



# O'Hanrahan Bridge Widening Project

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Appropriate Assessment Screening Report | March 2023  
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# O'Hanrahan Bridge Widening

## Appropriate Assessment Screening Report

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# 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 is intended 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 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 proposed development 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 proposed development, 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 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 one or more European sites in view of their 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 21<sup>st</sup> 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 30<sup>th</sup> 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 site<sup>1</sup> 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 amended<sup>2</sup> (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.

<sup>1</sup> Including, where applicable, 'sites'.

<sup>2</sup> 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 matters<sup>3</sup>:

- 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.

<sup>3</sup> 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 proposed development, 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 & 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 Directive<sup>4</sup> (Eionet, 2018), and Article 17 of the Habitats Directive<sup>5</sup> (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 proposed development 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 proposed development. 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 9<sup>th</sup> September 2021 and 19<sup>th</sup> 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

<sup>4</sup> 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.

<sup>5</sup> 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.



habitats were classified and sketched onto maps. The field surveys also aimed to 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 (*Reynoutria 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 14<sup>th</sup> January and 21<sup>st</sup> 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 proposed development, 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.

In addition, the edge beam on the northern side of the bridge will be strengthened to accommodate upgrading of the existing parapet. The existing surfacing and footways will be removed to allow the provision of bridge deck waterproofing and joint replacements before the widened footways are constructed and carriageway surfacing reinstated. The works will involve a number of service diversions and upgrades in both footways. Finally, it is also proposed to replace the existing bridge lighting.

Concrete repair works will also be undertaken on the existing O'Hanrahan bridge in areas where minor concrete defects are identified.

Development 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 as shown in Figure 2.1. 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.

The bridge is located within the urban environment of New Ross town, with the adjacent land use mainly consisting 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 National Road 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.

The primary function of the proposed development is to provide a shared pedestrian and cycleway from the New Ross quay front to Rosbercon Quay on the southern side of the bridge (see Figure 2.1), that is accommodated along the widened section of O'Hanrahan Bridge.

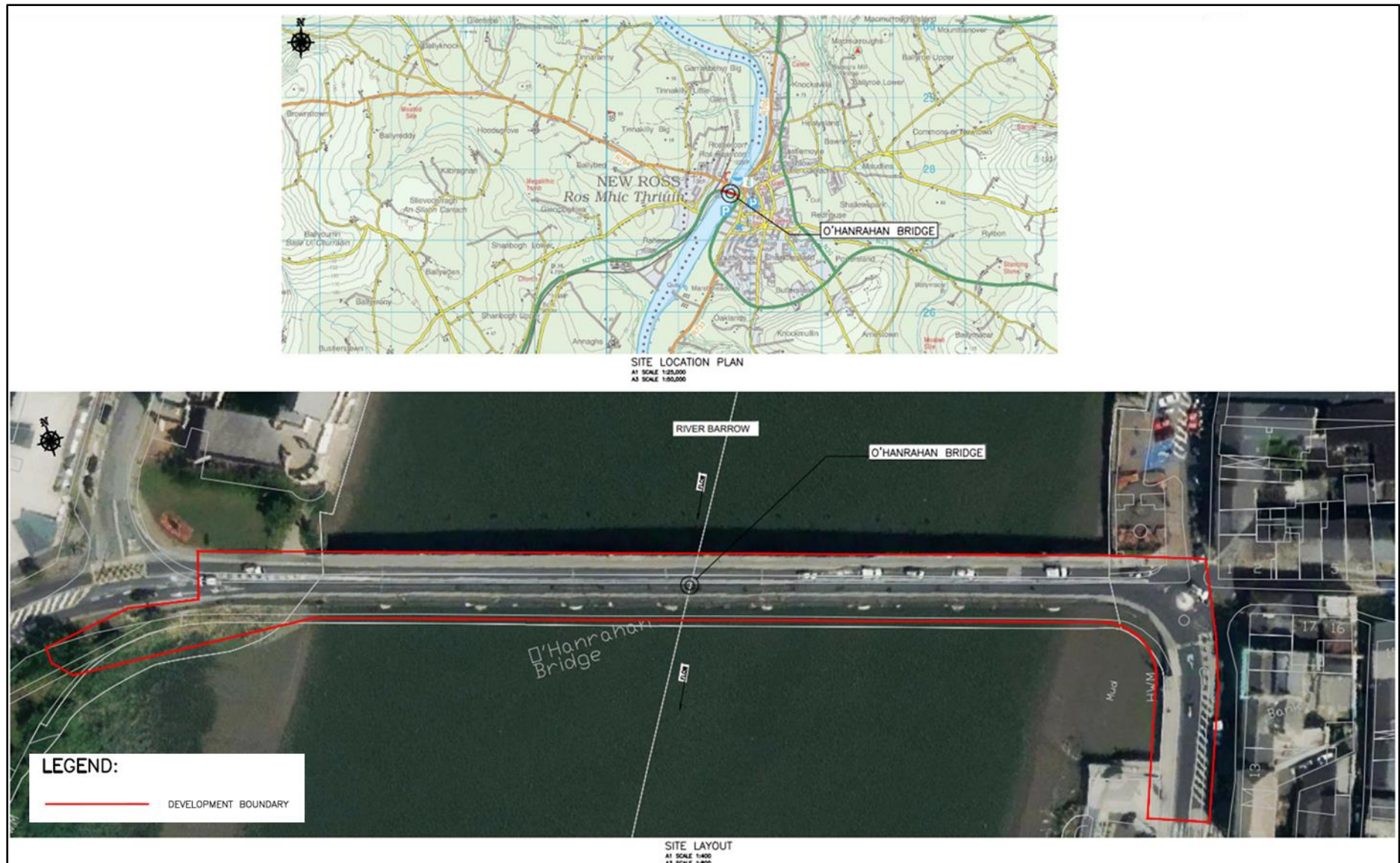


Figure 2.1 Location of the proposed development © Google Maps



**Plate 2.2** New Ross Quay with view to the north. In the foreground are the existing road, footpath and the existing flood defence wall at the south-east corner that is within the proposed development. In background is the O'Hanrahan Bridge. © Google Street View



**Plate 2.3** O'Hanrahan Bridge with view to the north-west. In the foreground are the existing road of the bridge and the narrow footpaths along the sides that are proposed to be widened as part of the development. The existing parapets are proposed to be replaced. © Google Street View



**Plate 2.4** New Ross Quay with views to the south. In the foreground are the existing road, parking spaces, existing flood defence wall and a public realm consisting of a small square with benches and flower beds. In the background is the O'Hanrahan Bridge and the Rosbercon Quay. © Google Street View



**Plate 2.5** Rosbercon Quay with view to the east. The proposed development will provide a connection to the South – East Greenway that will be part of the existing road in the foreground. In the background is the O'Hanrahan Bridge. © Google Street View

## 2.3 Design of the Proposed Development

### 2.3.1 Widening of the Bridge Deck

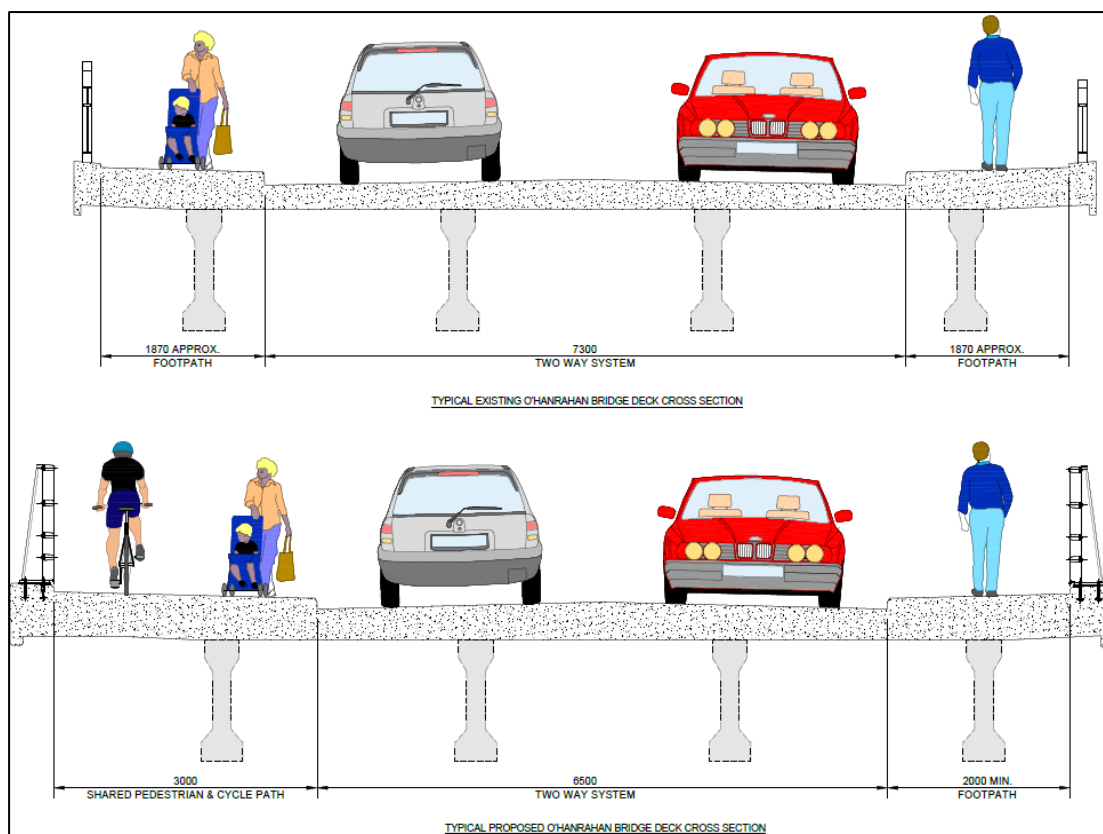
The widening works on the bridge itself consist of an approx. 1m wide reinforced concrete cantilever slab made integral with the existing deck slab, see Drawing No. WBRC-ROD-ENV-S101-DR-CB-30007 and 30008 in Appendix A. The cantilever slab includes an upstand edge beam to support the proposed N2 parapet. The proposed footway / cycleway will be provided up to this edge beam. The design of the widening works to the bridge will prioritise the use of precast concrete as opposed to in-situ concrete in order to minimise the risk of any spills or debris from entering the River Barrow. However, some in-situ concrete will be required to stitch together the widened section and existing structure.

Refer to Table 2.1 and Figure 2.2 below for details of the existing and proposed cross section. Also refer to Drawing no. WBRC-ROD-ENV-S101-DR-CB-30009 in Appendix A.

**Table 2.1 Cross Section of Existing and Proposed Carriageway of Bridge**

Element width	Existing (m)	Proposed (m)
Parapet Edge Beam (southern)	0.3m	0.5m
Footpath (Southern, proposed as new shared cycleway / footway)	1.8m	3m (min)
Carriageway	7.3m	6.5m
Footpath (Northern)	1.84m	2m (min)
Parapet Edge Beam (Northern)	0.3m	0.5m
<b>Overall Bridge Width</b>	<b>11.54m</b>	<b>12.5m</b>





**Figure 2.2 Cross Section of Existing and Proposed Carriageway (dimensions in mm)**

The extent of the widening was largely dictated by current and future traffic levels, the requirements of the future greenway, and also the load carrying capacity of the existing bridge beams for the additional dead load.

Following reclassification of Bridge Street, which was previously a national road, to a regional road due to the opening of the new bypass outside New Ross (leading to a reduction in traffic levels), a reduction in carriageway width was considered acceptable (and permit a 3m shared surface) given the reduced traffic volumes. Without reducing the carriageway, the 3m shared surface would not have been achievable as the extent of the widening is limited by the structural capacity of the existing bridge.

### 2.3.2 Parapet Replacement

The existing parapets, approximately 1m high, constructed of painted steel, were constructed in the 1960s as part of the main bridge. As part of a structural assessment of the bridge in 2020, these were deemed incapable of withstanding collisions from modern vehicles. Due to the level of traffic crossing the bridge, it was decided to replace these with 1.4m high N2 containment level parapets in accordance with DN-REQ-03034 (formerly NRA TD 19). The new parapets will likely be comprised of either steel or aluminium. This involves strengthening the existing reinforced concrete parapet edge beams. Whilst the new parapet edge beam on the southern (downstream) end of the bridge will be reconstructed as part of the widening works, it is also necessary to reconstruct the parapet edge beam on the northern (upstream) side of the bridge in order to facilitate the higher containment parapet. Refer to Drawing No. WBRC-ROD-ENV-S101-DR-CB-30015 in Appendix A for details.

The existing plaque, see Plate 2.6 below, located on the northwest corner of the bridge will be relocated to facilitate the upgrade of the bridge parapets. The plaque will be imbedded into the concrete wing wall on the southwest corner of the bridge.



**Plate 2.6** Existing Plaque located on the northeast corner of O'Hanrahan Bridge

### **2.3.3 Widening of quay/wing walls (south-east corner)**

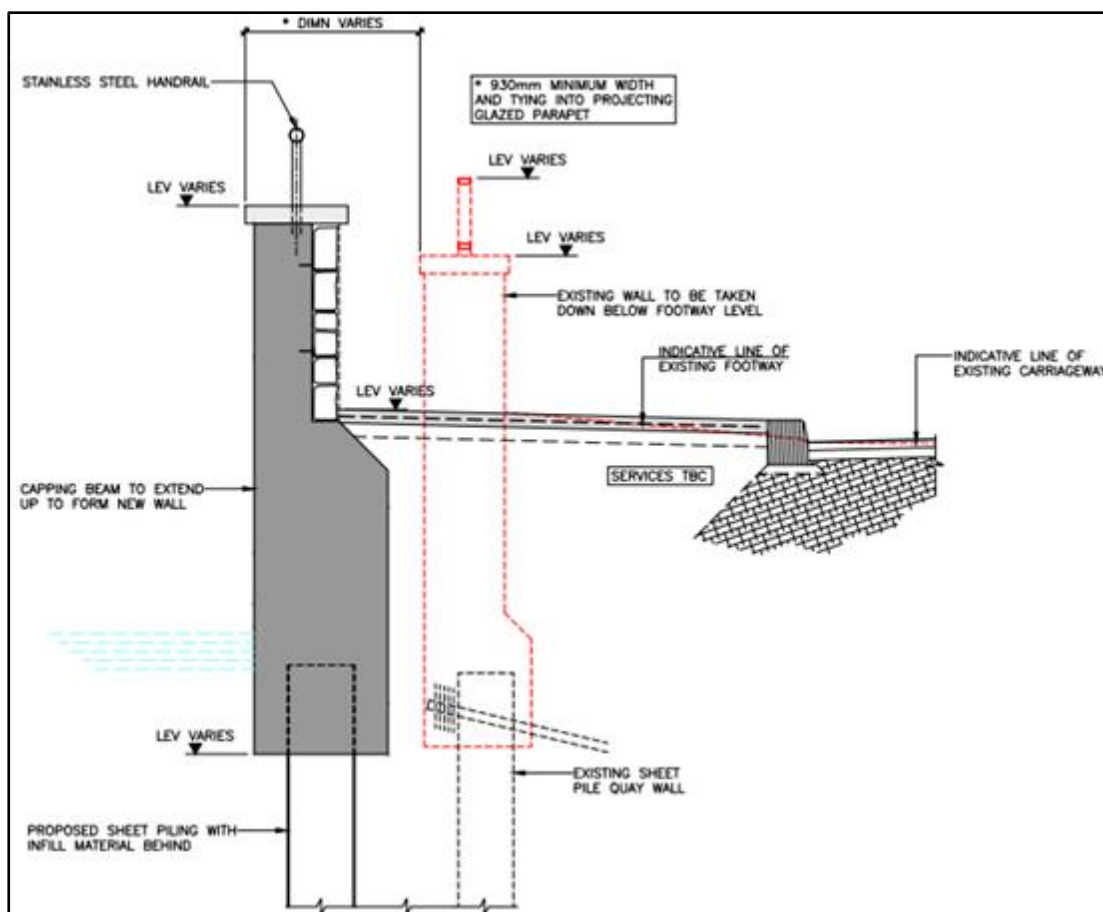
The existing O'Hanrahan bridge abutments, constructed in 1967, are founded on sheet-piles which also act as wing walls to interface with the quay on the eastern end of the bridge. The original railings on the south-east corner were recently replaced with a solid masonry clad reinforced concrete parapet wall as part of the New Ross Flood Alleviation Scheme as shown in Plate 2.7 below.



**Plate 2.7** Masonry clad reinforced concrete parapet wall developed as part of the New Ross Flood Alleviation Scheme

The function of the proposed quay wall extension (varying from 1m to 2m) on the southeast corner is to facilitate the transition from the widened section of O'Hanrahan Bridge (southern edge) to the existing quay wall on the eastern end of the bridge.

The works in this area involve the construction of a new quay wall in front of the existing via the installation of sheet piles to match the width of the widening of O'Hanrahan Bridge as shown in Figure 2.3, and in Drawing No. WBRC-ROD-ENV-S101-DR-CB-30013 in Appendix A. The width of the widening will vary from approx. 1m (at O'Hanrahan Bridge) to 2m at the interface with the existing quay wall and glazed flood defence panels, in order to maintain the 3m combined pedestrian and cycleway from the bridge onto the quays.



**Figure 2.3 Cross Section of Proposed Southeast Quay Wall (existing in red)**

The sheet piled design of the flood defence wall (see Figure 2.3) offers the simplest construction methodology as the installation of driven sheet piles is a standard construction technique and allows the permanent works and temporary works to be combined. Construction work being largely confined to outside of the existing quay wall would minimise the impact on the existing services beneath the existing footway.

The existing flood defence wall will be taken down below footway level and replaced by a matching flood defence wall along the line of the widened quay wall. This new wall will be supported by a new reinforced concrete capping beam on the sheet piles. The existing flood defence wall can be left in place until completion of the construction of the new flood defence wall.

Installation of the sheet piles will be completed via a piling rig from a river jack-up barge. The sheet piles will be driven into the riverbed as far as rock level and will be backfilled with compacted fill material.

With the exception of the flood defence wall being taken down below footway level, there will be no demolition works to the existing quay wall. The proposed wall will be structurally separate from the existing and will not impose any additional active earth pressures on the existing structure.

#### **2.3.4 Widening of quay/wing walls (south-west corner)**

Similar to the eastern end of the bridge, the western abutments are founded on sheet-piles which also act as wing walls to interface with the quay on the western end of the bridge. On the approaches to the wingwalls on the southwest corner, a reinforced concrete restraining slab acts as a flood wall as part of the New Ross Flood Alleviation Scheme. The restraining slab, constructed in the last decade, includes a masonry clad wall and guardrail. As part of the proposed widening works to O'Hanrahan Bridge, it is proposed to widen the southwestern end of the bridge by approximately 1m in order to continue the shared pedestrian and cycleway from the bridge to the South-Eastern Greenway, refer to Drawing no. WBRC-ROD-ENV-S101-DR-CB-30014 in Appendix A.

The works in this area involve the construction of a new sheet piled quay wall in front of the existing via the installation of sheet piles, similar to the south-eastern corner. The existing rock armour will be removed prior to commencement of piling works. The sheet piles will be installed approximately 1m in front of the existing southwestern wingwalls (beginning at the line of the abutments where the bridge widening ends) and continuing in front of the existing flood wall for a total distance of approximately 60m. 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.

The existing wingwall parapet will be taken down below footway level and replaced by an N2 parapet as per the proposed bridge upgrade. Similarly, beyond the wingwall, the existing flood defence wall will be taken down below footway level and replaced by a matching flood defence wall along the line of the widened quay wall. These will be supported by a new reinforced concrete capping beam on the sheet piles. The new sheet piled wing wall will be tied back to the existing and backfilled with compacted fill material. The sheet pile section in front of the existing flood wall will require ground anchors to prevent excessive lateral movement under accidental vehicle impact. The existing flood defence wall and wingwall parapet can be left in place until completion of the construction of the new flood defence wall / wingwall parapet.

Installation of the sheet piles will be completed via a piling rig either from the landside, a river barge, or a combination of both. The sheet piles will be driven into the riverbed as far as rock level and will be backfilled with compacted fill material.

With the exception of the flood defence wall and parapet being taken down below footway level, there will be no demolition works to the wingwall or restraining slab, the proposed wall will be structurally separate from the existing and will not impose any additional active earth pressures on the existing structure.

On the north-western corner of the bridge, the proposed parapet on the bridge will continue for approximately 20m. This will involve permanently closing off a private entrance to the Riverside Apartment complex. Currently, this entrance poses a risk for

road users as it exits onto the main R723 Regional Road just before the main bridge itself.

### **2.3.5 O'Hanrahan Bridge The Quay Mini Roundabout Junction**

The general arrangement of the O'Hanrahan Bridge The Quay Mini Roundabout Junction currently requires large commercial vehicles to either mount the near side kerb or take a wide turn into the opposing traffic lane to perform a left turn movement onto O'Hanrahan Bridge.

It is proposed to modify the proposed O'Hanrahan Bridge The Quay Mini Roundabout Junction to increase the safety of vulnerable road users on the new proposed active travel facilities by easing the movement of commercial vehicles at the junction. This will be achieved by removing the median traffic island approaching the mini roundabout on The Quay and building out the road edge with road marking and frangible bollards.

### **2.3.6 Drainage**

The proposed surface water drainage system of the bridge will follow the existing longitudinal profile of the deck. There is a vertical fall from a high point in the centre of the bridge towards the abutments at either end. Transverse falls in the carriageway and footpaths/cycle paths will also be provided to facilitate surface water drainage. Any runoff from the bridge (rainfall intensity also accounting for future effects of climate change) will flow into an approved combined kerb/drainage unit which is provided at the interface of the carriageway and footpaths/cycleways. Inspection units will be provided to allow inspection, rodding and maintenance. Water from the kerb/drainage system will flow into gullies / manholes at the ends of the bridge, which will tie into Wexford County Council's drainage network.

The proposed system will replace the existing drainage system on the bridge whereby the surface water flows to gullies adjacent to the existing footway kerbs and is discharged directly into the River Barrow via outlet pipes cast into the soffit of the bridge deck. The proposed system will contain all surface water and divert it to the drainage network on the east and west approaches of the bridge.

Where there are outfalls on the existing south-eastern quay wall that are obstructed by the proposed sheet piled wall, these outfalls will be extended through the new wall.

### **2.3.7 Utilities**

#### **Existing Utilities**

A significant number of services are present underneath the existing footpaths of O'Hanrahan Bridge which continue through the abutments and into the quays. These services were identified as part of a previous Ground investigation contract undertaken in 2020.

At the southern (downstream) end where the widening works are taking place, the following services have been identified:

- 1 No. 150mm dia. public lighting duct;
- 3 No. 150mm dia. water mains (not in use);
- 1 No. 150mm dia. Aurora duct;
- 1 No. 150mm dia. existing duct (unknown, possibly spare).

On the northern (upstream) end of the bridge, the following services have been identified:

- 2 No. 150mm dia. water mains (in use);
- 5 No. 80mm dia. existing ducts (unknown function);
- 3 No. 150mm dia. existing ducts (unknown function);
- 1 No. 200mm dia. pipe (unknown function).

In addition to the above, there is also an existing foul sewer suspended from the underside of the northern deck cantilever.

All existing services will be protected and / or diverted prior to, and during construction. Phasing of the works will be required (see construction sequence in Section 2.4).

On the southern (downstream) end, the existing Aurora duct, lighting duct and 150mm dia. spare duct shall remain in place and be protected throughout the works. In addition, it is proposed to provide 2 no. new 100mm dia. HDPE watermains.

On the northern (upstream) end, it is proposed to temporarily divert the 2 no. existing 150 mm dia. watermains in use to the southern end whilst works are taking place on the northern end. The other remaining ducts (3 No. 150 mm dia. existing ducts, 5 No. 80 mm dia. existing ducts and 1 No. 200mm dia. pipe) shall be protected throughout the works. The foul sewer suspended from the underside of the deck cantilever, shall be unaffected during the edge beam reconstruction, and shall be protected. Refer to the services drawings and general arrangement drawings for in Appendix A further details.

### **Lighting**

It is proposed to replace the existing lighting columns on the bridge. The proposed columns will be installed on reinforced concrete corbels which will protrude out from the new parapet edge beams, see Drawing no. WBRC-ROD-ENV-S101-DR-CB-30011 in Appendix A. The lighting columns will be of a similar height and spacing to the existing, will utilise the existing lighting duct in the footpath and will provide a lighting intensity similar to what is already in place.

## **2.4 Construction Sequence and Methodology**

The following section describes the likely construction sequence and timescales for the works at O'Hanrahan Bridge.

### **2.4.1 Timescale for Construction**

The works are expected, subject to Wexford County Council approval, to commence in late 2023, with construction likely to be approximately 9 months in duration.

### **2.4.2 Construction Sequence and Methodology**

The works will consist of the widening and upgrade of the main bridge itself, and the construction of the south-east and south-west quay wall. Due to the length of the bridge, and the need to keep traffic open, with at least one lane open at all times. It is likely that the work will consist of at least four phases on the bridge itself and a possible fifth phase for the quay walls. The proposed works will be undertaken on a live carriageway and will necessitate the use of lane closures and potential night works to complete the construction. Refer to Drawing No. WBRC-ROD-ENV-S101-DR-CB-30017 to 30021 in Appendix A for construction traffic management phases.

### **2.4.3 Main Bridge Work Sequencing**

- (1) Implement traffic management measures and lane closures for south-eastern side of bridge;

- (2) Implement protective measures to prevent debris entering the river;
- (3) Remove existing footpaths, road surfacing, waterproofing, expansion joints whilst protecting / diverting existing services and expose concrete deck;
- (4) Remove existing lighting columns, parapets and breakout parapet edge beam and deck cantilever;
- (5) Construct new widened cantilever slab, edge beams and lighting column corbels. Scaffolding to construct this slab will be propped/cantilevered off the existing bridge structure;
- (6) Carry out concrete deck repairs where necessary;
- (7) Install new parapets and lighting columns;
- (8) Install new waterproofing;
- (9) Construct new footpath/cycleway and drainage system;
- (10) Install new carriageway surfacing and expansion joints;
- (11) Switch traffic management to south-western end of bridge and repeat steps 2 to 11;
- (12) Switch traffic management to north-eastern end of bridge;
- (13) Implement protective measures to prevent debris entering the river, such as the use of silt-screens to trap and arrest any falling debris;
- (14) Remove existing footpaths, road surfacing, waterproofing, expansion joints whilst protecting / diverting existing services and expose concrete deck;
- (15) Divert existing watermain on northern side of bridge to southern side;
- (16) Remove existing lighting columns, parapets and breakout parapet edge beam;
- (17) Construct new edge beams and lighting column corbels;
- (18) Carry out concrete deck repairs where necessary;
- (19) Install new parapets and lighting columns;
- (20) Install new waterproofing;
- (21) Construct new footpath and drainage system;
- (22) Install new carriageway surfacing and expansion joints;
- (23) Switch traffic management to north-western end of bridge and repeat steps 14 to 24;
- (24) Redivert watermain to northern side of bridge;
- (25) Remove traffic management;
- (26) Undertake concrete repairs to bridge abutments, piers and underside of deck as necessary;
- (27) Remove protective measures in river.

#### **2.4.4 Construction Sequence of Southeast Quay Wall**

- (1) Procurement of sheet piles and traffic management set up;
- (2) Mobilisation of piling rig;
- (3) Transportation of structural steelwork to lay down area;
- (4) Installation of sheet piles to required embedded depth (approx. 22 linear m in length);
- (5) Back-filling behind newly installed sheet piles with compacted granular 6N/P fill (approx. 150m<sup>3</sup>), monitoring for movement;

- (6) Following the installation of the sheet piled wall, scaffolding will be erected to facilitate the construction of the reinforced concrete capping beam (new flood wall). The scaffolding will be cantilevered off of the sheet pile in order to avoid further instream work and also to prevent any concrete spillage or debris from entering the river;
- (7) Erect formwork for reinforced concrete capping beam and tie reinforcement steel;
- (8) Pour in-situ concrete for new capping beam and upstand wall to match existing flood defence wall (approx. 40m<sup>3</sup> of concrete);
- (9) Take down existing flood defence wall to below footpath level (reuse existing stonework where possible);
- (10) Completion of footway pavement and erection of stone cladding to new flood defence wall (approx. 10m<sup>3</sup> of stonework);
- (11) Removal of traffic management.

### **Piling Methodology**

Piling is anticipated to be carried out from a jack-up barge positioned in the River Barrow to avoid disruptions to traffic and costly traffic management. The typical dimensions of such a barge are 25m x 15m (length x width). The barge will carry a crane and/or long reach excavator equipped with a vibratory hammer that drives piles into the ground by vibration. In case of reaching a lower pile toe level than the specified impact driving may be required. The stack of sheet piles will be placed on an additional pontoon placed next to the barge, which can be tugged by a tugboat from a loading / unloading point on the west side of the River Barrow either at the marina, or on lands south of the O'Hanrahan bridge.

Piling works will start from the southern end and progress towards the south-eastern abutment. It is proposed to complete the closing sheet pile at low tide so as to reduce impacts on aquatic species (i.e., avoid trapping fish).

The work process involves the barge anchoring and stabilising itself, for which the barge shall be positioned / repositioned during high tide. Similarly, all the necessary material and personnel shall be transported during high tide.

The pile is lowered to a position and the vibrating clamp is attached to the head of the pile. The vibrations generated by vibratory hammer drive the pile into the ground. The vibration and noise generated by this process are continuous during the driving time but are less than those induced by impact driving. With the extent of piling works limited to approximately 20-25m in length, barge relocations are anticipated to be minor, or not required.

The sheet pile alignment is set so that the back side of the sheet piles is at a distance of approximately 1m from the front face of the existing quay wall. Localised obstacles such as dislodged blocks in the mudflats will be removed by an excavator bucket prior to piling works.

The gap between the sheet pile wall and the existing quay wall will be backfilled with clean imported granular fill, TII Specification for Road Works Series 600 Class 6. The top of the fill is envisaged to be flush with existing ground level or up to 500mm lower. The backfilling can be carried out once the entire sheet pile wall has been installed or can progress simultaneously with sheet piling – once a segment of sheet piles has been installed, the gap can be filled. A temporary transversal pile can be installed at



the end of each segment to prevent washout of the backfill. Alternatively, the fill can be placed once all piling is completed.

It is envisaged that piles will be embedded into the upper layer of weathered rock or dense gravels anticipated at ca. 15-20m below ground level (to be confirmed by the ground investigation). Sheet piles will meet the required top of wall level matching the existing quay wall level.

The construction is assumed to be carried out during normal working hours (daytime), 6 days a week. The estimated timeframe for 20-25m sheet pile driving is approximately 4 weeks. This excludes set up and other activities on site, either prior to, or after pile driving. The piling will occur intermittently throughout the day, with the remainder of the time spent on ancillary processes such as setting up the barge, positioning the piles, checking tolerances, delivering material and personnel, and similar.

#### **2.4.5 Construction Sequence of Southwest Quay Wall**

- (1) Removal of existing rock armour using an excavator;
- (2) Procurement of sheet piles and traffic management set up;
- (3) Mobilisation of piling rig;
- (4) Transportation of structural steelwork to lay down area;
- (5) Installation of sheet piles to required embedded depth (approx. area of sheet piles is 60m length x 15m depth = 900m<sup>2</sup>);
- (6) Back-filling behind newly installed sheet piles with compacted granular 6N/P fill (approx. 900m<sup>2</sup> x 1m = 900m<sup>3</sup>), monitoring for movement;
- (7) Erect formwork for reinforced concrete capping beam and tie reinforcement steel;
- (8) Following the installation of the sheet piled wall, scaffolding will be erected to facilitate the construction of the reinforced concrete capping beam (for new flood wall and parapet). The scaffolding will be cantilevered off of the sheet pile in order to avoid further instream work and also to prevent any concrete spillage or debris from entering the river;
- (9) Pour in-situ concrete for new capping beam and upstand wall to match existing flood defence wall (approx. 60m x 1.5m<sup>2</sup> = 90m<sup>3</sup> of concrete);
- (10) Install new N2 parapet;
- (11) Take down existing flood defence wall and existing parapet to below footpath level (reuse existing stonework where possible);
- (12) Completion of footway pavement and erection of stone cladding to new flood defence wall (approx. 10m<sup>3</sup> of stonework);
- (13) Removal of traffic management.

Piling methodology for the southwest corner is as described in Section 2.4.4.

#### **2.4.6 Resurfacing and waterproofing of bridge deck**

- To facilitate the waterproofing of the bridge deck, the existing road surface will be excavated to expose the top of the bridge deck;
- Deck surface will be prepared, cleaned and primed for application of bridge deck waterproofing;
- Spray-applied bridge deck waterproofing will be installed on the primed surface;
- New (narrower) road surfacing material will be laid and rolled, and footpaths will be reconstructed; and

- Road markings will be reapplied.

#### 2.4.7 Concrete repairs to Piers, Abutments and Deck Soffit

- Concrete repairs will be carried out where minor areas of defective concrete are identified;
- Defective concrete will be broken out by handheld drill/impact hammer or other specified method; and
- The exposed surfaces will be suitably primed, and an approved proprietary prebagged repair mortar/concrete will be placed by hand and allowed to dry.

### 2.5 Overview of Construction Programme

**Table 2.2 Construction Programme**

Construction Element	Approx. Duration of each task
Mobilisation, compound set up	2 weeks
Works on southern side of bridge	Approx. 4 months
Works on northern side of bridge	Approx. 4 months
Works on southeast quay wall*	Approx. 2 months (incl. 4 weeks of pile-driving)
Works on southwest quay wall**	Approx. 2 to 2.5 months (incl. 4 to 6 weeks of pile driving)
Concrete repairs to underside of bridge*	4-6 weeks
<b>Total Construction Phase</b>	<b>Approx. 9 months</b>
*These works can be carried out in parallel with the main bridge works	
** These works can be carried out following completion of the southeast corner and in parallel with the main bridge widening works	

### 2.6 Construction Materials

Sustainable decisions made during the design process will have a positive impact on the cost and carbon footprint of the scheme. To support sustainable construction, the following principles have been embedded in the design:

- Design for minimum waste;
- Aim for lean efficient design and construction methodology;
- Minimise energy in construction by adoption of blended mixes;
- Conservation of water resources by the adoption of water reducing admixtures;
- Use of precast construction off site as much as possible.

#### Estimated Quantities

- Structural concrete: approx. 328 m<sup>3</sup>
- Reinforcement steel: approx. 66 t
- Fill material: approx. 250 m<sup>3</sup>
- Sheet piles: approx. 85 lin. m
- Road surfacing: approx. 145 m<sup>3</sup>
- Verge concrete: approx. 346 m<sup>3</sup>
- Temporary formwork for concrete: approx. 2,301 m<sup>2</sup>

- Masonry stonework for cladding: approx. 23 m<sup>3</sup>
- Bridge deck waterproofing: approx. 2,202 m<sup>2</sup>
- Steel / Aluminium parapets: approx. 406 m
- RC wall with handrail: 59 m
- Expansion joint: approx. 125 m
- Steel / aluminium lighting columns: approx. 16 no.

### **Sourcing of Materials**

All imported material will be sourced from the nearest possible locations, where possible. Concrete, backfill and surfacing materials can be found from a number of manufacturers / quarries locally. Only those quarries that conform to all necessary statutory consents will be used in the construction phase.

It is assumed that the Contractor will source the sheet piles directly from the manufacturer/supplier. While Irish-based sheet pile suppliers exist, there is a greater range of sheet piles from the manufacturers/suppliers that exist in the UK.

## **2.7 Temporary Construction Compound**

The temporary construction compound will be set up and maintained by the successful Contractor. The construction compound and the associated temporary access road is located within lands on the west side of the River Barrow, with access onto the R704 Regional Road as shown in Figure 2.4 below, and in Drawing No. WBRC-ROD-ENV-S101-DR-CB-30016 in Appendix A. The lands are in the ownership of Wexford County Council.

At the time of writing, these lands are currently used as a construction compound for the separately proposed South East Greenway project. If the construction phases of both projects overlap, arrangements will be made to ensure both projects can effectively use this construction compound.



**Figure 2.4 Location of the Construction Compound**

### 2.7.1 Site Access and Haulage Routes

Access to the proposed construction compound will be from the R704 / R723 Regional Road connecting to the N25 National Road as shown in Drawing no. WBRC-ROD-ENV-S101-DR-CB-30016 in Appendix A.

### 2.8 Working Hours

The permitted working hours arising from construction works is as shown in the following table. The Contractor may propose night-time works outside of these hours provided it is agreed with Wexford County Council. On O'Hanrahan bridge, night works will likely be confined to the eastern half and underside of the structure only due to the close proximity of residential apartments on the western side.

**Table 2.3 Working Hours**

Period	Hours
Mon to Thurs	08:00 - 19:00
Mon to Thurs (where evening working is approved by KCC)	19:00 - 22:00
Fri	08:00 - 17:00
Sat	08:00 - 16:00
Sun and Bank Holiday	Not permitted

## **2.9 Operation of the Proposed Development**

O'Hanrahan Bridge was previously under the remit of Transport Infrastructure Ireland's EIRSPAN Bridge Management System due to its classification as a National Route. Since reclassified as a regional route, it is under the remit of Wexford County Council and will be maintained and managed in accordance with the bridge management procedures of Wexford County Council.

## **2.10 Development Change and Decommissioning**

There are no plans proposed for the decommissioning of the proposed development given the nature of the proposed development – i.e., the widening of O'Hanrahan Bridge rehabilitation works can in this instance, be considered as a 'permanent' operation. The decommissioning of the proposed development is likely to form part of subsequent planning consent procedures and in the unlikely event that specific decommissioning requirements are necessary, appropriate mitigation can be applied to those consents.

## **2.11 Receiving Natural Environment**

### **2.11.1 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.

### **2.11.2 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. 180m<sup>2</sup>) 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.”*

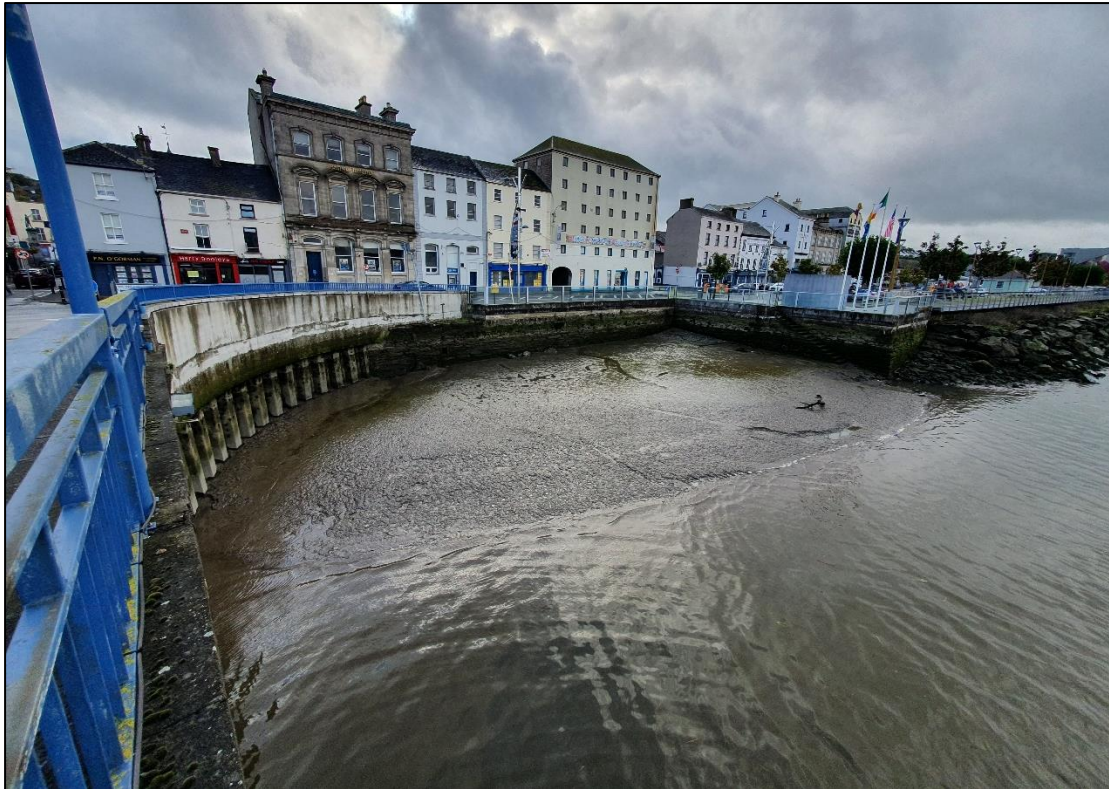
#### Mud shores (LS4)

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 herbs, including nettle (Urtica dioica), Hogweed (Heracleum sphondylium), Willowherbs eg. (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.

### **2.11.3 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 2.4 below shows the information recorded regarding water quality status at the location of the proposed development.

**Table 2.4 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., Coghlan, 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., Coghlan, 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.<sup>6</sup>

#### 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 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.

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<sup>6</sup> 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.

### Commercial netting by-catch

Commercial netmen using seasonal drift, draft and snap nets in the Barrow, Nore, Suir, Slaney and Munster 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 Llen. 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 1<sup>st</sup> 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 interstitia 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.<sup>7</sup> Furthermore, only a very small portion of kelts contribute to future spawning, and so impacts on kelts are generally imperceptible at the population scale.

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

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 2.5 below illustrates the known migration patterns of these species through the Barrow Estuary.

**Table 2.5 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
<b>Sea Lamprey</b>												
Upstream				Blue	Blue	Blue						
Downstream									Light Blue	Blue		
<b>River Lamprey</b>												
Upstream	Light Blue	Blue	Blue					Blue	Blue	Blue	Blue	Blue
Downstream	Blue	Blue	Blue	Blue	Blue							
<b>Twaite Shad</b>												
Upstream		Light Orange	Orange	Orange	Orange	Light Orange						
Downstream (spent)						Light Orange	Light Orange	Light Orange				
Downstream (0+)						Light Orange	Light Orange	Light Orange	Light Orange	Light Orange	Light Orange	Light Orange
Juveniles (<2 years)	Light Orange	Light Orange	Light Orange	Light Orange	Light Orange	Light Orange	Light Orange	Light Orange	Light Orange	Light Orange	Light Orange	Light Orange
<b>Atlantic Salmon</b>												
Upstream			Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Blue
Downstream (kelts)	Light Blue	Light Blue	Light Blue									Light Blue
Downstream (smolts)			Blue	Blue	Blue	Light Blue						

**2.11.4 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.

### 2.11.5 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.

### 2.11.6 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. 750m<sup>2</sup> 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.

## 2.12 Potential Impacts on the Natural Environment

### Construction Phase

#### Habitat Loss

The proposed development will result in the loss of c. 22 m<sup>2</sup> of intertidal mudflats and estuarine habitat on the eastern bank of the River Barrow, and 60 m<sup>2</sup> of estuarine habitat, of which 10 m<sup>2</sup> is also intertidal mudflats, on the western bank of the River Barrow, south of O'Hanrahan Bridge.

The total loss of habitat as a result of the proposed development is 82m<sup>2</sup> of estuarine habitat, of which 32m<sup>2</sup> is also intertidal mudflat.

These habitats correspond to Annex I habitats, namely, 'Mudflats and sandflats not covered by seawater at low tide' (1140) and 'Estuaries' (1130).

A small area of hard intertidal substrates (i.e. the existing quay wall on the eastern banks and rock armour on the western bank) and their associated biological communities will be permanently lost as a result of the proposed development.

Additionally, 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. 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

Sheet piling, which will be undertaken from a barge, poses a risk of injury to fauna in the River Barrow from hydroacoustic impacts, most notably on Twaite Shad. Twaite Shad is particularly sensitive to hydroacoustic impacts given that it is a hearing-specialist species and that 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.

Piling and other construction activities may cause additional physical disturbance to invertebrate fauna which may result in the mortality of small numbers of these species.

Artificial lighting poses a risk of negative impacts on biodiversity, particularly Otter and fish, by fragmentation of commuting/foraging corridors, disruption of circadian rhythms and increased risk of predation.

Owing to the scale, the proposed development does not have potential to give rise to significant shading impacts on the River Barrow or the species it supports during the construction phase.

### Water Quality

Due to the use of barges and other construction machinery within and in close proximity to the River Barrow, there is a risk of pollution to the river during construction. This could be in the form of spilled fuel, oil, concrete or grout or 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 sheet piling. Sheet piling will be undertaken from a barge for river-side installation. 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.
- Faecal contamination arising from inadequate treatment of on-site toilets and washing facilities.
- 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 impact to water quality. 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

Construction activities pose a risk of the spread of invasive non-native species to, from or within the vicinity of the works. A species of particular concern in this case is Chinese Mitten Crab, which could be spread within the Barrow-Nore-Suir Estuary by barges and other vessels associated with the construction of the proposed development.

### **Operational Phase**

#### Disturbance / Displacement

The proposed development has the potential to lead to disturbance from noise, vibration, visual cues, and lighting, which would lead to the displacement of certain species from the general area. Artificial lighting poses a risk of negative impacts on biodiversity, particularly otter and fish species by fragmentation of commuting/migration/foraging corridors, disruption of circadian rhythms and increased risk of predation.

#### Hydrological Impacts

Bridge works have the potential to cause permanent disturbance to river channels, floodplains and the flood regime. Watercourse crossings and embankments, if not appropriately designed, create an obstacle to flow, particularly under flood conditions resulting in increased flood risk and damage in the vicinity of the proposed development. Such structures can locally alter channel morphology resulting in changes in flow velocity and water depth. These structures can also result in localised riverbed and riverbank erosion, resulting in long-term changes to the morphology of the river channel.

Following the widening of the quay walls, the finish will replicate the existing smooth concrete and sheet piling currently present. Given the minor scale of the intervention, the proposed layout of the development will likely have negligible impact on channel cross section and resultant flow and sediment transport characteristics.

The proposed development will not alter the cross-sectional area of the bridge openings and general flow characteristics will not be affected. A section of the existing flood defences on the east quays will be altered where they tie into the abutment. The existing standard of protection (1 in 200 year coastal) will be reinstated. The proposed widening of quay walls will displace some flood waters, though the volume is considered negligible in the context of the Barrow system. Conversely, the widening of the quay walls will also increase the area of defended lands though this is also seen as insignificant.

### 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.

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

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

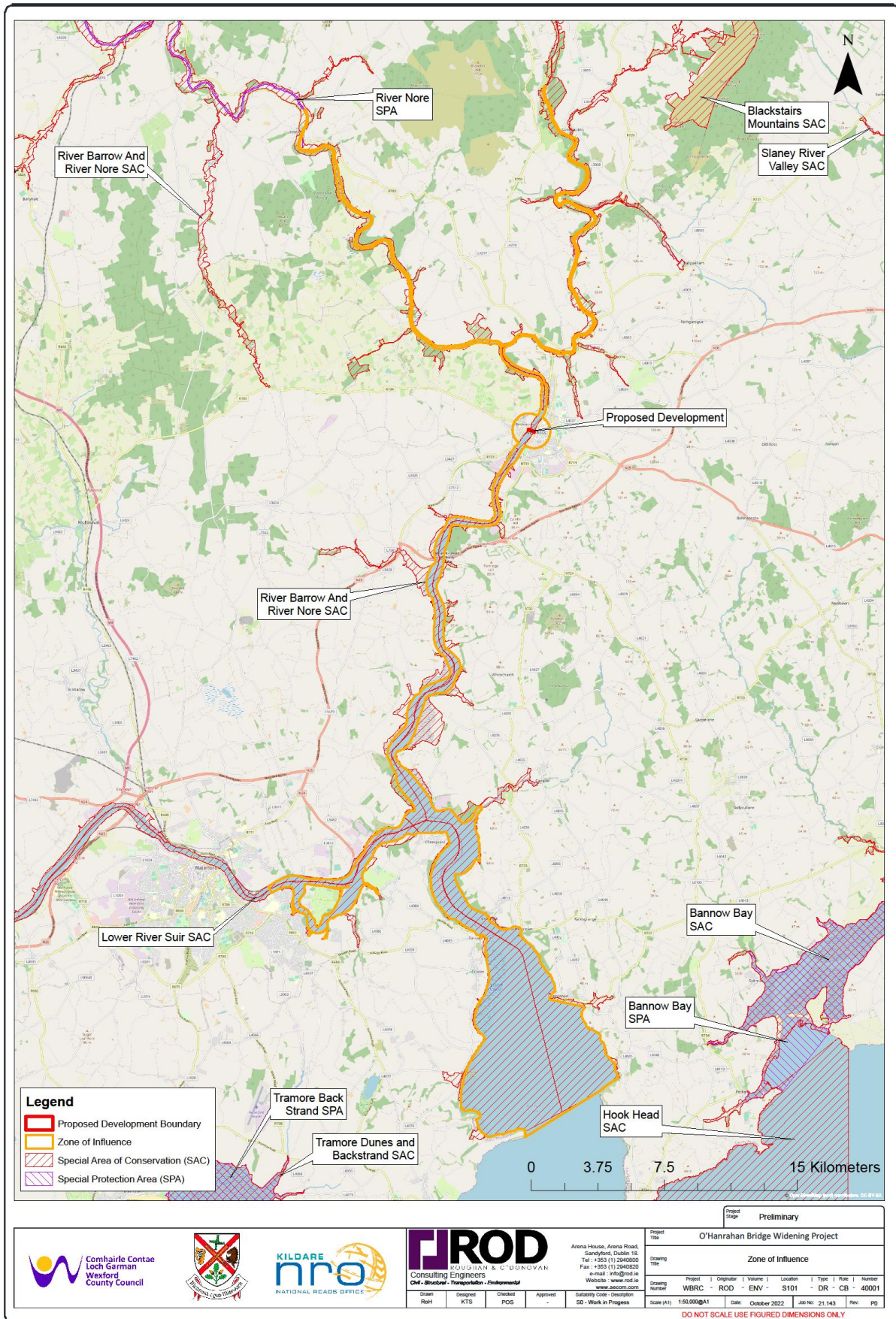
This area was defined as the zone of influence and extends to the maximum distance at which potential impacts may occur, including via hydrological connections, i.e., surface water pathways. Beyond this limit, noise and visual disturbance to birds will not occur.

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 proposed development 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** Location of European sites in relation to the zone of influence of the proposed development

**Table 3.1 European sites located within the zone of influence.**

European site [site code]	Are there potential pathways for impacts from the proposed development to this site?
<b>River Barrow and River Nore SAC [002162]</b>	<b>Yes.</b> The proposed development is located within the boundary lines of the River Barrow and River Nore SAC.
<b>Lower River Suir SAC [002137]</b>	<b>Yes.</b> The shortest absolute distance from the proposed development 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 proposed development to the site via a hydrological connection is 16.5 km south, through the River Barrow. The proposed development 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 proposed development.
<b>River Nore SPA [004233]</b>	<b>Yes.</b> The shortest absolute distance from the proposed development to this site is 9.2 km to the northwest. This is the direct over land distance between the SPA and the proposed development. The shortest distance from the proposed development to the site via a hydrological connection is 12.8 km northwest, upstream 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 proposed development.

### 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 Durrow. The larger of the many tributaries include the Lerr, Fushoge, Mountain, Aughavaud, Owenass, Boherbaun and Stradbally Rivers of the Barrow, and the Delour, Dinin, Erkina, 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 16<sup>th</sup> 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 Aughnabriskey, 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 *Lobaría 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 *Callitricho-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*)<sup>8</sup>
- [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.

<sup>8</sup> An asterisk (\*) in the title of an Annex I habitat denotes that it is a "priority habitat", i.e.. an Annex I habitat in danger of disappearing and for the conservation of which the EU has particular responsibility in view of the proportion of its natural range which falls within the European territory of Member States.



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), Widgeon (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 maritimae*)
- [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 of Likely Significant Effects**

Tables 3.2 – 3.4 below detail the evaluation of the potential impacts of the proposed development 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 for the Qualifying Interests of the site. Therefore, the evaluation of whether or not a potential impact will result in a likely significant effect (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 proposed development 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
<b>Estuaries [1130]</b>	<i>“To maintain the favourable conservation condition of Estuaries in the River Barrow and River Nore SAC”</i>	The proposed development will result in permanent habitat loss of a total area of 82m <sup>2</sup> of Estuary habitat. There is also the potential for habitat degradation impacts during the installation of the sheet piled wall, this involves significant vibration which could lead to a negative impact on the community distribution within the benthic sediment. Therefore, likely significant effects on the habitat area, community distribution and community extent of Estuaries within the River Barrow and River Nore SAC as a result of the proposed development cannot be ruled out at this stage.	Yes
<b>Mudflats and sandflats not covered by seawater at low tide [1140]</b>	<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>	The proposed development will result in permanent habitat loss of a total area of 32 m <sup>2</sup> of this habitat. Furthermore, there is also the potential for habitat degradation impacts due to the presence of the sheet piled wall, which could cause increased rates of flow directly adjacent to the wall which could increase the rate at which the sediment that forms this habitat is eroded. Therefore, likely significant effects on the habitat area of mudflats and sandflats not covered by seawater at low tide as a result of the proposed development cannot be ruled out at this stage.	Yes
<b>Reefs [1170]</b>	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 proposed development 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
<b>Salicornia and other annuals colonising mud and sand [1310]</b>	<i>"To maintain the favourable conservation condition of Salicornia and other annuals colonizing mud and sand in the River Barrow and River Nore SAC"</i>	The proposed development will 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. 50 m radius and the nearest confirmed location is 12.8 km downstream. Therefore, the proposed development will not give rise to any likely significant effects on the physical structure of <i>Salicornia</i> and other annuals colonizing mud and sand within the River Barrow and River Nore SAC.	No
<b>Atlantic salt meadows (<i>Glaucopuccinellietalia maritimae</i>) [1330]</b>	<i>"To restore the favourable conservation condition of Atlantic salt meadows in the River Barrow and River Nore SAC"</i>	This habitat occurs c. 9.4 km downstream of the proposed development. The proposed development will not result in the loss of any of this habitat within this European site. Considering the distance between the proposed development and this European site, as well as the assimilative capacity of the watercourses, potential indirect water quality impacts, such as accidental discharge of pollutants during the construction phase, will have dissipated by the time they have reached this habitat in the River Barrow and River Nore SAC. Therefore, the proposed development 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
<b>Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]</b>	<i>"To restore the favourable conservation condition of Mediterranean salt meadows in the River Barrow and River Nore SAC"</i>	This habitat occurs c. 19 km downstream of the proposed development. The proposed development will not result in the loss of any of this habitat within this European site. Considering the distance between the proposed development and this European site, as well as the assimilative capacity of the watercourses, potential indirect water quality impacts, such as accidental discharge of pollutants during the construction phase, will have dissipated by the time they have reached this habitat in the River Barrow and River Nore SAC. Therefore, the proposed development 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



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
<b>Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation [3260]</b>	"To maintain the favourable conservation condition of <i>Water courses of plain to montane levels with the Ranunculion fluitantis and 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
<b>European dry heaths [4030]</b>	"To maintain the favourable conservation condition of <i>European dry heaths in the River Barrow and River Nore SAC</i> "	European dry heaths are a strictly terrestrial based habitat and there are no pathways for impact between the proposed development and this qualifying interest. Therefore, there are no pathways for likely significant effects to occur on the Conservation Objectives of European dry heaths within the River Barrow and River Nore SAC in any form as a result of the proposed development.	No
<b>Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]</b>	"To maintain the favourable conservation condition of <i>Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels in the River Barrow and River Nore SAC</i> "	The proposed development 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
<b>*Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220]</b>	"To maintain the favourable conservation condition of <i>Petrifying springs with tufa formation (Cratoneurion) in the River Barrow and River Nore SAC</i> "	No – As Petrifying springs with tufa formation are located c. 22.2km upstream of the proposed development at a minimum, there is no pathway for impacts to occur to this habitat. There will be no physical or chemical interaction between this habitat and the proposed development that would result in any changes to the total habitat area and distribution or the hydrological regime of whatsoever. Therefore, it can be concluded that there will be no likely significant effects on these attributes of Petrifying springs with tufa formation within the River Barrow and River Nore SAC as a result of the proposed development.	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
<b>Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]</b>	<i>"To restore the favourable conservation condition of Old oak woodland with Ilex and Blechnum in the River Barrow and River Nore SAC"</i>	No – There will be no development or land-take occurring within Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> 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 proposed development 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
<b>*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]</b>	<i>"To restore the favourable conservation condition of Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) in the River Barrow and River Nore SAC"</i>	No – There will be no development or land-take occurring within Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> ( <i>alno-Padion</i> , <i>Alnion incanae</i> , <i>Alicion albae</i> ). 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 proposed development is 12.1 km along a downstream tributary of the River Barrow. There are no pathways for changes in water quality to reach this habitat. Therefore, is no potential for likely significant effects on the conservation objectives of this Qualifying Interest in the River Barrow and River Nore SAC.	No
<b>Desmoulin's Whorl Snail (<i>Vertigo moulinsiana</i>) [1016]</b>	<i>"To maintain the favourable conservation condition of Desmoulin's whorl snail in the River Barrow and River Nore SAC"</i>	Desmoulin's Whorl snail is a semi-terrestrial species that potentially occurs in salt marsh habitat downstream. Considering the distance between the proposed development and this European site, as well as the assimilative capacity of the watercourses, potential indirect water quality impacts, such as accidental discharge of pollutants during the construction phase, will have dissipated by the time they have reached this habitat in the River Barrow and River Nore SAC. Therefore, the proposed development 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

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
<b>Freshwater Pearl Mussel</b> <i>(Margaritifera margaritifera)</i> [1029]	“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.”	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.	Yes
<b>White-clawed Crayfish</b> <i>(Austropotamobius pallipes)</i> [1092]	“To maintain the favourable conservation condition of White-clawed crayfish in the River Barrow and River Nore SAC”	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 have 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.	No
<b>Sea Lamprey</b> <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
<b>River Lamprey</b> <i>(Lampetra fluviatilis)</i> [1099]	“To restore the favourable conservation condition of River lamprey in the River Barrow and River Nore SAC”		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
<b>Brook Lamprey (<i>Lampetra planeri</i>) [1096]</b>	<i>"To restore the favourable conservation condition of Brook lamprey in the River Barrow and River Nore SAC"</i>	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
<b>Twaite Shad (<i>Alosa fallax</i>) [1103]</b>	<i>"To restore the favourable conservation condition of Twaite shad in the River Barrow and River Nore SAC"</i>	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
<b>Atlantic Salmon (<i>Salmo salar</i>) [1106]</b>	<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
<b>European Otter (<i>Lutra lutra</i>) [1355]</b>	<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

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
<b>Killarney Fern (<i>Trichomanes speciosum</i>)</b> [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
<b>Nore Freshwater Pearl Mussel (<i>Margaritifera durrovensis</i>)</b> [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 proposed development, 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 proposed development in view of the Conservation Objectives of the Lower River Suir SAC [002137] (NPWS, 2017).**

Qualifying Interest	Conservation Objective as per NPWS (2017)	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
<b>Atlantic salt meadows (<i>Glaucopuccinellietalia maritimae</i>) [1330]</b>	<i>"To restore the favourable conservation condition of Atlantic salt meadows (<i>Glaucopuccinellietalia maritimae</i>) in Lower River Suir SAC"</i>	The proposed development occurs c. 22.2 km upstream of this habitat within the Lower River Suir SAC. The proposed development will not result in the loss of any of this habitat within this European site. Considering the distance between the proposed development and this European site, as well as the assimilative capacity of the watercourses, potential indirect water quality impacts, such as accidental discharge of pollutants during the construction phase, 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
<b>Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]</b>	<i>"To restore the favourable conservation condition of Mediterranean salt meadows (<i>Juncetalia maritimi</i>) in Lower River Suir SAC"</i>	The proposed development occurs c. 22.2 km upstream of this habitat within the Lower River Suir SAC. The proposed development will not result in the loss of any of this habitat within this European site. Considering the distance between the proposed development and this European site, as well as the assimilative capacity of the watercourses, potential indirect water quality impacts, such as accidental discharge of pollutants during the construction phase, 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
<b>Water courses of plain to montane levels with the <i>Ranunculon fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation [3260]</b>	<i>"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"</i>	This qualifying interest is limited to the freshwater extents of this European site, c. 20.5 km from the proposed development in a tributary of the River Suir. The proposed development will not result in the loss of any of this habitat within this European site. Considering the distance between the proposed development and this European site, as well as the assimilative capacity of the watercourses, potential indirect water quality impacts, such as accidental discharge of pollutants during the construction phase, 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)	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
<b>Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]</b>	<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 is assumed to occur in this European site c. 17.2 km downstream of the proposed development. The proposed development will not result in the loss of any of this habitat within this European site. Considering the distance between the proposed development and this European site, as well as the assimilative capacity of the watercourses, potential indirect water quality impacts, such as accidental discharge of pollutants during the construction phase, 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
<b>Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]</b>	<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>	No - Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles are terrestrial habitat and it not located within the footprint of the proposed development. There are no pathways for impact between the proposed development and this qualifying interest. Therefore, it can be concluded beyond reasonable scientific doubt that the proposed development will not significantly affect this European site in view of its Conservation Objectives for this Qualifying Interest.	No
<b>*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]</b>	<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>	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> ( <i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i> ) are a terrestrial habitat and would only be at risk during periods of high-water level or flooding. There are no pathways for impact between the proposed development and this qualifying interest. Therefore, it can be concluded beyond reasonable scientific doubt that the proposed development will not significantly affect this European site in view of its Conservation Objectives for this Qualifying Interest.	No
<b>*<i>Taxus baccata</i> woods of the British Isles [91J0]</b>	<i>"To restore the favourable conservation condition of <i>Taxus baccata</i> woods of the British Isles in Lower River Suir SAC"</i>	<i>Taxus baccata</i> woods of the British Isles is a terrestrial habitat and it not located within the footprint of the proposed development. There are no pathways for impact between the proposed development and this qualifying interest. Therefore, it can be concluded beyond reasonable scientific doubt that the proposed development 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)	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
<b>Freshwater Pearl Mussel</b> <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 28.2 km from the proposed development in a tributary of the River Suir. There are no pathways for impacts to Freshwater Pearl Mussel as a result of the proposed development. Therefore, it can be concluded that there will be no likely significant effects on the Freshwater Pearl Mussel through these attributes within the Lower River Suir SAC as a result of the proposed development.	No
<b>White-clawed Crayfish</b> <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 distance of at least 28.2 km from the proposed development in a tributary of the River Suir. There are no pathways for impacts to White-clawed Crayfish as a result of the proposed development. Therefore, it can be concluded that there will be no likely significant effects on the White-clawed Crayfish through these attributes within the Lower River Suir SAC as a result of the proposed development.	No
<b>Sea Lamprey</b> <i>(Petromyzon marinus)</i> [1095]	<i>"To restore the favourable conservation condition of Sea Lamprey in Lower River Suir SAC"</i>	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 Lower River Suir SAC cannot be ruled out at this stage.	Yes
<b>Brook Lamprey</b> <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



Qualifying Interest	Conservation Objective as per NPWS (2017)	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
<b>River Lamprey (<i>Lampetra fluviatilis</i>) [1099]</b>	<i>"To restore the favourable conservation condition of River Lamprey in Lower River Suir SAC"</i>	Construction works (including sheet piling) for the proposed development will give rise to noise and vibration effects which could cause physical harm to River 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 River lamprey passing through the estuary. Therefore, likely significant effects on the conservation objective of this Qualifying Interest within the Lower River Suir SAC cannot be ruled out at this stage.	Yes
<b>Atlantic Salmon (<i>Salmo salar</i>) [1106]</b>	<i>"To restore the favourable conservation condition of Atlantic Salmon in Lower River Suir SAC"</i>	There is a possibility that the proposed development could give rise to water quality impacts due to the potential for sedimentation or 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 Lower River Suir SAC as a result of the proposed development cannot be ruled out at this stage.	Yes
<b>Twaite Shad (<i>Alosa fallax fallax</i>) [1103]</b>	<i>"To restore the favourable conservation condition of Twaite Shad in Lower River Suir SAC"</i>	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 Lower River Suir SAC as a result of the proposed development cannot be ruled out at this stage.	Yes

Qualifying Interest	Conservation Objective as per NPWS (2017)	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
<b>Otter (<i>Lutra lutra</i>) [1355]</b>	<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 proposed development in view of the Conservation Objectives of the River Nore SPA [002298].**

Qualifying Interest	Conservation Objective	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><b>Kingfisher (<i>Alcedo atthis</i>) [A229]</b></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 <i>“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”</i> (NPWS, 2022).</p>	<p>There is potential for indirect impacts through habitat degradation as a result of changes in water quality.</p> <p>The proposed development 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 proposed development. Furthermore, the proposed development 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 proposed development 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 as a result of the proposed development.**

European site	Qualifying Interest
<b>River Barrow and River Nore SAC</b>	Estuaries [1130] 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]
<b>Lower River Suir SAC</b>	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]
<b>River Nore SPA</b>	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 proposed development, this AA Screening Report has found that the proposed development, individually, is 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 proposed development, 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 proposed development and the relevant European sites and has concluded, on the basis of objective information, that the proposed development, 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 rehabilitation and widening of O'Hanrahan Bridge that the proposed development, either individually or in combination with other plans and projects, is 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 proposed development is a development 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, the Lower River Suir 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 proposed development for the integrity of the European sites concerned.

## 6. REFERENCES

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

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

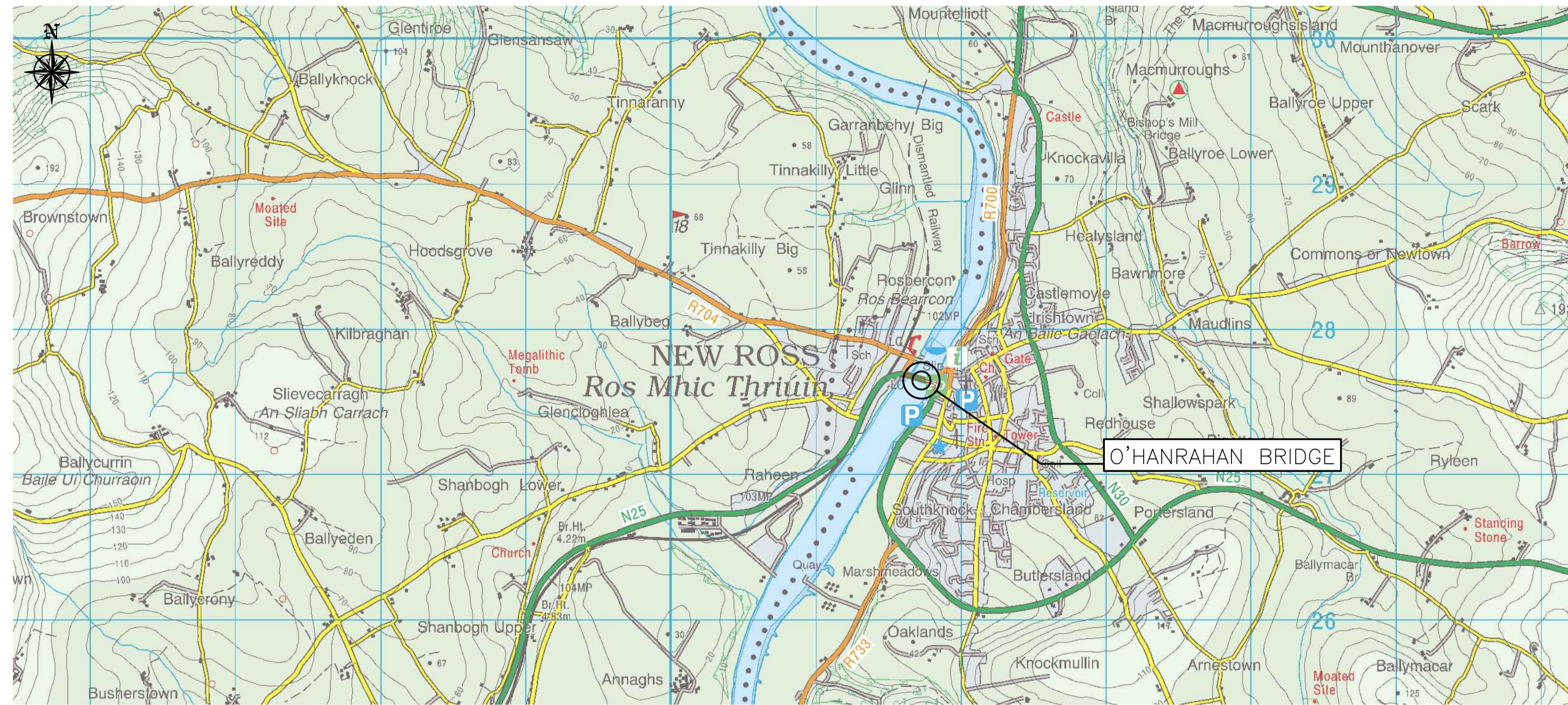
Planning and Development (Amendment) Act, 2010. No. 30 of 2010.

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## **APPENDIX A**

### **DEVELOPMENT DRAWINGS**



**SITE LOCATION PLAN**  
 A1 SCALE 1:25,000  
 A3 SCALE 1:50,000

- 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 TEMPORARY 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



**SITE LAYOUT**  
 A1 SCALE 1:400  
 A3 SCALE 1:800



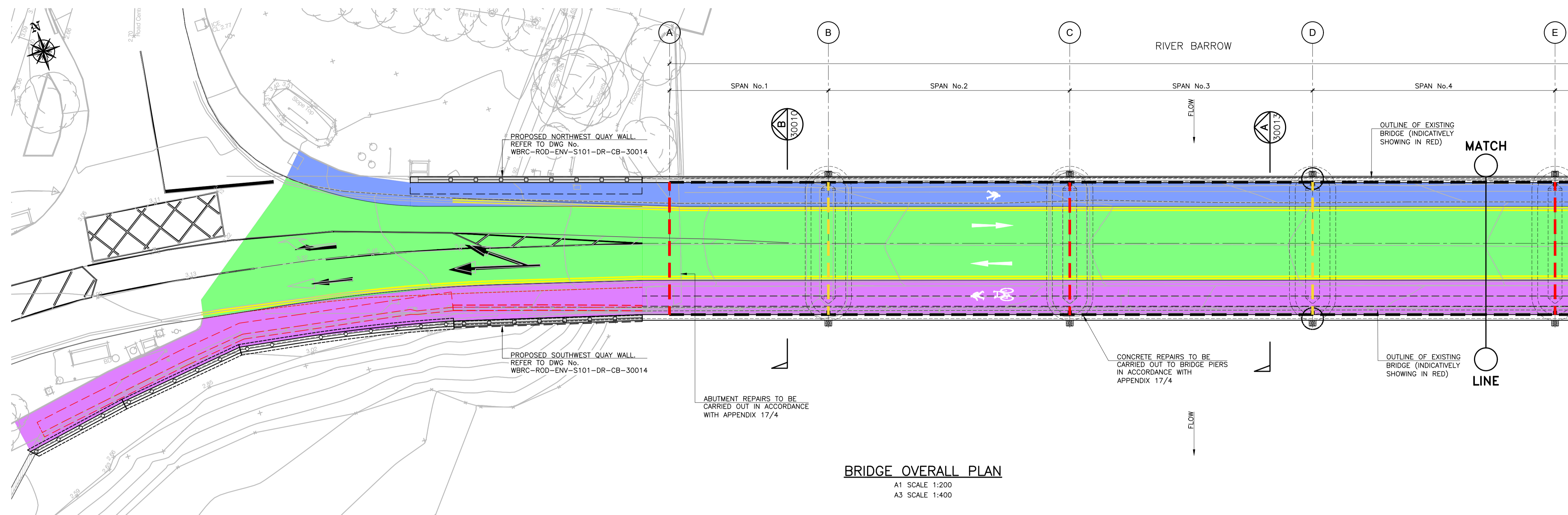
No.	Revision	Date	By	Chkd	App'd



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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	Location Plan of Proposed Development				
Drawing Number	Project	Originator	Volume	Location	Type   Role   Number
WBRC	ROD	ENV	S101	DR - CB	30001
Scale (A1)	As Shown	Date:	MAY 2022	Job No:	21.143
				Rev:	P0

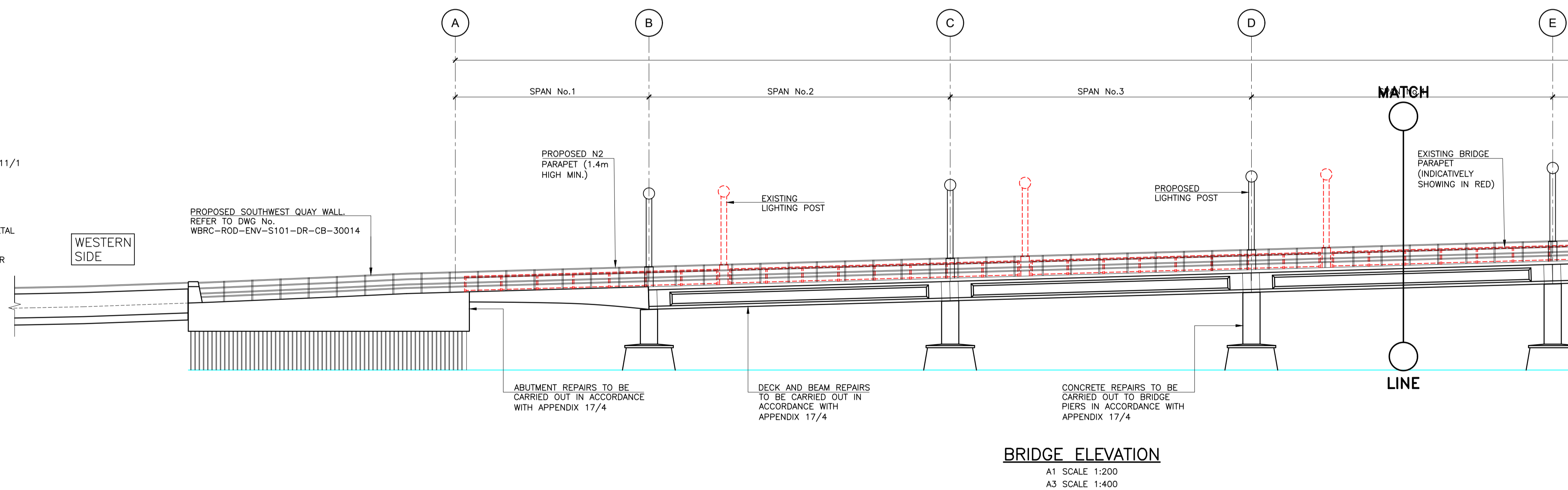


**NOTES:**

- ALL DIMENSIONS IN MILLIMETERS, UNLESS OTHERWISE NOTED.
- ALL LEVELS ARE IN METRES TO ORDNANCE DATUM MALIN HEAD.
- ALL CO-ORDINATES ARE IN METRES TO IRISH TRANSVERSE MERCATOR (ITM).
- WHERE EXISTING BOUNDARY WALLS AND FENCES ARE TO BE TAKEN DOWN TO ALLOW CONSTRUCTION OF PERMANENT WORKS TEMPORARY FENCING TO BE PROVIDED TO PREVENT UNAUTHORIZED ACCESS TO SITE AREA AND PRIVATE LANDS.
- THE CONTRACTOR IS REQUIRED TO PROVIDE ACCESS THROUGH THE EXTENT OF SITE IN ACCORDANCE WITH THE SPECIFICATION.
- THE CONTRACTOR SHALL LIAISE WITH THE RELEVANT SERVICE PROVIDERS TO AGREE AND IMPLEMENT PROTECTION MEASURES AND DIVERSIONS.
- WHERE EXISTING LIGHTING AND SIGNAGE IS TO BE TAKEN DOWN TO ALLOW CONSTRUCTION OF THE PERMANENT WORKS EQUIVALENT TEMPORARY LIGHTING AND SIGNAGE TO BE PROVIDED FOR THE DURATION OF THE WORKS UNTIL PERMANENT LIGHTING AND SIGNAGE IS REINSTATED OR IN PLACE.
- GAPS IN PARAPET EDGE BEAMS EITHER SIDE OF MOVEMENT JOINTS TO BE REFILLED AND RESEALED IN ACCORDANCE WITH APPENDIX 23/2.
- ALL FINISHES ON DRAWINGS ARE AS PER TII CORE SPECIFICATION.
- ALL BURIED SURFACES NOT RECEIVING BRIDGEDECK WATERPROOFING TO BE WATERPROOFED WITH 2 LAYERS OF EPOXY RESIN WATERPROOFING.
- ALL EXPOSED ARRISSES OF STRUCTURAL CONCRETE SHALL BE FINISHED WITH A 25 x 25mm CHAMFER UNLESS NOTED OTHERWISE.
- REFER TO APPENDIX 17/1 FOR CONCRETE MIXES.
- EXPOSED CONCRETE TO BE IMPREGNATED WITH HYDROPHOBIC PORELINER IN ACCORDANCE WITH THE SPECIFICATION.
- CONCRETE CLASS TO BE C40/50 (MIX 1).
- CONCRETE BLINDING TO BE MIX. ST1.
- COLD MILLING TO BE PROVIDED OVER EXTENT OF NEW PAVEMENT WORKS.
- ALL SURFACES OF THE PRECAST CONCRETE UNITS THAT INTERFACE WITH IN-SITU CONCRETE SHALL BE PREPARED IN ACCORDANCE WITH CLAUSE 1710.8 (v) (a) OF THE TII SPW TO ENSURE THAT THE SURFACE FINISH IS CONSIDERED "ROUGH".

**LEGEND:**

- PROPOSED SURFACING. REFER TO APPENDIX 7/1
- PROPOSED FOOTPATH. REFER TO APPENDIX 11/1
- PROPOSED FOOTPATH/CYCLEWAY. REFER TO APPENDIX 11/1
- EXISTING STRUCTURE
- DENOTES PROPOSED TYPE 1 BURIED JOINT UNDER CONTINUOUS SURFACING. REFER TO APPENDIX 23/1
- DENOTES PROPOSED TYPE 6 ELASTOMERIC JOINT IN METAL RUNNERS. REFER TO APPENDIX 23/1
- DENOTES EXTENT OF PROPOSED WATERPROOFING. REFER TO APPENDIX 20/1
- F- DENOTES CLASS OF FORMED CONCRETE FINISH
- U- DENOTES CLASS OF UNFORMED CONCRETE FINISH



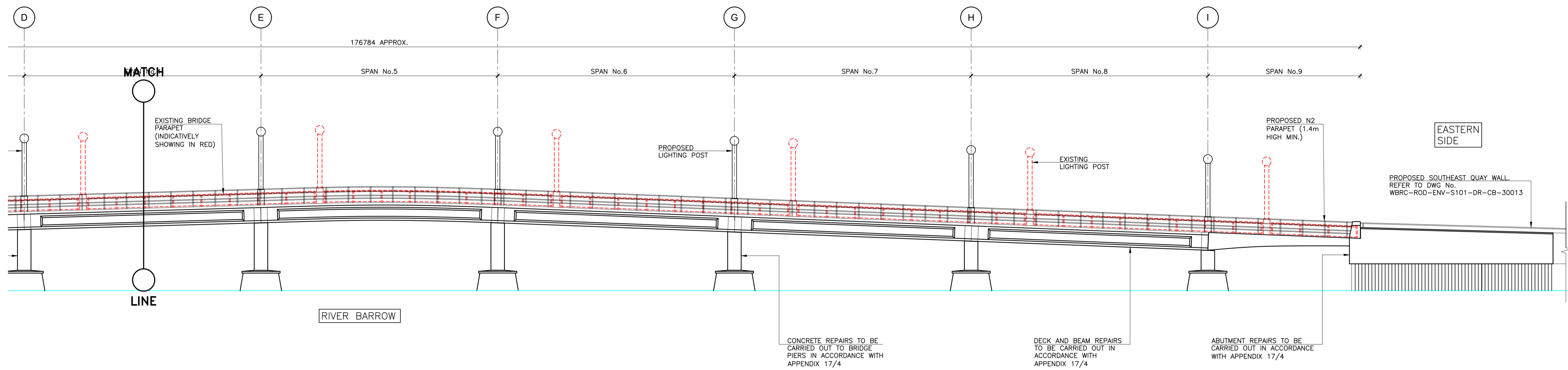
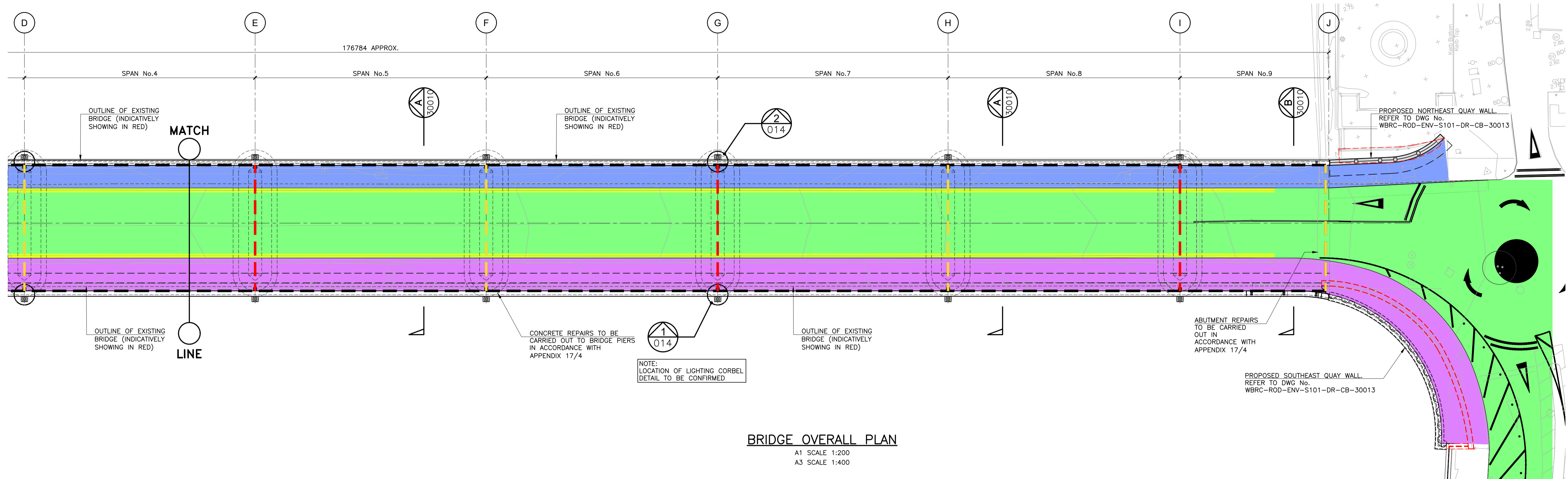
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Drawn	Designed	Checked	Approved	Suitability Code - Description
ZZX	CH	MR	JK	S4 - Stage Approval

Project Stage	Preliminary				
Project Title	O'Hanrahan Bridge Widening Project				
Drawing Title	Proposed O'Hanrahan Bridge Plan & Elevation Sheet 01 of 02				
Drawing Number	Project	Originator	Volume	Location	Type   Role   Number
Scale (A1)	WBRC - ROD - ENV - S101 - DR - CB - 30007				
As Shown	Date: MAY 2022	Job No: 21.143	Rev: P0		



**NOTES:**  
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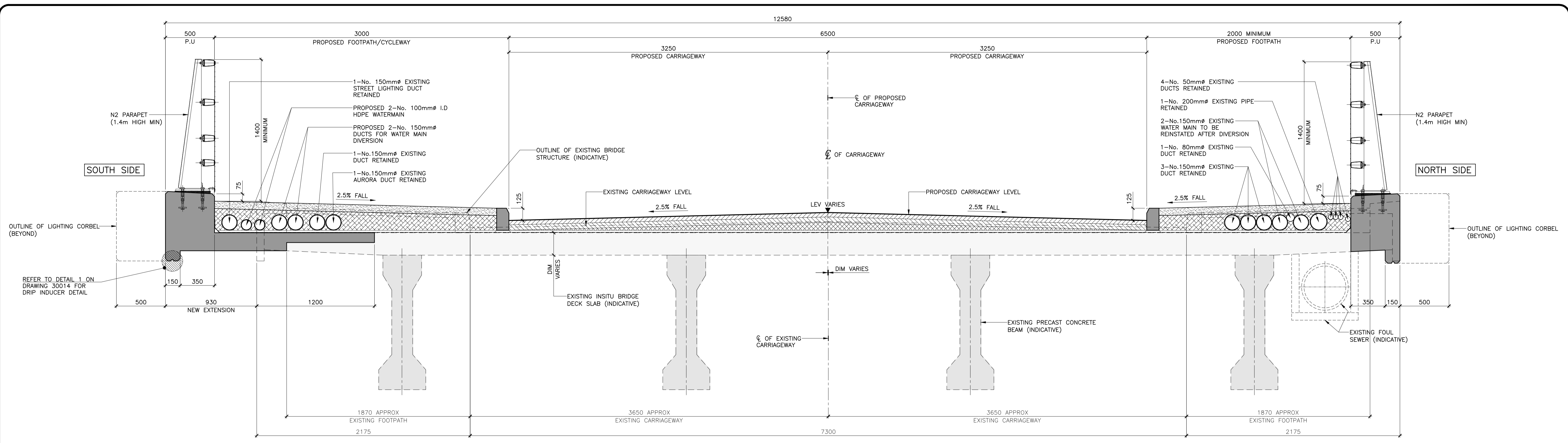
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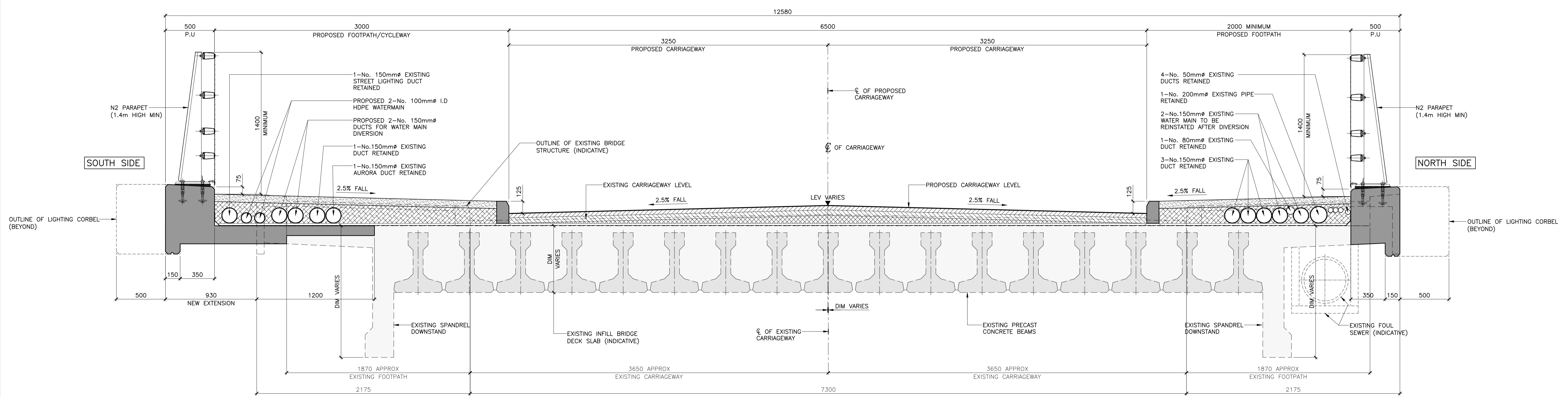
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ZZX	CH	MR	JK	S4 - Stage Approval

Project Stage	Preliminary				
Project Title	O'Hanrahan Bridge Widening Project				
Drawing Title	Proposed O'Hanrahan Bridge Plan & Elevation Sheet 02 of 02				
Drawing Number	WBRC	ROD	ENV	S101	DR - CB - 30008
Scale (A1)	As Shown	Date:	MAY 2022	Job No:	21.143
				Rev:	P0



SECTION A  
A1 SCALE 1:20  
A3 SCALE 1:40  
30012



SECTION B  
A1 SCALE 1:20  
A3 SCALE 1:40  
30012

- NOTES:
1. ALL DIMENSIONS IN MILLIMETERS, UNLESS OTHERWISE NOTED.
  2. ALL LEVELS ARE IN METRES TO ORDNANCE DATUM MALIN HEAD.
  3. ALL CO-ORDINATES ARE IN METRES TO IRISH TRANSVERSE MERCATOR (ITM).



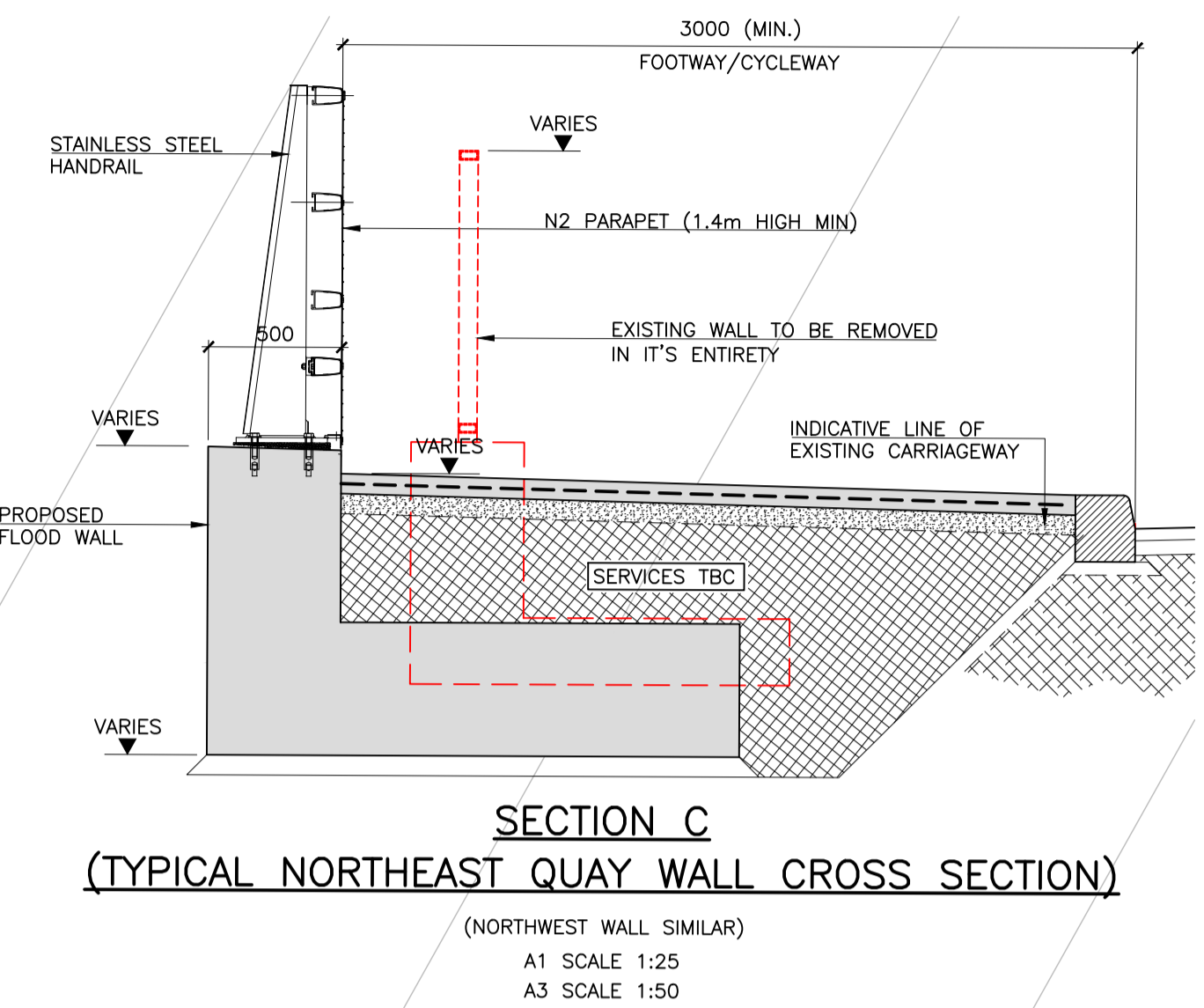
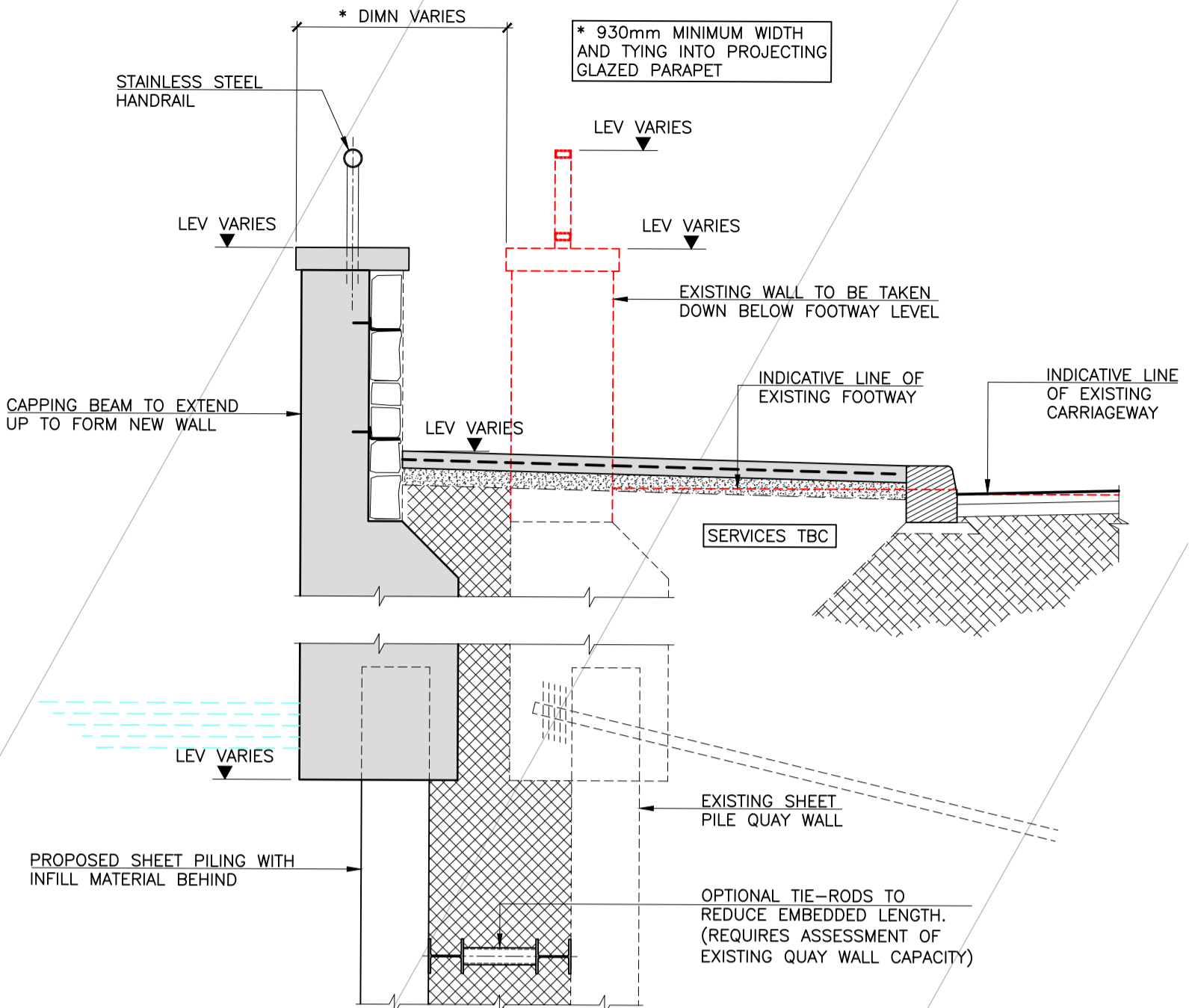
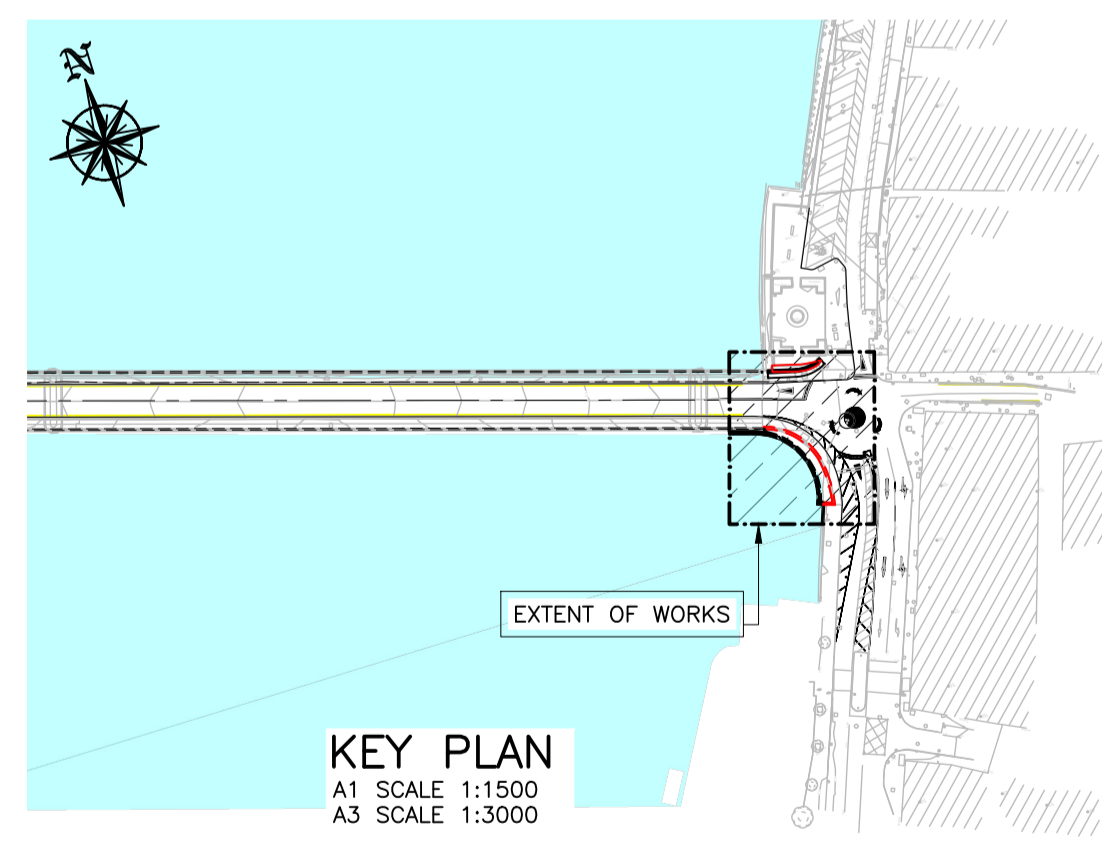
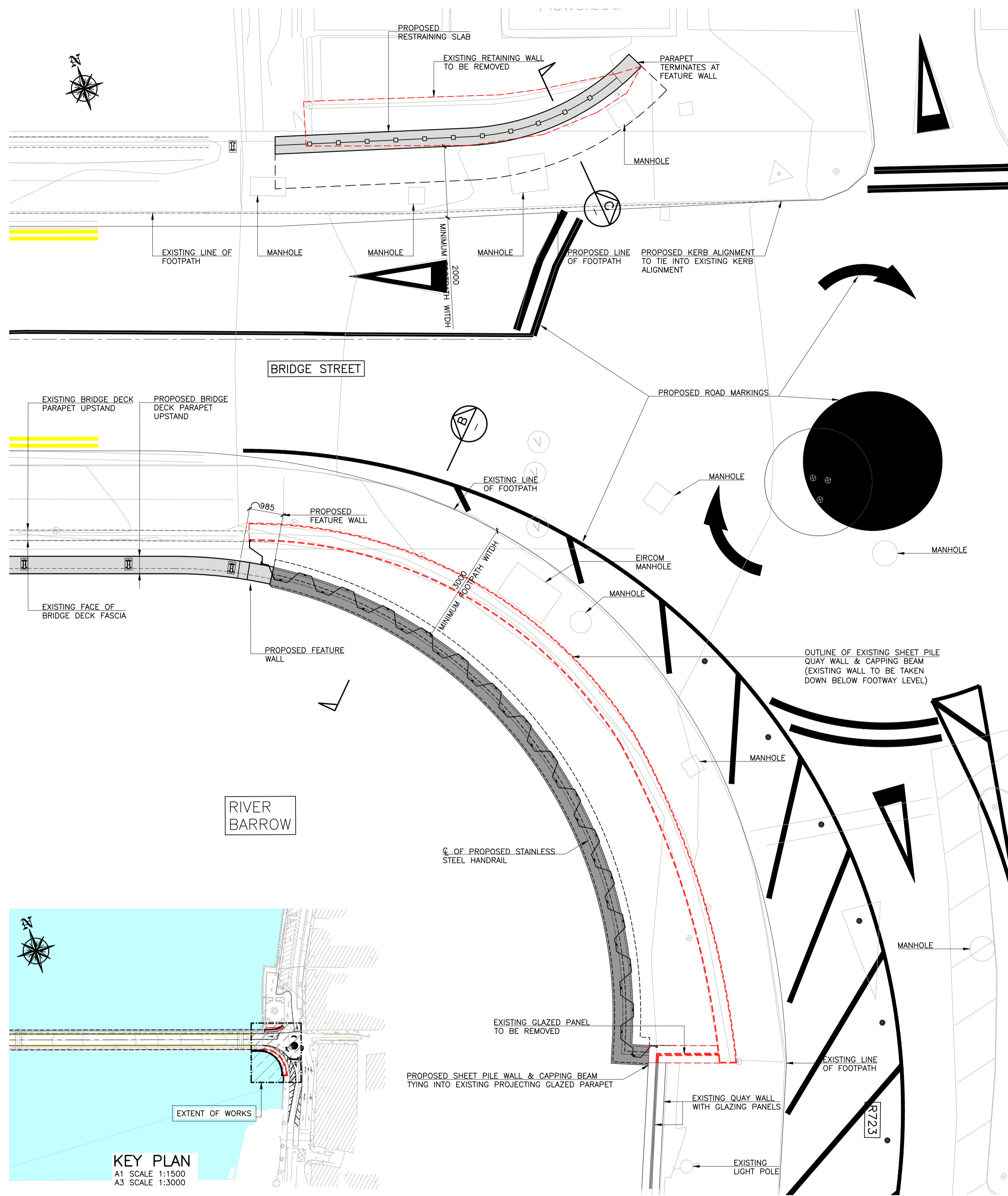
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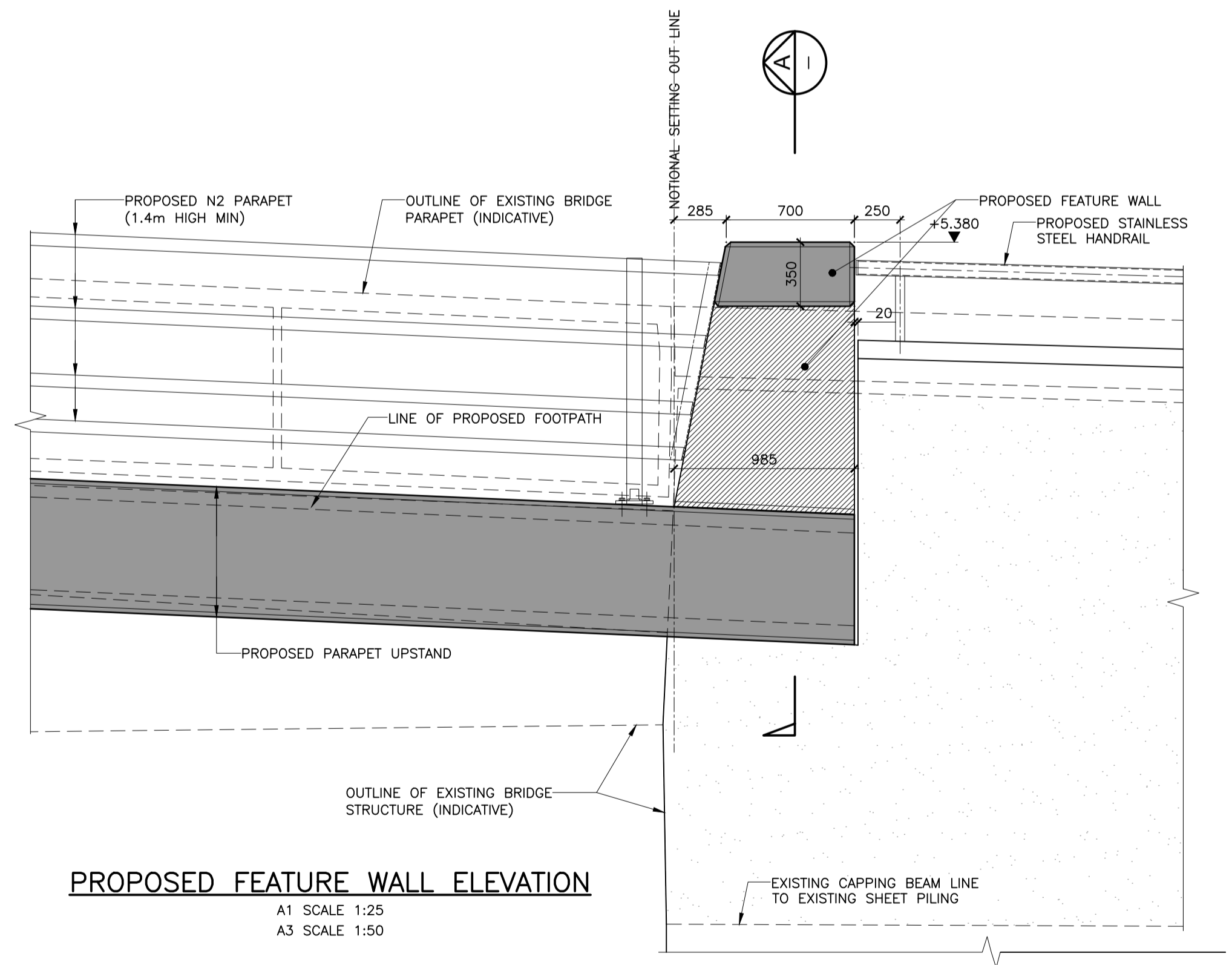
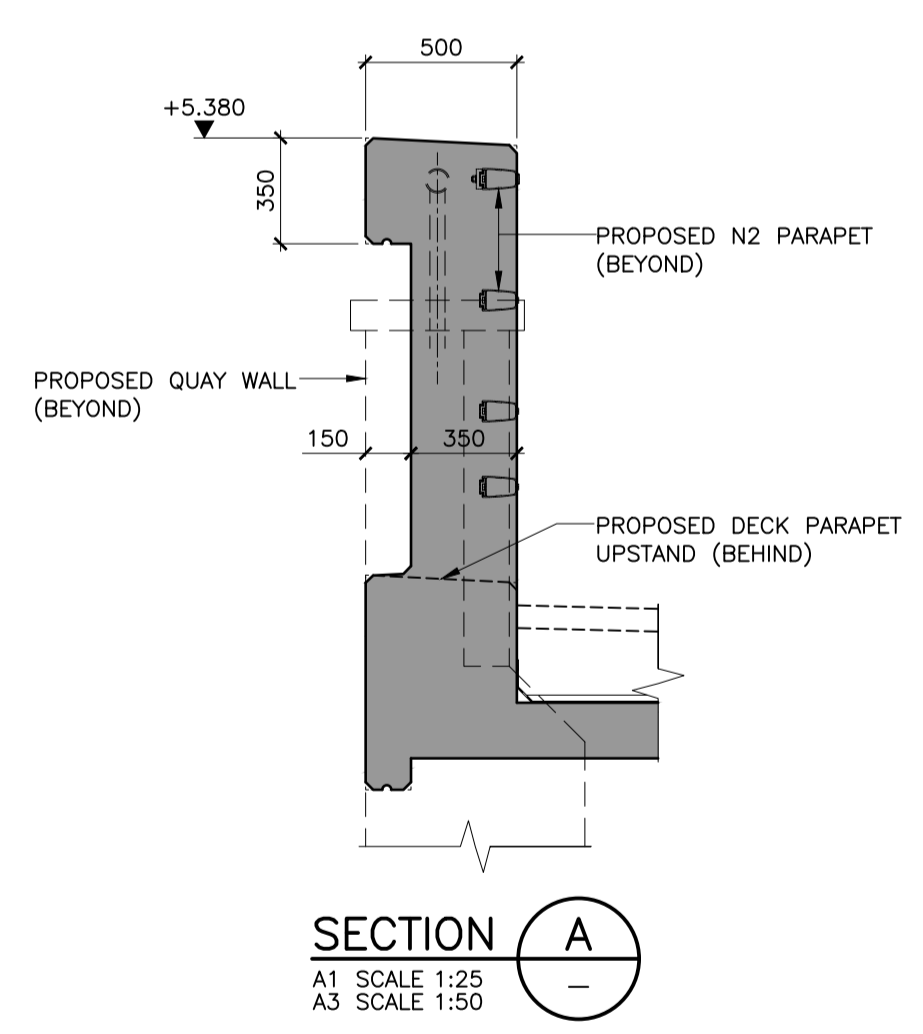
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OB	CH	MR	JK	S4 - Stage Approval

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Drawing Title	Proposed O'Hanrahan Bridge Deck Cross Sections				
Drawing Number	WBRC	ROD	ENV	S101	DR - CB - 30010
Scale (A1)	As Shown	Date:	MAY 2022	Job No:	21.143
				Rev:	P0



**SECTION B**  
(TYPICAL SOUTHEAST QUAY WALL CROSS SECTION)  
A1 SCALE 1:25  
A3 SCALE 1:50

**SECTION C**  
(TYPICAL NORTHEAST QUAY WALL CROSS SECTION)  
(NORTHWEST WALL SIMILAR)  
A1 SCALE 1:25  
A3 SCALE 1:50



**SECTION A**  
A1 SCALE 1:25  
A3 SCALE 1:50

**PROPOSED FEATURE WALL ELEVATION**  
A1 SCALE 1:25  
A3 SCALE 1:50

**PART PLAN – BRIDGE WIDENING & REMEDIAL WORKS TO EASTERN QUAY WALLS**  
A1 SCALE 1:75  
A3 SCALE 1:150

**NOTES:**  
1. REFER TO DRAWING WBRC-ROD-SBR-S101-DR-CB-30007 FOR GENERAL NOTES.



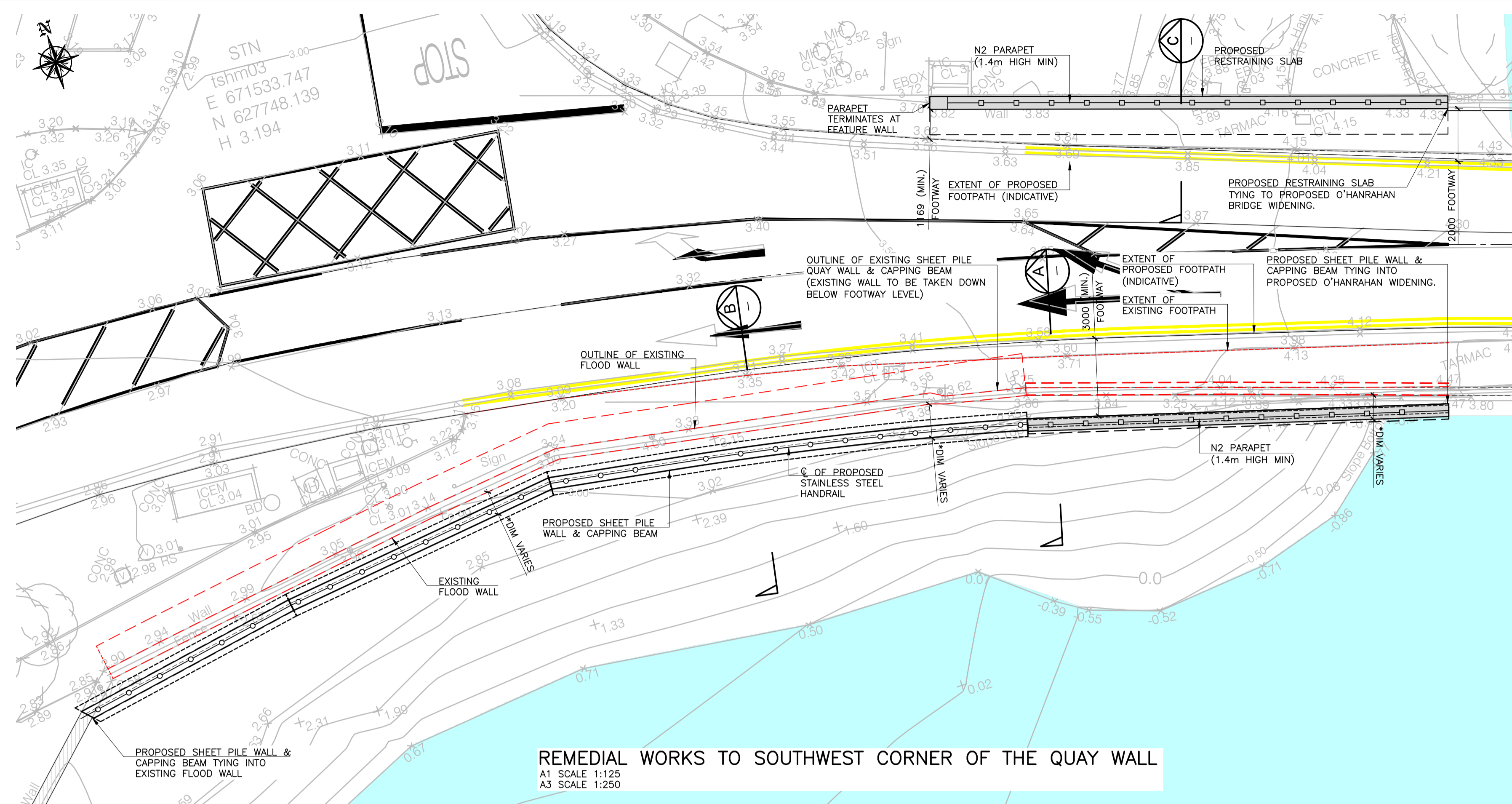
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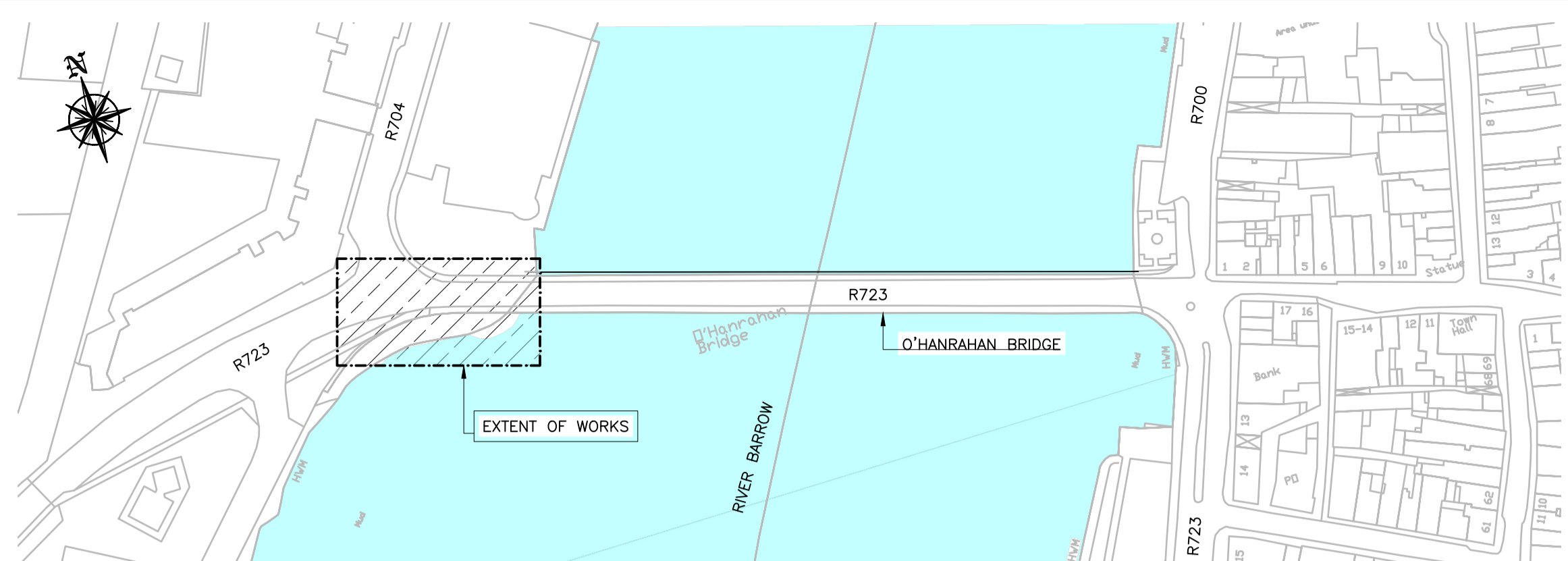
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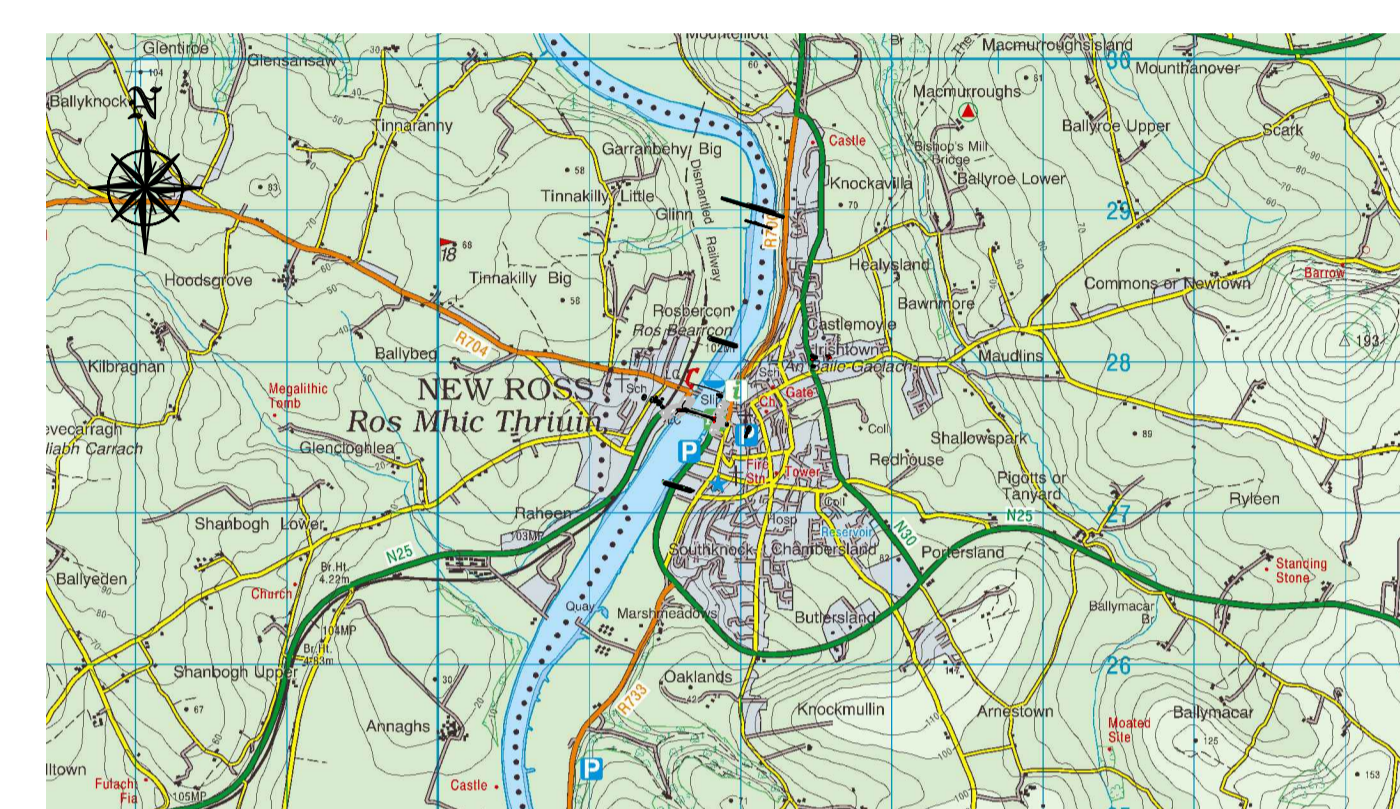
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Drawing Number	WBRC	ROD	SBR	S101	DR	CB - 30013
Scale (A1)	As Shown	Date:	Oct' 2021	Job No:	21.143	Rev: P0



**REMEDIAL WORKS TO SOUTHWEST CORNER OF THE QUAY WALL**  
 A1 SCALE 1:125  
 A3 SCALE 1:250



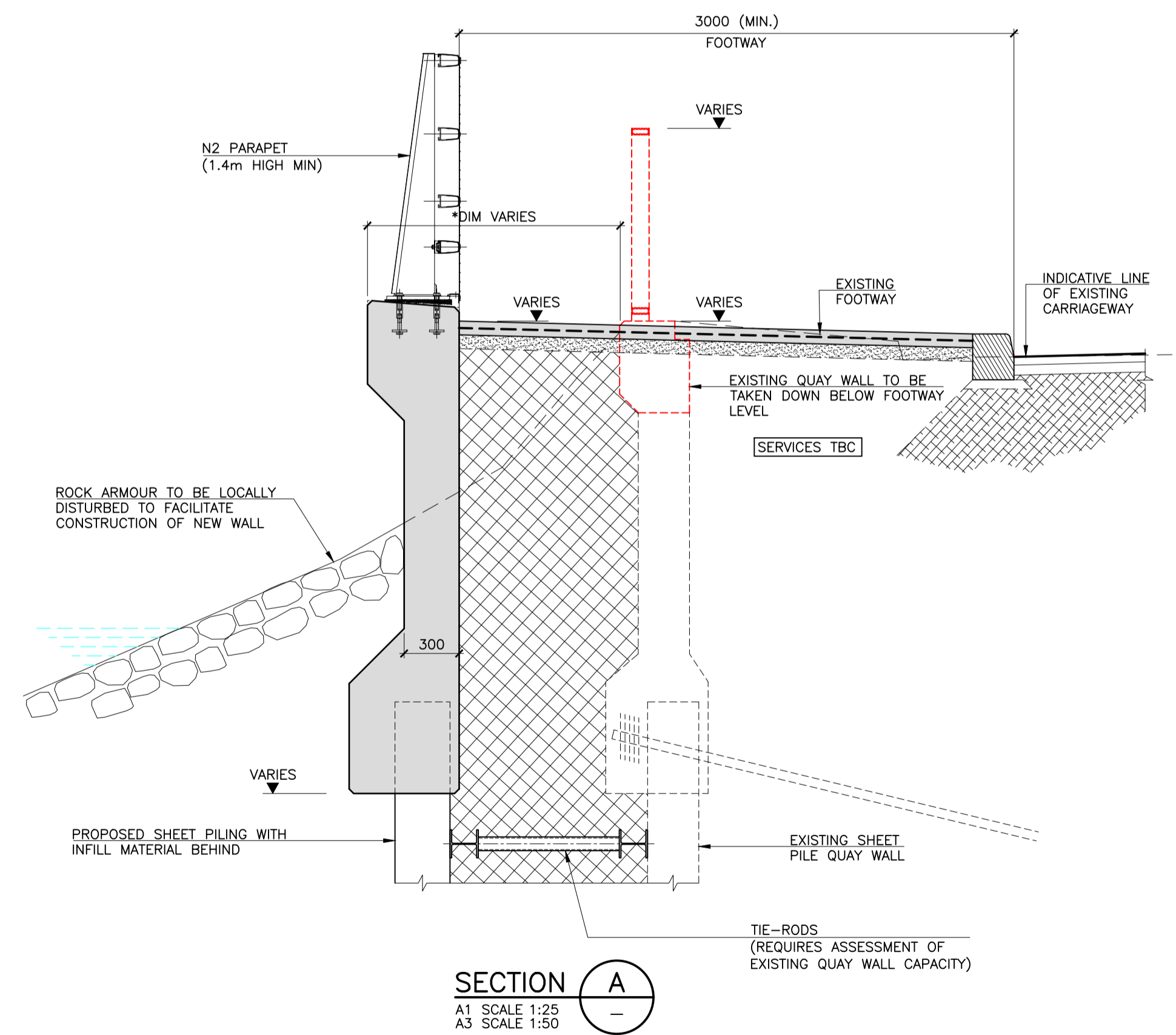
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 A3 SCALE 1:3000



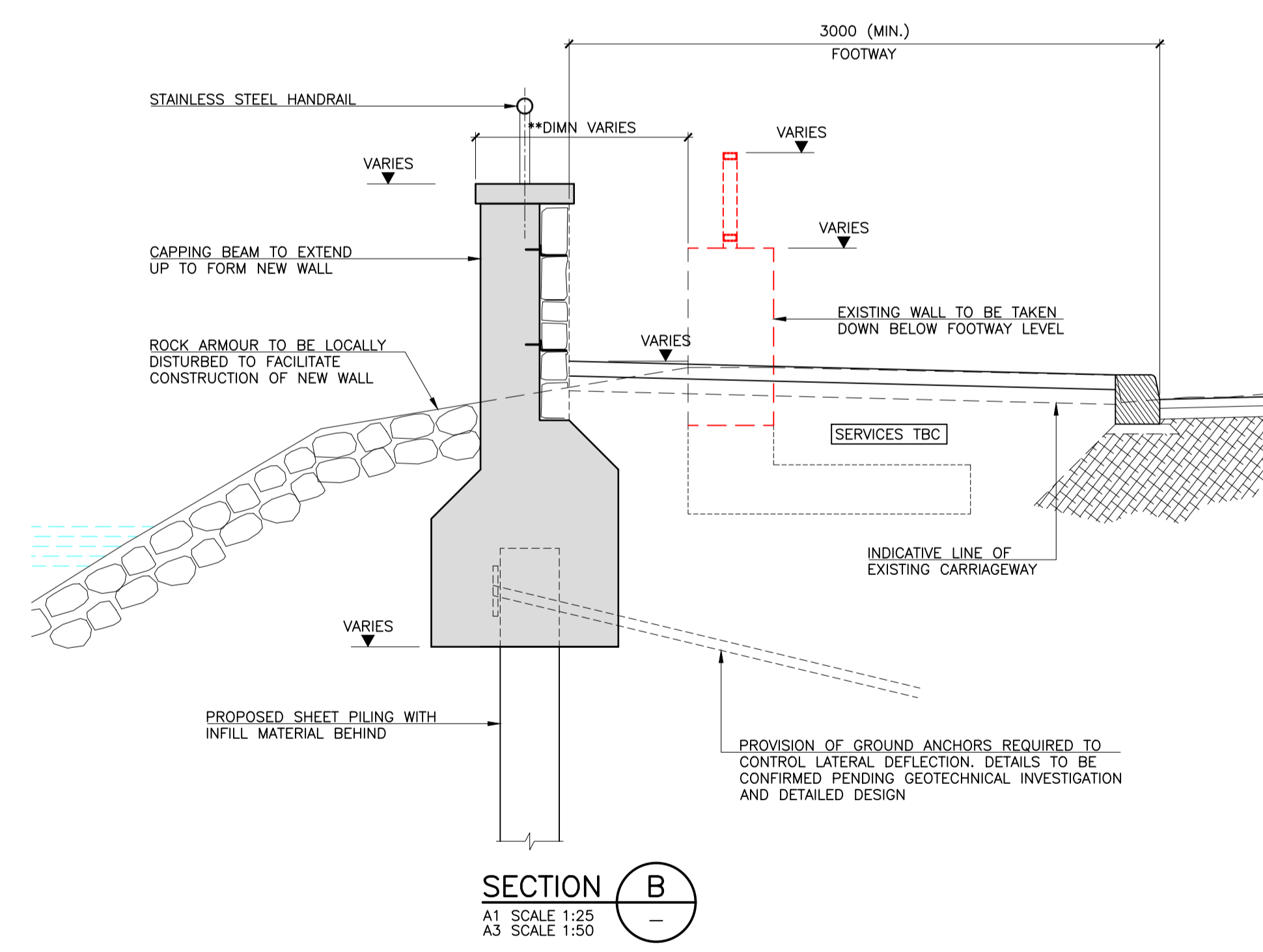
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 A1 SCALE 1:50000  
 A3 SCALE 1:100000

**NOTES:**

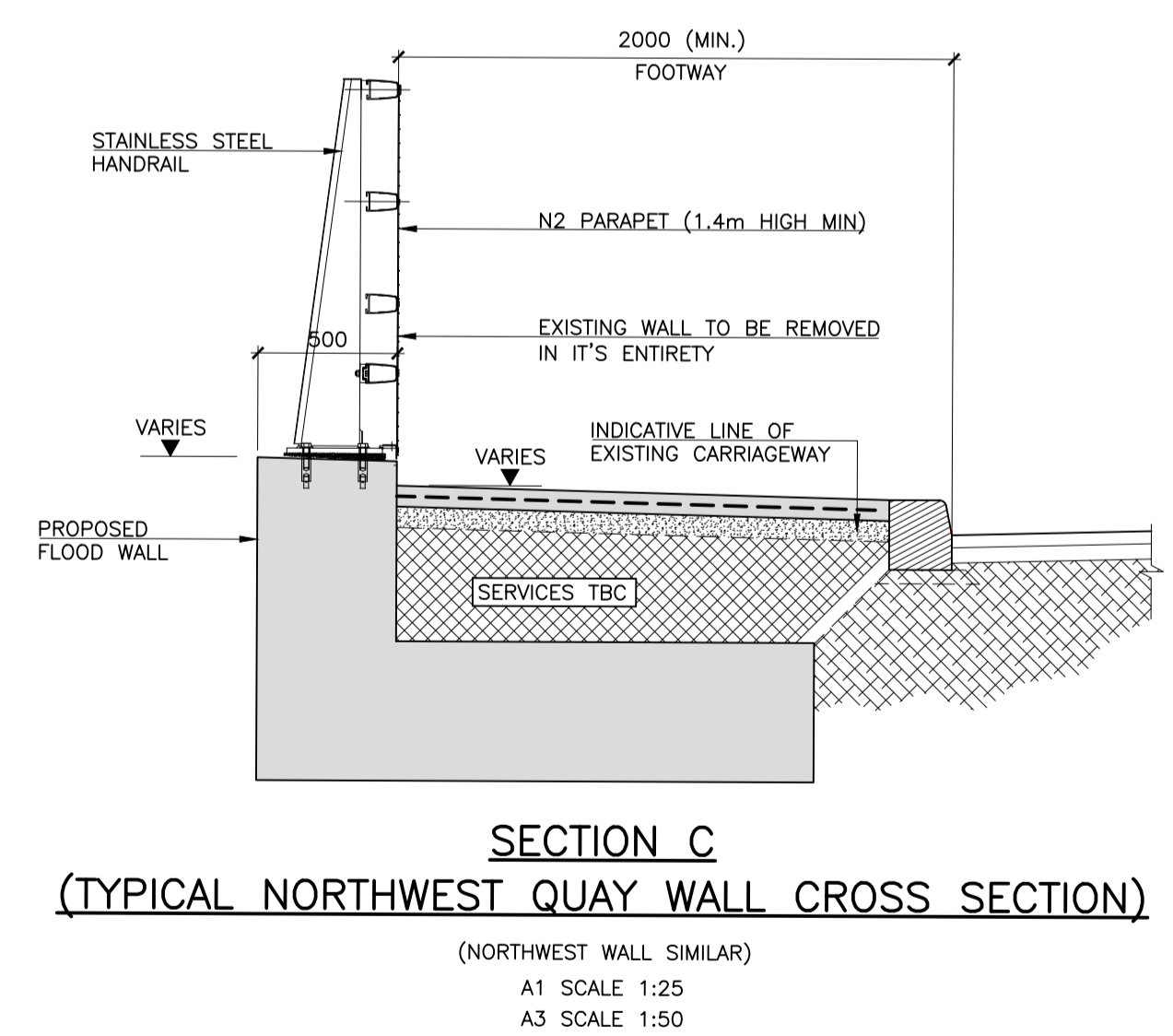
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3. ALL CO-ORDINATES ARE IN METRES TO IRISH TRANSVERSE MERCATOR (ITM).



**SECTION A**  
 A1 SCALE 1:25  
 A3 SCALE 1:50



**SECTION B**  
 A1 SCALE 1:25  
 A3 SCALE 1:50



**SECTION C**  
 (TYPICAL NORTHWEST QUAY WALL CROSS SECTION)  
 (NORTHWEST WALL SIMILAR)  
 A1 SCALE 1:25  
 A3 SCALE 1:50

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