



O'Hanrahan Bridge Widening Project

.....
Ground Investigation Works Appropriate Assessment
Screening Report | March 2023
.....



O'Hanrahan Bridge Widening

Ground Investigation Works

Appropriate Assessment Screening Report

TABLE OF CONTENTS

1. INTRODUCTION	1
1.1 Background	1
1.2 Competent Experts.....	1
1.3 Legislative Context	1
1.4 Screening Methodology.....	3
1.5 Ecological Assessment	5
1.5.1 Desk Study	5
1.5.2 Field Surveys	5
1.5.3 Assessment	7
2. DESCRIPTION OF THE PROPOSED DEVELOPMENT	8
2.1 Overview of the Proposed Development.....	8
2.2 Location of the Proposed Development	8
2.3 Construction Methodology.....	11
2.3.1 Construction Sequence and Methodology.....	11
2.4 Receiving Natural Environment	11
2.4.1 General Description and Context.....	11
2.4.2 Habitats.....	11
2.4.3 Watercourses, Fisheries and Aquatic Fauna	17
2.4.4 Otter	26
2.4.5 Flora.....	26
2.4.6 Invasive Alien Species	26
2.5 Potential Impacts on the Natural Environment	26
3. IDENTIFICATION OF LIKELY SIGNIFICANT EFFECTS	29
3.1 Establishing the Zone of Influence	29
3.2 Site Descriptions	32
3.3 Evaluation against Conservation Objectives	44
3.4 Summary of Likely Significant Effects	57
4. IN-COMBINATION EFFECTS	58
5. CONCLUSION.....	59
6. REFERENCES	60

APPENDIX A GROUND INVESTIGATION LOCATION PLAN

1. INTRODUCTION

1.1 Background

Roughan & O'Donovan (ROD) have been appointed by Kildare County Council (KCC) to provide engineering and environmental consultancy services in relation to the rehabilitation and widening of O'Hanrahan Bridge in New Ross, Co. Wexford ("the proposed development"). This Appropriate Assessment (AA) Screening Report for the Ground Investigation Works ("GI works") is intended to determine whether or not the GI works, either individually or in combination with other plans or projects, in view of best scientific knowledge, is likely to have a significant effect on areas designated as being of European importance for nature conservation ("European sites"), thereby enabling Wexford County Council, as the Competent Authority in this case, to fulfil its obligations under Article 6(3) of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora ("the Habitats Directive").

This document comprises the AA Screening Report in respect of the GI works and was prepared by ROD on behalf of KCC and in accordance with the requirements of the Habitats Directive as defined in Part XAB of the Planning and Development Act, 2000 (as amended) ("the Planning and Development Acts"). The aim of this AA Screening Report is to inform and assist the Competent Authority in carrying out its AA Screening by determining whether or not the GI works, either individually or in combination with other plans and projects, has the potential to significantly affect one or more European sites in view of their Conservation Objectives.

It is the considered opinion of ROD, as the author of this AA Screening Report, that the GI works, either individually or in combination with other plans or projects, in view of best scientific knowledge, is likely to have a significant effect on one or more European sites. in view of its Conservation Objectives. Therefore, AA is required in respect of the proposed development.

1.2 Competent Experts

This AA Screening Report was prepared by Patrick O'Shea, Calvin Townsend-Smyth and Rachel Heaphy. Patrick is a Senior Ecologist with over ten years' experience in ecological assessment. He holds a degree in Botany from Trinity College Dublin and an MSc in Ecological Management and Conservation Biology from Queen's University Belfast. Patrick is a Full member of the Chartered Institute of Ecological and Environmental Management (CIEEM). Calvin is an Ecologist with over three years' experience in ecological assessment. He holds a BSc (Hons) in Wildlife Biology from Munster Technological University and is a Qualifying member of CIEEM (QualCIEEM). Rachel is a Graduate Ecologist with one year's experience in ecological assessment. She holds a BSc (Hons) in Zoology from University College Cork and an MRes degree (with distinction) from the University of Roehampton. She is a Qualifying member of CIEEM (QualCIEEM).

1.3 Legislative Context

Council Directive 92/43/EEC of the 21st May 1992 on the conservation of natural habitats of wild fauna and flora ("the Habitats Directive") and Directive 2009/147/EC of the European Parliament and of the Council of the 30th November 2009 on the conservation of wild birds ("the Birds Directive") list habitats and species which are, in a European context, important for conservation and in need of protection. This protection is afforded in part through the designation of sites which support significant examples of habitats or populations of species. ("European sites").

Sites designated for wild birds are termed "Special Protection Areas" (SPAs) and sites designated for natural habitat types or other species are termed "Special Areas of Conservation" (SACs). The complete network of European sites is referred to as "Natura 2000".

In order to ensure the protection of European sites in the context of land use planning and development, Article 6(3) of the Habitats Directive provides for the assessment of the implications of plans and projects for European sites, as follows:

"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 site¹ 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."

In Case C-323/17 [§34], *People Over Wind*, the Court of Justice of the European Union ('the CJEU') referred to the nature of the test to be applied in making a screening determination as follows:

"[...] it is settled case-law that Article 6(3) of the Habitats Directive makes the requirement for an appropriate assessment of the implications of a plan or project conditional on there being a probability or a risk that the plan or project in question will have a significant effect on the site concerned. In the light, in particular, of the precautionary principle, such a risk exists if it cannot be excluded on the basis of objective information that the plan or project will have a significant effect on the site concerned (judgment of 26 May 2011, Commission v Belgium, C-538/09, EU:C:2011:349, paragraph 39 and the case-law cited). The assessment of that risk must be made in the light inter alia of the characteristics and specific environmental conditions of the site concerned by such a plan or project (see, to that effect, judgment of 21 July 2016, Orleans and Others, C-387/15 and C-388/15, EU:C:2016:583, paragraph 45 and the case-law cited)."

Article 7 of the Habitats Directive provides that the provisions of, *inter alia*, Article 6(3) are to apply to SPAs under Directive 2009/147/EC (the "Birds Directive").

As stated, the requirements arising out of Article 6(3) of the Habitats Directive are transposed into Irish law by Part XAB of the 2000 Act and by the European Communities (Birds and Natural Habitats) Regulations 2011 as amended² (S.I. No.477 of 2011) (the Habitats Regulations), including Part 5 thereof.

The determination of whether or not a plan or project requires AA is referred to as "Stage 1" or "AA Screening". A "Stage 1" or "AA Screening" is completed to determine whether or not the proposed development, either individually or in combination with other plans or projects, in view of best scientific knowledge, is likely to have a significant effect on areas designated as being of European importance for nature conservation ("European sites"), thereby enabling the Applicant, to fulfil its obligations under Article 6(3) of the Habitats Directive.

¹ Including, where applicable, 'sites'.

² Including inter alia S.I. 290 of 2013; SI 499 of 2013; SI 355 of 2015; the Planning, Heritage and Broadcasting (Amendment) Act 2021, Chapter 4; SI 293 of 2021.

Article 6(3) of the Habitats Directive specifies that AA must be undertaken by the “competent national authorities”. In Ireland, the “competent authority” is the relevant planning authority for each plan or project, e.g. the local authority or An Bord Pleanála. Consequently, the responsibility for carrying out AA Screening lies solely with the competent authority. In that respect, the AA Screening Report is not in itself an AA Screening Assessment but provides the competent authority with the information it needs in order to carry out its AA Screening.

1.4 Screening Methodology

At this stage of the process, the AA Screening Report assesses the potential effects from the plan or project on the European sites within the zone of influence and evaluates them in view of the sites' Conservation Objectives.

This AA Screening Report has had regard inter alia to the following matters³:

- The threshold test is that an appropriate assessment will be required if the proposed development is likely *to have a significant effect* on (a) European site(s) either individually or in combination with other plans or projects.
- It is not necessary, in order to trigger the requirement to proceed to stage 2 AA that the proposed development will *'definitely'* have significant effects on the protected site, but such a requirement will arise if it is a *'mere probability'* that such an effect exists. The requirement to carry out an AA will be satisfied if there is a *'probability or a risk'* that the proposed development will have *'significant effects'* on (a) European site(s).
- Consequent upon the application of the precautionary principle, such a *'risk'* will be found to exist if *'it cannot be excluded on the basis of objective information'* that the particular proposed development *'will have significant effects'* on (a) European site(s).
- An AA will be required if, on the basis of objective information, a *'significant effect'* on a European site *'cannot be excluded'*. An AA will not be required if, on the basis of objective information, a *'significant effect'* on (a) European site(s) *'can be excluded'*.
- In the case of *'doubt as to the absence of significant effects'* an AA must be carried out.
- The requirement to conduct an AA will arise where, at the screening stage, it is ascertained that the particular development is *'capable of having any effect'* (albeit this must be any *'significant effect'*) on (a) European site(s).
- The *'possibility'* of there being a *'significant effect'* on (a) European site(s) will give rise to a requirement to carry out an AA for the purposes of Article 6(3). There is no need to *'establish'* such an effect and it is merely necessary to determine that there *'may be'* such an effect.
- In order to meet the threshold of likelihood of significant effect, the word *'likely'* in Article 6(3) means less than the balance of probabilities. The test does not require any *'hard and fast evidence'* that such a significant effect was likely. It merely has to be shown that there is a *'possibility'* that this significant effect is likely.
- The assessment of whether there is a risk of *'significant effect'* on the European site must be made in light, inter alia, of the *'characteristics and specific environmental conditions of the site concerned'* by the relevant plan or project.

³ See Eoin Kelly v. An Bord Pleanála [2019] IEHC 84; Kelly v. An Bord Pleanála [2014] IEHC 400; Connelly v. An Bord Pleanála [2018] IESC 31; [2018] ILRM 453.

- Plans or projects or applications for developments which have *no appreciable effect* on European sites are excluded from the requirement to proceed to AA. If all applications for permission for proposed developments capable of having *any effect whatsoever* on such sites were to be caught by Article 6(3) *activities on or near the site would risk being impossible by reason of legislative overkill.*

While the threshold at the screening stage of Article 6(3) is very low nonetheless it is a threshold which must be met before it is necessary to proceed to the stage 2 AA.

Accordingly, best practice in undertaking AA Screening involves five steps as follows:

- (1) The first step involves gathering the information and data necessary to carry out a screening assessment. These include, but are not limited to, the details of all phases of the plan or project, environmental data pertaining to the area in which the plan or project is located, e.g., rare or protected habitats and species present or likely to be present, and the details of the European sites within the zone of influence.
- (2) The second step involves examining the information gathered in the first step and a scientific analysis of the potential impacts of the project on the receiving environment, particularly the European sites in the zone of influence.
- (3) The third step evaluates the impacts analysed in the second step against the Conservation Objectives of the relevant European sites, thereby determining whether or not those impacts constitute “likely significant effects”, within the meaning of Article 6(3) of the Habitats Directive.
- (4) The fourth step involves considering the potential for likely significant effects to arise from the combination of the impacts of the plan or project with those of other plans or projects. If it is determined in the third step that Stage 2 (AA) is required, consideration of potential cumulative impacts may be deferred to that stage.
- (5) The last step involves the issuing of a statement of the determination of the AA Screening. Notwithstanding the recommendation made in the AA Screening Report, the responsibility for completing this step lies solely with the competent authority.

The following guidance documents informed the assessment methodology:

- EC (2021) *Assessment of plans and projects in relation to Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*. Environment Directorate-General of the European Commission.
- EC (2018) *Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC*. European Commission, Brussels.
- DEHLG (2010) *Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities*. Department of the Environment, Heritage and Local Government, Dublin.
- NPWS (2010) *Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities*. Circular Letter NPWS 1/10 & PSSP 2/10. National Parks & Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin.
- OPR (2021) *Practice Note PN01: Appropriate Assessment Screening for Development Management*. Office of the Planning Regulator.

1.5 Ecological Assessment

In order to fully inform this AA Screening Report in respect of the GI works, it was necessary to establish the baseline ecological conditions in the receiving environment, particularly with regard to European sites.

1.5.1 Desk Study

During the desk study, the statutory consultee, the National Parks and Wildlife Service (NPWS), provided data on designations of sites, habitats, and species of conservation interest. This included reporting pursuant to Article 12 of the Birds Directive⁴ (Eionet, 2018) and Article 17 of the Habitats Directive⁵ (NPWS, 2019a, b, c), as well as the Site Synopses and Conservation Objectives for the relevant European sites.

The desk study involved a thorough review of existing information relating to ecology in the vicinity of the GI works and in the surrounding area. A number of web-based geographic information systems (GISs) were used to obtain information relating to the natural environment surrounding the GI works. These included the NPWS *Map Viewer* (NPWS, 2022), which provided information on the locations of protected sites, and the National Biodiversity Data Centre's *Biodiversity Maps* (NBDC, 2022), which provided recent and historic records of rare and protected species in the area.

As with all desk studies, the data considered were only as good as the data supplied by the recorders and recording schemes. The recording schemes provide disclaimers in relation to the quality and quantity of the data they provide, and these were considered when examining outputs of the desk study.

1.5.2 Field Surveys

Field surveys were conducted within the study area on 9th September 2021 and 19th January 2023 by ROD ecologist Calvin Townsend-Smyth.

The surveys adhered to the following guidelines:

- *Ecological Survey Techniques for Protected Flora and Fauna during the Planning of National Road Schemes* (TII, 2008).
- *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (TII, 2009).
- *Best Practice Guidance for Habitat Survey and Mapping* (Smith et al., 2011).

The purpose of the ecological surveys was to establish the presence or likely presence of features, habitats and species of conservation interest at the site. The potential presence of habitats or species listed as Qualifying Interests of European sites in the vicinity of the proposed development was a material consideration in the planning and execution of the ecological surveys.

The surveys with relevance to this AA Screening Report are described below.

Habitats

Habitats were classified in accordance with *A Guide to Habitats in Ireland* (Fossitt, 2000) and mapped following Smith et al. (2011). The whole site plus a 150 m buffer around the proposed development was systematically and thoroughly walked, and all habitats were classified and sketched onto maps. The field surveys also aimed to

⁴ Every three years, Member States of the European Union are required by Article 12 of the Birds Directive to report on implementation of the Directive. The most recent reporting available is for the period 2013-2018.

⁵ Under Article 17, to report to the European Commission every six years on their status and on the implementation of the measures taken under the Directive.

identify any habitats corresponding to types listed on Annex I to the Habitats Directive using the *Interpretation Manual of European Union Habitats* (EC, 2013). The presence (or signs) of protected fauna, including birds, mammals, amphibians and reptiles were noted during the surveys.

Watercourses, Fisheries and Aquatic Fauna

Aquatic habitats were assessed as part of the field surveys. Notes were made on the morphology, physical characteristics and potential of the river habitat to support protected flora and fauna. The surveys focussed particularly on the suitability of the River Barrow in the vicinity of the proposed development for fish and other aquatic species. The survey also aimed to confirm the presence or likely presence of Qualifying Interests of the River Barrow and River Nore SAC, e.g., Sea Lamprey, River Lamprey, Twaite Shad, Atlantic Salmon and Otter, as well as estuarine Annex I habitats.

Given that the proposed development is located within the tidal reach of the River Barrow, species which are limited to freshwater habitats, the presence of Freshwater Pearl Mussel and White-clawed Crayfish could be excluded.

Otter

An Otter survey was conducted adhering to best practice guidelines (TII, 2008a & b), and involved a systematic search of the footprint of the proposed development and a 50 m buffer, where accessible. It also included 150 m upstream and downstream of O'Hanrahan Bridge along the River Barrow. The survey involved a search for signs of otter activity (prints, spraints, trails, holts, couches, slides, feeding remains etc.).

Invasive Alien Species

As part of the habitat survey, the presence of invasive alien species was recorded. The ecologists had particular regard for invasive species subject to restrictions under Regulation 49 of the Habitats Regulations, including Himalayan Balsam (*Impatiens glandulifera*), Giant-rhubarb (*Gunnera* sp.), Japanese Knotweed (*Fallopia japonica*), Bohemian Knotweed (*Fallopia × bohemica*) and Rhododendron (*Rhododendron ponticum*). Other invasive species which can negatively impact biodiversity were also recorded. The distribution of recorded species was sketched on field maps and target notes were taken which detailed height, density, and any signs of previous management. The surveys were carried out in September 2021, which is inside the optimum survey period, with an additional survey carried out in January 2023 following the relocation of the site compound.

Benthic Surveys

Benthic biological surveys were undertaken by University College Cork's Aquatic Services Unit (ASU) on the 14th January and 21st September 2022. Surveys were carried out at low tide. A site walkover identified any hard benthos habitat and to obtain general overview of the site. Soft sediment sampling was undertaken at three locations on the south-eastern side and south-western sides of O'Hanrahan Bridge. The sampling locations were selected from the high water to low water level.

At each of the three sampling locations, replicate core samples were taken and an area was marked out and dug through to identify any large fauna. A small sample of sediment was also collected from each site for granulometric and loss on ignition analyses. The benthic sampling was conducted according to the methodology, *Methods for the Study of Marine Benthos* (Holme & McIntyre, 1984).

1.5.3 Assessment

The ecological baseline which was established by the desk study described above was used to inform the assessment of the potential ecological effects arising from the GI works, particularly with regard to European sites. Any assumptions that were made in view of any deficiencies in the ecological data were made in strict accordance with the Precautionary Principle.

2. DESCRIPTION OF THE PROPOSED DEVELOPMENT

2.1 Overview of the Proposed Development

O'Hanrahan Bridge is a 9-span post-tensioned concrete beam and reinforced concrete slab bridge over the River Barrow in New Ross town, Co. Wexford. The overall length of the bridge is 175m with an overall width of 11.6m. The proposed works aim to widen the bridge deck by approx. 1m in order to accommodate an enhanced combined pedestrian and cycleway. The widening works are to take place on the southern side of the bridge through the replacement of the existing bridge deck cantilever and parapet edge beam. As a result, the instream piers will not be affected. However, in order to tie the new widened section into the quays at the eastern end and ensure continuity of the new cycleway, the proposed development requires for a 20m long section of the existing quay wall on the south-east corner of the bridge to be reconstructed up to 2m out from the existing quay wall. This section will require working instream. Similarly, approx. 60m section of the south-west corner of the bridge will require widening works by approximately 1m out from the existing wall. The length of new sheet piles in front of the wingwalls will be approximately 19m, of which 5m will be located directly in the river. The remaining 41m of new wall will be constructed in front of the existing flood wall, all driven at the top of the embankment above the water level.

ROD have been commissioned by KCC to undertake Ground Investigation (GI) works at the site of the bridge in order to inform the planned widening of the bridge which will accommodate the enhanced combined pedestrian and cycleway. These GI works involve the gathering, manipulation and compilation of ground investigation data on the south-east and south-west corners of the bridge, where the existing wing walls of the abutment join the quay wall.

GI location plan drawings are provided in Appendix A.

2.2 Location of the Proposed Development

O'Hanrahan Bridge is located in the urban centre of New Ross, in Co. Wexford, where it carries the single carriageway R723 Regional Road over the River Barrow. The River Barrow system rises in the Slieve Bloom Mountains in Co. Laois and flows predominantly through undulating lowlands before entering the sea along the border of Co. Waterford and Co. Wexford. The river forms the boundary between County Wexford and County Kilkenny for the most part, the catchment includes a considerable amount of arable land, as well as pasture, woodland and large towns such as New Ross.

With the bridge located within the urban environment of New Ross town, the adjacent land use mainly consists of commercial and residential use. The setting is urban with the bridge site surrounded by a mix of historic buildings and structures, tourism sites and commercial properties on the eastern side; and residential, commercial, and industrial properties on the western side.

The N25 previously travelled over O'Hanrahan Bridge as the main link between County Wexford and County Waterford until January 2020 when the New Ross Bypass was officially opened.

GI works will be undertaken prior to the commencement of construction works. The proposed GI is focused on the southeast and southwest quay wall to inform the design of the proposed sheet pile wall and consist of three river boreholes BH01, BH02 and

BH03 as shown in Figure 2.1 below. A trial pit (TP01) will also be carried out on the land side to survey the utilities at this location.

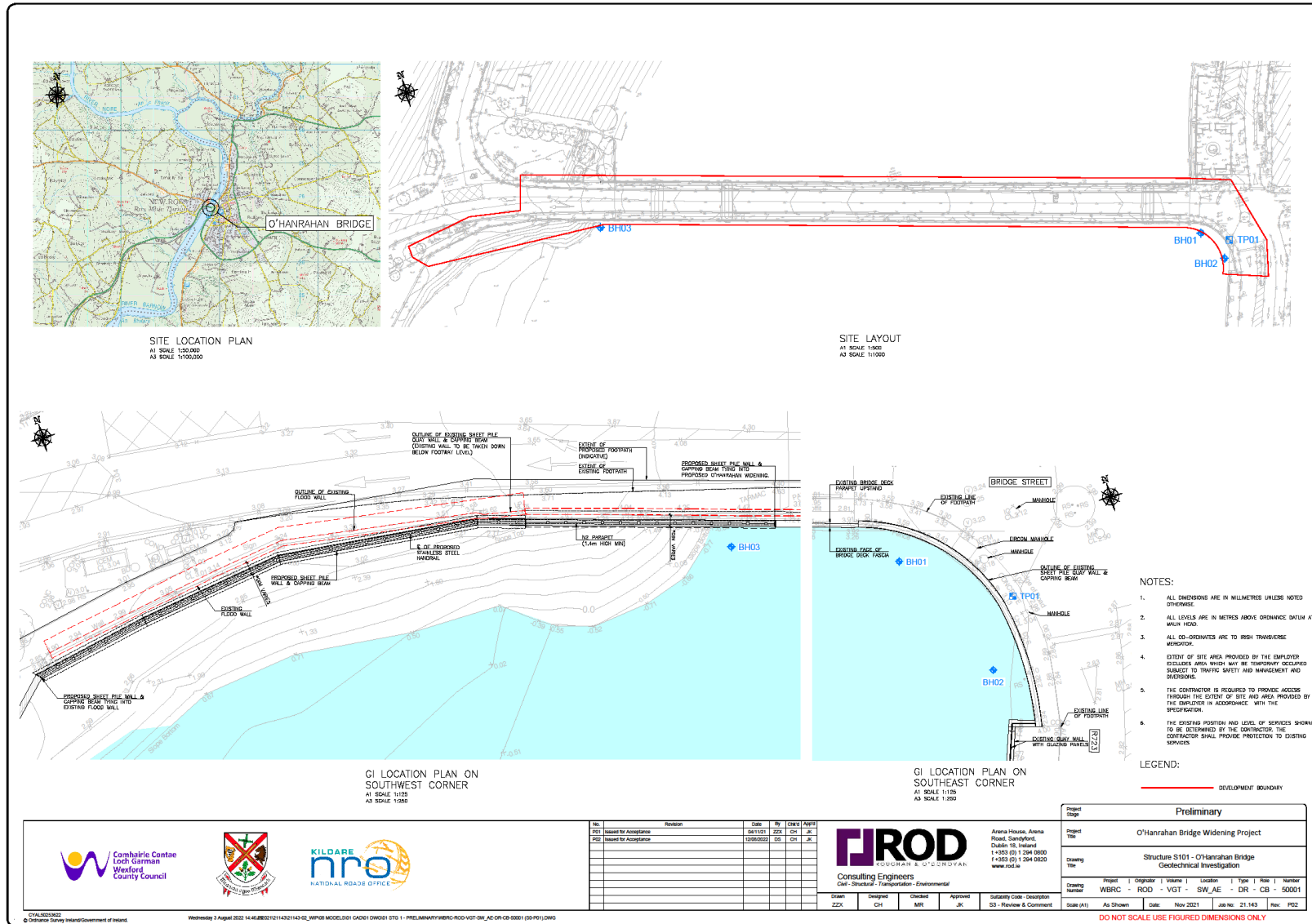


Figure 2.1 Location of proposed Geotechnical Investigation works

2.3 Construction Methodology

The following section describes the likely construction sequence for the GI works at O'Hanrahan Bridge. GI works will be undertaken from the river-side at low tide. A barge will be positioned during high tide and the river will be allowed to dewater naturally before the commencement of GI works at low tide.

2.3.1 Construction Sequence and Methodology

GI river works will be undertaken in the following sequence (river borehole):

- Drilling equipment and personnel to be loaded onto jack-up barge at access point as agreed with the Client;
- The drilling rig will be positioned and secured over the moon pool (an opening inside the barge);
- Geotextile membrane will be placed on the working area;
- Absorbing padding and drip tray will be positioned beside/below rig engine;
- Positioning of barge and securing of jack-up legs once GPS location has been confirmed;
- Drilling will be carried out at low tide only using geobor-s rotary drilling and sample recovery of rock and soil, and;
- Once the scheduled depth is reached and upon approval from the Engineer, the drilling will stop, the barge will be positioned and secured at the next location and the process will be repeated.

GI road works will be undertaken in the following sequence (road trial pit):

- Appropriate Road Opening License (ROL) will be applied and received before commencing of the works;
- Traffic Management will be implemented;
- The engineer will CAT scan the location of the works and mark the location of the existing utility services;
- The excavator will move into position and excavate to the required depth;
- If services are encountered impeding or preventing the full excavation of the trial pit relocation may be required;
- Excavated material will be logged and sampled for laboratory testing, and;
- Backfilling will be carried out immediately after the completion of the excavation.

2.4 Receiving Natural Environment

2.4.1 General Description and Context

O'Hanrahan Bridge is a 9-span post-tensioned concrete beam and reinforced concrete slab bridge over the River Barrow in New Ross town, Co. Wexford. The principal habitat types that exist along the footprint of the proposed development include mudflats, buildings and artificial surfaces, and a tidal river. Treelines, lower salt marsh, grassy verges and scattered trees and parkland can all be found in the area immediately adjacent to the footprint of the proposed development. The River Barrow is tidal at O'Hanrahan Bridge and is a habitat for rare and protected species including lamprey, Atlantic salmon, Twaite Shad and Otter.

2.4.2 Habitats

This section describes the habitats recorded during the field survey within the proposed development footprint and a 150m buffer. A total of 14 different Fossitt (2000) habitats

were identified in the study area. These habitats are listed below, and mapping of these habitats is presented in Appendix B of this NIS:

- Buildings and Artificial Surfaces (BL3)
- Sea Walls, Piers and Jetties (CC1)
- Tidal Rivers (CW2)*
- Recolonising bare ground (ED3)
- Reed and large sedge swamps (FS1)
- Improved agricultural grassland (GA1)
- Amenity Grassland (GA2)
- Mud Shores (LS4)*
- (Mixed) broadleaved woodland (WD1)
- Scattered Trees and Parkland (WD5)
- Hedgerows (WL1)
- Treelines (WL2)
- Scrub (WS1)
- Immature woodland (WS2)

Buildings and artificial surfaces (BL3)

Much of the land surrounding the proposed development is built land consisting of the urban centre of New Ross. Further away from the river, the majority of the surrounding area comprises built areas including roads and buildings. Generally, built habitats are not considered to be of high ecological significance.

Sea walls, piers and jetties (CC1)

This category is used for all coastal constructions that are partially or totally inundated by sea water at high tide. This habitat was recorded along both banks of the River Barrow at the location of the proposed development as a masonry, concrete sea walls and rock armour. In addition to this, a small jetty is located c. 50m upstream of the bridge on the eastern bank which is included in this habitat category.

Aquatic Services Unit (2022a & 2022b) surveyed the hard intertidal surfaces within and adjacent to the footprint of the proposed sheet pile walls in January and September 2022. The description of these habitats is reproduced below, and the full reports are presented in Appendix C to this NIS.

South-east corner:

“The quay walls were covered in green algae [...], the majority of which was Vaucheria sp., a genus of alga common in freshwater and estuarine sites. In addition, there were trace amounts of filamentous green algae and very small amounts of Ulva intestinalis also present. Higher up on the quay walls were scattered small amounts of the moss Cinclidotus fontinaloides, a species often found on rocks and other hard substrates above the water line but subject to frequent inundation. The only higher plant visible were very scarce amounts of stunted plants of an Oenanthe species, possibly O. crocata (Hemlock waterdropwort) a common species in freshwater sites. There were no rare or unusual plants noted.”

South-west corner:

“Along the foreshore below the bridge there has been the import of protective rocks and an area of artificially made ground associated with the base of the bridge. Here vegetation has developed that is more typical of recolonising ground and is an eclectic mix of species. Species that indicate the coastal nature of the area include Sea Aster (Aster tripolium) and Common Mallow (Malva sylvestris). Also, several species of disturbed ground occur including a variety of species of yellow asteraceae, Dandelions, Hawkbits, Sow thistles, docks (Rumex species), Brassicaceae, rank grasses Couch Grass, Cock’s foot grass, False Oat Grass, Teasel, Willowherbs, Thistles, Plantains, Red Valerian, occasional woody saplings e.g., Ash.”

While these habitats are not species-rich or of a very natural or locally distinct character, they are one of the principal ecosystem features which define this part of the River Barrow and support the integrity of habitats and species of conservation interest in the River Barrow and River Nore SAC.

Tidal rivers (CW2)

The proposed development runs along the northern bank of the River Barrow. The river within the extents of the proposed development is subject to the influence of the tides and is designated as part of the River Barrow and River Nore SAC. This habitat class contains other habitat types within it, namely ‘Sea walls, piers and jetties’ (CC1), and ‘Mud shores’ (LS4). In addition, the River Barrow at this location corresponds to the Annex I habitat ‘Estuaries’ (1130) which is listed as a Qualifying Interest of the River Barrow and River Nore SAC. EC (2013) describes this habitat as the downstream part of a river valley, subject to the tide and extending from the limit of brackish waters. Therefore, the Annex I type applies to the intertidal areas.

Specialist surveys of these habitats were undertaken by UCC Aquatic Services Unit in January and September 2022, and the results are included as relevant.



Plate 2-7 Estuary / Tidal River flowing under O'Hanrahan Bridge.

Recolonising bare ground (ED3)

This category includes areas where disturbed or bare ground in derelict sites or artificial surfaces have been invaded by herbaceous plants. This habitat is present within the footprint of the construction site compound and the surrounding area.

Reed and large sedge swamps (FS1)

This category includes species-poor stands of herbaceous vegetation that are dominated by reeds and/or other large grasses or large, tussock-forming sedges. An area of this habitat (c. 180m²) is present along the western bank of the River Barrow, approximately 40m south of O'Hanrahan Bridge. UCC Aquatic Services Unit (2022b) surveyed this habitat in September 2022. The description of this habitat from the survey report is reproduced below and the full data are presented in Appendix C to this NIS.

“The River Barrow is tidal at New Ross and is considered to be at the upper estuarine extent of the Barrow. Fringing the muddy river channel of the Barrow River at Hanrahan’s Bridge is typical reed bed vegetation which is common in upper estuarine environments on muddy substrates and where saline influence is more limited. Phragmites reed beds are an important component of emergent vegetation communities in estuarine systems. Here at the upper portion of the Estuary Common Reed (Phragmites australis) dominates over more halophytic plants which occur in more saline conditions such as Cord grasses (Spartina spp).

Common Reed (P. australis) is tall and a dominant competitor for light, so that dense stands of the common reed tend to be species poor in other plants but at the fringes of the reedbed trees (i.e., willows Salix spp.) occur at the inland edge of the shore.

Fringing the reedbed towards the estuary side species such as Soft Stem Bulrush Schoenoplectus spp. (likely tabermontani) and Club Rush (Bolboschoenus maritimus) grow on the open mud and shoreward species such as some Reed Canary-grass (Phalaris arundinacea), Buck's horn plantain (Plantago coronopus) and Willowherbs (Epilobium spp.) also occur."



Plate 2-8 Reed Bed and Intertidal Mudflats.

Improved agricultural grassland (GA1)

This category includes highly modified or intensively managed agricultural grasslands. This habitat can be found on the northern and eastern sides of the construction site compound.

Amenity grassland (GA2)

This category includes improved or species poor grasslands including amenity, recreational or landscaped grasslands. UCC Aquatic Services Unit (2022b) surveyed this habitat in September 2022. The description of this habitat from the survey report is reproduced below and the full data are presented in Appendix C to this NIS.

"A small area of amenity grassland (improved) occurs adjacent to the Bridge. This habitat is dominated by a variety of grasses including Poa species and with broadleaved herbs such as Daisy (Bellis perennis), Dandelion (Taraxacum spp.), clovers (Trifolium spp.) and plantains (Plantago spp.) are common."

Mud shores (LS4)

Mud shores are formed primarily of very fine sediment and usually occur along the most sheltered sections of coastline. The silt/clay fraction of the sediment is typically

found in the upper reaches of estuaries. They are subject to variable, reduced or low salinity conditions. Mud shores are often characterised by elevated mudflats that are dissected by networks of shallow channels associated with flooding and drainage. This habitat is present in the intertidal areas of the River Barrow, including within the footprint of the proposed development.

UCC Aquatic Services Unit (2022a & 2022b) surveyed the mudflats within the extents of the proposed sheet pile wall in January and September 2022. The description of the mudflats from the survey reports is reproduced below and the full data are presented in Appendix C to this NIS.

“The infaunal and granulometric results point to a single habitat type within the survey area. This has been identified as Tubificoides benedii and other oligochaetes in littoral mud [LS.LMu.UEst.Tben] (Conner et al., 2004). This habitat type has been described as extremely species-poor. Consisting almost exclusively of oligochaetes. It is known to occur at the head of estuaries, in sheltered locations with no strong river flow and a strong freshwater influence, which is consistent with the conditions in the survey area at O’Hanrahans Bridge.”

This habitat corresponds to the Annex I habitat ‘Mudflats and sandflats not covered by seawater at low tide’ (1140) and is listed as a Qualifying Interest of the River Barrow and River Nore SAC. While the mudflat habitats at this location are very species-poor and do not represent best examples of this habitat type, they support the integrity of other habitats and species that are listed as Qualifying Interests of the River Barrow and River Nore SAC.



Plate 2-9 Mud Shores, Sea Walls, Piers and Jetties, and Buildings and Artificial Surfaces at the south-eastern corner of O’Hanrahan Bridge.

(Mixed) broadleaved woodland (WD1)

This woodland type includes woodlands which are composed of a mixture of both native and non-native tree species. Examples of this habitat can be found within and adjacent to the residential areas to the west of the site.

Scattered Trees and Parkland (WD5)

This category can be used in situations where scattered trees, standing alone or in small clusters, cover less than 30% of the total area under consideration but are a prominent structural or visual feature of the habitat. This usually occurs in areas of cultivated grassland, particularly amenity areas. This habitat has been created for amenity use on the western banks of the River Barrow on both sides of the bridge. Within the study area, this habitat included Silver Birch (*Betula pendula*) and Sweet Chestnut (*Castanea sativa*) tree species.

Hedgerows (WL1)

This habitat type includes linear strips of shrubs with occasional trees that form field and property boundaries. Examples of this habitat type can be found along throughout the residential and agricultural areas within the study area.

Treelines (WL2)

Treelines are narrow rows or single lines of trees that are greater than 5m in height and typically form property or field boundaries. Examples of this habitat type can be found throughout the residential and agricultural areas within the study area.

Scrub (WS1)

This category includes areas that are dominated by shrubs, stunted trees or brambles where canopy height is less than 5m. This habitat is present along the western bank of the River Barrow on the southern side of O'Hanrahan Bridge. UCC Aquatic Services Unit (2022a & 2022b) surveyed this habitat in September 2022. The description of this habitat from the survey report is reproduced below and the full data are presented in Appendix C to this NIS.

“At the upper extent of the Reed bed a small patch of White Willow (Salix alba) occurs this is associated with some bramble (Rubus fruticosus agg.) on the landward side. The herbaceous layer consists of herbs, including nettle (Urtica dioica), Hogweed (Heracleum sphondylium), Willowherbs e.g., (Epilobium hirsutum) Hedge woundwort (Stachys sylvatica), Docks (Rumex spp.) and rank grasses Couch Grass, False Oat Grass, etc.”

Himalayan Balsam was recorded growing beneath the trees which is an invasive species restricted under Section 49 of the Habitats Regulations.

Immature woodland (WS2)

Immature woodlands are areas dominated by young or sapling trees. This habitat type can be on the northern boundary of the construction site compound. This habitat is dominated by silver birch.

2.4.3 Watercourses, Fisheries and Aquatic Fauna

Water Quality

The Water Framework Directive (WFD) requires that each EU Member State protects and improves water quality in all waters so that good ecological status is achieved. Additionally, proposed actions (within discrete River Basin Management Plans) are also required, to secure national natural water resources for the future. The EPA is

the competent authority responsible for monitoring, protecting and improving the water environment in the Republic of Ireland. In accordance with WFD guidelines, water quality 'Status' is assigned using a variety of available data on aquatic flora and fauna (including fish), the availability of nutrients, and aspects like salinity, temperature and pollution by chemical pollutants. Morphological features, such as quantity, water flow, water depths and structures of the riverbeds, are also taken into account.

The original EPA water quality classification (Quality Rating System (Q-values)) is also used to assess water quality in Irish rivers, taking into account aquatic macrophytes, phytobenthos and hydromorphology. The Q-value system has been shown to be a robust and sensitive measure of riverine water quality and has been linked with both chemical status and land-use pressures in catchments. Individual macroinvertebrate taxa are ranked for their sensitivity to organic pollution and the Q-value of the watercourse is based primarily on the relative abundance of these taxa within a biological sample. A review of both the Q-value status and WFD status for the watercourses was undertaken.

The online EPA Unified GIS Application provides access to information at individual waterbody level and at Water Management Unit level for all the River Basin Districts in Ireland. Waterbodies can relate to surface waters (these include rivers, lakes, estuaries [transitional waters], and coastal waters) or to groundwater. Table 2.1 below shows the information recorded regarding water quality status at the location of the proposed development.

Table 2.1 EPA water quality results

Transitional Waterbody	WFD Status (2010-2012)	WFD Status (2013-2018)	WFD Risk
Barrow Nore Estuary Upper	Moderate	Moderate	At Risk
New Ross Port	Poor	Moderate	At Risk
Upper Barrow Estuary	Good	Good	Review
Nore Estuary	Moderate	Good	At Risk
River Waterbody Name	Station Name	Q Value	
Barrow_240	St. Mullins	4	Good
Nore_240	Brownsbarn Br	4	Good

The 'Poor' and 'Moderate' statuses of the waterbodies are indicated to be as a result of poor Phytoplankton and Macroinvertebrate Status, respectively as per the EPA Catchments website.

Fisheries

The River Barrow catchment is internationally important for the presence of fish species including lamprey species, Twaite Shad (*Alosa fallax*), and Atlantic Salmon (*Salmo salar*), European Eel (*Anguilla anguilla*).

Lamprey Species

Sea Lamprey (*Petromyzon marinus*) and River Lamprey (*Lampetra fluviatilis*) are both likely to be present at the proposed development location in significant numbers during their upstream spawning migrations and downstream migrations following metamorphosis. The major upstream movements of Sea Lamprey occur in April, May and, to a lesser extent, June, while those of River Lamprey occur earlier, beginning in

August and continuing over the winter and spring. The downstream migration of Sea Lamprey occurs in September and October, while that of River Lamprey occurs over an extended period from late winter to early summer.

Literature review

Two lamprey species, Sea Lamprey and River Lamprey, migrate past the proposed development. Brook Lamprey is restricted to the freshwater stretches of the River Barrow and River Nore and, therefore, will not be affected by the proposed development. Sea Lamprey is present at the proposed development location at two key phases in its life cycle: 1) adults migrate upstream from the sea to their spawning grounds in the freshwater stretches of the river; and 2) newly-metamorphosed adults migrate downstream from their juvenile habitats to the sea to feed as adults. River Lamprey is also present at the proposed development location during its migrations between its spawning and juvenile habitats in the freshwater reaches and its adult habitats in the estuary, as well as during its adult phase, when it resides in the estuary. All lamprey species are semelparous (Maitland, 2003), i.e., adults undergo a single spawning event and then die. Thus, no spent adults occur in the vicinity of the proposed development.

The upstream migration of adult Sea Lamprey is concentrated in the months of April, May and June (Maitland, 2003; King & Roche, 2008). The upstream migration period of River Lamprey is less well-known and may occur over a long period beginning in August and continuing throughout autumn and winter, until the spawning season in spring (King & Roche, 2008). Peak migration periods have been proposed as being from October to December (Maitland, 2003). In the case of both Sea Lamprey and River Lamprey, upstream migration is almost exclusively nocturnal (Maitland, 2003; Andrade et al., 2007; Quintella et al., 2009; Vrieze et al., 2011).

Lamprey larvae, known as "ammocoetes", burrow into fine sediments at the bottom of fresh waters and live as filter-feeders. Metamorphosis occurs after c. 5 years in Sea Lamprey and after 3-5 years in River Lamprey (Maitland, 2003a). The downstream migration of recently-metamorphosed lampreys, known as "macrophthalmia", is not well-studied, but it appears to vary between years and river systems. MOR (2010) stated that Sea Lamprey begin their downstream migration once metamorphosis is complete (usually by September) and most arrive in the estuary in October. MOR (2010) also suggested that newly-metamorphosed River Lamprey "*begin their downstream migration over an extended period from late winter to early summer*". Downstream migration by both Sea Lamprey and River Lamprey is predominantly nocturnal (Maitland, 2003; Potter, 1980; Lucas & Bracken, 2010; Silva et al., 2013; Moser et al., 2014; Dawson et al., 2015).

Twaite Shad

Adult shad move from the sea into estuaries in spring and spawn just above the top of tidal waters in May and June. During the breeding season, large numbers of adult shad move up and down the estuary with the tide. Most adults return to the lower estuary within days of spawning and to sea by the end of the summer. Juvenile shad spend one or two years in the estuary, moving up and down with the tides and feeding on planktonic crustaceans and other invertebrates. Twaite Shad is classed as vulnerable to extinction in Ireland (King et al., 2011).

Inland Fisheries Ireland Data

As part of its national monitoring programme for Habitats Directive: Annex II and Red Data Book fish species, IFI has been studying the ecology and behaviour of Twaite Shad in the estuaries of the larger rivers in the South-East of Ireland since 2010. The

following reports describe the methods used to survey for shads and their respective degrees of success:

- King, J.J. and Linnane, S.M. (2004) The status and distribution of lamprey and shad in the Slaney and Munster Blackwater SACs. *Irish Wildlife Manuals* 14. National Parks & Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin.
- Kelly, F., Harrison, A., Connor, L., Matson, R., Morrissey, E., Feeney, R., Wogerbauer, C., O'Callaghan, R. and Rocks, K. (2011) *Sampling Fish for the Water Framework Directive – Summary Report 2010*. Inland Fisheries Ireland, Dublin.
- IFI (2011) *Sampling Fish for the Water Framework Directive – Transitional Waters 2010: Barrow, Nore and Suir Estuaries*. Inland Fisheries Ireland, Dublin.
- IFI (2012a) *National Programme: Habitats Directive and Red Data Book Fish species. Executive Report 2011. IFI Report Number: IFI/2012/1-4103*. Inland Fisheries Ireland, Dublin.
- Rooney, S.M., O'Gorman, N.M., King, J.J. (2013) *National Programme: Habitats Directive and Red Data Book Species Executive Report 2012*. Inland Fisheries Ireland, Dublin.
- Rooney, S.M., O'Gorman, N.M., Cierpial, D. and King, J.J. (2014) *National Programme: Habitats Directive and Red Data Book Species Executive Report 2013*. Inland Fisheries Ireland, Dublin.
- O'Gorman, N.M., Rooney, S.M., Cierpial, D. and King, J.J. (2015) *National Programme: Habitats Directive and Red Data Book Species Executive Report 2014*. Inland Fisheries Ireland, Dublin.
- Rooney, S. and King, J.J. (2015) *A poster on acoustic tracking of twaite shad by the Habitats Directive and Red Data Book Species team presented at the 3rd International Conference on Fish Telemetry (ICFT) in Halifax, Nova Scotia in 2015*. Inland Fisheries Ireland, Dublin.
- Gallagher, T., O'Gorman, N.M., Rooney, S.M., Coughlan, B., and King, J.J. (2016) *National Programme: Habitats Directive and Red Data Book Species Executive Report 2015*. Inland Fisheries Ireland, Dublin.
- Gallagher, T., O'Gorman, N.M., Rooney, S.M., Coughlan, B., and King, J.J. (2017) *National Programme: Habitats Directive and Red Data Book Species Summary Report 2016*. Inland Fisheries Ireland, Dublin.
- Gallagher, T., O'Gorman, N.M., Rooney, S.M., Coughlan, B., and King, J.J. (2019) *National Programme: Habitats Directive and Red Data Book Species Summary Report 2017*. Inland Fisheries Ireland, Dublin.
- Gallagher, T., O'Gorman, N.M., Rooney, S.M., and King, J.J. (2020) *National Programme: Habitats Directive and Red Data Book Species Summary Report 2018*. Inland Fisheries Ireland, Dublin.
- Gallagher, T., O'Gorman, N.M., Rooney, S.M., Brett, A., and O'Leary, C. (2022) *National Programme: Habitats Directive and Red Data Book Species Summary Report 2021*. Inland Fisheries Ireland, Dublin.
- IFI (2022a) *Twaite Shad* <<https://www.fisheriesireland.ie/fish-species/twaite-shad.html>> [Accessed 28/01/2022]. Inland Fisheries Ireland, Dublin.
- IFI (2022b) *Juvenile Shad Monitoring* <<https://www.fisheriesireland.ie/Habitats-and-Red-Data-Book/juvenile-shad-monitoring.html>> [Accessed 28/01/2022]. Inland Fisheries Ireland, Dublin.

- IFI (2022c) *Adult Shad Monitoring* <<https://www.fisheriesireland.ie/Habitats-and-Red-Data-Book/adult-shad-monitoring.html>> [Accessed 28/01/2022]. Inland Fisheries Ireland, Dublin.

Monitoring of juvenile Twaite Shad is challenging due to the small size of the fish and large extent of their estuarine habitat, as well as other environmental factors such as flooding and tidal influences. Given these challenges, IFI's monitoring programme has focussed primarily on sampling young-of-the-year fish in Waterford Harbour and the Barrow, Nore and Suir Estuaries. The main survey technique used to target post-larval and young-of-the-year fish is fine-mesh zooplankton or bongo netting. Other techniques include beach seining, fyke netting and beam trawling, though only bongo and seine netting have produced positive results.

Bongo netting

Sampling using bongo nets is carried out 4-8 weeks after spawning, which occurs in June. Samples are collected in a pair of bongo nets mounted at the front of a boat moving against the tide for 10 minutes. These trawls are carried out along the margins of depositional banks at 1-2km intervals along the estuary/harbour. This technique has had mixed success over the years, with the highest numbers of fish (178 young-of-the-year shad) captured in 2011 and only small numbers in later years, with none being recorded using this method in some years. This is despite considerable annual survey effort (70 trawls in 2014). The low catch-per-unit-effort may be accounted for by poor timing, inadequate technique or some other underlying cause. The fact that many of these surveys have formed part of IFI's National Bass Programme may point to suboptimal tidal conditions for surveying.⁶

Beach seining

IFI carries out seine netting surveys in August each year as part of the National Bass Programme and in September-October on a three-year rolling program during WFD surveillance monitoring of transitional waters. These surveys have been successful in recording young-of-the-year shads 50-100mm in length and have highlighted the wide distribution of juvenile shads within the Barrow, Nore and Suir Estuaries. In August 2016, sixteen seine net samples were collected from four locations in the Barrow and Suir Estuaries over two days. A total of 90 shads were recorded during this survey. Of the three techniques used in October 2016, juvenile shads were only captured in beach seine nets. A total of 42 shad was recorded in seine net samples from the mouth of Waterford Harbour to the upper tidal limits of the Rivers Barrow, Nore and Suir.

As part of its monitoring of adult shad, IFI has collected data from a wide variety of sources, including surveys and information and samples submitted by third parties. IFI has sampled adult shad via trawling surveys and an acoustic telemetry study. In addition, samples of shad from by-catch in commercial netting and from surveys by other agencies, as well as angling logbooks have also contributed to IFI's monitoring of Twaite Shad.

Trawling surveys

Since 2014, trawling surveys using commercial trawlers with IFI officers on board have been carried out in the Lower Barrow and Suir Estuary and Waterford Harbour as part of the National Bass Programme. Sampling takes place in September and each trawl lasts 10-15 minutes. This technique usually captures larger specimens in comparison with seine netting. In 2014, a total of 26 shad (61-28 mm in length) was recorded in

⁶ A study in Cornwall (Hillman, 2003) has identified that the optimal time for bass surveys is near high water while the optimal time for surveying shad and other clupeomorphs is near low water.

three of the 34 trawls. In 2015, a total of only three shad (215-320mm in length) was recorded in three of the 36 trawls undertaken.

Acoustic telemetry

Since 2012, IFI has been using acoustic telemetry to study the behavioural ecology of spawning and post-spawning Twaite Shad in the Barrow, Nore, Suir and Munster Blackwater Estuaries. Fish are first captured by drift netting or recreational angling and external acoustic transmitters are fitted. The fish's movements are then detected up by acoustic receivers within the estuaries. The telemetry study is ongoing, and future work will examine knowledge gaps regarding residency and behaviour in the outer estuaries, as well as site fidelity in repeated spawning migrations.

Angling surveys and logbooks

IFI staff conduct angling surveys to determine the distribution of adult shad and also attended shad angling competitions to measure the size distribution of fish caught by anglers. These methods have yielded information regarding the locations and timing of spawning events and the sizes and ages of spawning fish, as well as establishing iteroparity in this species. This data is supplemented by records submitted by third parties, e.g., district fisheries inspectors, and such data has included particularly interesting records, such as a rod-caught shad from Careysville, c. 25km upstream of the tidal limit of the Munster Blackwater.

Commercial netting by-catch

Commercial netmen using seasonal drift, draft and snap nets in the Barrow, Nore, Suir, Slaney and Muster Blackwater Estuaries (and coastal waters) are the most significant source of information and material for studies of shads. These netmen operating in the SAC estuaries regularly make records and samples of shad by-catch available to IFI for inclusion in its ongoing monitoring of these species.

Marine fisheries surveys

Fisheries monitoring is also carried out in the marine environment by Bord Iascaigh Mhara and the Marine Institute. As with commercial netmen, these agencies also make shad records and samples available to IFI for inclusion in its studies.

Kick sampling for shad eggs

In 2017, 2018 and 2021, IFI used kick sampling as a technique for confirming the occurrence of shad spawning in the Barrow, Nore, Suir and Munster Blackwater. This technique is recommended in the Common Standards Monitoring Guidance for Freshwater Fauna (JNCC, 2015). The methodology involves repeated 15-second kick samples upstream of a handheld 250µm net in a transect across the river. Eggs are collected and sent for genetic analysis to confirm species. In 2017 and 2021, this method confirmed shad spawning in the River Barrow near St Mullin's and also in the River Nore near Inistioge, in the River Suir near Carrick-on-Suir and in the Munster Blackwater near Lismore in 2017 alone. It is expected that IFI will continue to employ this method as part of its annual monitoring of shad.

Environmental DNA analysis

In 2018, IFI undertook a pilot study on the use of eDNA to identify the presence of shad in four rivers for which there are recent or historical records of these species, but which are not known to support significant populations, namely the Boyne, Liffey, Lee and Ilen. The samples taken had not yet been analysed for eDNA at the time of that reporting was published (Gallagher et al., 2020). Further eDNA sampling was

undertaken in 2021 at St. Mullins to measure the effects of the weir on shad migration. The results of this analysis have also not been published (Gallagher et al., 2022).

Notwithstanding the significant ongoing survey effort in IFI's monitoring programme over the last 9 years, gaps remain in the understanding of the ecology and behaviour of Twaite and Allis Shad, particularly in relation to juveniles during their residency in estuaries, and anecdotal records from anglers and commercial netmen remain the most significant source of information. However, having thoroughly reviewed existing literature relating to this species, it was considered that sufficient information was available to inform this NIS. Furthermore, having examined the survey methods used by IFI and others, it was considered that any additional surveys carried out to inform this NIS would not contribute any significant additional information regarding the distribution, densities and movement patterns of post-larval and juvenile Twaite Shad in the Barrow Estuary.

Further literature review

Adult Twaite Shad gather outside estuaries in April and enter rivers in May and June (Maitland & Hatton-Ellis, 2003; Freyhof & Kottelat, 2008; Rooney & King, 2015). This can vary with water temperature, tides and fluvial conditions (Doherty et al., 2004). Twaite Shad are commonly recorded congregating in Waterford Harbour in March and occasionally in February (Doherty et al., 2004; Gallagher et al., 2016). Upstream migration from the estuaries peaks at water temperatures of 10-14°C (IFI, 2022a). Acoustic telemetry studies by IFI (Rooney & King, 2015; IFI, 2022c) have found that shads are highly mobile during their spawning migration, moving up to 35km upstream and downstream with the tides.

Spawning occurs over gravel (IFI, 2022a) at the top of tidal waters (King et al., 2011). Once the adults reach the spawning grounds in late May and early June, they remain there for 1-2 weeks, when there is a steady rise in water temperatures from 13°C to 19°C (Rooney & King, 2015; IFI, 2022c). Fish move onto the breeding area at dusk (IFI, 2022a) and spawning takes place throughout the night in large, noisy schools (Maitland & Hatton-Ellis, 2003; Doherty et al., 2004; Freyhof & Kottelat, 2008; King et al., 2011). The eggs sink into the gravel or float downstream, hatching 4-8 days later (Maitland & Hatton-Ellis, 2003; Doherty et al., 2004). Most juveniles move to the lower estuary during their first summer and migrate to sea at end of their second year (Freyhof & Kottelat, 2008). Once in brackish water, these fish feed primarily mysids and copepods (Maitland & Hatton-Ellis, 2003). The movements and ecology of Twaite Shad during their residency in estuaries are not fully understood (IFI, 2022a) and are the subject of ongoing research (IFI, 2022c).

Twaite Shad is an iteroparous species, i.e., individuals can spawn multiple times over their lifespan (Rooney & King, 2015, IFI, 2022a). Examination of scales by King & Roche (2008) showed that repeat spawning is the norm and angling returns from the River Barrow also reveal a relatively well-established population of repeat-spawners there (King et al., 2011). After spawning, spent fish migrate back to sea (Freyhof & Kottelat, 2008) and most surviving adults return to sea almost immediately (Doherty et al., 2004; IFI, 2022a). As part of IFI's acoustic telemetry studies, Rooney & King (2015) found that, following presumed spawning, tagged shad returned to the lower part of the estuary within 1-3 days (IFI, 2022c).

Apart from the nocturnal spawning habit, the diel activity patterns of Twaite Shad are not well defined/studied. However, it appears that, with the exception of the spawning period, Twaite Shad is a mainly diurnal species. Gregory & Clabburn (2003) found that the numbers of adult shad migrating upstream and downstream were much reduced

between 21:00 and 03:00 and that a peak in activity occurred around dawn. Esteves & Andrade (2008) found that shad larvae were more common during daylight hours, particularly in the afternoon, than they were at night.

Twaite Shad, like all members of the herring family, is considered a “hearing specialist” as it has a much greater auditory range than other fishes (Teague & Clough, 2011). As Twaite Shad is a hearing specialist and predominantly diurnal, and as both adults and juveniles are likely to be pass by the proposed development location in significant numbers, this species is considered to be the most sensitive receptor in terms of noise impacts.

Summary

During the period from March to May, inclusive, adult Twaite Shad are expected to migrate upstream through the works area in significant numbers during daylight hours. Later in the summer, i.e., in June and July, spent adult shad are likely to be present in significant numbers on their return from their spawning grounds to the lower estuary and, eventually, the sea. The timing of the arrival of young-of-the-year (0+) shad at the location of the proposed development is not known, but it is thought that they gradually move down the tidal reaches of the river from June to August/September. Similarly, little is known of the behaviour and ecology of juvenile Twaite Shad during their residency in the estuary. Therefore, following the Precautionary Approach, juveniles are assumed to move upstream and downstream through the works area at all times of the year and to be most active during daylight. Owing to their sensitive auditory systems, diurnal habit and year-round presence, as well as their small body size, juvenile Twaite Shad are considered highly vulnerable to noise impacts arising from pile driving.

Salmonids

While the River Barrow at the location of the proposed development does not provide suitable spawning habitat for salmonids, e.g., Atlantic Salmon (*Salmo salar*) and Brown Trout (*S. trutta*), it is an important link between the estuarine, coastal and oceanic feeding grounds for these species and their spawning beds further upstream. Salmonid species may be present at the proposed development location at any time of year but occur in most significant numbers during their upstream spawning migration (predominantly in autumn and winter) and out-migration of smolts (almost entirely in spring). In addition, sea or slob trout (Brown Trout with a marine or estuarine adult phase) may be present at any time of the year.

Literature review

Like lampreys and shads, Atlantic Salmon is an anadromous species, i.e., the adult life stage is marine, with mature fish returning to their natal freshwater streams to spawn. Adults can begin their spawning migration at any time of year, but there are two main migration periods: fish who have spent one winter at sea, known as “grilse”, ascend rivers in late winter, while fish who have spent more than one winter at sea, known as “multi-sea-winter (MSW)” (or “spring” salmon, if they enter fresh water before 1st June), generally enter rivers earlier in the year. Movement of spawning salmon upstream through the estuary is predominantly nocturnal and usually occurs on the ebb tide (Smith & Smith, 1997). Once spawning has occurred, most adults die, though as many as 36% may survive and return to sea as kelts (Hendry & Cragg-Hine, 2003). Only 3-6% survive to spawn in subsequent years (Mills, 1989; Hubley et al., 2008).

The eggs hatch in spring and the young, known as “alevins”, remain within the gravel interstia until the yolk-sac is depleted, which takes a number of weeks, at which point the rise to the surface and begin their free-swimming phase. At this point the juvenile

fish are known as “fry”. At the end of their first summer these fish develop parr marks on their sides and are thereafter known as “parr”. Juveniles spend 2-4 years in fresh waters (Hendry & Cragg-Hine, 2003), normally undergoing smoltification (a series of physiological changes or metamorphosis which prepares the young salmon for life in the marine environment) and migrating to sea in the spring (March-June) of their third year (King et al., 2011). Out-migrating smolts are predominantly nocturnal (Moore et al., 1995). However, they become increasingly active during daylight hours with increasing water temperatures (Thorpe et al., 1994; Ibbotson et al., 2006, 2011; Haraldstad et al., 2017). Smolts do not require a period of acclimation to saline conditions and so tend not to delay in the estuary, preferring to move directly to sea (Moore et al., 1995).

As the up-estuary section of the migration of adult Atlantic Salmon is predominantly nocturnal, the vast majority of individuals will migrate past the proposed development location during the hours of darkness. Similarly, any out-migrating kelts are likely to migrate at night. In addition, these fish are likely to spend only a very short time in the estuary, instead migrating directly from the river to the sea.⁷ Furthermore, only a very small portion of kelts contribute to future spawning, and so impacts on kelts are generally imperceptible at the population scale.

Smolts are likely to pass through the construction area in significant numbers on their migration from the river to the sea in the period from March to May, inclusive. As with adult salmon, smolts migrate mostly at night. As with kelts, smolts do not tend to delay in the estuary, preferring to migrate directly to sea.

European Eel

Unlike salmonids and lampreys, European Eel (*Anguilla anguilla*) has a catadromous life history, i.e., spawning occurs at sea and juveniles migrate into fresh waters to feed and mature. The major influx of juvenile eels occurs in early spring. Large numbers of eels are expected to be present at the proposed development location during this time.

Migration Periods

Based on the literature review above, Table 2.2 below illustrates the known migration patterns of these species through the Barrow Estuary.

Table 2.2 Indicative migration periods for Sea Lamprey, River Lamprey, Twaite Shad and Atlantic Salmon species in the Barrow Estuary. Blue shading indicates mostly nocturnal activity, orange indicates mostly diurnal activity, shade indicates relative abundance of fish.

Category	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sea Lamprey												
Upstream												
Downstream												
River Lamprey												
Upstream												
Downstream												

⁷ Atlantic Salmon kelts occasionally spend longer periods (up to several weeks) in estuaries on their post-spawning migration to the sea (Lindberg, 2011).

Category	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Twaite Shad												
Upstream												
Downstream (spent)												
Downstream (0+)												
Juveniles (<2 years)												
Atlantic Salmon												
Upstream												
Downstream (kelts)												
Downstream (smolts)												

2.4.4 Otter

There are frequent and widespread records of Otter throughout the study area according to data supplied by the NPWS and the NBDC (2022). However, no evidence of Otter (e.g., holts, couches, spraints or prints) were recorded during the walkover survey, which assessed 150m upstream and downstream of the proposed development. Nevertheless, records and data reviewed as part of the desk study indicate that Otter are present at the location of the proposed development and within the study area.

2.4.5 Flora

No species protected under the Flora (Protection) Order, 2022 were recorded within the study area. Species identified within specific habitats are detailed in Section 2.5.2 above and invasive alien plant species identified within or adjacent to the site are discussed in Section 2.5.6 below.

2.4.6 Invasive Alien Species

During the field survey, two species restricted under Regulation 49 of the Habitats Regulations, namely *Spartina sp.* and Himalayan Balsam (*Impatiens glandulifera*), were recorded on the bank of the River Barrow c. 15m downstream of the bridge. *Spartina sp.* was found growing within reed bed habitat which covers a total area of c. 750m² within proximity of the bridge. Himalayan Balsam was recorded growing along a 15m stretch of the riverbank under a treeline c. 30m south of the proposed development. These species have potential to be spread as a result of construction works.

Chinese Mitten Crab (*Eriocheir sinensis*) was recorded in the Waterford Estuary in 2009 (Invasive Species Ireland, 2021) and is presumed to still be present there. This is the only record of this species in Ireland. However, it is much more widespread in Great Britain (NIEA, 2020) and remains a threat.

2.5 Potential Impacts on the Natural Environment

Habitat Loss

The proposed development will result in the loss of recolonising bare ground (ED3) and built land (BL3) as these are the habitats found within the construction site compound which will be in use during the GI works. However, as the compound site is currently in use as a construction compound for the separately proposed South-east Greenway project, habitat loss at this location is expected to be minimal.

Disturbance/Displacement

The use of a jack-up barge, cable percussion rig and rotary core GI works poses a risk of hydroacoustic impacts on fauna in the River Barrow, most notably Twaite Shad, which, as a hearing specialist, is particularly sensitive to hydroacoustic impacts. Juveniles are likely to be present in the estuary at all times of the year. Injury from noise or vibration can alter behaviour (i.e., leaving safe shallow areas to avoid high levels of disturbance) which can result in increased rates of predation of these species. Hydroacoustic impacts from noise and vibration can also displace Otter and any impacts on fish species will have an indirect negative effect on Otter as they rely on the local fish populations as a food source.

Water Quality

Due to the use of barges and other heavy machinery on and in close proximity to the River Barrow, there is a risk of pollution during the GI works. This could be in the form of spilled fuel, oil or the disturbance of contaminated ground. The aspects of the construction of the proposed development which pose the greatest risk of such impacts include:

- Elevated silt/sediment loading within watercourses from construction site runoff and drilling. Drilling will be undertaken from a barge for river-side boreholes. Elevated silt loading can lead to long-term damage to aquatic ecosystems by smothering spawning grounds and gravel beds and clogging the gills of fish. Increased silt load in receiving watercourses stunts aquatic plant growth, limits dissolved oxygen capacity and overall reduces the ecological quality with the most critical period associated with low flow conditions. Other pollutants in the watercourse can bind to silt which can lead to increased bioavailability of these pollutants. Effects on erosion and deposition processes during construction are likely to be *negative, temporary, imperceptible to slight* and highly localised to the works area.
- Spillage of concrete, grout and other cement-based products. These cement-based products are highly alkaline (releasing fine highly alkaline silt) and extremely corrosive and can result in significant impact to watercourses altering the pH, smothering the stream bed and physically damaging fish through burning and clogging of gills due to the fine silt.
- Accidental spillage of hydrocarbons from construction plant and at storage depots / construction compound have the potential to enter drainage ditches/land drains and subsequently the River Barrow, via surface water runoff.
- There is also potential for pollutants derived from construction materials to be mobilised by flood waters.

Given the naturally high sediment load in the River Barrow at this location (due to the estuarine waters), sedimentation is not considered to pose a significant risk. However, the synergistic effects of the naturally occurring sediment with any pollutants must be considered. Any pollution incident could have significant negative impacts on aquatic and shoreline life depending on the severity of the pollution. Pollution can also have indirect negative impacts on water-dependent terrestrial habitats and species that are hydrologically connected to the source of the pollution.

Invasive Alien Species

The GI works pose a risk of the spread of invasive non-native species to, from or within the vicinity of the works. Species of particular concern in this case is Chinese Mitten Crab (*Eriocheir sinensis*) and Asian Clam (*Corbicula fluminea*) which could be spread within the Suir-Barrow-Nore Estuary by barges and other vessels associated with the

GI works. Furthermore, Himalayan Balsam (*Impatiens glandulifera*) is present on the bank of the River Barrow c. 60m to the southwest of the bridge. However, the GI works are not expected to interact with the infested area or result in the further spread of this species

3. IDENTIFICATION OF LIKELY SIGNIFICANT EFFECTS

3.1 Establishing the Zone of Influence

Section 3.2.3 of DEHLG (2010) outlines the procedure for selecting the European sites to be considered in AA. It states that European sites potentially affected should be identified and listed, bearing in mind the potential for direct, indirect and in-combination effects. It also states that the specific approach in each case is likely to differ depending on the scale and likely effects of the plan or project. However, it advises that the following sites should generally be included:

- All European sites within or immediately adjacent to the plan or project area;
- All European sites within the zone of influence of the plan or project; and,
- In accordance with the Precautionary Principle, all European sites for which there is doubt as to whether or not they might be significantly affected.

The “zone of influence” of a plan or project is the geographic extent over which significant ecological effects are likely to occur. In the case of projects, the guidance recognises that the zone of Influence must be established on a case-by-case basis using the Source-Pathway-Receptor Model (OPR, 2021) with reference to the following key variables:

- The nature, size and location of the project;
- The nature of the impacts which may arise from the project;
- The sensitivities of the ecological receptors, and;
- The potential for in-combination effects.

For example, in the case of a project that could affect a watercourse, it may be necessary to include the entire upstream and/or downstream catchment in order to capture all European sites with water-dependent features of interest.

For example, in the case of a project that could affect a watercourse, it may be necessary to include the entire upstream and/or downstream catchment in order to capture all European sites with water-dependent features of interest.

Having regard to the above key variables, the zone of influence was defined as:

- The entire area within 550 m of the GI works;
- The entire extent of the transitional waters of the River Barrow and the River Nore upstream and downstream of the GI works, and;
- The transitional waters of the River Suir as far as the Lower Suir Estuary (Little Island-Cheekpoint).

This area was defined as the zone of influence because it extends to the maximum distance at which potential likely significant effects could occur, including via hydrological connections, i.e., surface water pathways. Beyond this limit, noise and visual disturbance to birds will not occur.

European sites outside of the zone of influence are excluded due to various factors such as considerable overland or upstream distance, lack of hydrological connection and/or lack of supporting habitat for qualifying interest species in the vicinity of the proposed development. There are no pathways for impact arising from the proposed development to reach those sites, therefore there is no potential for likely significant effects to occur to the qualifying interests of those European sites.

A geographical representation of the zone of influence was produced in ArcGIS 10.5 using the boundary of the GI works and publicly available Ordnance Survey Ireland maps. This was used in combination with NPWS shapefiles to identify the boundaries of European sites in relation to the zone of influence (Figure 3.1). It was determined that three European sites, namely the River Barrow and River Nore SAC, the Lower River Suir SAC and the River Nore SPA occur within the zone of influence. Table 3.1 assesses if and how these sites are connected to the proposed development. Detailed descriptions of these sites are given in Section 3.2.

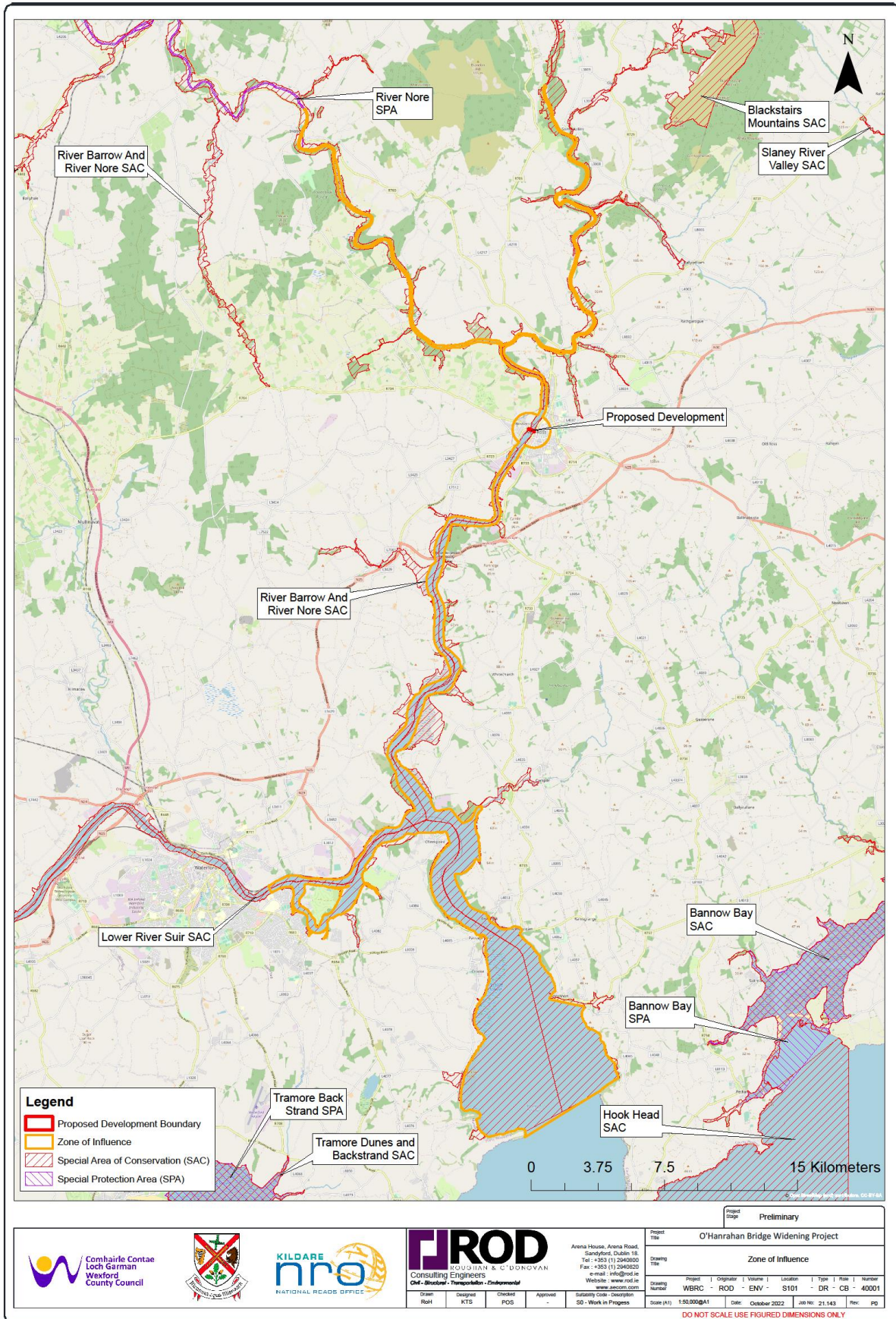


Figure 3.1 The boundaries of European sites relative to the location of the Ground Investigation Works.

Table 3.1 European sites located within the zone of influence

European site [site code]	Are there potential pathways for impacts from the GI works to this site?
River Barrow and River Nore SAC [002162]	Yes. The GI works are located within the boundary lines of the River Barrow and River Nore SAC.
Lower River Suir SAC [002137]	Yes. The shortest distance from the GI works to this site is 14 km to the south. This is the direct over land distance between the SAC and the proposed development. This SAC adjoins the boundary of the River Barrow and River Nore SAC to the south at the confluence of the River Suir and the River Barrow. The shortest distance from the GI works to the site via a hydrological connection is 16.5 km south, through the River Barrow. The GI works and the location of this SAC are within the transitional waters of the River Barrow and River Suir, respectively. Therefore, there is a tidal influence which can potentially bring waters (and suspended matter) from the River Barrow upstream into the River Suir. Therefore, there is potential for likely significant effects to the Qualifying Interests of this site as a result of the GI works.
River Nore SPA [004233]	Yes. The shortest absolute distance from the GI works to this site is 9.2 km to the northwest. This distance is over land and this location is within the zone of influence. The shortest distance from the GI works to the site via a hydrological connection is 12.8 km northwest, through the river Barrow and the River Nore. This SPA is designated for Kingfisher, and there is suitable supporting habitat for this species in the area surrounding the proposed development and downstream of the proposed development. As the proposed development and the location of this SPA are within the transitional waters of the Barrow Nore Estuary and Nore Estuary, respectively, there is a tidal influence which can potentially bring waters (and suspended matter) from the River Barrow upstream into the River Nore, potentially impacting Kingfisher habitat and distribution within this SPA. Therefore, there is potential for likely significant effects to the Qualifying Interests of this site as a result of the GI works.

3.2 Site Descriptions

River Barrow and River Nore SAC

The description of the River Barrow and River Nore SAC provided here is based on the Conservation Objectives (NPWS, 2011), Site Synopsis (NPWS, 2016), and Natura 2000 Standard Data Form (NPWS, 2020) for the site, as well as the Conservation Objectives Supporting Documents for marine, coastal and woodland habitats (NPWS, 2011a, b, c).

Site Overview

This site consists of the freshwater stretches of the Barrow and Nore River catchments as far upstream as the Slieve Bloom Mountains, and it also includes the tidal elements and estuary as far downstream as Creadan Head. The site passes through eight counties: Offaly, Kildare, Laois, Carlow, Kilkenny, Tipperary, Wexford and Waterford. Towns along the edge of the site include Mountmellick, Portarlinton, Monasterevin, Stradbally, Athy, Carlow, Leighlinbridge, Graiguenamanagh, New Ross, Inistioge, Thomastown, Callan, Bennettsbridge, Kilkenny and Durrrow. The larger of the many tributaries include the Lerr, Fushoge, Mountain, Aughavaud, Owenass, Boherbaun and Stradbally Rivers of the Barrow, and the Delour, Dinin, Erkina, Owveg, Munster, Arrigle and King's Rivers on the Nore.

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

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

A good example of petrifying springs with tufa formations occurs at Dysart Wood along the Nore. This is a rare habitat in Ireland, and one listed with priority status on Annex I of the E.U. Habitats Directive. These hard water springs are characterised by lime encrustations, often associated with small waterfalls. A rich bryophyte flora is typical of the habitat and two diagnostic species, *Palustriella commutata* and *Eucladium verticillatum*, have been recorded.

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

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

On the steeply sloping banks of the River Nore, about 5 km west of New Ross, in Co. Kilkenny, Kylecorragh Woods form a prominent feature in the landscape. This is an excellent example of relatively undisturbed, relict oak woodland with a very good tree canopy. The wood is quite damp and there is a rich and varied ground flora. At

Brownstown, a small, mature oak dominated woodland occurs on a steep slope. There is younger woodland to the north and east of it. Regeneration throughout is evident. The understorey is similar to the woods at Brownsford. The ground flora of this woodland is developed on acidic, brown earth type soil and comprises a thick carpet of Bilberry (*Vaccinium myrtillus*), Heather (*Calluna vulgaris*), Hard Fern (*Blechnum spicant*), Common Cow-wheat (*Melampyrum pratense*) and Bracken (*Pteridium aquilinum*).

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

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

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

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

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

Heather, Tormentil (*Potentilla erecta*), Carnation Sedge (*Carex panicea*) and Bell Heather (*Erica cinerea*).

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

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

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

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

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

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

Seventeen Red Data Book plant species have been recorded within the site, most in the recent past. These are Killarney Fern (*Trichomanes speciosum*), Divided Sedge, Clustered Clover, Basil Thyme (*Acinos arvensis*), Red Hemp-nettle (*Galeopsis angustifolia*), Borrer's Saltmarsh-grass, Meadow Barley, Opposite-leaved Pondweed (*Groenlandia densa*), Meadow Saffron/Autumn Crocus (*Colchicum autumnale*), Wild Clary/Sage, Nettle-leaved Bellflower, Saw-wort (*Serratula tinctoria*), Bird Cherry (*Prunus padus*), Blue Fleabane (*Erigeron acer*), Fly Orchid (*Ophrys insectifera*), Ivy Broomrape (*Orobanche hederæ*) and Greater Broomrape. Of these, the first nine are protected under the Flora (Protection) Order, 2015. Divided Sedge was thought to be extinct but has been found in a few locations in the site since 1990. In addition plants which do not have a very wide distribution in the country are found in the site including Thin-spiked Wood-sedge, Field Garlic (*Allium oleraceum*) and Summer Snowflake. Six rare lichens, indicators of ancient woodland, are found including *Lobaria laetevirens* and *L. pulmonaria*. The rare moss *Leucodon sciuroides* also occurs.

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

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

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

The site is of ornithological importance for a number of E.U. Birds Directive Annex I species, including Greenland White-fronted Goose, Whooper Swan, Bewick's Swan, Bar-tailed Godwit, Peregrine and Kingfisher. Nationally important numbers of Golden Plover and Bar-tailed Godwit are found during the winter. Wintering flocks of migratory

birds are seen in Shanahoe Marsh and the Curragh and Goul Marsh, both in Co. Laois, and also along the Barrow Estuary in Waterford Harbour. There is also an extensive autumnal roosting site in the reedbeds of the Barrow Estuary used by Swallows before they leave the country. The old oak woodland at Abbeyleix has a typical bird fauna including Jay, Long-eared Owl and Raven. The reedbed at Woodstown supports populations of typical waterbirds including Mallard, Snipe, Sedge Warbler and Water Rail.

Land use at the site consists mainly of agricultural activities – mostly intensive in nature and principally grazing and silage production. Slurry is spread over much of the area. Arable crops are also grown. The spreading of slurry and fertiliser poses a threat to the water quality of the salmonid river and to the populations of E.U. Habitats Directive Annex II animal species within the site. Many of the woodlands along the rivers belong to old estates and support many non-native species. Little active woodland management occurs. Fishing is a main tourist attraction along stretches of the main rivers and their tributaries and there are a number of Angler Associations, some with a number of beats. Fishing stands and styles have been erected in places. Both commercial and leisure fishing takes place on the rivers. There is net fishing in the estuary and a mussel bed also. Other recreational activities such as boating, golfing and walking, particularly along the Barrow towpath, are also popular. There is a golf course on the banks of the Nore at Mount Juliet and GAA pitches on the banks at Inistioge and Thomastown. There are active and disused sand and gravel pits throughout the site. Several industrial developments, which discharge into the river, border the site. New Ross is an important shipping port. Shipping to and from Waterford and Belview ports also passes through the estuary.

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

Overall, the site is of considerable conservation significance for the occurrence of good examples of habitats and of populations of plant and animal species that are listed on Annexes I and II to the Habitats Directive. Furthermore, it is of high conservation value for the populations of bird species that use it. The occurrence of several plant species listed in *Ireland Red List No. 10: Vascular Plants* (Wyse Jackson et al., 2016), including three rare plants in the salt meadows and the population of the hard water form of the Freshwater Pearl Mussel, which is limited to a 10 km stretch of the Nore, add further interest to this site.

Qualifying Interests

- [1130] Estuaries
- [1140] Mudflats and sandflats not covered by seawater at low tide
- [1170] Reefs

- [1310] *Salicornia* and other annuals colonising mud and sand
- [1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
- [1410] Mediterranean salt meadows (*Juncetalia maritimi*)
- [3260] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Calliticho-Batrachion* vegetation
- [4030] European dry heaths
- [6430] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
- [7220] *Petrifying springs with tufa formation (*Cratoneurion*)
- [91A0] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles
- [91E0] *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)
- [1016] Desmoulin's Whorl Snail (*Vertigo moulinsiana*)
- [1029] Freshwater Pearl Mussel (*Margaritifera margaritifera*)
- [1092] White-clawed Crayfish (*Austropotamobius pallipes*)
- [1095] Sea Lamprey (*Petromyzon marinus*)
- [1096] Brook Lamprey (*Lampetra planeri*)
- [1099] River Lamprey (*Lampetra fluviatilis*)
- [1103] Twaite Shad (*Alosa fallax*)
- [1106] Atlantic Salmon (*Salmo salar*)
- [1355] European Otter (*Lutra lutra*)
- [1421] Killarney Fern (*Trichomanes speciosum*)
- [1990] Nore Freshwater Pearl Mussel (*Margaritifera durrovensis*)

Sensitivities of the Site

Land use at the site consists mainly of agricultural activities, mostly intensive and principally grazing and silage production. Slurry is spread over much of the area. Arable crops are also grown. The spreading of slurry and fertiliser poses a threat to water quality and populations of Annex II species within the site. Many of the woodlands along the rivers belong to old estates and support many non-native species. Fishing is a main tourist attraction along stretches of the main rivers and their tributaries and there are a number of angling clubs, some with a number of beats. Both commercial and leisure fishing takes place on the rivers. There is net fishing and a mussel bed in the estuary. Other recreational activities such as boating, golfing and walking, particularly along the Barrow towpath, are also popular. There is a golf course on the banks of the River Nore at Mount Juliet and sports pitches at Inistioge and Thomastown. There are active and disused sand and gravel pits throughout the site. Several industrial developments, which discharge into the river, border the site. New Ross is an important shipping port and shipping to and from Waterford and Belview ports also passes through the estuary.

The main threats to the site and current damaging activities include high inputs of nutrients into the river system from agricultural run-off and several sewage plants, over-grazing in the woodland areas, and invasion by non-native species, e.g., Cherry Laurel and Rhododendron. Water quality remains vulnerable. Good quality water is necessary to maintain the populations of Annex II species and is dependent on controlling fertilisation of the grasslands, particularly along the River Nore. It also requires that sewage be properly treated before discharge. Drainage activities in the

catchment can lead to flash floods which can damage the many Annex II species present. Capital and maintenance dredging within the lower reaches of the system pose a threat to migrating fish species such as Lamprey and Shad. Land reclamation also poses a threat to the salt meadows and the protected species therein.

Lower River Suir SAC

The description of the Lower River Suir SAC provided here is based on the Conservation Objectives (NPWS, 2011), Site Synopsis (NPWS, 2016), and Natura 2000 Standard Data Form (NPWS, 2020) for the site, as well as the Conservation Objectives Supporting Documents for marine, coastal and woodland habitats (NPWS, 2011a, b, c).

Site Overview

The Lower River Suir SAC consists of the freshwater stretches of the River Suir south of Thurles, the tidal stretches as far as the confluence with the Barrow/Nore east of Cheekpoint, and many tributaries including the Clodiagh, Lingaun, Anner, Nier, Tar, Aherlow and Multeen. The River Suir and its tributaries flow through the counties of Tipperary, Kilkenny and Waterford.

Upstream of Waterford city, the swinging meanders of the Suir criss-cross the Devonian sandstone rim of hard rocks no less than three times as they leave the limestone-floored downfold below Carrick-on-Suir. In the vicinity of Carrick-on-Suir the river follows the limestone floor of the Carrick Syncline. Upstream of Clonmel the river and its tributaries traverse Upper Palaeozoic Rocks, mainly the Lower Carboniferous Visean and Tournaisian. The freshwater stretches of the Clodiagh River in Co. Waterford traverse Silurian rocks, through narrow bands of Old Red Sandstone and Lower Avonian Shales, before reaching the carboniferous limestone close to its confluence with the Suir. The Aherlow River flows through a Carboniferous limestone valley, with outcrops of Old Red Sandstone forming the Galtee Mountains to the south and the Slievenamuck range to the north. Glacial deposits of sands and gravels are common along the valley bottom, flanking the present-day river course.

Alluvial wet woodland is a declining habitat type in Europe as a result of drainage and reclamation. The best examples of this type of woodland in the site are found on the islands just below Carrick-on-Suir and at Fiddown Island. Species occurring here include Almond Willow (*Salix triandra*), White Willow (*S. alba*), Rusty Willow (*S. cinerea* subsp. *oleifolia*), Osier (*S. viminalis*), with Yellow Iris (*Iris pseudacorus*), Hemlock Water-dropwort (*Oenanthe crocata*), Wild Angelica (*Angelica sylvestris*), Pendulous Sedge (*Carex pendula*), Meadowsweet (*Filipendula ulmaria*) and Common Valerian (*Valeriana officinalis*). The terrain is littered with dead trunks and branches and intersected with small channels which carry small streams to the river. The bryophyte and lichen floras appear to be rich. A small plot is currently being coppiced and managed by the National Parks and Wildlife Service. In the drier areas species such as Ash (*Fraxinus excelsior*), Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*) and Blackthorn (*Prunus spinosa*) occur.

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

Old oak woodlands are also of importance at the site. The best examples are seen in Portlaw Wood which lies on both sides of the Clodiagh River. On the south-facing side

the stand is more open and the oaks (mainly Pedunculate Oak, *Quercus robur*) are well grown and spreading. Ivy (*Hedera helix*) and Bramble (*Rubus fruticosus* agg.) are common on the ground, indicating relatively high light conditions. Oak regeneration is dense, varying in age from 0-40 years and Holly (*Ilex aquifolium*) is fairly common but mostly quite young. Across the valley, by contrast, the trees are much more closely spaced and though taller, are poorly grown on average. There are no clearings; large oaks extend to the boundary wall. In the darker conditions, Ivy is much rarer and Holly much more frequent, forming a closed canopy in places. Oak regeneration is uncommon since there are as yet few natural clearings. The shallowness of the soil on the north-facing slope probably contributes to the poor tree growth there. The acid nature of the substrate has induced a 'mountain' type oakwood community to develop. The site is quite species-rich throughout, including an abundance of mosses, liverworts and lichens. The rare lichen *Lobaria pulmonaria*, an indicator of ancient woodlands, is found here.

Inchinquillib Wood consists of three small separate sloping blocks of woodland in a valley cut by the young Multeen River and its tributaries through acidic Old Red Sandstone and Silurian rocks. Two blocks, both with an eastern aspect, located to the north of the road, are predominantly of Sessile Oak (*Quercus petraea*) and Hazel, with Downy Birch (*Betula pubescens*), Ash and Holly. The ground flora is quite mixed with, for example, Wood-sedge (*Carex sylvatica*), Bluebell (*Hyacinthoides non-scripta*), Primrose (*Primula vulgaris*), Wood-sorrel (*Oxalis acetosella*), Pignut (*Conopodium majus*) and Hard Fern (*Blechnum spicant*). The base poor nature of the underlying rock is to some extent masked by the overlying drift. The third block, to the south of the road, and with a northern aspect, is a similar although less mature mixture of Sessile Oak, Birch and Holly. Here the influence of the drift is more marked, with the occurrence of Wood Anemone (*Anemone nemorosa*) amongst the ground flora.

Two stands of Yew (*Taxus baccata*) woods, a rare habitat in Ireland and the E.U., occur within the site. These are on limestone ridges at Shanbally and Cahir Park. Both are in woods planted with non-native species, including conifers. However, the area at Cahir Park is fairly substantial in size and includes some relatively undisturbed patches of wood and some very old trees. Regeneration of the Yew trees is mostly poor, due to competition from species such as Sycamore (*Acer pseudoplatanus*) and, at Shanbally, due to heavy grazing by goats. Other native species which occur with the Yew trees include Ash, Pedunculate Oak, Hazel and Spindle (*Euonymus europaeus*). Future prospects for these Yew woods are good as the sites are proposed for restoration under a Coillte E.U. LIFE programme.

Floating river vegetation is evident in the freshwater stretches of the River Suir and along many of its tributaries. Typical species found include Canadian Pondweed (*Elodea canadensis*), water-milfoils (*Myriophyllum* spp.), Fennel Pondweed (*Potamogeton pectinatus*), Curled Pondweed (*P. crispus*), Perfoliate Pondweed (*P. perfoliatus*), Pond Water-crowfoot (*Ranunculus peltatus*), other crowfoots (*Ranunculus* spp.) and the moss *Fontinalis antipyretica*. At a couple of locations along the river Opposite-leaved Pondweed (*Groenlandia densa*) occurs. This species is protected under the Flora (Protection) Order, 1999. The Aherlow River is fast flowing and mostly follows a natural unmodified river channel. Submerged vegetation includes the aquatic moss *Fontinalis antipyretica* and Stream Water-crowfoot (*R. pencillatus*), while shallow areas support species such as Reed Canary-grass (*Phalaris arundinacea*), Brooklime (*Veronica beccabunga*) and Water Mint (*Mentha aquatica*). The river bank is fringed in places with Alder (*Alnus glutinosa*) and willows (*Salix* spp.).

The Multeen River is fast flowing, mostly gravel-bottomed and appears to follow a natural unmodified river channel. Water-crowfoots occur in abundance and the aquatic

moss *Fontinalis antipyretica* is also common. In sheltered shallows, species such as Water-cress (*Nasturtium officinale*) and water-starworts (*Callitriche* spp.) occur. The river channel is fringed for most of its length with Alder, Willow and a narrow strip of marshy vegetation.

Salt meadows occur below Waterford City in old meadows where the embankment is absent, or has been breached, and along the tidal stretches of some of the inflowing rivers below Little Island. There are very narrow, non-continuous bands of this habitat along both banks. More extensive areas are also seen along the south bank at Ballynakill, the east side of Little Island, and in three large salt meadows between Ballynakill and Cheekpoint. The Atlantic and Mediterranean sub-types are generally intermixed. The species list is extensive and includes Red Fescue (*Festuca rubra*), oraches (*Atriplex* spp.), Sea Aster (*Aster tripolium*), Sea Couch (*Elymus pycnanthus*), frequent Sea Milkwort (*Glaux maritima*), occasional Wild Celery (*Apium graveolens*), Parsley Water-dropwort (*Oenanthe lachenalii*), English Scurvygrass (*Cochlearia anglica*) and Sea Arrowgrass (*Triglochin maritima*). These species are more representative of the Atlantic sub-type of the habitat. Common Cord-grass (*Spartina anglica*), is rather frequent along the main channel edge and up the internal channels. The legally protected (Flora (Protection) Order, 1999) Meadow Barley (*Hordeum secalinum*) grows at the landward transition of the saltmarsh. Sea Rush (*Juncus maritimus*), an indicator of the Mediterranean salt meadows, also occurs.

Other habitats at the site include wet and dry grassland, marsh, reedswamp, improved grassland, coniferous plantations, deciduous woodland, scrub, tidal river, stony shore and mudflats. The most dominant habitat adjoining the river is improved grassland, although there are wet fields with species such as Yellow Iris, Meadowsweet, rushes (*Juncus* spp.), Meadow Buttercup (*Ranunculus acris*) and Cuckooflower (*Cardamine pratensis*).

Cabragh marshes, just below Thurles, lie in a low-lying tributary valley into which the main river floods in winter. Here there is an extensive area of Common Reed (*Phragmites australis*) with associated marshland and peaty fen. The transition between vegetation types is often well displayed. A number of wetland plants of interest occur, in particular the Narrow-leaved Bulrush (*Typha angustifolia*), Bottle Sedge (*Carex rostrata*) and Blunt-flowered Rush (*Juncus subnodulosus*). The marsh is naturally eutrophic but it has also the nutritional legacy of the former sugar factory which discharged into it through a number of holding lagoons, now removed. Production is high, which is seen in the size of such species as Celery-leaved Buttercup (*Ranunculus sceleratus*), as well as in the reeds themselves.

Throughout the Lower River Suir site are small areas of woodland other than those described above. These tend to be a mixture of native and non-native species, although there are some areas of semi-natural wet woodland with species such as Ash and willow. Cahir Park Woodlands is a narrow tract of mixed deciduous woodland lying on the flat-lying floodplain of the River Suir. This estate woodland was planted over one hundred years ago and it contains a large component of exotic tree species. However, due to original planting and natural regeneration there is now a good mix of native and exotic species. About 5 km north-west of Cashel, Ardmayle pond is a long, possibly artificial water body running parallel to the River Suir. It is partly shaded by planted Lime (*Tilia hybrids*), Sycamore and the native Alder. Growing beneath the trees are shade tolerant species such as Remote sedge (*Carex remota*). The site is of particular conservation interest for the presence of a number of Annex II animal species, including Freshwater Pearl Mussel (both *Margaritifera margaritifera* and *M. margaritifera* subsp. *durrovensis* occur), White-clawed Crayfish, Salmon, Twaite Shad (*Alosa fallax fallax*), three species of Lampreys - Sea Lamprey, Brook Lamprey and

River Lamprey, and Otter. This is one of only three known spawning grounds in the country for Twaite Shad.

The site also supports populations of several other animal species. Those which are listed in the Irish Red Data Book include Daubenton's Bat, Natterer's Bat, Pipistrelle Bat, Pine Marten, Badger, Irish Hare, Smelt and Common Frog. Breeding stocks of Carp are found in Kilsheelan Lake. This is one of only two lakes in the country which is known to have supported breeding Carp. Carp require unusually high summer water temperatures to breed in Ireland. As the site is therefore unusual in this regard, it may also support interesting invertebrate populations.

Parts of the site have also been identified as of ornithological importance for a number of Annex I (E.U. Birds Directive) bird species, including Greenland White-fronted Goose (10), Golden Plover (1,490), Whooper Swan (7) and Kingfisher. Figures given in brackets are the average maximum counts from four count areas within the site for the three winters 1994-1997. Wintering populations of migratory birds use the site. Flocks are seen in Coolfinn Marsh and also along the reedbeds and saltmarsh areas of the Suir. Coolfinn supports nationally important numbers of Greylag Goose on a regular basis, with numbers between 600 and 700 recorded. Other species occurring include Mallard (21), Teal (159), Wigeon (26), Tufted Duck (60), Pintail (4), Pochard (2), Little Grebe (2), Black-tailed Godwit (20), Oystercatcher (16), Lapwing (993), Dunlin (101), Curlew (195), Redshank (28), Greenshank (4) and Green Sandpiper (1). Nationally important numbers of Lapwing (2,750) were recorded at Faithlegg in the winter of 1996/97. In Cabragh marshes there is abundant food for surface feeding wildfowl which total approximately 1,000 in winter. Widgeon, Teal and Mallard are numerous, and the latter has a large breeding population, with up to 400 in summer. In addition, less frequent species like Shoveler and Pintail occur and there are records for both Whooper and Bewick's swans. Kingfisher, a species that is listed on Annex I of the E.U. Birds Directive, occurs along some of the many tributaries throughout the site.

Land use at the site consists mainly of agricultural activities including grazing, silage production, fertilising and land reclamation. The grassland is intensively managed and the rivers are therefore vulnerable to pollution from run-off of fertilisers and slurry. Arable crops are also grown. Fishing is a main tourist attraction on stretches of the Suir and some of its tributaries, and there are a number of Angler Associations, some with a number of beats. Fishing stands and styles have been erected in places. Both commercial and leisure fishing takes place on the rivers. The Aherlow River is a designated Salmonid Water under the E.U. Freshwater Fish Directive. Other recreational activities such as boating, golfing and walking are also popular. Several industrial developments, which discharge into the river, border the site including three dairy related operations and a tannery.

The Lower River Suir contains excellent examples of a number of Annex I habitats, including the priority habitats alluvial forest and yew woodland. The site also supports populations of several important animal species, some listed on Annex II to the Habitats Directive or in *Ireland Red List No. 12: Terrestrial Mammals* (Marnell et al., 2019). The presence of two plant species protected under the Flora (Protection) Order, 2015 and the ornithological importance of the site adds further to its ecological interest and importance.

Qualifying Interests

- [1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
- [1410] Mediterranean salt meadows (*Juncetalia maritimi*)

- [3260] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation
- [6430] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
- [91A0] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles
- [91E0] *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)
- [91J0] **Taxus baccata* woods of the British Isles
- [1029] Freshwater Pearl Mussel (*Margaritifera margaritifera*)
- [1092] White-clawed Crayfish (*Austropotamobius pallipes*)
- [1095] Sea Lamprey (*Petromyzon marinus*)
- [1096] Brook Lamprey (*Lampetra planeri*)
- [1099] River Lamprey (*Lampetra fluviatilis*)
- [1103] Twaite Shad (*Alosa fallax*)
- [1106] Atlantic Salmon (*Salmo salar*)
- [1355] European Otter (*Lutra lutra*)

Sensitivities of the Site

Land use at the site consists mainly of agricultural activities including grazing, silage production, fertilising and land reclamation. The grassland is intensively managed, and the rivers are, therefore, vulnerable to pollution from run-off of fertilisers and slurry. Arable crops are also grown. Fishing is a main tourist attraction on stretches of the River Suir and some of its tributaries, and there are a number of angling clubs, some with a number of beats. Fishing stands and styles have been erected in places. Both commercial and leisure fishing takes place on the rivers. The Aherlow River is a designated Salmonid Water under the Freshwater Fish Directive (2006/44/EC). Other recreational activities such as boating, golfing and walking are also popular. Several industrial developments, which discharge into the river, border the site, including three dairy-related operations and a tannery.

River Nore SPA

The description of the River Nore SPA provided here is based on the Conservation Objectives (NPWS, 2015a), Site Synopsis (NPWS, 2015b), and Natura 2000 Standard Data Form (NPWS, 2020a) for the site, as well as the Conservation Objectives Supporting Document (NPWS, 2014a).

Site Overview

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

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

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

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

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

Qualifying Interests

[A229] Kingfisher

Sensitivities of the Site

This site is particularly sensitive to natural system modifications such as landfill, land reclamation and drying out, general transportation and service corridors such as port areas.

3.3 Evaluation against Conservation Objectives

Tables 3.2 – 3.4 below detail the evaluation of the likely effects of the GI works in view of the Conservation Objectives of the site identified and described in Section 3.2. As explained in Sections 1.2 and 1.3, AA Screening is carried out in view of the Conservation Objectives of the relevant European sites, which are in turn defined by detailed Attributes and corresponding Targets. Therefore, the evaluation of whether or not a likely effect is significant (in view of the Conservation Objective in question) is made with regard to these Attributes and Targets.

Table 3.2 Evaluation of the likely effects of the Ground Investigation works in view of the Conservation Objectives of the River Barrow and River Nore SAC [002162] (NPWS, 2011a).

Qualifying Interest	Conservation Objective as per NPWS (2011a)	Does the proposed development provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets?	Likely Significant Effect
Estuaries [1130]	<i>“To maintain the favourable conservation condition of Estuaries in the River Barrow and River Nore SAC”</i>	This habitat is tidal and subject to natural disturbances by different flows. The GI works are temporary and will not reduce the total area of this habitat. The GI works are over a small area such that the community distribution and will return to baseline conditions quite quickly. Therefore, the GI works will not give rise to likely significant effects on the habitat area and community distribution of this Qualifying Interest within the River Barrow and River Nore SAC.	No
Mudflats and sandflats not covered by seawater at low tide [1140]	<i>“To maintain the favourable conservation condition of the Mudflats and sandflats not covered by seawater at low tide in the River Barrow and River Nore SAC”</i>	This habitat occurs within the footprint of the GI works. The retractable legs used to stabilise the jack up barge will be planted on the floor of the riverbed. This will result in a disturbance of the benthic habitat, albeit minor and temporary. The GI works themselves involve the use of cable percussion and rotary core drilling, which will give rise to vibration effects, possibly leading to negative impacts on the community distribution within the benthic sediment. Although, works will be minor and temporary in nature and the habitat and natural flow variability of the river will return to baseline conditions in a short period of time, using the Precautionary Principle, likely significant effects on the conservation objectives of this Qualifying Interest in the River Barrow and River Nore SAC cannot be ruled out.	Yes
Reefs [1170]	NPWS (2011a) does not contain a site-specific Conservation Objective for Reefs. Therefore, as per advice from the NPWS, the Conservation Objective for Reefs in another European site, in this case the Hook Head SAC [000764], was used: <i>“To maintain the favourable conservation condition of Reefs”</i> (NPWS, 2011b).	As reefs are a saltwater habitat, the closest location of this QI is at least 27.2 km downstream of the proposed works (NPWS, 2011a). Any water quality impacts from sedimentation or potentially spilled pollutants would dissipate before they reached this far downstream. Considering the localised nature, duration and distance of GI works from this Qualifying Interest as well as the dilution capacity of the rivers, the GI works will not give rise to likely significant effects on the conservation objectives of this Qualifying Interest within the River Barrow and River Nore SAC.	No

Qualifying Interest	Conservation Objective as per NPWS (2011a)	Does the proposed development provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets?	Likely Significant Effect
Salicornia and other annuals colonising mud and sand [1310]	"To maintain the favourable conservation condition of Salicornia and other annuals colonising mud and sand in the River Barrow and River Nore SAC"	The nearest <i>Salicornia</i> and other annuals colonising mud and sand as per the NPWS is located 12.8 km downstream of the GI works. Any water quality impacts from sedimentation or potentially spilled pollutants would dissipate before they reached this far downstream. Considering the localised nature, duration and distance of GI works from this Qualifying Interest as well as the dilution capacity of the rivers, the GI works will not give rise to likely significant effects on the conservation objectives of this Qualifying Interest within the River Barrow and River Nore SAC.	No
Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330]	"To restore the favourable conservation condition of Atlantic salt meadows in the River Barrow and River Nore SAC"	The nearest Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) as per the NPWS is located 9.4 km downstream of the GI works. Any water quality impacts from sedimentation or potentially spilled pollutants would dissipate before they reached this far downstream. Considering the localised nature, duration and distance of GI works from this Qualifying Interest as well as the dilution capacity of the rivers, the GI works will not give rise to likely significant effects on the conservation objectives of this Qualifying Interest within the River Barrow and River Nore SAC.	No
Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]	"To restore the favourable conservation condition of Mediterranean salt meadows in the River Barrow and River Nore SAC"	The nearest Mediterranean salt meadows (<i>Juncetalia maritimi</i>) as per the NPWS is located 19 km downstream of the GI works. Any water quality impacts from sedimentation or potentially spilled pollutants would dissipate before they reached this far downstream. Considering the localised nature, duration and distance of GI works from this Qualifying Interest as well as the dilution capacity of the rivers, the GI works will not give rise to likely significant effects on the conservation objectives of this Qualifying Interest within the River Barrow and River Nore SAC.	No
Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation [3260]	"To maintain the favourable conservation condition of Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation in the River Barrow and River Nore SAC"	This habitat type is found throughout the freshwater stretches of rivers in Ireland and also occurs in the upper part of river estuaries. The salinity levels in the River Barrow within the Zone of Influence of the proposed development are considered too high for this habitat to occur and no evidence of this habitat type was observed during the surveys. Therefore, it can be concluded beyond reasonable scientific doubt that the proposed development will not significantly affect the Conservation Objective for this Qualifying Interest.	No

Qualifying Interest	Conservation Objective as per NPWS (2011a)	Does the proposed development provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets?	Likely Significant Effect
European dry heaths [4030]	<i>"To maintain the favourable conservation condition of European dry heaths in the River Barrow and River Nore SAC"</i>	European dry heaths are a strictly terrestrial habitat there are no pathways for impact between the proposed development and this Qualifying Interest. Additionally, this habitat is not located within the footprint of the GI works. Therefore, there are no pathways for likely significant effects to occur on the attributes of European dry heaths within the River Barrow and River Nore SAC in any form as a result of the GI works.	No
Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]	<i>"To maintain the favourable conservation condition of Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels in the River Barrow and River Nore SAC"</i>	The GI works may slightly alter the physical structure of the river only within c. 50m of the proposed development as a result of slight changes made to the hydrological dynamic (i.e. rates of erosion and deposition) of the river. This habitat is not present within the c. 50m radius and the nearest confirmed location is 19 km downstream. Therefore, the GI works will not give rise to any likely significant effects on the conservation objectives of this Qualifying Interest within the River Barrow and River Nore SAC.	No
*Petrifying springs with tufa formation (Cratoneurion) [7220]	<i>"To maintain the favourable conservation condition of Petrifying springs with tufa formation (Cratoneurion) in the River Barrow and River Nore SAC"</i>	This Qualifying Interest is located at least 22.2 km upstream of the GI works. The GI works will not alter the physical structure of the river at any locations at which this habitat is present; and given the hydrological distance and river flow direction between the GI works and Petrifying springs with tufa formation, there are no potential sources or pathways from the GI works that could lead to likely significant effects on the conservation objectives of this Qualifying Interest in the River Barrow and River Nore SAC.	No
Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]	<i>"To restore the favourable conservation condition of Old oak woodland with Ilex and Blechnum in the River Barrow and River Nore SAC"</i>	There will be no development or land-take occurring within Old sessile oak woods with Ilex and Blechnum in the British Isles. Furthermore, this is a terrestrial based habitat that is only at-risk during periods of high-water level or flooding. The closest occurrence of this habitat to the GI works is 880 m upstream. Therefore, there are no pathways for impacts from changes water quality to reach this habitat. Therefore, there is no potential for likely significant effects on the conservation objectives of this Qualifying Interest in the River Barrow and River Nore SAC.	No

Qualifying Interest	Conservation Objective as per NPWS (2011a)	Does the proposed development provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets?	Likely Significant Effect
<p>*Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) [91E0]</p>	<p><i>“To restore the favourable conservation condition of Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) in the River Barrow and River Nore SAC”</i></p>	<p>The closest Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) is hydrologically connected to the site of the GI works, but not in the river. Considering the nature of the GI works, the distance and dilution capacity of the watercourse, the GI works will not give rise to any likely significant effects on the habitat area, habitat distribution, woodland size, woodland structure or vegetation composition of Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) in the River Barrow and River Nore SAC.</p>	<p>No</p>
<p>Desmoulin's Whorl Snail (<i>Vertigo moulinsiana</i>) [1016]</p>	<p><i>“To maintain the favourable conservation condition of Desmoulin's whorl snail in the River Barrow and River Nore SAC”</i></p>	<p>Desmoulin's Whorl snail is a semi-terrestrial species that potentially occurs in salt marsh habitat downstream. Considering the localised nature, duration and distance of GI works from this Qualifying Interest as well as the dilution capacity of the rivers, the GI works will not give rise to likely significant effects on the conservation objectives of this Qualifying Interest within the River Barrow and River Nore SAC.</p>	<p>No</p>
<p>Freshwater Pearl Mussel (<i>Margaritifera margaritifera</i>) [1029]</p>	<p><i>“The status of the freshwater pearl mussel (<i>Margaritifera margaritifera</i>) as a qualifying Annex II species for the River Barrow and River Nore SAC is currently under review. The outcome of this review will determine whether a site-specific conservation objective is set for this species.”</i></p>	<p>Although Freshwater Pearl Mussel are limited to the freshwater stretches of the River Barrow and River Nore, their host fish (Salmonoids) are essential to their life cycle and are likely to be present in the estuary and connected watercourses. Potential impacts to host fish arising from the proposed development, e.g., water quality, may indirectly impact Freshwater Pearl Mussel. Therefore, likely significant effects on the conservation objectives for Freshwater Pearl Mussel in the River Barrow and River Nore SAC cannot be ruled out at this stage.</p>	<p>Yes</p>
<p>White-clawed Crayfish (<i>Austropotamobius pallipes</i>) [1092]</p>	<p><i>“To maintain the favourable conservation condition of White-clawed crayfish in the River Barrow and River Nore SAC”</i></p>	<p>White-clawed Crayfish are limited to the freshwater stretches of the rivers Barrow and Nore, which occur at least 22.4 km and 18.5 km upstream of the proposed development, respectively. This is a sufficient distance such that any water quality impacts from potential spillages during construction would dissipate by the time they reached suitable habitat for this qualifying interest. Therefore, there will be no likely significant effects on the conservation objectives for this qualifying interest in the River Barrow and River Nore SAC as a result of the proposed development.</p>	<p>No</p>

Qualifying Interest	Conservation Objective as per NPWS (2011a)	Does the proposed development provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets?	Likely Significant Effect
Sea Lamprey (<i>Petromyzon marinus</i>) [1095]	"To restore the favourable conservation condition of Sea lamprey in the River Barrow and River Nore SAC"	Construction works (including sheet piling) for the proposed development will give rise to noise and vibration effects which could cause physical harm to Sea lamprey. Construction works also have the potential for sedimentation and spilled pollutants such as fuel and concrete, which can have toxic effects on aquatic life including Sea lamprey passing through the estuary. Therefore, likely significant effects on the conservation objective of this Qualifying Interest within the River Barrow and River Nore SAC cannot be ruled out at this stage.	Yes
River Lamprey (<i>Lampetra fluviatilis</i>) [1099]	"To restore the favourable conservation condition of River lamprey in the River Barrow and River Nore SAC"		Yes
Brook Lamprey (<i>Lampetra planeri</i>) [1096]	"To restore the favourable conservation condition of Brook lamprey in the River Barrow and River Nore SAC"	The proposed development is located on a sediment-rich estuary and suitable habitat for this species is limited to the freshwater extents of the watercourse, c. 18.5 km upstream. Water quality impacts from sedimentation or potentially spilled pollutants cannot be carried into freshwater extents upstream. Therefore, there will be no likely significant effects on the conservation objectives for this qualifying interest in the River Barrow and River Nore SAC as a result of the proposed development.	No
Twaite Shad (<i>Alosa fallax</i>) [1103]	"To restore the favourable conservation condition of Twaite shad in the River Barrow and River Nore SAC"	Construction works (including sheet piling) associated with proposed development could give rise high levels of noise. This has the potential to lead to disturbance / displacement impacts to juvenile Twaite shad, causing them to abandon the safety of the mudflats and be subjected to higher rates of predation, resulting in the increased loss of juveniles and creating an imbalance in the population structure. Additionally, there is potential for the proposed development to give rise to injury / mortality impacts due through changes in water quality arising from spilled pollutants, such as concrete or fuel from the proposed development. Such substances can have toxic effects on aquatic life including Twaite shad. Therefore, likely significant effects on the population structure of Twaite shad within the River Barrow and River Nore SAC as a result of the proposed development cannot be ruled out at this stage.	Yes

Qualifying Interest	Conservation Objective as per NPWS (2011a)	Does the proposed development provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets?	Likely Significant Effect
Atlantic Salmon (<i>Salmo salar</i>) [1106]	<i>“To restore the favourable conservation condition of Salmon in the River Barrow and River Nore SAC”</i>	There is a possibility that the proposed development could give rise to water quality impacts due to the potential for pollutants, such as concrete or fuel, to be spilled, as these can have toxic effects on aquatic life including Atlantic salmon. The installation of sheet piles will give rise to noise and vibration effects which could be of a magnitude to cause injury to Atlantic salmon. Increased intensity of artificial lighting can trigger behavioural changes in Atlantic salmon which could result in higher predation rates as well as forming a barrier preventing migration. Therefore, likely significant effects on adult spawning fish, salmon fry abundance, out-migrating smolt abundance, the number of redds and water quality within the River Barrow and River Nore SAC as a result of the proposed development cannot be ruled out at this stage.	Yes
European Otter (<i>Lutra lutra</i>) [1355]	<i>“To restore the favourable conservation condition of Otter in the River Barrow and River Nore SAC”</i>	Construction works associated with the proposed development will include noise and vibration which could result in disturbance or displacement impacts to Otter. Additionally, potential water quality impacts such as sedimentation or potential discharge of pollutants can have direct toxic effects on Otter. Therefore, likely significant effects on available fish biomass for Otter within the River Barrow and River Nore SAC as a result of the proposed development cannot be ruled out at this stage.	Yes
Killarney Fern (<i>Trichomanes speciosum</i>) [1421]	<i>“To maintain the favourable conservation condition of Killarney Fern in the River Barrow and River Nore SAC”</i>	Killarney fern is a strictly terrestrial based species and is not located within the vicinity of the proposed development. Therefore, there are no pathways for likely significant effects to occur on the population, distribution or habitat for Killarney fern within the River Barrow and River Nore SAC in any form as a result of the proposed development.	No
Nore Freshwater Pearl Mussel (<i>Margaritifera durrovensis</i>) [1990]	<i>“To restore the favourable conservation condition of the Nore freshwater pearl mussel in the River Barrow and River Nore SAC”</i>	Although Nore Freshwater Pearl Mussel are limited to the freshwater stretches of the River Nore, their host fish (Salmonoids) are essential to their life cycle and are likely to be present in the estuary and connected watercourses. Potential impacts to host fish arising from the GI works, e.g. water quality, may indirectly impact Nore Freshwater Pearl Mussel. Therefore, likely significant effects on the conservation objectives for Nore Freshwater Pearl Mussel in the River Barrow and River Nore SAC cannot be ruled out at this stage.	Yes

Table 3.3 Evaluation of the likely significant effects of the Ground Investigation works in view of the Conservation Objectives of the Lower River Suir SAC [002137] (NPWS, 2017).

Qualifying Interest	Conservation Objective as per NPWS (2017)	Do the GI works provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets?	Likely Significant Effect
Atlantic salt meadows (<i>Glaucopuccinellietalia maritimae</i>) [1330]	“To restore the favourable conservation condition of Atlantic salt meadows (<i>Glaucopuccinellietalia maritimae</i>) in Lower River Suir SAC”	The location of the GI works occurs c. 16.5 km upstream of this European site. The GI works do not provide for any land-take of this habitat and will not result in the loss of any of this habitat within this European site. Considering the distance between the GI works and this European site, as well as the assimilative capacity of the watercourses, water quality impacts, such as sedimentation or potential discharge of pollutants, will have dissipated by the time they have reached this habitat within the Lower River Suir SAC. Therefore, the proposed development will not give rise to any likely significant effects on the conservation objectives of this qualifying interest within the Lower River Suir SAC.	No
Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]	“To restore the favourable conservation condition of Mediterranean salt meadows (<i>Juncetalia maritimi</i>) in Lower River Suir SAC”	The location of the GI works occurs c. 16.5 km upstream of this European site. While this habitat has not been mapped, it is assumed to be within proximity to Atlantic salt meadows (<i>Glaucopuccinellietalia maritimae</i>). The GI works do not provide for any land-take of this habitat and will not result in the loss of any of this habitat within this European site. Considering the distance between the GI works and this European site, as well as the assimilative capacity of the watercourses, water quality impacts, such as sedimentation or potential discharge of pollutants, will have dissipated by the time they have reached this habitat within the Lower River Suir SAC. Therefore, the proposed development will not give rise to any likely significant effects on the conservation objectives of this qualifying interest within the Lower River Suir SAC.	No
Water courses of plain to montane levels with the <i>Ranunculon fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation [3260]	“To maintain the favourable conservation condition of Water courses of plain to montane levels with the <i>Ranunculon fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation in Lower River Suir SAC”	Although watercourses of plain to montane levels with <i>Ranunculon fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation are traditionally freshwater habitats, some aquatic mosses found in this habitat can tolerate saline influences and therefore have the potential to be present downstream of the GI works in this European site. The GI works will not result in the loss of any of this habitat within this European site. Considering the distance between the GI works and this European site, as well as the assimilative capacity of the watercourses, water quality impacts, such as sedimentation or potential discharge of pollutants, will have dissipated by the time they have reached the Lower River Suir SAC. Therefore, the proposed development will not give rise to any likely significant effects on the conservation objectives of this qualifying interest within the Lower River Suir SAC.	No

Qualifying Interest	Conservation Objective as per NPWS (2017)	Do the GI works provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets?	Likely Significant Effect
Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]	“ <i>To maintain the favourable conservation condition of Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels in Lower River Suir SAC</i> ”	This qualifying interest can be found along the margins of transitional waterbodies and is thus assumed to occur in this European site at least c. 16.5 km downstream of the proposed development. The GI works will not result in the loss of any of this habitat within this European site. Considering the distance between the GI works and this European site, as well as the assimilative capacity of the watercourses, water quality impacts, such as sedimentation or potential discharge of pollutants, will have dissipated by the time they reached the Lower River Suir SAC. Therefore, the GI works will not give rise to any likely significant effects on the conservation objectives of this qualifying interest within the Lower River Suir SAC.	No
Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]	“ <i>To restore the favourable conservation condition of Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles in Lower River Suir SAC</i> ”	There will be no land-take of Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles within this European site. Furthermore, this is a terrestrial habitat, it is not located within the footprint of the proposed development and would only be at risk during periods of high-water level or flooding. Therefore, there are no pathways for impact between the GI works and this qualifying interest. Therefore, it can be concluded beyond reasonable scientific doubt that the GI works will not significantly affect this European site in view of its Conservation Objectives for this Qualifying Interest.	No
*Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) [91E0]	“ <i>To restore the favourable conservation condition of Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) in Lower River Suir SAC</i> ”	There will be no land-take of Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>) within this European site. Furthermore, this is a terrestrial habitat, it is not located within the footprint of the proposed development and would only be at risk during periods of high-water level or flooding. Therefore, there are no pathways for impact between the GI works and this qualifying interest. Therefore, it can be concluded beyond reasonable scientific doubt that the GI works will not significantly affect this European site in view of its Conservation Objectives for this Qualifying Interest.	No
*<i>Taxus baccata</i> woods of the British Isles [91J0]	“ <i>To restore the favourable conservation condition of <i>Taxus baccata</i> woods of the British Isles in Lower River Suir SAC</i> ”	There will be no land-take <i>Taxus baccata</i> woods of the British Isles within this European site. Furthermore, this is a terrestrial habitat, it is not located within the footprint of the proposed development and would only be at risk during periods of high-water level or flooding. Therefore, there are no pathways for impact between the GI works and this qualifying interest. Therefore, it can be concluded beyond reasonable scientific doubt that the GI works will not significantly affect this European site in view of its Conservation Objectives for this Qualifying Interest.	No

Qualifying Interest	Conservation Objective as per NPWS (2017)	Do the GI works provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets?	Likely Significant Effect
Freshwater Pearl Mussel (<i>Margaritifera margaritifera</i>) [1029]	<i>"To restore the favourable conservation condition of Freshwater Pearl Mussel in Lower River Suir SAC"</i>	Freshwater Pearl Mussel is limited to the freshwater stretches of the River Suir and any suitable habitat for this species is found at a direct overland distance of at least c. 28.2 km and a hydrological distance of at least c. 46.4 km from the proposed development in a freshwater tributary of the River Suir. Considering the distance between the location of the GI works and suitable Freshwater Pearl Mussel habitat, as well as the assimilative capacity of the watercourses, any water quality impacts, such as sedimentation or potentially discharged pollutants that may be carried downstream in the estuarine waters, will have dissipated by the time they have reached suitable habitat in the Lower River Suir SAC. Therefore, the GI works will not give rise to any likely significant effects on the conservation objectives of this qualifying interest within the Lower River Suir SAC.	No
White-clawed Crayfish (<i>Austropotamobius pallipes</i>) [1092]	<i>"To maintain the favourable conservation condition of White-clawed Crayfish in Lower River Suir SAC"</i>	White-clawed Crayfish is limited to the freshwater stretches of the River Suir and any suitable habitat for this species is found at a direct overland distance of at least c. 28.2 km and a hydrological distance of at least c. 46.4 km from the proposed development in a freshwater tributary of the River Suir. Considering the distance between the location of the GI works and suitable White-clawed Crayfish habitat, as well as the assimilative capacity of the watercourses, any water quality impacts, such as sedimentation or potentially discharged pollutants that may be carried downstream in the estuarine waters, will have dissipated by the time they have reached suitable habitat in the Lower River Suir SAC. Therefore, the GI works will not give rise to any likely significant effects on the conservation objectives of this qualifying interest within the Lower River Suir SAC.	No
Sea Lamprey (<i>Petromyzon marinus</i>) [1095]	<i>"To restore the favourable conservation condition of Sea Lamprey in Lower River Suir SAC"</i>	There is a possibility that the GI works could give rise to water quality impacts due to the potential for sedimentation and spilled pollutants such as fuel and concrete, which can have toxic effects on aquatic life including Sea lamprey passing through the estuary. Furthermore, the borehole drilling will give rise to noise and vibration effects which could cause physical harm to Sea lamprey. Therefore, likely significant effects on the conservation objective of this Qualifying Interest within the River Barrow and River Nore SAC cannot be ruled out at this stage.	Yes

Qualifying Interest	Conservation Objective as per NPWS (2017)	Do the GI works provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets?	Likely Significant Effect
Brook Lamprey (<i>Lampetra planeri</i>) [1096]	<i>“To restore the favourable conservation condition of Brook Lamprey in Lower River Suir SAC”</i>	The proposed development is located on a sediment-rich estuary at least 16.5 km upstream of this European site. Suitable spawning and juvenile habitat for this Qualifying Interest is limited to the freshwater extents of this European site, c. 25.1 km downstream of the proposed development. Considering the distance between the proposed development and any suitable spawning or juvenile habitat, there will be no likely significant effects on the conservation objectives for this qualifying interest in the Lower River Suir SAC as a result of the proposed development.	No
River Lamprey (<i>Lampetra fluviatilis</i>) [1099]	<i>“To restore the favourable conservation condition of River Lamprey in Lower River Suir SAC”</i>	There is a possibility that the GI works could give rise to water quality impacts due to the potential for sedimentation and spilled pollutants such as fuel and concrete, which can have toxic effects on aquatic life including River lamprey passing through the estuary. Furthermore, the borehole drilling will give rise to noise and vibration effects which could cause physical harm to River lamprey. Therefore, likely significant effects on the conservation objective of this Qualifying Interest within the River Barrow and River Nore SAC cannot be ruled out at this stage.	Yes
Atlantic Salmon (<i>Salmo salar</i>) [1106]	<i>“To restore the favourable conservation condition of Atlantic Salmon in Lower River Suir SAC”</i>	Although the GI works are located at least 16.5 km upstream of this European site, Atlantic salmon are sensitive to water quality impacts. During the GI works, there is potential for sedimentation and accidental discharge of pollutants which can have toxic effects on aquatic life including Atlantic salmon to reach the Lower River Suir SAC. Therefore, likely significant effects on the conservation objectives of this Qualifying Interest within the Lower River Suir SAC cannot be ruled out at this stage.	Yes
Twaite Shad (<i>Alosa fallax fallax</i>) [1103]	<i>“To restore the favourable conservation condition of Twaite Shad in Lower River Suir SAC”</i>	Twaite shad are highly sensitive to hydroacoustic impacts and the GI works could give rise to high levels of noise and vibration as a result of borehole drilling. This could lead to the disturbance of juvenile Twaite shad, causing them to abandon the safety of the mudflats and be subjected to higher rates of predation, resulting in the increased loss of juveniles and creating an imbalance in the population structure. Additionally, the chance for water quality impacts in the event of a spillage of pollutants such as fuel which has toxic effects on aquatic life including Twaite shad will apply added pressure to the local population. Therefore, likely significant effects on the population structure of Twaite shad within the Lower River Suir SAC cannot be ruled out at this stage.	Yes

Qualifying Interest	Conservation Objective as per NPWS (2017)	Do the GI works provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets?	Likely Significant Effect
Otter (<i>Lutra lutra</i>) 1355]	<i>"To maintain the favourable conservation condition of Otter in Lower River Suir SAC"</i>	Construction works associated with the proposed development will include noise and vibration which could result in disturbance or displacement impacts to Otter. Additionally, potential water quality impacts such as sedimentation or potential discharge of pollutants can have direct toxic effects on Otter. Therefore, likely significant effects on available fish biomass for Otter within the Lower River Suir SAC as a result of the proposed development cannot be ruled out at this stage.	Yes

Table 3.4 Evaluation of the likely effects of the Ground Investigation works in view of the Conservation Objectives of the River Nore SPA [004233].

Qualifying Interest	Conservation Objective	Do the GI works provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets?	Likely Significant Effect
<p>Kingfisher (<i>Alcedo atthis</i>) [A229]</p>	<p><i>“To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.”</i></p> <p>No Attributes or Targets are defined at present for the River Nore SPA or any SPA in the Member State where Kingfisher is listed as a qualifying interest. The Attributes and Targets used below are taken from other SPAs in the Member State.</p> <p>According to the Generic Conservation Objectives for the SPA, 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” (NPWS, 2022).</p>	<p>Yes – There is potential for indirect impacts through habitat degradation because of changes in water quality.</p> <p>The GI works could give rise habitat degradation and indirect habitat loss impacts through changes in water quality arising from spilled pollutants, such as concrete or fuel. These pollutants can have toxic effects on aquatic life, including on the fish populations that Kingfisher depend on as a food source. This could affect the quality and quantity of prey items available for Kingfisher.</p> <p>There will be no loss of suitable nesting habitat for Kingfisher as there are no examples of this habitat within the vicinity of the GI works. Furthermore, the GI works will not alter the vertical dimensions of the existing bridge enough to increase the collision risk for birds commuting along the river channel.</p> <p>Therefore, likely significant effects the Conservation Objectives for Kingfisher within the River Nore SPA as a result of the GI works cannot be ruled out at this stage.</p>	<p>Yes</p>

3.4 Summary of Likely Significant Effects

In Section 3.1, it was established that three European sites, namely the River Barrow and River Nore SAC, the Lower River Suir SAC and the River Nore SPA, occur within the zone of influence of the proposed development and that there are pathways for impacts between the proposed development and these European sites. There are no pathways for impacts between the proposed development and any other European site. The European sites in the zone of influence were described in detail in Section 3.2.

In Section 3.3, it was established, in light of the best scientific knowledge, that the proposed development, will give rise to ecological impacts which would constitute likely significant effects on three of these European sites, in view of the site's Conservation Objectives. This finding had regard to the nature, size and location of the proposed development, the existing levels of noise and visual disturbance in the area and the sensitivities of the Qualifying Interests of the site concerned. A summary of the Qualifying Interests in the European site likely to be affected is provided in Table 3.5.

Table 3.5 Summary of the European sites and their Qualifying Interests likely to be affected by the Ground Investigation works.

European site	Qualifying Interest
River Barrow and River Nore SAC	Mudflats and sandflats not covered by seawater at low tide [1140] Freshwater pearl mussel (<i>Margaritifera margaritifera</i>) [1029] Sea lamprey (<i>Petromyzon marinus</i>) [1095] River lamprey (<i>Lampetra fluviatilis</i>) [1099] Twaite shad (<i>Alosa fallax</i>) [1103] Atlantic salmon (<i>Salmo salar</i>) [1106] Otter (<i>Lutra lutra</i>) [1355] Nore freshwater pearl mussel (<i>Mergaritifera durrovensis</i>) [1990]
Lower River Suir SAC	Sea Lamprey (<i>Petromyzon marinus</i>) [1095] River Lamprey (<i>Lampetra fluviatilis</i>) [1099] Twaite Shad (<i>Alosa fallax</i>) [1103] Atlantic Salmon (<i>Salmo salar</i>) [1106] European Otter (<i>Lutra lutra</i>) [1355]
River Nore SPA	Kingfisher (<i>Alcedo atthis</i>) [A229]

4. IN-COMBINATION EFFECTS

Article 6(3) of the Habitats Directive requires that AA be carried out in respect of any plan or project which is likely to have a significant effect on one or more European sites, "*either individually or in combination with other plans or projects*". Therefore, regardless of whether or not the likely effects of a plan or project are significant when considered in isolation, the potential for the plan or project to significantly affect European sites in combination with other past, present or foreseeable future plans or projects must also be assessed.

In the case of the GI works, this AA Screening Report has found that the GI works, individually, are likely to have significant effects on three European sites. Therefore, the assessment of the proposed development must proceed to Stage 2 (AA). The in-combination assessment of likely significant effects on these European sites arising from the GI works, in combination with other plans or projects, should be undertaken at that stage.

5. CONCLUSION

In accordance with Article 6(3) of the Habitats Directive, Part XAB of the Planning and Development Act, the relevant case law, established best practice and the Precautionary Principle, this AA Screening Report has examined the details of the GI works and the relevant European sites and has concluded, on the basis of objective information, that the GI works, either individually or in combination with other plans or projects, has the potential to give rise to impacts which would constitute likely significant effects on the River Barrow and River Nore SAC, the Lower River Suir SAC and the River Nore SPA, in view of their Conservation Objectives.

In light of this conclusion, it is the considered opinion of ROD, as the author of this AA Screening Report, that Wexford County Council, as the Competent Authority, should find in completing its AA Screening in respect of the GI works for O'Hanrahan Bridge that the GI works, either individually or in combination with other plans and projects, are likely to have a significant effect on the River Barrow and River Nore SAC, the Lower River Suir SAC and the River Nore SPA, in view of the Conservation Objectives of those sites. Therefore, Wexford County Council should determine that AA is required in respect of the proposed development.

As the GI works are being carried out by or on behalf of a local authority requiring AA, Section 177AE of the Planning and Development Acts will apply. This means that the role of competent authority will be assumed by Wexford County Council. Wexford County Council's AA must contain complete, precise and definitive findings and conclusions in relation to the implications of the project for the integrity of River Barrow and River Nore SAC and the River Nore SPA. A Natura Impact Statement (NIS) should be prepared to provide Wexford County Council with the scientific information upon which it will base its findings and conclusions. The NIS should take the form of a comprehensive examination, analysis and evaluation, including recommendations, in respect of the implications of the GI works for the integrity of the European sites concerned.

6. REFERENCES

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive). Official Journal of the European Communities, L206/7.

DEHLG (2010) *Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities*. Department of the Environment, Heritage and Local Government, Dublin.

Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (the Birds Directive). Official Journal of the European Union, L20/7.

EC (2001) *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*. Environment Directorate-General of the European Commission.

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 European Commission.

EC (2018) *Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC*. European Commission, Brussels.

Eionet (2018) *Population status and trends at the EU and Member State levels: 2013 - 2018. Article 17 Assessments*. <<https://bd.eionet.europa.eu/article17/>> [Accessed: October 2021]. European Topic Centre on Biological Diversity.

Eoin Kelly v. An Bord Pleanála & anor [2019] IEHC 84.

European Communities (Birds and Natural Habitats) Regulations, 2011. *SI No.477/2011*.

European Communities (Birds and Natural Habitats) (Amendment) Regulations, 2013. *SI No. 499/2013*.

European Communities (Birds and Natural Habitats) (Amendment) Regulations, 2015. *SI No. 355/2015*.

European Communities (Birds and Natural Habitats) (Amendment) Regulations, 2021. *SI No. 293/2021*.

McCorry, M., Ryle, T. (2009) *Saltmarsh Monitoring Project 2007 – 2008*. National Parks & Wildlife Service, Department of Environment, Heritage and Local Government Dublin

Ní Dhúill, E., Smyth, N., Waldren, S. & Lynn, D. (2015) *Monitoring methods for the Killarney Fern (Trichomanes speciosum Willd.) in Ireland*. Irish Wildlife Manuals, No. 82. National Parks & Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.

NPWS (2010) *Circular NPW 1/10 & PSSP 2/10 Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities*. Department of the Environment, Heritage and Local Government, Dublin.

NPWS (2011a) *Conservation Objectives for the River Barrow and River Nore SAC [002162]. Version 1*. National Parks & Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.

NPWS (2011b) *Site Synopsis for the River Nore SPA [004233]*. National Parks & Wildlife Service, Department of Housing, Local Government and Heritage Dublin.

NPWS (2013) *Site Synopsis for the Lower River Suir SAC [002137]*. National Parks & Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.

NPWS (2016) *Site Synopsis for the River Barrow and River Nore SAC [002162]*. National Parks & Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.

NPWS (2017) *Conservation Objectives for the Lower River Suir SAC [002137]*. National Parks & Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin.

NPWS (2019a) *The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview*. Unpublished NPWS Report. National Parks & Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin

NPWS (2019b) *The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments*. Unpublished NPWS Report. National Parks & Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin

NPWS (2019c) *The Status of EU Protected Habitats and Species in Ireland. Generic Version 8.0*. Department of Housing, Local Government and Heritage.

NPWS (2022a) *Online Map Viewer* <<http://webgis.npws.ie/npwsviewer/>> [Accessed 27/09/2022]. Department of Culture, Heritage and the Gaeltacht, Dublin.

NPWS (2022b) *Conservation Objectives for the River Nore SPA [004233]. First Order Site-specific Conservation Objectives Version 1.0*. Department of Housing, Local Government and Heritage, Dublin.

OPR (2021) *Practice Note PN01: Appropriate Assessment Screening for Development Management. Published March 2021*. Office of the Planning Regulator.

People Over Wind and Peter Sweetman v. Coillte Teoranta [2018] C-323/17.

Planning and Development Act, 2000. No. 30 of 2000.

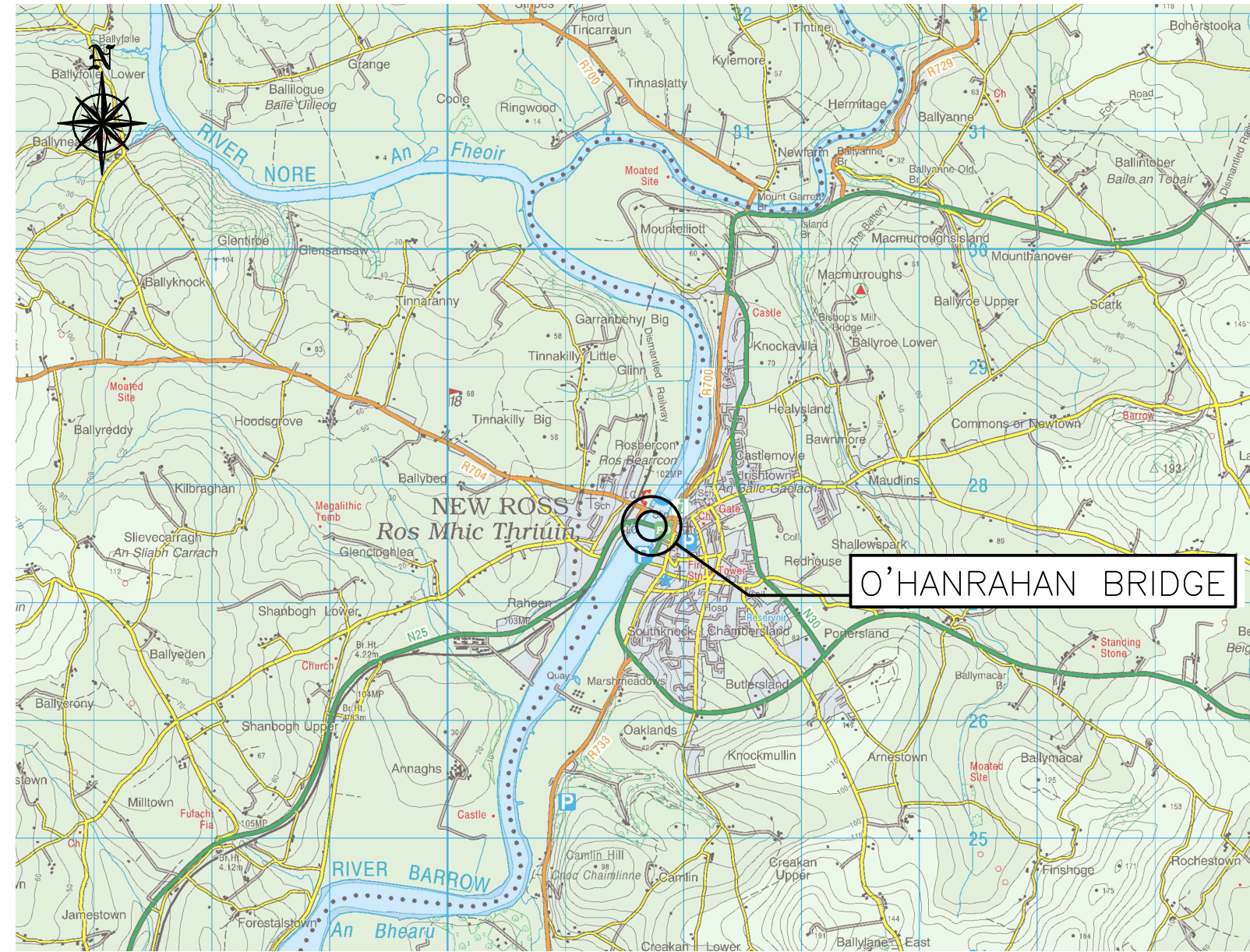
Planning and Development (Amendment) Act, 2002. No. 32 of 2002.

Planning and Development (Strategic Infrastructure) Act, 2006. No. 27 of 2006.

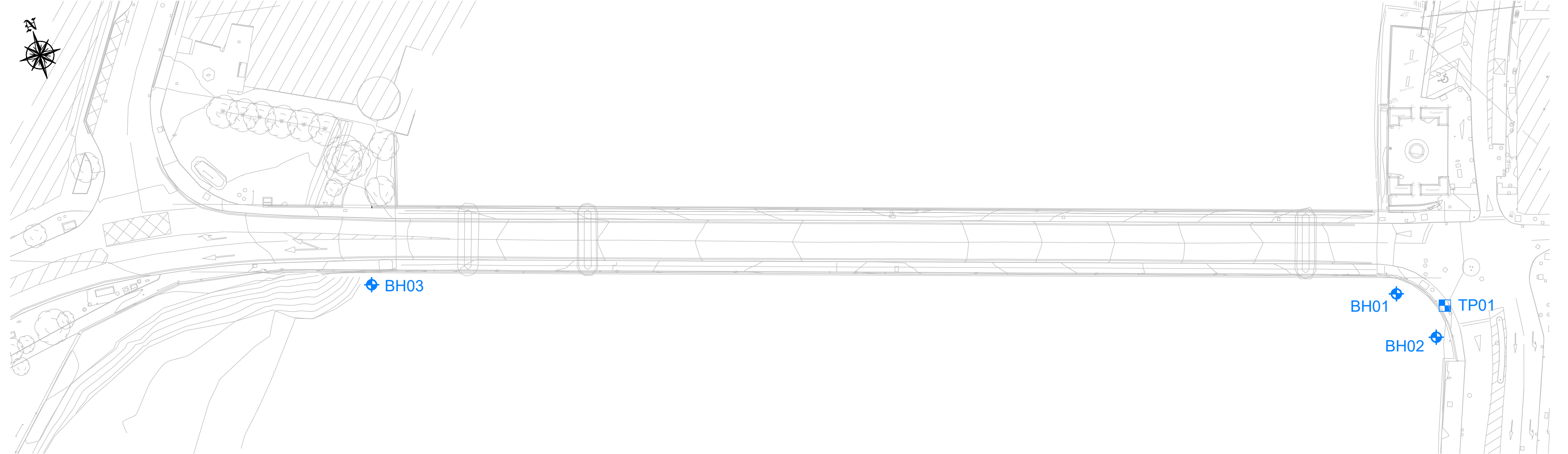
Planning and Development (Amendment) Act, 2010. No. 30 of 2010.

Sweetman & Others v. An Bord Pleanála [2013] C-258/11.

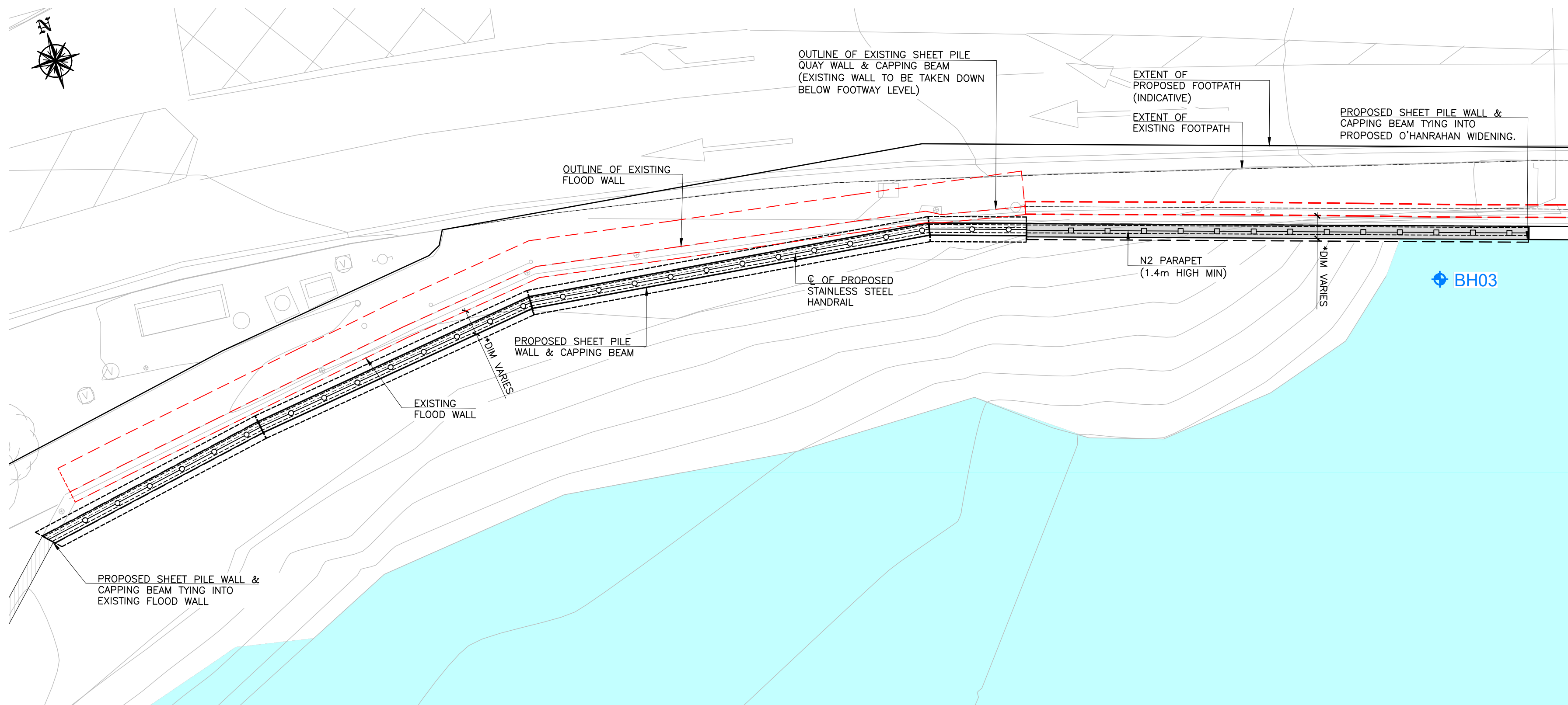
APPENDIX A
GROUND INVESTIGATIONS
LOCATION PLAN



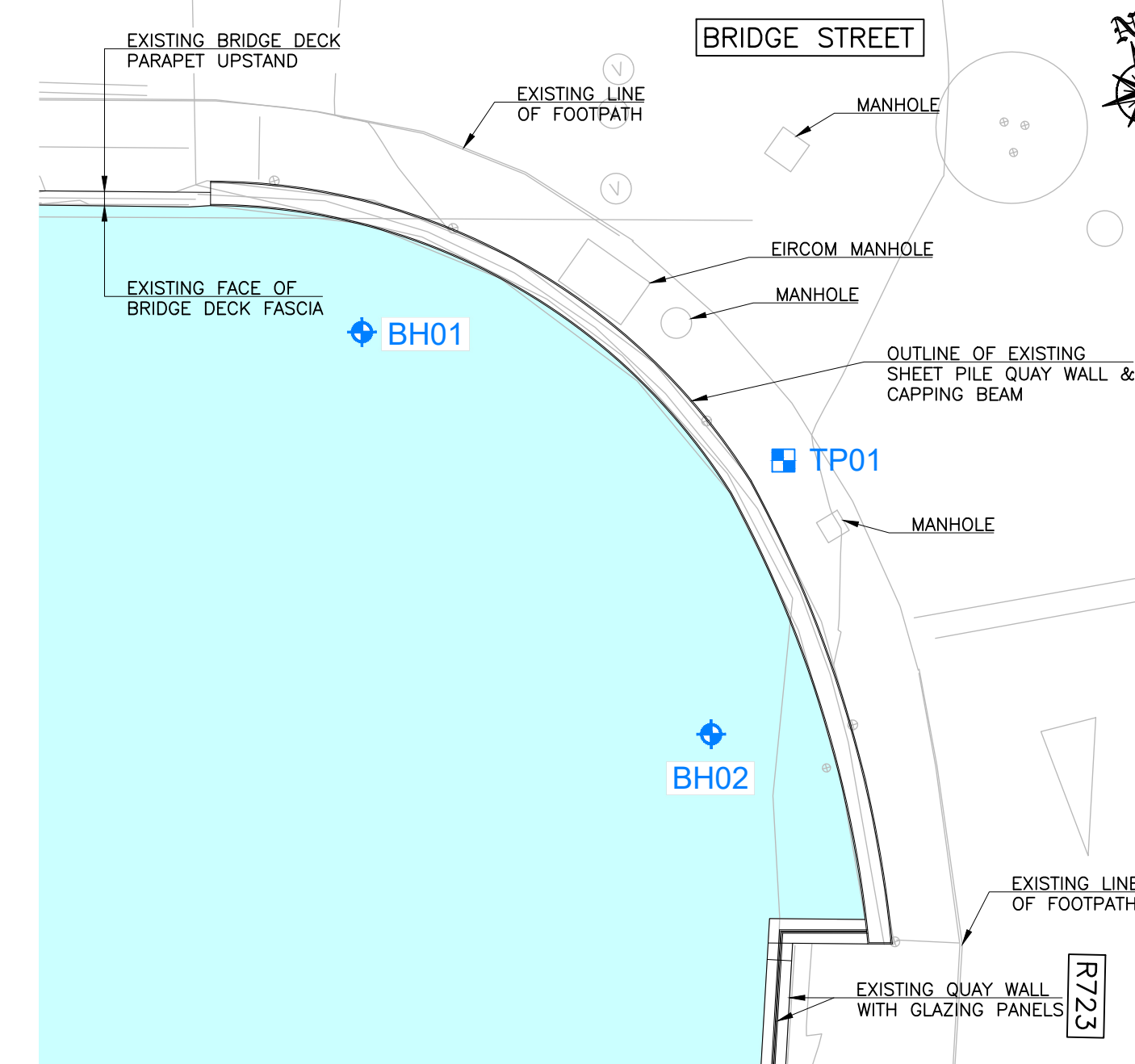
SITE LOCATION PLAN
 A1 SCALE 1:50,000
 A3 SCALE 1:100,000



SITE LAYOUT
 A1 SCALE 1:500
 A3 SCALE 1:1000



**GI LOCATION PLAN ON
 SOUTHWEST CORNER**
 A1 SCALE 1:125
 A3 SCALE 1:250



**GI LOCATION PLAN ON
 SOUTHEAST CORNER**
 A1 SCALE 1:125
 A3 SCALE 1:250

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM AT MALIN HEAD.
3. ALL CO-ORDINATES ARE TO IRISH TRANSVERSE MERCATOR.
4. EXTENT OF SITE AREA PROVIDED BY THE EMPLOYER EXCLUDES AREA WHICH MAY BE TEMPORARILY OCCUPIED SUBJECT TO TRAFFIC SAFETY AND MANAGEMENT AND DIVERSIONS.
5. THE CONTRACTOR IS REQUIRED TO PROVIDE ACCESS THROUGH THE EXTENT OF SITE AND AREA PROVIDED BY THE EMPLOYER IN ACCORDANCE WITH THE SPECIFICATION.
6. THE EXISTING POSITION AND LEVEL OF SERVICES SHOWN TO BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL PROVIDE PROTECTION TO EXISTING SERVICES

LEGEND:

— DEVELOPMENT BOUNDARY



No.	Revision	Date	By	Chkd	App'd



Arena House, Arena Road, Sandyford, Dublin 18, Ireland
 t +353 (0) 1 294 0800
 f +353 (0) 1 294 0820
 www.rod.ie

Drawn	Designed	Checked	Approved	Suitability Code - Description
ZZX	CH	MR	JK	S4 - Stage Approval

Project Stage	Preliminary					
Project Title	O'Hanrahan Bridge Widening Project					
Drawing Title	Geotechnical Investigation Locations					
Drawing Number	Project	Originator	Volume	Location	Type	Role Number
Scale (A1)	WBRC	ROD	ENV	S101	DR	CB - 30012
As Shown	Date:	MAY 2022	Job No:	21.143	Rev:	P0