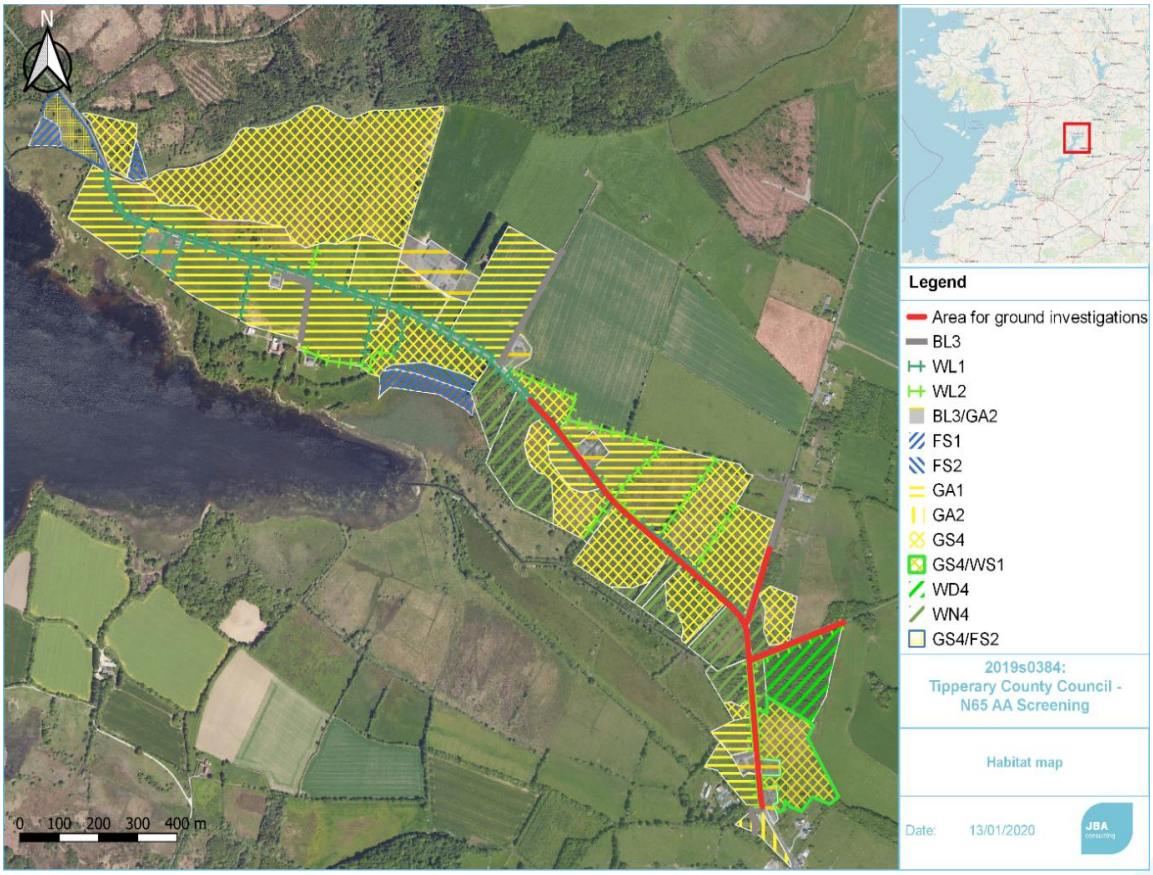


Figure 2-2: Habitat map

Table 2-1: Habitats present as per Fossitt, 2000.

Fossitt code	Name
BL3	Buildings and artificial surfaces
WL1	Hedgerows
WL2	Treelines
FS1	Reed and large sedge swamps
FS2	Tall-herb swamps
GA1	Improved agricultural grassland
GA2	Amenity grassland
GS4	Wet grassland
WD1	Mixed broadleaved woodland
WD4	Conifer plantation
WN4	Wet pedunculate oak-ash woodland
FW2	Depositing/lowland rivers
FW4	Drainage ditches

BL3 Buildings and artificial surfaces

This habitat in this area consists of roads and houses. Often described as being in conjunction with Amenity grassland, in which case it is referring to a house with a garden.

WL1 Hedgerows

Mature Hedgerows containing Blackthorn (*Prunus spinosa*), Hawthorn (*Crataegus monogyna*), Hazel (*Corylus avellana*), Brambles (*Rubus fruticosus* agg.) and occasional trees including Ash (*Fraxinus excelsior*) and Willow (*Salix* spp.) are present along the side of the N65 in this area. Given the maturity of the hedgerow, a well-established field layer is likely, but was not entirely evident during the ecological walkover survey, due to the time of year. Honeysuckle (*Lonicera pericylmenum*), Ivy (*Hedera hibernica*), Garlic Mustard (Allaria petiolata), Colt's foot (*Tussilago farfara*), Lords and Ladies (*Arum maculatum*), Herb Robert (*Geranium robertanium*), Hogweed (*Heracelum sphondylium*) and Lesser Celandine (*Ficaria verna*) were observed growing under, through or directly adjacent to the hedgerows.

WL2 Treelines

Treelines were predominantly composed of Ash (*Fraxinus excelsior*), Hawthorn (*Crataegus monogyna*), Beech (*Fagus sylvatica*) and Willow (*Salix* spp.). Some Oak (*Quercus robur*) and Sycamore (*Acer pseudoplatanus*) were also occasionally observed within the treelines. Trees tended to be mature and many were covered in a layer of Ivy. Treelines ran alongside fields, alongside ditches and through fields. Treelines bordering fields tended to have a ground/shrub layer with a similar species composition as the hedgerows. Other species recorded as present in the undergrowth beneath treelines included Primroses (*Primula vulgaris*), Early dog-violet (*Viola reichenbachiana*), Vetches (*Vicia* spp.) and Nettles (*Utrica dioica*),

FS1 Reed and large sedge swamps

There are two areas of Reed and large sedge swamps in the vicinity of the N65, neither of which are directly adjacent to the area of proposed works (Figure 2-3). Reed and large sedge swamps in this area are dominated by Common Reed (*Phragmites australis*) and contain Bulrush (*Typha latifola*) and Water Horsetail (*Equisetum fluviatile*).

Figure 2-3: Overlooking Lough Derg, reed and large sedge swamps in the foreground.

FS2 Tall-herb swamps

Two areas of tall herb swamps were observed near to the N65. Species observed within these areas included Watermint (*Mentha aquatica*), Fools Watercress (*Apium nodiflorum*), Willowherbs (*Epilobium* spp.), Iris (*Iris pseudacorus*), Cuckoo flower (*Cardamine pratensis*), Marsh Marigold (*Caltha palustris*), Common sedge (*Carex nigra*), horsetails including Marsh horsetail (*Equisetum palustre*) and Water horsetail, and occasional stands of Common Reed as the habitat transitions to Reed and large sedge swamp. Within the area of this habitat to the north of the proposed development area, the remaining herb layer from last year is taller but unidentifiable at this time of year.

This habitat can potentially include pockets of the Annex I habitat Annex I habitat "6430 Hydrophilous tall-herb fringe communities of plains and of the montane to alpine levels".

GA1 Improved agricultural grassland

A significant proportion of the grassland adjacent to the N65 is improved agricultural grassland. This grassland is intensively modified, is species poor and is grazed by cattle, sheep and horses. In some areas, wet grassland and improved agricultural grassland habitats are intermittently mosaiced or transitioning from one to the other.

GA2 Amenity grassland

Amenity grassland is located next to houses and at the town of Carrigahorig. Amenity grassland is improved and species poor.

GS4 Wet grassland

Wet grassland occurs in a significant proportion of the fields adjacent to the N65. This includes areas of poorly drained farmland that have not recently been improved and seasonally flooded alluvial grasslands. Purple Moor-grass dominates (*Molinia caerulea*) the wet grassland. Other species present include abundant rushes (*Juncus* spp.), mainly Soft

Rush (*J. effusus*), small sedges (*Carex* spp.), Watermint, Common Marsh Bedstraw (*Galium palustre*), Willowherbs, Iris, Cuckoo flower, Marsh Marigold, Silverweed (*Potentilla anserina*) and horsetails. The proportion of flowering herbs within the sward of each field varies, depending on the habitat quality and management.

Wet grassland habitats have previously been recorded as containing a number of rare species on the Shannon Callows, including Elongated Sedge (*Carex elongata*), Pale Sedge (*Carex pallescens*) and Marsh Stitchwort (*Stellaria palustris*). Threats to wet grassland habitats have been identified as including drainage and development (EPA 1998).

WD4 Conifer plantation

The Sitka spruce (*Picea sitchensis* (Bong.) Carr) conifer plantation is located behind a small area of Wet pedunculate oak, ash woodland. It is bordered by a broadleaf treeline, including Sycamore, Birch (*Betula pubescens*), Ash and Hawthorn. Drainage ditches surround the woodland and may pass through it also.

WN4 Wet pedunculate oak-ash woodland

The woodland in this area appear to be periodically flooded and are surrounded by drains (Figure 2-4). They are dominated by Ash but also contain Oak, Beech, Elm (*Ulmus glabra*), Willows and Holly (*Ilex aquifolium*). Ground flora was not fully identifiable during the survey, due to the time of year but included Primroses, Early dog-violet, Ivy, Nettles, and Brambles.

Wet, broadleaved semi-natural woodland occurs quite frequently along the Shannon Callows and the growth of trees within them is often stunted as a result of regular inundation. The main threat to theses woodlands is drainage and clearance (EPA 1998).

Figure 2-4: Wet pedunculate oak-ash woodland to the left and wet grassland to the right.

WS1 Scrub

There was one section of scrub present that was dominated by Brambles. It is surrounded by an area of wet grassland.

FW2 Depositing/lowland rivers

Vegetation was not observed in either Lorrha Stream or Carrigahorig Stream, during the ecological walkover survey, and both streams appeared to have experienced some human modification. Both streams are connected to Lough Derg.

FW4 Drainage ditches

Several drainage channels were observed, including one running parallel to the stream flowing from Carrigahorig to Lough Derg (Figure 2-5). Two drains from the eastern side of the N65 flow under the road and into this marked drainage channel. An old drainage channel was observed running through the area of wet grassland within the SAC and SPA. Not all drains would have been observable during the ecological walkover survey. Drainage ditches were observed to contain a variety of well-established vegetation including rushes, Iris, Water Mint, *Apium* spp., Duckweeds (*Lemmna* spp.), Bur-reeds (*Sparganium s*pp.) and occasionally Common Reed.

2.4.1 Waterbodies within the Vicinity of the Proposed Site

The site lies within the WFD catchment Lower Shannon 25C and sub-catchments Shannon[Lower]_SC_070 and LorrhaStream_SC_010. Carrigahorig Stream runs south of Road N65, crossed by N65 approximately 100 m south from where the proposed works will take place. The stream is flowing in a south-east to north-west direction, feeding into Lough Derg. North of the section for the proposed works, the road is crossing the Lorrha Stream, which is flowing in a north-east to south-west direction, passing through Friar's Lough and feeding into Lough Derg (Figure 2-5).

Carrigahorig and Lorrha Streams has the Water Framework Directive (WFD) status 'Poor' (EPA 2020). Both streams are located within sub-catchment LorrhaStream_SC_010.

Lough Derg is located approximately 150 m south of Road N65, within sub-catchment Shannon[Lower]_SC_070. The lake has the WFD status 'Moderate' (EPA 2020). Lough Derg makes part of Lough Derg, North-east Shore SAC and Lough Derg (Shannon) SPA (shown in Figure 2-5). Detail descriptions of these Natura 2000 sites are given in Section 3.

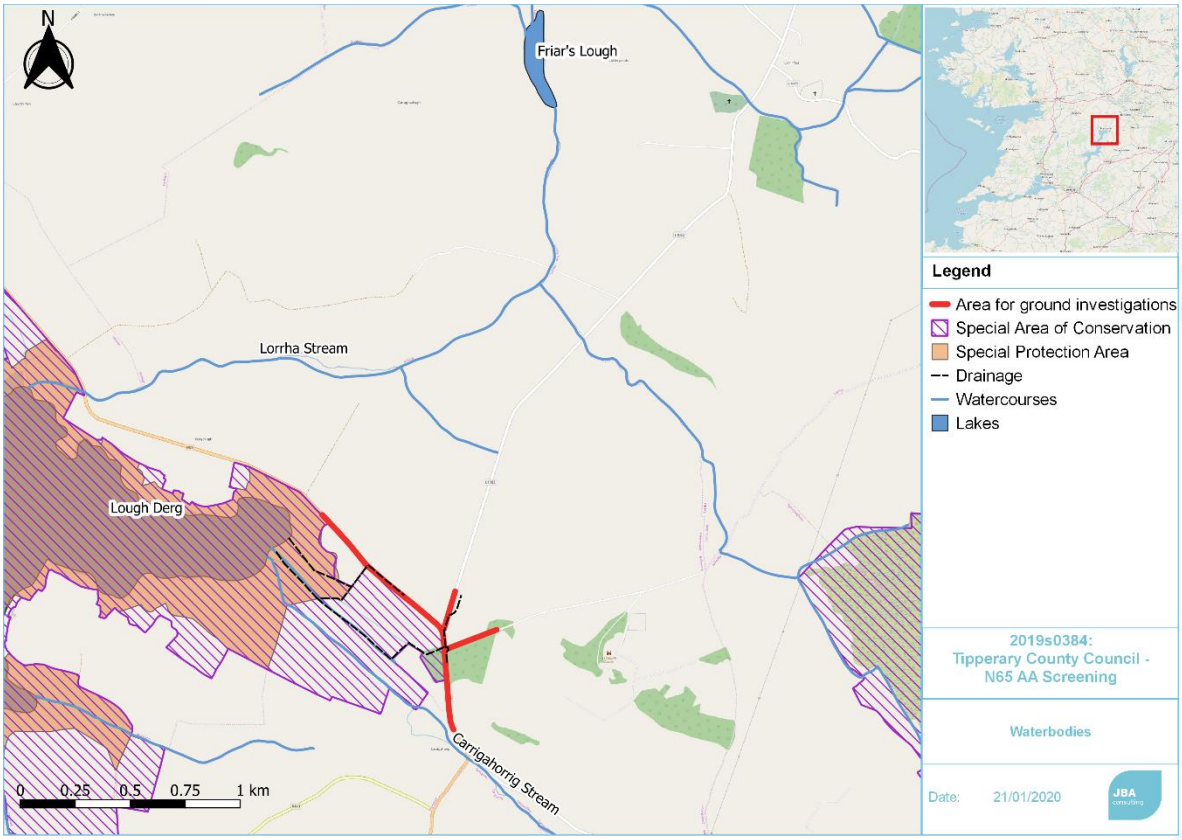


Figure 2-5: Watercourses relative to works and Natura 2000 sites

3 Natura 2000 Sites

The DoEHLG (2009) guidance identifies that Screening for Appropriate Assessment of a plan or project should consider the following Natura 2000 sites:

- Any Natura 2000 sites within or adjacent to the plan or project area.
- Any Natura 2000 sites within the likely Zone of Influence (ZoI) of the plan or project. This is dependent on the nature and scale of the plan, with 15km generally recommended for plans, but potentially less for projects.
- Any Natura 2000 sites that are more than 15km from the plan or project area, but may potentially be impacted upon, for example, through a hydrological connection.

As the proposed works are considered of 'Project' status, and only Natura 2000 sites within a 15km range of the proposed development were examined. The Natura 2000 sites within this range are listed in Table 3-1 and their location are shown in Figure 3-1. As evident from the table 3-1 below, Lough Derg SAC and Lough Derg SPA are immediately adjacent to the proposed works location, and as such careful consideration of potential impact will be required.

Table 3-1: Natura 2000 sites within 15 km of the proposed site

Natura 2000 site	Site Code	Approximate distance from site
Lough Derg, North-east Shore SAC	002241	0.0 km
Lough Derg (Shannon) SPA	004058	0.0 km
Kilcarren-Firville Bog SAC	000647	1.4 km
River Shannon Callows SAC	000216	2.6 km
Middle Shannon Callows SPA	004096	2.6 km
Arragh More (Derrybreen) Bog SAC	002207	5.6 km
Liskeenan Fen SAC	001683	6.4 km
Ballyduff/Clonfinane Bog SAC	000641	7.8 km
Redwood Bog SAC	002353	8.1 km
Barroughter Bog SAC	000231	9.8 km
River Little Brosna Callows SPA	004086	10.0 km
Scohaboy (Sopwell) Bog SAC	002206	10.7 km
Cloonmoylan Bog SAC	000248	10.9 km
Ardgraigue Bog SAC	002356	11.7 km
Slieve Aughty Mountains SPA	004168	12.3 km
Rosturra Wood SAC	001313	12.6 km
All Saints Bog SPA	004103	13.0 km
All Saints Bog and Esker SAC	000566	13.0 km
Sharavogue Bog SAC	000585	13.8 km
Dovegrove Callows SPA	004137	14.4 km
Pollnaknockaun Wood Nature Reserve SAC	000319	14.4 km
Ridge Road, SW of Rapemills SAC	000919	14.4 km
Derrycrag Wood Nature Reserve SAC	000261	14.8 km

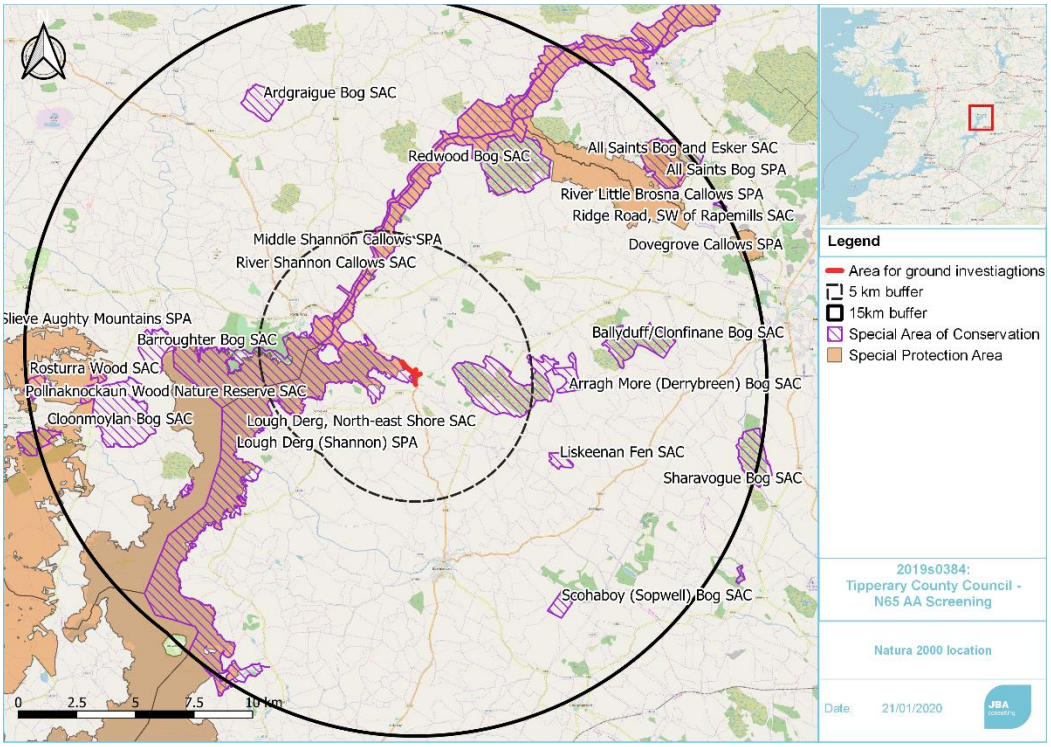


Figure 3-1: Natura 2000 sites within 15 km of the proposed site (Source: NPWS).

The five Natura 2000 sites that could potentially be impacted by the proposed project, and considered to be within the Zone of Influence (ZoI), are:

- Lough Derg, North-east Shore SAC (002241)
- Lough Derg (Shannon) SPA (004058)
- Kilcarren-Firville Bog SAC (000647)
- River Shannon Callows SAC (000216)
- Middle Shannon Callows SPA (004096)

These Natura 2000 sites were identified to be within the ZoI of the project due to their proximity to the proposed site of works, the type of qualifying interests and what they are vulnerable to. The descriptions of these Natura 2000 sites are outlined in the following sections below. All other Natura 2000 sites were not anticipated to be impacted due to either distance or absence of pathways between the development site and the receiving environment.

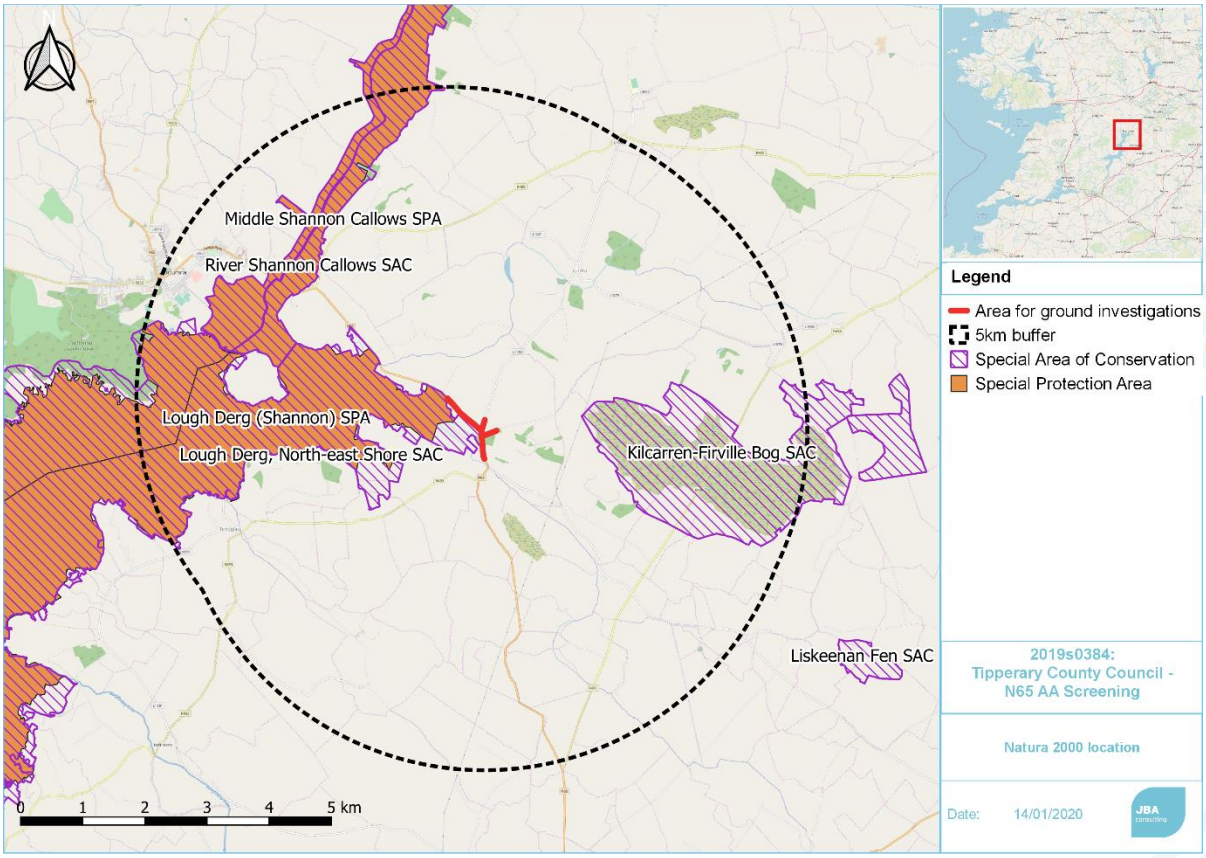


Figure 3-2: Natura 2000 sites considered to be within ZoI (source: NPWS)

3.1 Lough Derg, North-east Shore SAC (002241)

This Natura 2000 site incorporates part of the water body of Lough Derg and includes most of the northern lake shore and approximately one-third of the northeast shoreline. Lough Derg itself is the lowest order lake on the River Shannon and is one of the largest freshwater bodies in Ireland. Most of the lake overlies Carboniferous Limestone, which outcrops along the shores, but some old Red Sandstone occurs on the eastern side (NPWS, 2017a). These limestone pavements 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* (NPWS, 2014a).

Alkaline fens occur occasionally along the lake margins and a substantial area of Yew woodlands is located along the east shore of Lough Derg at Cornalack. Juniper occurs throughout this site in a range of habitats, associated with calcareous grasslands, heath and limestone outcrops. 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 (NPWS, 2014a).

Deciduous woodlands are also a notable feature of the site, dominated by oak *Quercus* spp. and wet woodland is frequent along the lake shore and in some areas, this conforms with alluvial woodland. Red Data Book species occurring within the site are Irish Fleabane *Inula salicina*, Marsh Pea *Lathyrus palustris* and Ivy Broomrape *Orobanche hederae*, the stonewort *Chara tomentosa.* Irish Fleabane is protected under the Flora (Protection) Order, 1999 (NPWS, 2014a).

The lake is nationally important for waterfowl and is of conservation interest for fish, such as the Lampreys listed under Annex II E.U. Habitats Directive, and freshwater invertebrates (NPWS, 2014a).

3.1.1 Qualifying Interests

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):

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

3.1.2 Site Vulnerability

The threats, pressures and activities that impact the Lough Derg, North-east Shore SAC (NPWS 2017a) are listed in Table 3-2.

Table 3-2: Threats and pressures posed to Lough Derg, North-east Shore SAC (NPWS 2017a).

Threats and pressures	Rank Low (L) Moderate (M) High (H)	Source- inside (i) outside (o) both (b)
Flooding and rising precipitations	L	i
Lack of fires	M	i
Temperature changes (e.g. rise of temperature & extremes)	L	i
Problematic native species	L	i
Management of aquatic and bank vegetation for drainage purposes	M	i
Human induced changes in hydraulic conditions	L	i
Diffuse pollution to surface waters due to household sewage and waste waters	M	i
Invasive non-native species	H	b
Droughts and less precipitations	L	i
Paths, tracks, cycling tracks	H	i
Species composition change (succession)	L	i
Piers / tourist harbours or recreational piers	H	i
Outdoor sports and leisure activities, recreational activities	M	i

Threats and pressures	Rank Low (L) Moderate (M) High (H)	Source- inside (i) outside (o) both (b)
Mining and quarrying	M	i
Pollution to surface waters (limnic, terrestrial, marine & brackish)	H	b
Intensive grazing	L	i
Eutrophication (natural)	H	b
Restructuring agricultural land holding	L	i
Fertilisation	M	b

3.2 Lough Derg (Shannon) SPA (004058)

Lough Derg lies within counties Tipperary, Galway and Clare and is the largest of the River Shannon Lakes, being some 40 km long. 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 and the lake has most recently been classified as a mesotrophic system (NPWS, 2014b).

Lough Derg is of importance for both breeding and wintering birds, and the many islands in the lake are important nesting sites. The site supports a nationally important breeding colony of Common Tern *Sterna hirundo* and Cormorant *Phalacrocorax carbo*. In winter, it has nationally important populations of Tufted Duck *Aythya fuligula* and Goldeneye *Bucephala clangula*, as well as a range of other species including Whooper Swan *Cygnus cygnus*. Parts of Lough Derg (Shannon) SPA are a Wildfowl Sanctuary (NPWS, 2014b).

3.2.1 Special Conservation Interests

The conservation interests of Lough Derg (Shannon) SPA are listed below. These are habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (numbers in brackets are Natura 2000 codes):

- Cormorant (*Phalacrocorax carbo*) [A017]
- Tufted Duck (*Aythya fuligula*) [A061]
- Goldeneye (*Bucephala clangula*) [A067]
- Common Tern (*Sterna hirundo*) [A193]
- Wetland and Waterbirds [A999]

3.2.2 Site Vulnerability

The threats, pressures and activities that impact the Lough Derg (Shannon) SPA (NPWS 2017b) are listed in Table 3-3.

Table 3-3: Threats and pressures posed to Lough Derg (Shannon) SPA (NPWS 2017b).

Threats and pressures	Rank Low (L) Moderate (M) High (H)	Source- inside (i) outside (o) both (b)
Leisure fishing (other than bait-fishing)	M	i
Hunting	M	i
Fertilisation	H	o
Nautical sports	H	i

3.3 Kilcarren Firville Bog SAC (000647)

Kilcarren Firville Bog is a lowland raised bog complex consisting of active raised bog that is wet and actively peat forming and degraded raised bog, which has been degraded by peat cutting, drainage or other land use activities, but is capable of regeneration. The area also contains Rynchosporion habitat in wet depressions, pool edges and erosion channels (NPWS, 2013b).

The uncut high bog is surrounded by a large cutover area which is still subject to varying degrees of peat-cutting. The cutover bog is frequently dominated by Purple Moor-grass, and Bog-myrtle *Myrica gale* is locally abundant. Birch woodland with some Holly and Willows is widespread in most cutover areas, and Scots Pine *Pinus sylvestris* is common in a few locations. These scrub areas provide habitat for a population of the nationally rare shrub Alder Buckthorn *Frangula alnus* (NPWS, 2013b).

3.3.1 Qualifying Interests

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):

- Active raised bogs* [7110]
- Degraded raised bogs still capable of natural regeneration [7120]
- Depressions on peat substrates of the *Rhynchosporion* [7150]

3.3.2 Site Vulnerability

The threats, pressures and activities that impact the Kilcarren Firville Bog SAC (NPWS, 2017e) are listed in Table 3-4.

Table 3-4: Threats and pressures posed to Kilcarren Firville Bog SAC (NPWS, 2017e).

Threats and pressures	Rank Low (L) Moderate (M) High (H)	Source- inside (i) outside (o) both (b)
Fertilisation	L	i
Fire and fire suppression	L	i
Fertilisation	M	o
Roads, motorways (all paved/ tarred roads)	L	i
Restructuring agricultural land holding	M	o
Mowing / cutting of grassland	L	i

Threats and pressures	Rank Low (L) Moderate (M) High (H)	Source- inside (i) outside (o) both (b)
Grazing	L	i
Forest planting on open ground (increase in forest area, planting e.g. on grassland, heathland)	M	o
Grazing	M	o
Restructuring agricultural land holding	M	i
Mowing / cutting of grassland	M	o
Peat extraction	L	i

3.4 River Shannon Callows SAC (000216)

The River Shannon Callows is a long and diverse site which consists of seasonally flooded, semi-natural, lowland wet grassland, along and beside the river between the towns of Athlone and Portumna. It is approximately 50 km long and averages about 0.75 km wide. Along much of its length the site is bordered by raised bogs (many, but not all, of which are subject to large-scale harvesting), esker ridges and limestone-bedrock hills. The soils grade from silty-alluvial to peat (NPWS, 2013a).

The River Shannon Callows is mainly composed of lowland wet grassland. Different plant communities occur, depending on elevation, and therefore flooding patterns. Two habitats listed on Annex I of the E.U. Habitats Directive are well-represented within the site – Molinia meadows and lowland hay meadows. In places these two habitats grade into one another. Botanically, the site is extremely diverse with two legally protected species of plants, Opposite-leaved Pondweed *Groenlandia densa* and Meadow Barley *Hordeum secalinum* (NPWS, 2013a).

Other habitats found within the site include alluvial woodland on a series of islands, limestone pavements with mature Hazel *Corylus avellana* woodland, lowland dry grassland, drainage ditches, freshwater marshes and reedbeds (NPWS, 2013a).

The site is of international importance for wintering waterfowl, of particular note is an internationally important population of Whooper Swans and hold a large number of breeding wader, rare breeding birds and the endangered Corncrake *Crex crex*. The site also holds a population of Otter *Lutra lutra*, a species listed on Annex II of the E.U. Habitats Directive (NPWS, 2013a).

3.4.1 Qualifying Interests

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):

- Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410]
- Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) [6510]
- Limestone pavements* [8240]
- Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)* [91E0]
- *Lutra lutra* (Otter) [1355]

3.4.2 Site Vulnerability

The threats, pressures and activities that impact the River Shannon Callows SAC (NPWS, 2017d) are listed in Table 3-5.

Table 3-5: Threats and pressures posed to River Shannon Callows SAC (NPWS, 2017d).

Threats and pressures	Rank Low (L) Moderate (M) High (H)	Source- inside (i) outside (o) both (b)
Forestry clearance (clear-cutting, removal of all trees)	M	i
Fertilisation	M	i
Flooding	H	i
Modification of hydrographic functioning, general	L	i
Siltation rate changes, dumping, depositing of dredged deposits	M	i
Abandonment of pastoral systems, lack of grazing	H	i
Abandonment / lack of mowing	H	i
Outdoor sports and leisure activities, recreational activities	L	i
Use of biocides, hormones and chemicals	H	i
Non intensive mixed animal grazing	L	i
Paths, tracks, cycling tracks	L	i
Modifying structures of inland water courses	M	i
Grazing in forests/ woodland	L	i
Landfill, land reclamation and drying out, general	L	i
Removal of hedges and copses or scrub	L	i
Intensive grazing	M	i
Mechanical removal of peat	L	i
Predation	M	b
Hunting	L	b
Trampling, overuse,	L	i

3.5 Middle Shannon Callows SPA (004096)

The Middle Shannon Callows is a long and diverse site which consists of seasonally flooded, semi-natural, lowland wet grassland, along and beside the river between the towns of Athlone and Portumna. It is approximately 50 km long and averages about 0.75 km wide. The site has extensive areas of callow, or seasonally flooded, semi-natural, lowland wet grassland, along both sides of the river (NPWS, 2012).

The diversity of semi-natural habitats present, and the sheer size of the site attract an excellent diversity of bird species, including significant populations of several. The site is of

international importance as it regularly supports in excess of 20,000 wintering water birds and international important populations of Whooper Swan and Black-tailed Godwit *Limosa limosa*. The site is also important for breeding waders, including the Corncrake which is an IUCN Red Listed species (NPWS, 2012).

3.5.1 Special Conservation Interests

The conservation interests of Middle Shannon Callows SPA are listed below. These are habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (numbers in brackets are Natura 2000 codes):

- 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]

3.5.2 Site Vulnerability

The threats, pressures and activities that impact the Middle Shannon Callows SPA (NPWS, 2017d) are listed in Table 3-6.

Table 3-6: Threats and pressures posed to Middle Shannon Callows SPA (NPWS 2017e).

Threats and pressures	Rank Low (L) Moderate (M) High (H)	Source- inside (i) outside (o) both (b)
Hunting	L	i
Bridge, viaduct	H	i
Fertilisation	L	i
Grazing	H	i
Nautical sports	H	i
Urbanised areas, human habitation	H	o
Abandonment of pastoral systems, lack of grazing	L	i
Paths, tracks, cycling tracks (includes non-paved forest roads)	L	i
Leisure fishing (other than bait-fishing)	M	i
Fertilisation	M	o
Walking, horse-riding and non-motorised vehicles	M	i

4 Other Relevant Plans and Projects

4.1 Cumulative effects

4.1.1 North Tipperary County Development Plan 2010-2016 (as varied)

Tipperary County Council was established 1st June 2014 as an amalgamation of North and South Tipperary County Councils, and has at present two county development plans, one for north and one for south Tipperary. The lifetimes of these plans have been extended and will remain in effect until a new Regional Spatial and Economic Strategy is made by the Southern Regional Assembly. The plans have been republished in order to provide consistency and the most recent edition of the North County Development Plan is from 11th December 2017 (Tipperary County Council, 2019).

The strategic core aims of the plan are to promote development of a strong network of towns, facilitate the development of sustainable and socially inclusive communities, secure sustainable economic development, promote strong and competitive retail centres, safeguard natural and built heritage of the county, continue to be a leader in addressing climate change through facilitation of renewable energy developments and to promote sustainable transport patterns and integrated land-use and transportation policies (Tipperary County Council, 2017).

Lough Derg is a nationally renowned visitor attraction and there is a growing trend towards activity-based tourism. The Plan will ensure that the environmental, cultural and social resources in the natural environment are protected (Tipperary County Council, 2017).

The Plan aims to maintain and protect the safety, capacity and efficiency of national roads and associated junctions, and avoiding new access and intensification of existing access to national roads where the speed limit is greater than 50 km per hour. Permission to new accesses will be given in exceptional circumstances (Tipperary County Council, 2017).

A screening has been carried out on the Plan to determine whether or not its implementation would result in significant adverse impacts on Natura 2000 sites. The screening found that the Plan would not result in significant impacts on Natura 2000 sites. Any plans or projects which may have potential to impact on Natura 2000 sites must be screened for Appropriate Assessment (AA) and a full AA must be carried out if the plan or project is likely to have a significant effect on a Natura 2000 site (Tipperary County Council, 2017).

Other projects

As of January 2017, the projects listed below which are not retention applications, home extensions and/or internal alterations, has been granted permission in the vicinity of the proposed development.

Tipperary County Council	
Planning Application Reference	17600305
Development address	FIRMOUNT, CARRIGAHORIG
Description: Construct dwelling house, domestic garage, install a wastewater treatment system with percolation area and all associated site works	
Final Decision on Application	CONDITIONAL
Decision Date	10/7//2017
Distance from proposed project	650 m

4.1.2 River Basin Management Plan for Ireland 2018-2021

The River Basin Management Plan (RBMP for Ireland 2018-2021 sets out the actions that Ireland will take to improve water quality and achieve 'good' ecological status in water bodies (rivers, lakes, estuaries and coastal waters) by 2021 (DoHPLG, 2018a). Changes from previous River Basin Management Plans is that all River Basin Districts are merged as one national River Basin District. The Plan provides a more coordinated framework for improving the quality of our waters — to protect public health, the environment, water amenities and to sustain water-intensive industries, including agri-food and tourism, particularly in rural Ireland.

Lorrha Stream is included amongst 190 prioritised areas for action where collaboration between the Government and the dairy industry aims to promote best agricultural practice in order to address existing environmental pressures (DoHPLG, 2018a). The criteria for these prioritised areas for action is that they are identified as *At Risk* of not achieving their objectives or *Under Review* (DoHPLG 2018b). Both Lorrha Stream and Carrighahorig Stream, and Lough Derg are identified as being At Risk (EPA, 2019). Most of the waterbodies at risk which are not included in the prioritised areas for action will get targeted actions in the third cycle RBMP from 2021-2027 (DoHPLG, 2018a).

4.1.3 Summary

The County Development Plan, RBMP and projects near the proposed project are considered in combination with the currently proposed project in the Screening Assessment section below.

5 Screening Assessment

5.1 Introduction

This screening exercise will focus on assessing the likely adverse effects of the project on the Natura 2000 sites identified in Section 3 above.

This section identifies the potential impacts which may arise as a result of the proposed project. It then goes on to identify how these impacts could potentially impact on the Natura 2000 sites. The significance of potential impacts is also assessed, with any potential in-combination effects also identified.

5.1.1 Assessment Criteria

5.1.2 Description of 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

The proposed ground investigation works are not anticipated to impact on any QIs of the Natura 2000 sites. Lough Derg, North-east Shore SAC and Lough Derg (Shannon) SPA are in close proximity of the site of proposed works, being directly adjacent to the N65 road. The site also has potential groundwater connection with Kilcarren Firville Bog SAC. However, the works are not anticipated to have a significant impact on the Natura 2000 sites.

The rationale for excluding impacts via the main pathways is given in more detail in the following sections.

5.1.2.1 Surface water

The proposed site of works is in close proximity to with Lough Derg, North-east Shore SAC and Lough Derg (Shannon) SPA. There are drainage ditches along part of the road which are discharging to Lough Derg. (Figure 2-5). The other Natura 2000 sites are located either upstream of the site or within a separate sub-catchment and therefore are not impacted via surface water pathways

Potential impact via surface water would be by runoff during the works, given that the site is liable to flood. This would bring an increased load of sedimentation and pollutants to the watercourses. However, the nature of the works is carried out in such a way that there will be no water discharge and neither of the Dynamic Probe (Heavy), Window Samples or Boreholes will produce any loose soil. The Trial Pit excavations will generate loose soil, however, it will be returned into the pit immediately after the excavation is done. The entire process for one Trial Pit is estimated to take approximately 1 hour.

On consideration of the type of works along the road verge, and the temporary nature of the works (three to five weeks), it is not anticipated that any significant amount of sediment or pollution would be delivered to the watercourses via surface water pathways.

As habitats are not expected to be impacted by the proposed works, it is not anticipated that the water birds utilising these habitats and for which Lough Derg (Shannon) SPA is designated, would be impacted either.

No cumulative impact with other projects and plans is anticipated.

5.1.2.2 Groundwater

The proposed site of works lies within the same groundwater body as Lough Derg, North-east Shore SAC, Lough Derg (Shannon) SPA and Kilcarren Firville Bog SAC, giving the potential for diffusion of substances into the groundwater. The aquifer vulnerability at the site of the works is moderate to high (Figure 5-1). There is a small area of bedrock at the surface indicated at the south eastern end of the site. The subsoil within the site is peat and the underlying bedrock is muddy limestone and calcareous shale (GSI, 2019). Peat

soils are formed in areas with high groundwater levels close to the ground surface, although historical drainage may have lowered the groundwater levels. The slope (dip, refer to Figure 5-1) of the bedrock at the site is north east, which indicate the flow of the groundwater (GSI, 2019). The Flood Risk Assessment carried out for the site (JBA 2017a) states that local groundwater flow may enter Friar's Lough through seepage, which in turn discharges to Lough Derg via Lorrha Stream. Friar's Lough is located approximately 5.8km upstream of Lough Derg, with Lorrha Stream connecting the two lakes.

Backfilling of the investigation holes will be carried out continuously throughout the works. This would prevent leakage of pollution through the holes to the groundwater.

Given the small scale of the project and limited nature of the works and considering the flow direction of groundwater being north east (see Figure 5-1 below), it is not anticipated that Lough Derg, North-east Shore SAC and Lough Derg (Shannon) SPA will be significantly impacted via groundwater pathways, either alone or in combination with other projects.

Kilcarren Firville Bog SAC lies to the east of the site and groundwater could potentially flow towards the SAC. However, due to the small-scale of the project and the distance between the works and this SAC (1.4km), significant impacts are not anticipated for this SAC.

River Shannon Callows SAC and Middle Shannon Callows SPA lies within a separate groundwater body from proposed project and negative impacts to groundwater are not anticipated.

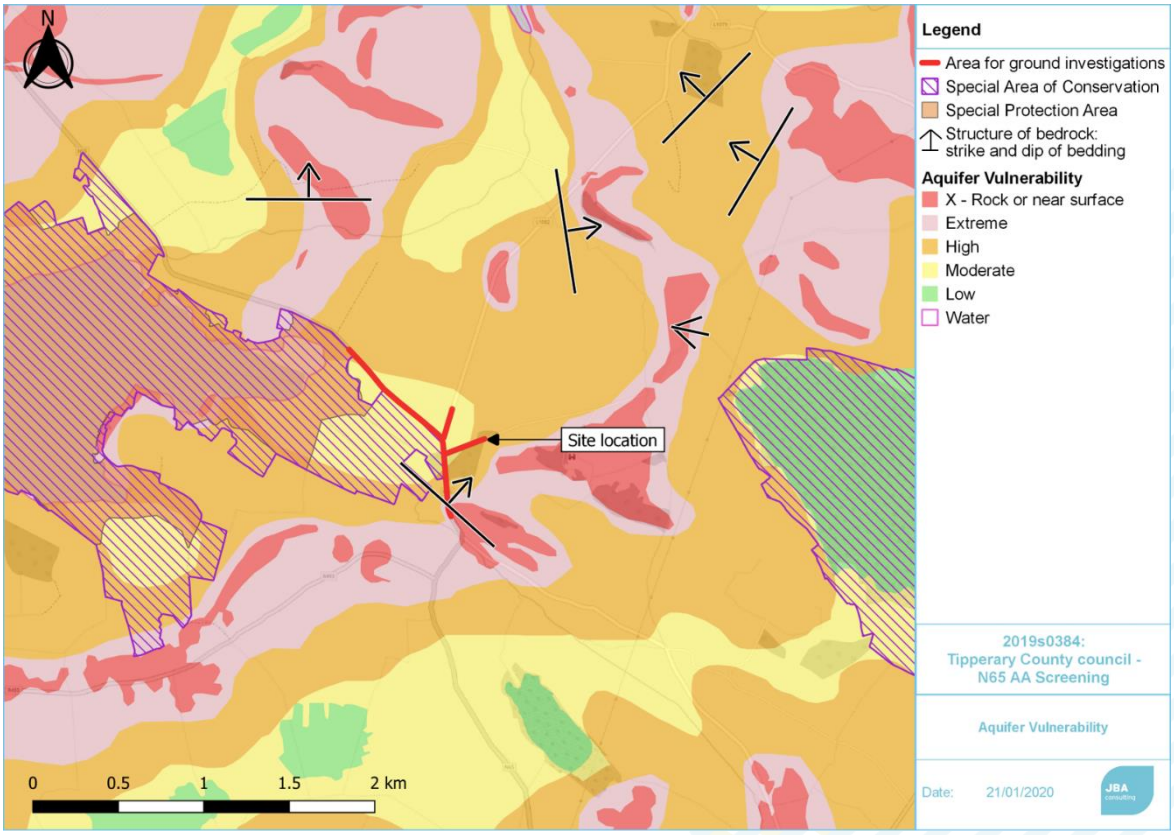


Figure 5-1: Aquifer vulnerability (source: GSI)

5.1.2.3 Land and Air

Land

Lough Derg, North-east Shore SAC and Lough Derg (Shannon) SPA are directly adjacent to the proposed site. However, works will be conducted along the verges of the existing roads. Some samples may be taken at the edge of wet pedunculate oak-ash woodland habitat, which occurs in a few areas along the road (Figure 2-2 and Figure 5-2). However, no works involving trial pit excavations will occur within the SAC boundaries. Thus, the proposed works are not anticipated to impact on the habitat and thus no impact on the Natura 2000 sites is expected via land pathways.

The other Natura 2000 sites are located further than 1km distance and are not anticipated to be impacted via land pathways.

Figure 5-2: Google Street View with image captured in March 2019 showing wet pedunculate oak-ash woodland habitat on both sides of road N65. (Map data ©2020 Google).

Air

Dust release and vehicular emissions can sometimes travel up to 10km and impact on surrounding habitats. The distance and direction of travel is dependent upon wind speed and direction. The prevailing wind in the area is south west (based on measurements carried out between 1955-2008 at Birr approximately 16km from the site (Met Éireann, 2020)). Given the small scale of the project and the general direction of the wind blowing away from Lough Derg, North-east Shore SAC, Lough Derg (Shannon) SPA, River Shannon Callows SAC and Middle Shannon Callows SPA, it is not anticipated to significantly impact on the QIs of these Natura 2000 sites.

Winds from the proposed site could potentially come in the direction of Kilcarren Firville Bog SAC which lies to the east. The SAC is designated for Active raised bogs [7110], Degraded raised bogs still capable of natural regeneration [7120] and Depressions on peat substrates of the Rhynchosporion [7150]. Potential threats would be via hydrological change, fertilisation, grazing management and habitat reduction. Impacts via air pathways to Kilcarren Firville Bog SAC are not anticipated.

No cumulative impact with other projects and plans is anticipated on any of the Natura 2000 sites.

5.1.3 Description of likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the Natura 2000 sites

Project Elements	Comment
Size and scale	The proposed ground investigations will provide information on the extent of soft ground along the road alignment and below the existing road. The works will comprise of 2 No. phases. **Phase 1** DPH Dynamic Probes (Heavy): 46 No. Dynamic Probe Heavy (DPH probes) driven to refusal in soft ground areas carried out at regular intervals on alternating sides of the road (estimated depth = 10m, however, they could extend to deeper depths). Window Samples: 19 No. Window Samples including sample recovery and storage driven to refusal in soft ground areas carried out at regular intervals on alternating sides of the road (estimated depth = 10m, however, they could extend to deeper depths). **Phase 2** Depending on the findings from Phase 1 of the ground investigation, the following site investigation points may also be specified at specific locations as part of a second phase of the ground investigation to provide further information on the ground conditions: Trial Pits: Trial pits mechanically excavated to a depth of 4.5 m or refusal at shallower depths with a minimum 13 tonne mechanical tracked excavator. Locations to be determined following completion of Phase 1. Boreholes: 200 mm diameter cable percussion boreholes through peat, glacial till (boulder clay, glacial gravels or soft to firm fine-grained alluvium), to be taken to refusal on rock or boulders in the glacial till. A piezometer may be required to be installed in the boreholes to provide information on the groundwater conditions in the area. **Overview of the investigation methods** *DPH Dynamic Probes (Heavy)* Dynamic probes are used in ground investigations for determining the depths to the bottom of soft ground strata and to obtain information on the strength of the soft material. The apparatus for the dynamic probes comprises a driving rod with a cone fitted at the base which has a slightly greater diameter than the rod, a hammer and a steel anvil. The diameter of the upper rod is 32mm and the diameter of the cone is 42mm. The operating procedure for the dynamic probe involves driving the rod/cone into the ground by dropping a mass (i.e. the hammer) on the rod a distance of 0.5m. This is usually achieved using a mechanical latch to release the hammer.

	Window Samples Window sampling or windowless sampling is a technique used to bore through shallow soft soils to obtain a profile of the ground conditions and to facilitate soil sampling for chemical and geotechnical analysis. The window sampling method involves driving cylindrical steel tubes into the ground using a hydraulic hammer. The dynamic probe equipment mentioned in Section 3.1 can be used to take the window samples. The steel sample tubes are usually 75mm in diameter and 1m long and include a broad slot, or window, cut down one side. The soil is pushed into the sample tube as it is driven into the ground. On reaching the required depth, the sample tube and drill rods are extracted manually or using a hydraulic jack. Where the ground is unstable, steel casing can be installed to prevent the sides of the borehole from collapsing when the tubes are extracted. After the sample tubes are withdrawn from the ground, the soil core is logged and sampled from the window. Window sample holes shall be backfilled with sand. *Trial Pits* Trial pits comprise the excavation of pits up to 4.5m depth using a hydraulic excavator to determine the soil profile and allow for bulk soil sampling for testing. Both tracked mounted and rubber-tired excavators are used to access a variety of ground conditions. A tracked excavator would be required in soft ground conditions where access would be difficult. Bog mats (i.e. large steel plates) are sometimes also required to distribute the load over particularly difficult soft ground areas. After completion of the pit, the hole is immediately backfilled with the arisings and compacted in layers typically using the excavator bucket. *Boreholes* Boreholes are used to obtain a profile of the ground conditions and to facilitate soil sampling for chemical and geotechnical analysis. Standard penetration tests can be carried out using this investigation method to provide information on the strength/density of the soil. Standard light-cable percussion boring uses a two-tonne capacity winch driven by a diesel engine and a tripod derrick approximately 7m in height. The derrick folds down so that the rig can be towed by a four-wheel drive vehicle. The borehole is formed using a 'clay cutter' for cohesive soils or a 'shell' (or bailer) for non-cohesive materials. A chiselling tool can be employed to penetrate very hard ground or obstructions. The sides of the borehole are supported using steel casing which is lowered into the ground as the boring proceeds. If the exploratory borehole is constructed in sands or gravels, the casing is used to support the borehole sides to allow in-situ testing and sampling.

	Depending on the ground conditions, the borehole can extend to considerable depths in the overburden (e.g. greater than 60m), however, they would typically refuse on boulders which is estimated to be between 5m and 10m. Cable percussion boreholes would not be capable of penetrating through rock. All boreholes of dynamic probes shall be backfilled with bentonite pellets or by tremie-grouting with a cement/bentonite grout (1:4 ratio). The top surface of boreholes shall be made good and rendered similar to the state that existed prior to the formation of the boreholes.
Land-take	There will be no land take from any of the Natura 2000 sites.
Distance from Natura 2000 site or key features of the site	The Natura 2000 sites of closest proximity to the proposed site are Lough Derg, North-east Shore SAC (0.0km), Lough Derg (Shannon) SPA (0.0km), Kilcarren-Firville Bog SAC (1.4km), River Shannon Callows SAC (2.6km) and Middle Shannon Callows SPA (2.6km).
Resource requirements (water abstraction etc.)	There will be no water abstraction requirements. Soil samples will be collected during the ground investigations; however, this is not anticipated to have a significant impact on the Natura 2000 sites.
Emissions (disposal to land, water or air)	*Temporary impacts*: Water The proposed works will not produce any discharge of water. Potential pollutants will be utilised at the site, including diesel and engine/hydraulic oils. These could potentially leak into surface water during heavy rainfall via drainage ditches. Given the small scale and temporary nature of the project, it is not anticipated to have a significant impact. Potential pollutants could also leak into groundwater via the boreholes. However, the groundwater is estimated to flow in a north easterly direction, away from Lough Derg, North-east Shore SAC and Lough Derg (Shannon) SPA Groundwater could potentially flow towards Firville Bog SAC (located 1.4km east of the proposed site). However, given the small scale and temporary nature of the project, it is not anticipated to significantly impact on any QIs of the Natura 2000 sites. There is no surface water or groundwater pathway between the proposed site and River Shannon Callows SAC and Middle Shannon Callows SPA, thus no impacts anticipated. Air Air pollution is restricted to working machinery and dust emissions may arise from the ground investigation works. These will be temporary and are not anticipated to have a significant impact on any of the Natura 2000 sites.

	Permanent impacts: Backfilling of the investigation holes will assure that no pollution enters the groundwater after the works have been conducted. After the ground investigation works have been carried out, the road will have the same traffic usage as before and no permanent impacts are anticipated.
Excavation requirements	The dynamic probes (heavy) and window samples will be driven to refusal in soft ground areas, estimated depth = 10m, however, they could extend to deeper depths. Trial pits will be excavated to a minimum of 4.5m and boreholes will be driven to refusal, estimated depth = 5m to 10m, however, they could extend to deeper depths.
Transportation requirements	*Temporary impacts*: Working machinery will work along the road and may impact on the local traffic and causing traffic congestions. However, one lane will always remain open throughout the works. This will be temporary (approximately 3 to 5 weeks) and access to the site will be on pre-existing roads, thus transportation requirements will not affect Natura 2000 sites. *Permanent impacts*: Given the temporary nature of the project, no permanent impacts are anticipated due to transportation requirements.
Duration of construction, operation, decommissioning etc.	The ground investigation works will take 3 to 5 weeks. Any construction of new road alignment is not within the scope of this AA Screening report.
Other	None

5.1.4 Description of likely changes to the Natura 2000 Sites

Potential Impact	Comment
Reduction of habitat area	There will be no loss of habitat from Natura 2000 sites.
Disturbance to key species	*Temporary Impacts:* The ground investigation works will increase the noise level and disturbance locally around the road. Wintering and breeding birds, which are the qualifying interests of the Lough Derg (Shannon) SPA, are susceptible to disturbance. However, given the small scale and temporary nature (3 to 5 weeks) of the proposed works, it is not anticipated to significantly impact on these QIs. *Permanent Impacts*: No permanent disturbance is anticipated to key species.
Habitat or species fragmentation	No habitat or species fragmentation is likely as the project poses no restrictions to habitats or species of the Natura 2000 sites.
Reduction in species density	None anticipated given the temporary nature (3 to 5 weeks) of the proposed works.

Changes in key indicators of conservation value (water quality etc.)	*Temporary impacts on water quality*: Given the scale and temporary nature of the works and that there will be no discharge of water, there will be no significant impact on water quality. *Permanent impacts on water quality*: No permanent impact on water quality is anticipated.
Climate change	N/A

5.1.5 Description of likely impacts on the Natura 2000 sites as a whole

Impact	Comments
Interference with the key relationships that define the structure of the site	None
Interference with key relationships that define the function of the site	None

5.1.6 Provide indicators of significance as a result of the identification of effects set out above in terms of:

Impact	Indicators
Loss (Estimated percentage of lost area of habitat)	No loss of area is anticipated.
Fragmentation	None anticipated.
Disruption & disturbance	None anticipated.
Change to key elements of the site (e.g. water quality etc.)	None anticipated. In addition, the proposed works will follow best practice guidelines and the works will not produce any discharge of water.

5.1.7 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 or magnitude of impacts is unknown

Following initial screening, and based upon best scientific judgement it is concluded that there will be no significant impacts on the following Natura 2000 sites:

- Lough Derg, North-east Shore SAC (002241)
- Lough Derg (Shannon) SPA (004058)
- River Shannon Callows SAC (000216)
- Middle Shannon Callows SPA (004096)
- Kilcarren Firville Bog SAC (000647)

5.2 Conclusion

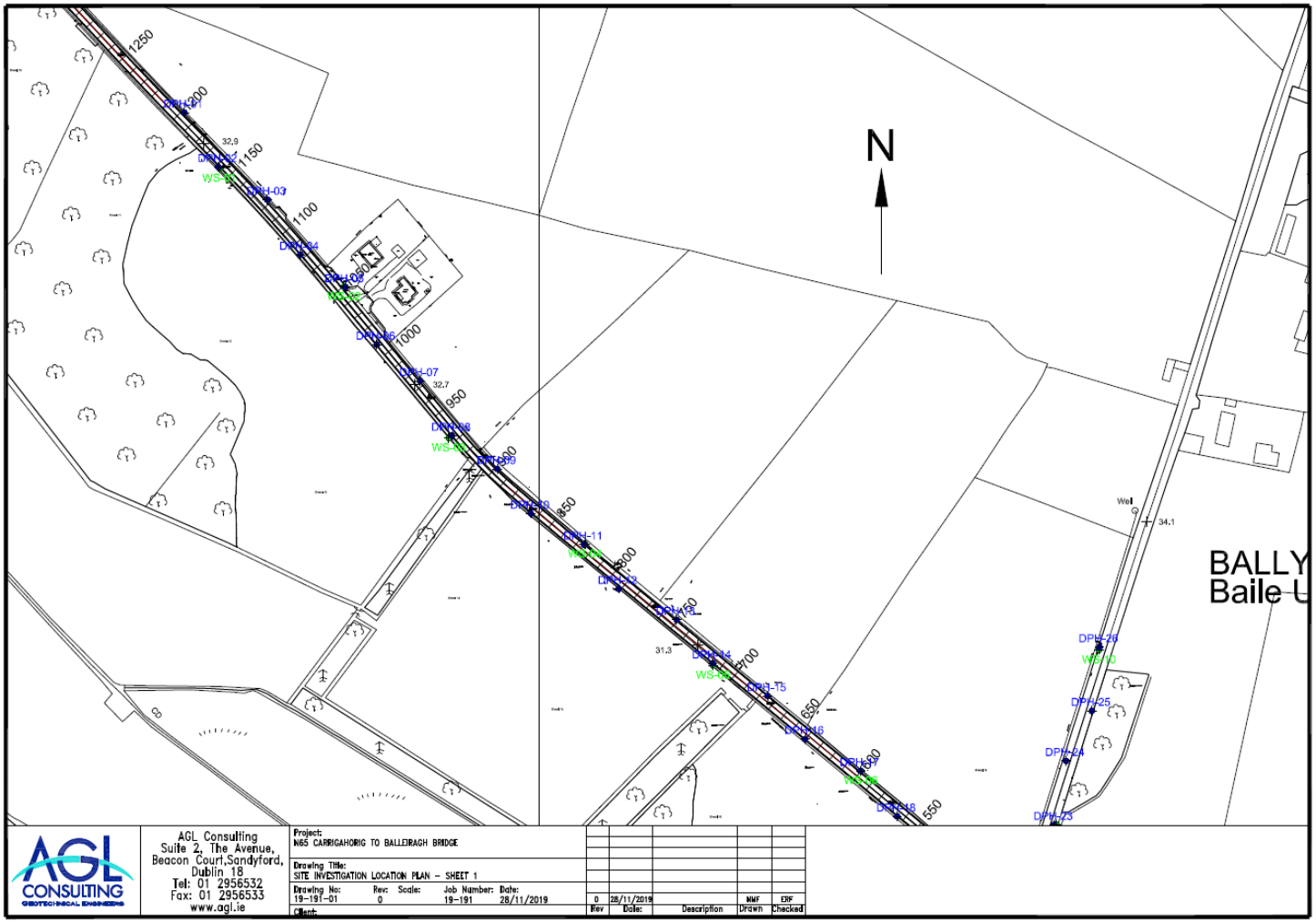
No likely significant impacts on the five NATURA 2000 sites considered in the scope of this assessment, are expected.

If any changes occur in the design of these works, a new Screening for Appropriate Assessment is required.

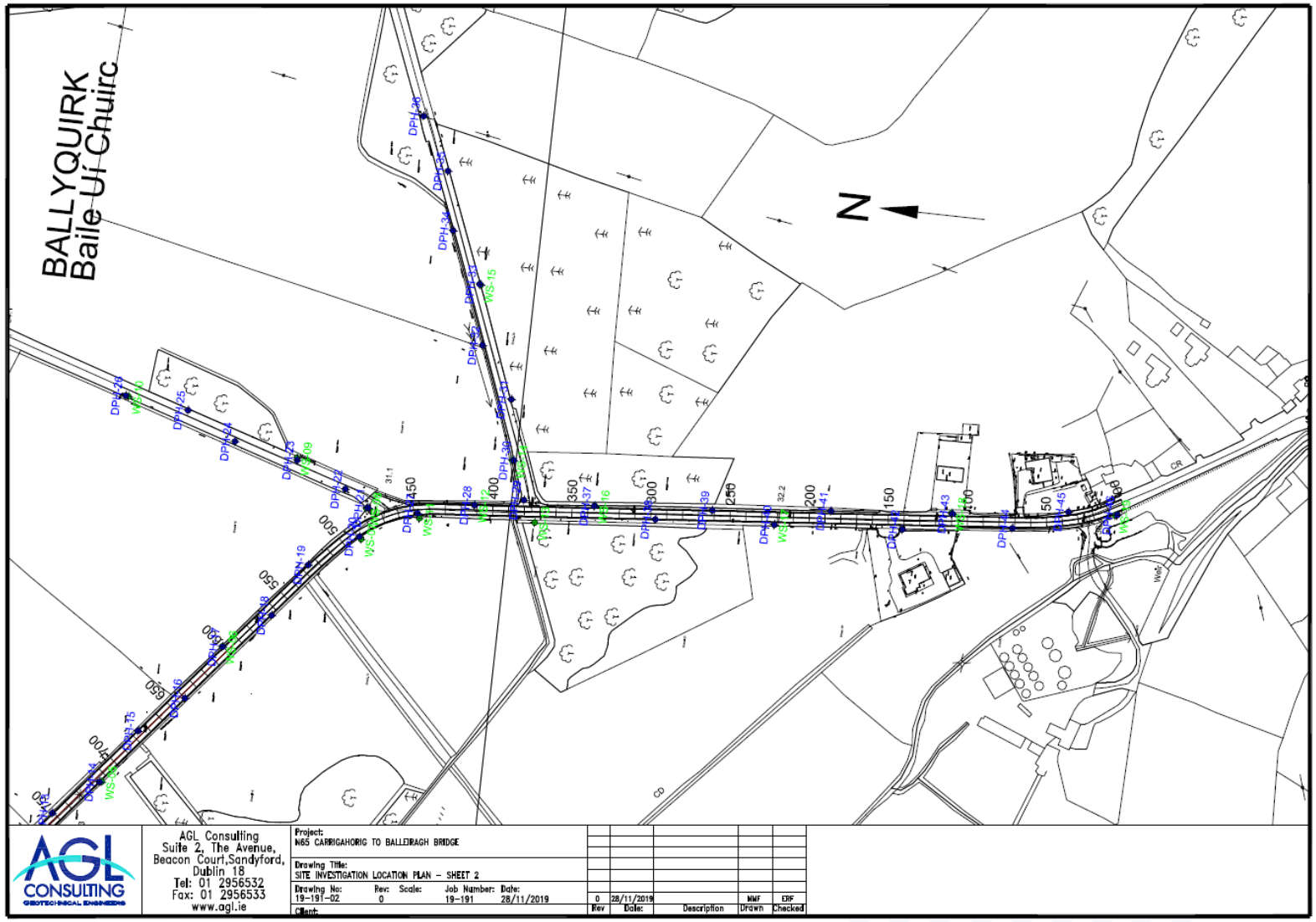
Appendices

A Site Investigation Location Plan

A.1 Sheet 1



A.2 Sheet 2


BALLYQUIRK
Baile Uí Chuirc
N
AGL Consulting
Suite 2, The Avenue,
Beacon Court,Sandyford,
Dublin 18
Tel: 01 2956532
Fax: 01 2956533
www.agl.ie
Project:
N65 CARRIGAHORIG TO BALLEIRAGH BRIDGE
Drawing Title:
SITE INVESTIGATION LOCATION PLAN – SHEET 2
Drawing No: 19-191-02
Rev: 0
Scale:
Job Number: 19-191
Date: 28/11/2019
Client:
Rev
Date
Description
Drawn
Checked

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Offices at

Dublin
Limerick

Registered Office
24 Grove Island
Corbally
Limerick
Ireland

+353(0)61 345463
info@jbaconsulting.ie
www.jbaconsulting.ie
Follow us:

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