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POINT BRIDGE AND TOM CLARKE BRIDGE WIDENING PROJECT

GROUND INVESTIGATION WORKS AND ENVIRONMENTAL SURVEYS

Natura Impact Statement

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Point Bridge and Tom Clarke Bridge Widening Project - Ground Investigation Works and Environmental Surveys

Natura Impact Statement

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1. INTRODUCTION

1.1 Background

Roughan & O'Donovan (ROD) was appointed by Dublin City Council (DCC) to prepare a Natura Impact Statement (NIS) in support of a licence application to the Maritime Area Regulatory Authority (MARA), for maritime usage. The subject of the licence application, the 'proposed works' comprises ground investigation works ("the GI works") and marine environmental surveys ("the environmental surveys") for the purposes of site investigation to inform the design of the proposed Point Bridge and Tom Clarke Bridge Widening Project in Dublin City.

As part of the maritime usage licence application, a Supporting Information for Screening for Appropriate Assessment (SISAA) Report was submitted. The SISAA Report is essentially an Appropriate Assessment (AA) Screening Report and serves the same function. The SISAA Report was intended to determine whether or not the GI works and the environmental surveys, 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 MARA, 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").

The report concluded that 'on the basis of objective information, that the works, either individually or in combination with other plans or projects, in view of best scientific knowledge, is not likely to give rise to impacts which would constitute significant effects in view of the Conservation Objectives of any European site'.

MARA, the Competent Authority for AA determination regarding the granting of maritime usage licences, made the determination that an appropriate assessment is required in respect of the licence application. The screening report prepared by MARA details the potential impacts to a number of Qualifying Interests of designated sites, namely pertaining to marine mammals (Harbour Porpoise, Common Bottlenose Dolphin, Harbour Seal and Grey Seal), by disturbance from underwater noise and to birds (various gull and seabird / coastal species) by visual and noise disturbance. Impacts to marine mammals were screened in for all designated sites within the management units for cetaceans and within the maximum foraging ranges for pinnipeds. Impacts to bird species were screened in for impacts to sites within the ranges of the QI species.

This document comprises the NIS in respect of the GI works and environmental surveys, together referred to as 'the proposed works' and has been prepared by ROD on behalf of DCC. It contains an examination, analysis and evaluation of the likely impacts from the proposed works, both individually and in combination with other plans and projects, in view of best scientific knowledge and the Conservation Objectives of the European sites concerned. It also prescribes appropriate mitigation to ensure that the proposed development will not adversely affect the integrity of those sites. Finally, it provides complete, precise and definitive findings which are capable of removing all reasonable scientific doubt as to the absence of adverse effects on the integrity of the European sites concerned and sets out detailed reasons which explains the basis for such findings.

1.2 Competent Experts

This Natura Impact Statement was prepared by Síofra Sealy and reviewed by Patrick O'Shea. Síofra is a Senior Ecologist with six years' experience in ecological consultancy. She holds a BA (Hons) degree in Natural Sciences (Zoology) from Trinity College Dublin and is an Associate Member of the Chartered Institute of Ecology and Environmental Management (ACIEEM).

Patrick O'Shea. is a Principal 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 CIEEM.

1.3 Legislative Context

Council Directive 92/43/EEC of the 21st May 1992 on the conservation of natural habitats of wild fauna and flora ("the Habitats Directive") and Directive 2009/147/EC of the 30th November 2009 on the conservation of wild birds ("the Birds Directive") list habitats and species which are 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 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* [or sites] *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* [...]*, 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* [...]*.*"

Further clarification on the use of mitigation measures was provided in *Eco Advocacy*[1], where the CJEU ruled that where constituent elements are incorporated into the design of a project as standard features required for all projects of that nature and not with the aim of reducing negative effects of a project on European sites, those features cannot be regarded as indicative of likely significant effects on European sites concerned and should not be interpreted as mitigation measures intended to avoid or reduce harmful effects of a plan or project on those European sites. The judgment stated that:

> "*In the light of the foregoing considerations, the answer to the fourth question is that Article 6(3) of the Directive 92/43 must be interpreted as meaning that, in order to determine whether it is necessary to carry out an appropriate assessment of the implications of a plan or project for a site, account may be taken of the features of that plan or project which involve the removal of contaminants and which therefore may have the effect of reducing harmful effects of the plan or project on that site, where those features have been incorporated into that plan or project as standard features, inherent in such a plan or project, irrespective of any effect on the site*."

1 Eco Advocacy v. An Bord Pleanála [2023] C-721/21

The requirements arising out of Article 6(3) are transposed into Irish law by Part XAB, including section 177AE, of the Planning and Development Act 2000 (as amended)), and in other circumstances by European Communities (Birds and Natural Habitats) Regulations 2011 as amended[2] (S.I. No.477 of 2011) (the Habitats Regulations), including Part 5 thereof.

The determination of whether or not a plan or project meets the two thresholds for requiring AA is referred to as "Stage 1" or "AA Screening". The first threshold is reached if the plan or project is not directly connected with or necessary to the management of one or more European sites. In its ruling in Waddenzee[3], the Court of Justice of the European Union (CJEU) interpreted the second threshold as being reached where "it cannot be excluded, on the basis of objective information, that [the plan or project] will have a significant effect on that site". Thus, in applying the Precautionary Principle, the CJEU interpreted the word "likely" to mean that, as long as it cannot be demonstrated that an effect will not occur, that effect is considered "likely". A likely effect is considered to be "significant" only if it interrupts or causes a delay in achieving the Conservation Objectives of the site concerned[4].

Prior to approval of a plan or project which is the subject of AA (also referred to as "Stage 2"), it is necessary to "ascertain" that the plan or project will not "adversely affect the integrity of the site". In its guidance document (EC, 2018), the European Commission stated that "*the integrity of a site involves its constitutive characteristics and ecological functions*" and that "*the decision as to whether it is adversely affected should focus on and be limited to the habitats and species for which the site has been designated and the site's conservation objectives*". Regarding the word "ascertain", the CJEU, also in Waddenzee, interpreted this as meaning "where no reasonable scientific doubt remains as to the absence of such effects". Therefore, the legal test at Stage 2 is satisfied (and the plan or project may be authorised) when it can be demonstrated beyond reasonable scientific doubt that the plan or project will not interrupt or cause delays in the achievement of the Conservation Objectives of the site or sites concerned. AA is informed by a "Natura Impact Report" (NIR) in the case of plans or a "Natura Impact Statement" (NIS) in the case of projects.

The CJEU has made a relevant judgment on what information should be contained within documents supporting AA[5] (in the NIR or NIS):

> "[The AA] *cannot have lacunae and must contain complete, precise and definitive findings and conclusions capable of removing all reasonable scientific doubt as to the effects of the works proposed on the protected site concerned*."

The High Court and Supreme Court[6] have also provided clarity on how competent authorities should undertake AA[7] and has stated that the following four matters require to be addressed:

[2] Including inter alia S.I. 290 of 2013; SI 499 of 2013; SI 355 of 2015; the Planning, Heritage and Broadcasting (Amendment) Act 2021, Chapter 4; SI 293 of 2021.
[3] Landelijke Vereniging tot Behoud van de Waddenzee, Nederlandse vereniging tot Bescherming van Vogels *v.* Staatssecretaris van Landbouw, Naturbeheer en Visserij (Waddenzee) [2004] C-127/02 ECR I-7405.
[4] Conservation Objectives are referred to, but not defined, in the Habitats Directive. In Ireland, Conservation Objectives are set for Qualifying Interests (the birds, habitats or other species for which a given European site is selected) and represent the overall target that must be met for that Qualifying Interest to reach or maintain favourable conservation condition in that site and contribute to its favourable conservation status nationally.
[5] Sweetman v. An Bord Pleanála [2013] Case C-258/11.
[6] See Kelly (Eoin) v An Bord Pleanála [2014] I.E.H.C. 400 where the High Court (Finlay Geoghegan J.) held that section 177V(1) of the Planning and Development Act 2000 (as amended) must be construed so as to give effect to Article 6(3) of the Habitats Directive, and hence, an appropriate assessment carried out under section 177V(1) of the 2000 Act must meet the requirements of Article 6(3) of the Habitats Directive as interpreted by jurisprudence of the CJEU case law; Connelly v An Bord Pleanála [2018] 2 I.L.R.M 453; [2018] I.E.S.C. 31.
[7] Kelly v. An Bord Pleanála [2014] I.E.H.C. 422.

- First, an appropriate assessment must identify, in the light of the best scientific knowledge in the field, all aspects of the development project which can, by itself or in combination with other plans or projects, affect (a) European site(s) in the light of its conservation objectives;
- Second, there must be complete, precise and definitive findings and conclusions regarding the previously identified potential effects on any relevant European site(s) and may not have lacunae or gaps. The requirement for precise and definitive findings and conclusions requires analysis, evaluation and decisions. Further, the reference to findings and conclusions in a scientific context requires both findings following analysis and conclusions following an evaluation each in the light of the best scientific knowledge in the field;
- Third, on the basis of those findings and conclusions, the Competent Authority (here; MARA must be able to determine that no scientific doubt remains as to the absence of the identified potential effects;
- Fourth, where the aforesaid three requirements are satisfied, MARA may determine that the proposed development will not adversely affect the integrity of any relevant European site. Accordingly, an appropriate assessment may only include a determination that the proposed development will not adversely affect the integrity of any relevant European site where upon the basis of complete, precise and definitive findings and conclusions made, An Bord Pleanála decides that no reasonable scientific doubt remains as to the absence of the identified potential effects.

1.4 Methodology

In accordance with the requirements for AA, this NIS assesses the likely effects of the proposed development on the integrity of the European sites "screened in" at Stage 1. This assessment is undertaken in six steps, as follows:

1. Step 1 involves gathering all of the information and data that will be necessary for a full and proper 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 or invasive species present or likely to be present, and the details of the European sites within the zone of influence.
2. Step 2 involves examination of the information gathered in the first step and detailed scientific analysis of the effects of the plan or project on the ecological structure and function of the receiving environment, focussing on European sites.
3. Step 3 evaluates the effects analysed in Step 2 against the Conservation Objectives of the relevant European site or sites, thereby determining whether or not they constitute adverse effects on site integrity.
4. Having established that the plan or project will adversely affect the integrity of one or more European sites, Step 4 involves the development of appropriate mitigation, including, where appropriate, monitoring and enforcement measures, to eliminate or minimise those effects such that they no longer constitute adverse effects on the integrity of the site(s) concerned, as well as consideration of the significance of any residual (post-mitigation) effects.
5. Step 5 involved the assessment of the significance of any residual effects arising from the proposed development in combination with other plans or projects.
6. Step 6 involves the final determination of whether or not the plan or project will adversely affect the integrity of one or more European sites. Notwithstanding the final recommendation made in the NIS, the responsibility for completing this step lies solely with the Competent Authority.

The following guidance documents informed the assessment methodology:

- European Commission (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.
- 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. Department of the Environment, Heritage and Local Government, Dublin.
- Office of the Planning Regulator (OPR (2021) *Appropriate Assessment Screening for Development Management*. Office of the Planning Regulator, Dublin.

1.5 Ecological Assessment

In order to fully inform this NIS, it was necessary to establish the baseline ecological conditions in the receiving environment, particularly with regard to European sites. This was achieved by undertaking desktop studies, carrying out field surveys and engaging in consultations with the relevant stakeholders, including the National Parks & Wildlife Service (NPWS) and Inland Fisheries Ireland (IFI).

1.5.1 Desk Study

During the desk study, the statutory consultee, the NPWS, provided data on designations of sites, habitats and species of conservation interest. This included reports pursuant to Article 17 of the Habitats Directive[8] (NPWS, 2019a, b, c) and Article 12 of the Birds Directive (Eionet, 2018)[9], as well as the Site Synopses, and Conservation Objectives (including supporting documents) for the relevant European sites.

The desk study involved thorough reviews of existing information relating to ecology in the vicinity of the proposed works. A number of web-based geographic information systems (GISs) were used to obtain information relating to the natural environment surrounding the proposed works. These included the NPWS *Map Viewer* (NPWS, 2024), which provided information on the locations of protected sites, the National Biodiversity Data Centre's *Biodiversity Maps* (NBDC, 2024), which provided recent and historic records of protected species in the area, and Ordnance Survey Ireland's *GeoHive*, which provided additional information on the wider environment. Only species that are relevant to this NIS are included in Section 2.5

Other resources used during the desk study included the following:

- Environmental Protection Agency (EPA) Unified GIS Application provided data in relation to the Water Framework Directive Risk/Status of waterbodies in the zone of influence.

[8] 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.
[9] 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 2008-2012.

- The planning application for the BusConnects Ringsend to City Centre Core Bus Corridor (CBC) Scheme (ABP Case Ref: HA29N.317679)
- Surveys undertaken by ROD to inform the nearby proposed Dodder Public Transportation Bridge Opening Bridge (DPTOB) (ROD, 2021). This project was incorporated into the BusConnects Ringsend to City Centre Core Bus Corridor (CBC) Scheme (above).
- Trituris (2019). Dublin City otter survey. Report prepared by Triturus Environmental Ltd. for Dublin City Council as an action of the Dublin City Biodiversity Action Plan 2015- 2020.

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.

The desk study findings are presented in Section 2.3 Receiving Natural Environment.

1.5.2 Consultations

Consultations were not carried out for the works proposed as part of the maritime usage licence (GI works and environmental surveys); however consultations were carried out for the proposed Point Bridge and Tom Clarke Widening Project (subject to a MAC licence and separate NIS). The proposed works (subject of this NIS) are required to inform the design of the Point Bridge and Tom Clarke Widening Project and therefore the consultation for the Point Bridge and Tom Clarke Widening Project are also relevant to this NIS. A summary of these consultations relevant to Appropriate Assessment is presented in Table 1-1 below. All issues raised by the consultees relevant to the proposed works have been addressed in this NIS as far as possible.

Consultation allowed for in-depth discussion of ecological sensitivities at the site of the proposed works and discussion of how the potential adverse effects could be mitigated.

Table 1-1 Details of Consultations

Consultee	Date	Summary of Response
National Parks & Wildlife Service (NPWS) / Development Application Unit (DAU)	19th August 2024	NPWS was invited to provide observations relating to the proposed Point Bridge and Tom Clarke Widening Project The DAU made the following observations: • With regard to the proposed construction of the new Point Bridge for pedestrians and cyclists and the widening of the Tom Clarke Bridge, the Department's principal concerns regarding these projects from a nature conservation perspective relate to their potential effects on otter and various bat species, which are included in Annex IV of the Habitats Directive (92/43/EEC) and therefore subject to a system of strict protection under this Directive, and known to forage regularly in the vicinity of the proposed sites of the projects. • As Roughan & O'Donovan will be aware from the otter surveys undertaken by Triturus Ltd in connection with the Royal Canal Greenway projects and on which Roughan & O'Donovan have been employed as consultants, an active otter holt has been recorded in recent years in the North Wall Quay, and other survey work carried out by Triturus for

Consultee	Date	Summary of Response
		Waterways Ireland in connection with the restoration of the Camden Lock which leads from the Grand Canal Basin into Dodder-Liffey confluence has identified a second active holt near this lock, as well as additional evidence of otter usage of the Grand Canal Basin. Otter spraint in the past has also been recorded in the environs of Tom Clarke Bridge. Similarly, bat surveys carried out in connection with various development projects have recorded several species of bats foraging over the Dodder-Liffey confluence and the Grand Canal Basin. Fresh otter and bat surveys of the surrounds of Tom Clarke Bridge and the site of the proposed Point Bridge should therefore be undertaken in order to establish current usage by otter and bat species of these areas and the potential effects during both their construction and operational phases of the planned bridge projects on these species. • Atlantic salmon and lamprey species are species included in Annex IV to the Habitats Directive which are known to migrate into and out of the Liffey system from and to the sea, and the potential effects of the proposed bridge projects on the movements of these species should consequently be evaluated as well. • Small numbers of common tern nest in most years between the Camden and Westmoreland Locks at the entrance to the Grand Canal Basin from the Dodder-Liffey confluence, and black guillemots nest in both the north and south Liffey Quays. Any possible effects of the proposed bridge projects on these and other bird species occurring in their vicinity should be assessed too. • Regarding Appropriate Assessment (AA), it is noted that in Section 3.4 of the EIA Scoping Report prepared in relation to the bridges projects it was concluded that they could potentially result in significant effects on the South Dublin Bay and River Tolka Estuary Special Protection Area (SPA), the North Bull Island SPA, Howth Head SPA and the North-west Irish Sea SPA, the North Dublin Bay Special Area of Conservation (SAC) and Rockabill to Dalkey Island SAC. In line with the AA carried out with the Bus Connects Ringsend to Dublin City Centre Core Bus Corridor Scheme, it is recommended that AA for the bridges projects should also consider their potential effects on otter as a Qualifying Interest (QI) species for the Wicklow Mountains SAC which includes the headwaters of the River Dodder in Glenasmole, because the range of at least male otters frequenting the latter water course could possibly stretch from the Liffey to its headwaters in that SAC. • Particular attention when undertaking EIA and AA of the construction of the proposed Point Bridge and widening of Tom Clarke Bridge should be paid to the possible in-combination effects on flora and fauna of these projects with the construction of the bridge from Sir John Rogerson's Quay across the Dodder-Liffey confluence to the Poolbeg Peninsula as part of the Ringsend to City Centre Bus Connects Scheme referred to above, which was recently granted permission by An Bord Pleanála, and the new Port Access Bridge to be built across the Liffey immediately downstream of Tom Clarke Bridge by Dublin Port Company as part of their 3FM Project

Consultee	Date	Summary of Response
		which the company applied to the Board for permission for at the end of July (ABP-320250-24).
Inland Fisheries Ireland (IFI)	17th July 2024	IFI made the following observations following a request for a preplanning consultation: • Consideration for the potential for suspended solids to enter the waterbody. • The Liffey represents an important salmonid system with excellent populations of Atlantic salmon, Sea trout and Brown trout throughout. Both migratory and resident fish groups utilise coastal habitat in the vicinity of the proposed development at some time during their life cycle. In addition to a summer run of Salmon, Grilse & Sea trout, the Liffey system is also known to contain populations of all three species of Lamprey found in Ireland. All three Irish Lamprey species are listed as Annex II species under the EU Habitats Directive. • Migratory Atlantic salmon, Sea trout, and Lamprey (juvenile fish on their seaward run and adult fish returning from the sea to spawn) have to pass through the Liffey Estuary /Dublin Harbour to reach the sea or return to their spawning grounds. Large numbers of eels also migrate through this area. Estuaries / transitional waters include a variety of different habitats. Their importance to fisheries relates to the fact that migratory fish must pass through these zones on their passage to / from the sea, while such transitional waters also act as important spawning / nursery areas for a wide variety of different marine fish species. • Ground and seabed preparation and associated construction works, including dredging, topographic alteration have significant potential to cause the release of sediments and pollutants into surrounding waters. Pollution of the adjacent coastal waters from poor on-site construction practices could have a significantly negative impact on the fauna and flora of surface waters in this area. High levels of suspended solids settling on the seabed can alter habitats resulting in potential loss of feeding, nursery and spawning grounds for fish. All measures necessary should be taken to ensure protection of local aquatic ecological integrity, in the first place by complete impact avoidance and as a secondary approach through mitigation by reduction and remedy. • Foreshore works should be designed and implemented in an ecologically sound and sustainable way involving consultation with IFI. Method statements should be submitted to IFI for approval in advance of any "in-stream" works of any kind. Consultation should be undertaken with IFI in relation to any application for a Section 4 licence for discharge of effluent to surface waters. • Concrete / cement and other construction materials can be highly toxic to aquatic life. Use of these elements should be strictly controlled and monitored with appropriate licensing where applicable, particularly where batching / casting is planned locally. Implementation of comprehensive environmental management planning systems is essential for all construction activities.

Consultee	Date	Summary of Response
		• Because of the importance of the Liffey river system it is recommended that the "Guidelines on protection of fisheries during construction works in and adjacent to waters" (2016) http://www.fisheriesireland.ie/fisheries-management-1/624-guidelines-on-protection-of-fisheries-during-construction-works-in-and-adjacent-to-waters should be consulted when planning to undertake works. • Pre-construction baseline data (biotic and abiotic) is essential within the EIA process and IFI would be delighted to contribute any information that may be relevant to the fishery section. A previous transitional water survey was carried out by IFI in 2010. This will provide a list of species identified in the Liffey estuary and can be found at: http://www.wfdfish.ie/wpcontent/uploads/2011/11/Liffey_estuary_report_2010.pdf • Potential impacts (likely and significant effects) of the development on the system should be comprehensively assessed and recommendations and mitigation measures should formulated. The identification of good baseline data across a range of sites, both close to the development and at a distance from the site will allow for comparison between the current situation and that which may develop over time if the project proceeds. Consultation between the project team and IFI will be essential in order that a fisheries-sustainable solution is arrived at and incorporated in the final works programme.

1.5.3 Field Surveys

The ecological surveys which were carried out to inform the proposed works are presented in Table 1-2. The surveys which are relevant to Appropriate Assessment and detailed further in this NIS are indicated. Those surveys which are not relevant to Appropriate Assessment, i.e. those which do not concern habitats and species protected under the Habitats Directive, have been excluded.

Table 1-2 Ecological survey dates and relevance to AA.

Survey	Survey Date	Informed Appropriate Assessment
Wintering birds	February, October, November, December 2022, January 2023.	Yes
Breeding birds	July 2022	Yes
Bats	June 2022	No
Habitats	July 2022	Yes
Invasive species	July 2022	Yes
Otter	February 2022 and 2024	Yes
Badger and other mammals	February 2022	No

The surveys adhered to the following guidelines:

- *Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna on National Road Schemes* (TII, 2009a);
- *Best Practice Guidance for Habitat Survey and Mapping* (Smith *et al*., 2011);

- *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (4th Edition). The Bat Conservation Trust, London (Collins, J. (Ed.), 2023);
- *Guidelines for the Treatment of Otters prior to the Construction of National Road* Schemes (TII, 2008a);
- *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (TII, 2009b).

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 works was a material consideration in the planning and execution of the ecological surveys. The surveys with relevance to the NIS are described below.

1.5.3.1 Study Area

The study area for the field surveys to inform the proposed works included the area up to 150m for habitats, mammals and breeding birds. The area up to 550m was used for wintering bird surveys.

1.5.3.2 Habitats

The habitat survey was undertaken as part of a multidisciplinary walkover survey on 1st July 2022. 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 150m buffer around the proposed works was systematically and thoroughly walked, and all 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.

1.5.3.3 Otter

Otter surveys were undertaken on the 25th of February 2022 and 13th February 2024, adhering to best practice guidelines (TII, 2008a & b), and involved a systematic search of the entire study area for signs of otter activity (prints, spraints, trails, holts, couches, slides, feeding remains etc.). The survey was carried out up to 150m surrounding the proposed works.

1.5.3.4 Birds

Wintering Birds

Point count surveys were carried out during the 2022/2023 wintering bird season. The aim of the surveys was to characterise the use of the study area by wintering birds. The surveys covered the area within 800 m of the proposed works. The surveys were undertaken in accordance with Gilbert et al. (1998) and utilised the 'look-see' methodology. Surveys were timed to cover a range of tidal conditions, including spring and neap tides, with a particular focus on low tides as intertidal mudflats are exposed during extreme low tides. During each survey, bird species, location, numbers and behaviour were recorded.

Wintering bird surveys were carried out between February 2022 and January 2023 during February, October, November, December and January. The schedule of surveys is outlined in Table 1-3 below.

Table 1-3 Wintering Bird Survey Schedule

Date	Tidal State
25th February 2022	Low Tide
11th October 2022	Low Tide
17th November 2022	Low Tide
20th December 2022	Low Tide
24th January 2023	Low Tide

1.5.3.5 Invasive Alien Plant Species

An invasive species survey was undertaken on 1st July 2022. 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.

1.5.4 Ecological Assessment

Once established, the ecological baseline in the receiving environment was used to inform the assessment of the likely ecological effects of the proposed works, particularly with regard to European sites. Any assumptions that had to be made in view of gaps in the ecological data or other information were made in strict accordance with the Precautionary Principle. The results of the desk study and field surveys are presented in Section 2.3 Receiving Environment.

2. DESCRIPTION OF THE PROPOSED WORKS

2.1 Environmental Surveys

2.1.1 Gas Main Survey

Acoustic sub-bottom profiling and marine magnetometer surveys are proposed for the detection of the buried infrastructure and to locate metallic objects on the riverbed. A survey vessel (a small rigid inflatable boat) will be used to transport both sets of apparatus over the survey area. The proposed surveying equipment comprises of a "Innomar Standard Sub-bottom Profiler" and "Geometrics G-882 Marine Magnetometer" or equivalent.

2.1.2 Inspection of North Wall Quay Wall and Tom Clarke Bridge Piers

A Norbit Winghead High Frequency Scanning Multibeam Echo Sounder or equivalent will be mounted on the survey vessel. The multibeam system will provide a detailed topographical survey of North Wall Quay river wall and Tom Clarke Bridge piers below the water line for inspection purposes.

2.1.3 Structural inspection works for Tom Clarke Bridge

Structural inspection works at Tom Clarke Bridge piers will consist of a dive survey and a survey of the pier concrete above the water. The dive survey will involve a visual condition survey of the visible sections of piles and underwater ultrasonic testing to determine the thickness of the steel pile wall. The above-water survey of the pier concrete will involve chloride testing (depth of ingress into the concrete cover) and defects mapping of the concrete substructures (including the bascule pier).

2.1.4 Inspection of Quay at the end of Thorncastle Street

The proposed structural inspection works will include an underwater point cloud survey undertaken in the vicinity of the existing quay wall at the end of Thorncastle Street in Ringsend, Dublin at the confluence of the Rivers Dodder and Liffey to examine the existing wall condition. There will be no excavations / soil disturbance / structures erected in the maritime area for these survey works.

2.2 Ground Investigations (GI works)

2.2.1 Overview

The ground investigation works will include slit trenching and 8 no. boreholes (7 no. in the River Liffey) in the form of rotary core and Geobore S drilling as detailed in Table 2-1. Concrete coring will also be required to confirm the thickness of the existing mass concrete slab at the Tom Clarke Bridge bascule pier. A piezometer will be installed in the land-based borehole in order to monitor groundwater levels.

2.2.2 Location

The proposed in-river investigation works will be undertaken within a tidal reach of the River Liffey and in close proximity to the upstream side of the existing Tom Clarke Bridge structure, protective dolphins, and the quay near Thorncastle Street. The works are also in close proximity to the St Patrick's Rowing club floating pontoon and the high-pressure gas main which passes underneath the Liffey to the west of Tom Clarke bridge. The land-based investigation works are located on the existing North Quay Wall Campshires adjacent to the historic quay wall and the structure supporting the left turn lane from Tom Clarke bridge to North Wall Quay road.

2.2.3 Outline of the Works

2.2.3.1 General Layout

The scope of the works envisaged under this ground investigation is as follows:-

a) High Frequency Scanning Multibeam Echo Sounder survey, Acoustic sub-bottom profiler survey, underwater ultrasonic testing, magnetometer survey and point cloud surveying techniques;

b) Geobore S drilling, sampling and *in situ* testing;

c) Rock coring, proving rock to a specified depth and *in situ* testing;

d) Slit trenching, sampling and *in situ* testing;

e) Concrete Coring;

f) Monitoring of groundwater levels in standpipes and piezometers;

g) Detailed borehole and coring;

h) Sampling to IS EN 22475-1 requirements, predominantly providing Category A samples for laboratory testing of strength and stiffness;

i) Logs as described in IS EN14688-1; IS EN1489-1; and BS5930 and the specification;

j) The ground investigation should be carried out in accordance with British Standard 10175:2001, Investigation of Potentially Contaminated Sites: Code of Practice and the EPA Landfill Manual: Investigations for landfill.

k) Specific slit trenches, probes or sediment grab samples to be carried out for the purpose of contamination assessment, waste classification and offshore marine disposal of excavated spoil plus laboratory testing of soil and ground water samples for engineering properties, behaviour and suitability for reuse as engineering fill;

l) Laboratory testing of rock samples for engineering properties, behaviour and suitability;

m) Laboratory testing of soil and ground water samples for environmental contamination, waste classification and offshore marine disposal of excavated spoil;

n) Preparation of detailed Main Factual Report as per S1.21.8 and cl 16.8 of the Specification, together with the production of Digital Data to AGS Format as per S1.21.10 and cl. 16.5;

o) Preparation of an interpretive Ground Investigation Report in accordance with IS EN1997-2, Section 6 as per S1.21.9;

p) Preparation of a Contamination Assessment Report in accordance with the EPA document '*Environmental Risk Assessment for Unregulated Waste Disposal Sites (2007)*' as per Cl 1.21.9.

q) Preparation of a Waste Classification Assessment and reporting of acceptability of materials for disposal as inert, non-hazardous or hazardous wastes to landfill facilities in accordance with the Commission Decision of 18 December 2014 and EU Commission Regulation No 1357/2014;

r) Assessment of river bottom sediment samples for potential offshore marine disposal in compliance with Marine Institute (2006) "*Guidelines for Assessment of Dredge Material for Disposal in Irish Waters*".

s) Liaison with Dublin City Council and external bodies including landowners, project archaeologist and other appointed third parties working near or over the water during the course of the investigations;

t) Liaison with Dublin Port Company and Waterways Ireland in respect of access, safety measures and employee training required for exploratory works within or in the vicinity of navigable waterways;

u) Liaison and compliance with Health & Safety requirements of PSCS and general contractor.

v) Provision of temporary traffic management;

The locations of all ground investigations and surveys are shown on the Proposed Ground Investigation Plan, Drawing No: PTCB-ROD-GEN-AE-SK-CS-301052 in Appendix A.

2.2.4 Schedule of Investigations

Table 2-1 to Table 2-5 below detail the Schedule of Investigations.

Table 2-1 Borehole Schedule

Cable Percussion Boreholes & Rotary Drilling / Geobor-S Polymer Gel Wireline Coring Drillholes								
Hole ID.	Type	Scheduled Depth (m bGL)				Remarks	Coordinates (ITM Grid)	
		CP	RO	PG	RC		Easting	Northing
Land BHs								
BH105	PG & RC	-	-	30	30 to 40 (10m into rock)	PG may continue beyond its scheduled depth up to the level where rock is found. SPTs as per specification. Piezometer to be installed. Contamination Samples.	718009	734392.6
Marine BHs								
BH101	PG & RC	-	-	20	20 to 30 (10m into rock)	PG may continue beyond its scheduled depth up to the level where rock is found. SPTs as per specification. Environmental samples	718005.5	734274.0
BH102	PG & RC	-	-	20	20 to 30 (10m into rock)	PG may continue beyond its scheduled depth up to the level where rock is found. SPTs as per specification. Environmental samples	718004.6	734298.5
BH103	PG & RC	-	-	20	20 to 30 (10m into rock)	PG may continue beyond its scheduled depth up to the level where rock is found. SPTs as per specification. Environmental samples	718006.2	734343.8
BH104	PG & RC	-	-	20	20 to 30 (10m into rock)	PG may continue beyond its scheduled depth up to the level where rock is found. SPTs as per specification. Environmental samples	718011.3	734368.5
Marine RCs								
RC601	RC	-	-	-	15 to 20	Coring to confirm the extent of the existing gravity quay wall base below riverbed. Environmental samples	717930.801	734211.362
RC602	RC	-	-	-	15 to 20	Coring to confirm the extent of the existing gravity quay wall base below riverbed. Environmental samples	717936.489	734209.289

Cable Percussion Boreholes & Rotary Drilling / Geobor-S Polymer Gel Wireline Coring Drillholes								
Hole ID.	**Type**	**Scheduled Depth (m bGL)**				**Remarks**	**Coordinates (ITM Grid)**	
		CP	**RO**	**PG**	**RC**		**Easting**	**Northing**
RC603	RC	-	-	-	15 to 20	Coring to confirm the extent of the existing gravity quay wall base below riverbed. Environmental samples	717942.408	734208.368
Notes	Each borehole will take approximately 3 no. days to complete. In-river borehole drilling will be undertaken from a jack up barge either 18mx12m or 18mx18m, with 27m legs.							

Table 2-2 Window Sampling & Grab Sample Schedule for Contamination Assessment

Contamination Assessment Window Sampling / Grab Sample Locations					
Hole ID.	**Type**	**Schedule Depth (m bGL)**	**Remarks**	**Coordinates (ITM Grid)**	
				Easting	**Northing**
WS01	WS	6	*Location and sampling to be identified by Environmental Scientist as part of contamination assessment / waste classification*	TBC	TBC
WS02	WS	6	*Location and sampling to be identified by Environmental Scientist as part of contamination assessment / waste classification*	TBC	TBC
WS03	WS	6	*Location and sampling to be identified by Environmental Scientist as part of contamination assessment / waste classification*	TBC	TBC
WS04	WS	6	*Location and sampling to be identified by Environmental Scientist as part of contamination assessment / waste classification*	TBC	TBC
GS 101	GS	0.5	*Location and sampling to be identified by Environmental Scientist as part of contamination assessment / waste classification*	TBC	TBC
GS 102	GS	0.5	*Location and sampling to be identified by Environmental Scientist as part of contamination assessment / waste classification*	TBC	TBC
GS 103	GS	0.5	*Location and sampling to be identified by Environmental Scientist as part of contamination assessment / waste classification*	TBC	TBC
GS 104	GS	0.5	*Location and sampling to be identified by Environmental Scientist as part of contamination assessment / waste classification*	TBC	TBC

Table 2-3 Slit Trench Schedule

Slit Trench Locations							
Hole ID.	**Type**	**Schedule Depth (m bGL)**	**Remarks**	**Coordinates (ITM Grid)**			
				Point 1	**Point 2**	**Point 3**	**Point 4**
ST101	ST	2.5	Pedestrian protection required. **Shape and extent as per Ground Investigation Drawing.** An archaeologist to be present during excavation	Easting: 718022.9 Northing: 734388.2	Easting: 718003.1 Northing:73 4389.3	Easting: 718004.0 Northing: 734399.7	Easting: 718014.4 Northing: 734397.3
Hole ID.	**Type**	**Schedule Depth (m bGL)**	**Remarks**	**Point 1**		**Point 2**	
ST102	ST	2.5	Traffic Management System required. Pedestrian protection required. Minimum width of 1.5m. An archaeologist to be present during excavation.	Easting: 718027.9	Northing: 734389.0	Easting: 718025.2	Northing: 734387.8

Table 2-4 Concrete Coring Locations

Concrete Coring Locations					
Hole ID.	**Type**	**Schedule Thickness (m)**	**Remarks**	**Coordinates (ITM Grid)**	
				Easting	**Northing**
CC101	CC	Full concrete slab thickness	*Coring to confirm the thickness of the existing mass concrete slab placed during the temporary works cofferdam construction used to construct the Tom Clarke Bascule Pier.*	718011.7	734297.6

Table 2-5 Geophysical Surveys

Quay Wall and Services Inspections			
Method	**Remarks**	**Coordinates (ITM Grid)**	
		Easting	**Northing**
High Frequency Scanning Multibeam Echo Sounder (MBES)	*To provide detailed topographical survey of the north quay wall at Tom Clarke Bridge and the existing south quay wall near Thorncastle Street.*	-	-
Marine Magnetometer	*To detect buried infrastructure and to locate surface metallic objects on the riverbed.*	-	-
Underwater Ultrasonic Testing (UT)	*To determine the thickness of the steel pile wall.*	-	-
Point Cloud Survey	*Provide precise measurements and 3D spatial imagery of the existing quay wall and associated cladding, including positions and any protrusions or irregularities.*	-	-
Acoustic Sub-Bottom Profiling (SBP)	*Determine buried objects (cables, pipes or infrastructure) and existing quay wall extents under riverbed.*	-	-

Notes

1. CP = Cable Percussion, RO = Rotary Open Hole, RC = Rotary Core, PG = Polymer Gel Geobor-S Rotary Coring, ST = Slit Trench; WS = Window Sampling, GS Grab Sediment Sample; CC = Concrete Coring.
2. Coordinates to Irish Transverse Mercator Grid (ITM) and reduced levels to Malin Head Datum required for all BH i.e. CP and RC (incl. RO & PG), TP, ST, PC.
3. Undisturbed sampling is required in cohesive soils.
4. A minimum total core recovery of 95% and a minimum rock quality designation of 40% is required when coring in rock. Where voids are encountered a standard penetration test shall be undertaken.
5. Standard penetration tests are to be carried out as per the Specification.

2.2.5 Timing and Duration

The duration of all of the works will be less than three months, commencing in February 2025 and completing in April 2025, inclusive, provided that all relevant licences are obtained. Detailed breakdown of timing and duration of each of the survey works is provided in Table 2-6 below.

Table 2-6 Timing and Duration of Environmental Surveys and Ground Investigation Works.

Survey Type	Commencement	Duration
Gas Main Survey	Feb 2025	2 days
Inspection of North Wall Quay Wall and Tom Clarke Bridge	Feb 2025	2 days
Structural Inspection works	Feb 2025	One week
Ground Investigation works	Feb 2025	3 months
Note [1] Gas Main Survey and Inspection of North Wall Quay Wall and Tom Clarke Bridge will be carried out at the same time.		

2.3 Receiving Natural Environment

2.3.1 General Description and Context

The proposed works are located within the Lower River Liffey and in close proximity to both the upstream and downstream sides of the existing Tom Clarke Bridge in Dublin City, spanning from North Wall Quay to Ringsend on the southside of the River Liffey. The River Liffey is tidal at this location. The land-based investigation works are located on the existing North Quay Wall Campshires adjacent to the historic quay wall and the structure supporting the left turn lane from Tom Clarke bridge to North wall quay road. The predominant habitat types that occur within the footprint of the proposed works and in the immediate vicinity are buildings artificial surfaces (BL3), estuaries (MW4), mud shores (LS4), infralittoral muds (SS3) and scattered trees and parkland (WD5). A detailed description of the receiving natural environment is presented below, as informed by the desk study and field surveys.

2.3.2 Habitats and watercourses

Desk Study

Two major waterbodies, the River Liffey and the River Dodder, lie within the study area for the proposed works. There is no fish spawning habitat in the study area.

Water courses - 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 2-7 and Table 2-8 below show the information recorded regarding water quality status at the location of the proposed works.

Table 2-7 EPA Transitional waterbody water quality results

Transitional Waterbody	WFD Status (2013-2018)	Transitional Water Quality (2018-2020)	WFD Status (2016-2021)	WFD Risk
Liffey Estuary Lower	Good	Intermediate	Moderate	At Risk
Liffey Estuary Upper	Good	Potentially Eutrophic	Good	Under Review

Table 2-8 EPA River waterbody water quality results

River Waterbody	WFD Status (2013-2018)	WFD Status (2016-2021)	WFD Risk
Dodder_050	Moderate	Moderate	At Risk
Grand Canal Basin (Liffey and Dublin Bay)	Moderate	Good	Under Review

The 'Moderate' status of the Liffey Estuary Lower waterbody is indicated to be as a result of moderate Biological Status or Potential and Hydromorphological Conditions, respectively as per the EPA Catchments website.

The 'Moderate' status of the Dodder_050 waterbody is indicated to be as a result of moderate Biological Status or Potential.

Habitats

Field Survey

This section describes the habitats recorded during the field survey (01/07/22) within the proposed works footprint and a 150m buffer. A total of eight different Fossitt (2000) habitats were identified in the study area. These habitats are listed below, and mapping of these habitats are presented in Figure 2-1:

- Buildings and Artificial Surfaces (BL3)
- Sea Walls, Piers & Jetties (CC1)
- Mud Shores / Infralittoral Muds (LS4/SS3)

- Estuaries (MW4)
- Recolonising Bare Ground (ED3)
- Amenity Grassland (GA2)
- Scattered Trees & Parkland (WD5)
- Scrub (WS1)

Buildings and artificial surfaces (BL3)

The proposed works location and surrounding environment is primarily comprised of BL3. This category includes roads, bridges, buildings, hard standing and other elements of the built environment. Generally, built habitats are not considered to be of high ecological significance.

Sea Walls, Piers & Jetties (CC1)

This category is used for all coastal constructions that are partially or totally inundated by sea water at high tide. This habitat includes the pontoons along the Liffey's North Quay and the pontoon and gangway next to St Patrick's Rowing Club.

Mud Shores / Infralittoral Muds (LS4/SS3)

The mouth of the River Dodder where it meets the river Liffey to the southwest of the proposed works contains both intertidal mudflat (LS4) and subtidal muds (SS3). The intertidal mudflats which are exposed at low tide corresponds to the Annex I habitat, 'Mudflats & Sandflats not covered by seawater at low tide' [1140]. EC (2013) describes this habitat as "sands and muds of the coasts of the oceans, their connected seas and associated lagoons, not covered by sea water at low tide, devoid of vascular plants, usually coated by blue algae and diatoms". The subtidal habitat corresponds to the Annex I habitat, 'Estuaries' [1130]. 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.

Estuaries (MW4)

The proposed works crosses the lower reaches of the River Liffey / Lower Liffey Estuary and is tidal. This habitat also corresponds to the Annex I habitat, 'Estuaries' [1130].

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 along the edge of North Wall Quay, which is within the footprint of the construction site compound and the surrounding area.

Amenity Grassland / Scattered trees and parkland (GA2 / WD5)

There was a small area of amenity grassland at the southern end of the existing Tom Clarke Bridge. There were several trees lining the grassland. Species recorded here included Alder (*Alnus glutinosa*), Annual Meadow-grass (*Poa annua*), Broadleaved Dock (*Rumex obtusifolius*), Creeping Buttercup (*Ranunculus repens*), Daisy (*Bellis perennis),* Dandelion (*Taraxacum* agg.), London Plane (Platanus × acerifolia), Perennial Ryegrass (*Lolium perenne*), Red Clover (*Trifolium pratense*), Ribwort Plantain (*Plantago lanceolata*). This habitat is also mapped as a mosaic with BL3 in the wider area where small areas of grassland are present within areas surrounded by BL3.

Scrub (WS1)

This category includes areas that are dominated by shrubs, stunted trees or brambles where canopy height is less than 5m. There was a linear strip of scrub along the top rock armour to the southwest of the Tom Clarke Bridge, this lined the amenity grassland / scattered trees and parkland. Species recorded here included; American Willowherb (*Epilobium ciliatum*), Black Medick (*Medicago lupulina*), Bramble (*Rubus fructicosus*), Broadleaved Dock (*Rumex obtusifolius), Butterfly Bush (Buddleja davidii), Common Mallow (Malva sylvestris), Common Poppy* (*Papaver rhoeas*), Couch grass (*Elytrigia repens*), English Stonecrop (*Sedum anglicum*), European Ivy (*Hedera helix*), Hedge Mustard (*Sisymbrium officinale),* Ivy-leaved toadflax (*Cymbalaria muralis*), Nettle (*Urtica dioica*), Pellitory-of the-wall (*Parietaria judaica*), Self-Heal (*Prunella vulgaris*), Ragwort (*Jacobaea vulgaris*), Red Valerian (*Centranthus ruber*), Redshank (*Persicaria maculosa*), Smooth Hawks-beard (*Crepis capillaris*), Smooth Sowthistle (*Sonchus oleraceus*), Spear Thistle (*Cirsium vulgare*), Speedwell (*Veronica* sp.), and Yarrow (*Achillea millefolium*).

2.3.3 Flora

Flora Protection Order

Desk Study

The NBDC returned no records for species protected under the Flora (Protection) Order, 2022 in the desk study area.

Field Survey

No species protected under the Flora (Protection) Order, 2022 were recorded within the study area.

Invasive Alien Species

Desk Study

Records on the NBDC biodiversity database (NBDC, 2024) for a number of invasive alien species subject to restrictions as listed on the Third Schedule of the Birds and Natural Habitats Regulations [S.I.477/2011] were identified within the vicinity of the proposed works [NBDC 2x2km Grid Squares: O13R, O13S, O13W, O13X] (Table 2-9 below).

Table 2-9 Restricted invasive alien species recorded in the vicinity of the proposed works in the past decade (NBDC 2x2km Grid Squares: O13R, O13S, O13W, O13X)

Common Name	Scientific name
American Mink	*Mustela vison*
Giant Rhubarb	*Gunnera tinctoria*
Grey Squirrel	*Sciurus carolinensis*
Harlequin Ladybird	*Harmonia axyridis*
Himalayan Balsam	*Impatiens glandulifera*
Japanese Knotweed	*Fallopia japonica*
Rose-ringed Parakeet	*Psittacula krameri*
Sea-buckthorn	*Hippophae rhamnoides*
Three-cornered Garlic	*Allium triquetrum*

Field Survey

No invasive alien species listed on the Third Schedule were identified during the survey undertaken on the site. One unlisted invasive species, Butterfly-bush (*Buddleja davidii*), was recorded within the study area.

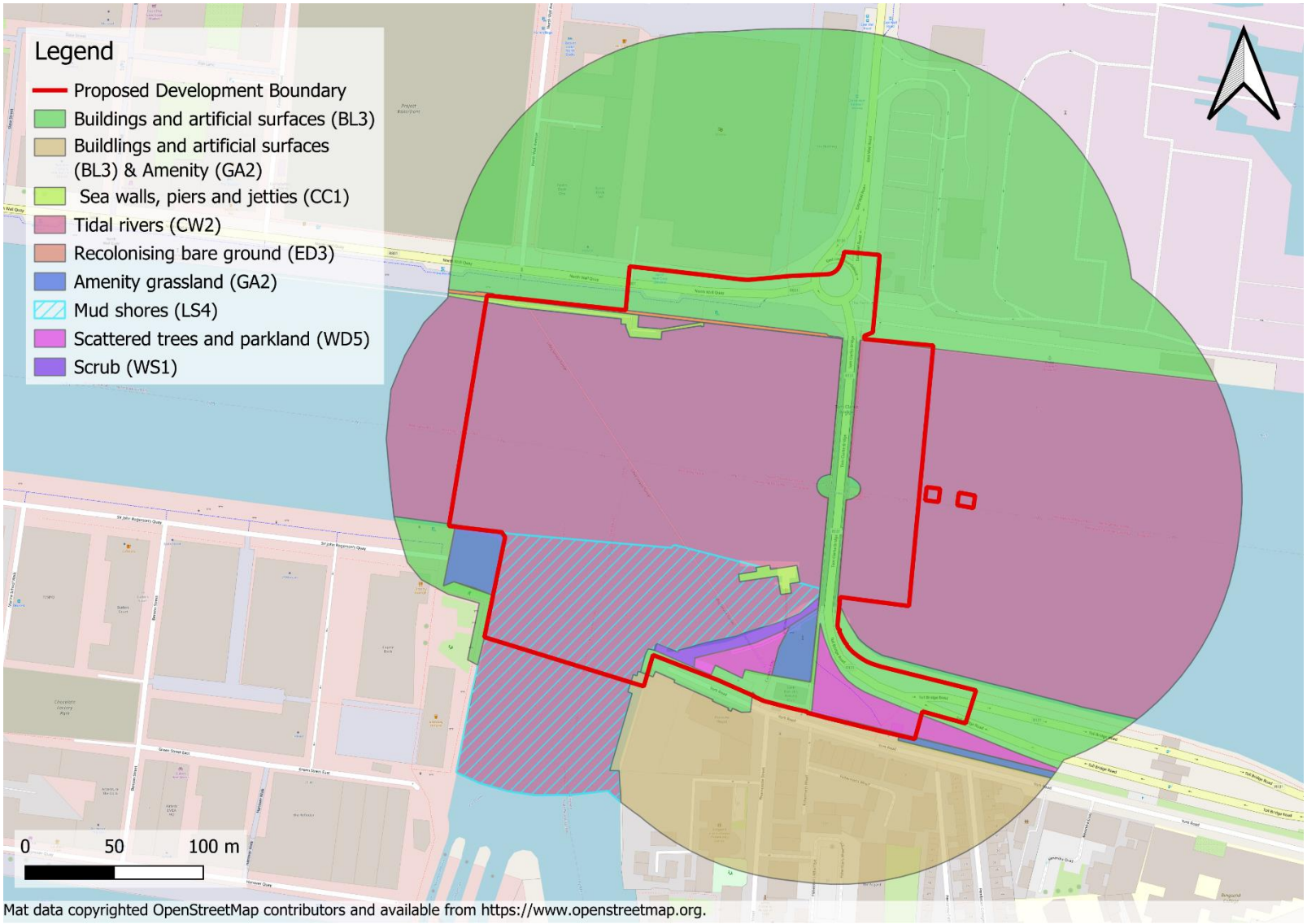

Figure 2-1 **Habitat Survey Map, this shows the location of the proposed Point Bridge Project, GI works will be undertaken in the estuary surrounding the project boundary.**

2.3.4 Otter

Desk Study

A search of the NBDC's online biodiversity database returned records of Otter in the vicinity of the proposed works [NBDC 2x2km Grid Squares: O13R, O13S, O13W, O13X]. Two otter holts were identified in the desk study and there is also evidence of usage of Grand Canal Basin by otter. The first is an active otter holt close to Camden Lock, 155m southwest of the proposed works (NPWS consultation, 2024). The second active otter holt is present along North Wall Quay approximately 670m west of the proposed works (Trituris, 2023). Both Otter holts were outside of the field survey area.

Field Survey

During the ROD Otter surveys of the site, spraint was found in three locations on the north quay wall of the Liffey, adjacent to the proposed works. Spraint was also found at the Grand Canal lock sign area, between the confluence of the River Dodder, the Grand Canal and the River Liffey. No otter holts were identified within 150m of the proposed works.

2.3.5 Birds

Desk Study

A search of the NBDC's online biodiversity database (NBDC, 2024) returned records for numerous Annex I and Qualifying Interest bird species in the vicinity of the proposed works [NBDC 2x2km Grid Squares: O13R, O13S, O13W, O13X] (Table 2-10 below).

A consultation with the NPWS also highlighted the presence of nesting Common Tern (*Sterna hirundo*) in the vicinity of the proposed works at Camden Lock. These nests were also detailed in the planning application for the BusConnects Ringsend to City Centre Core Bus Corridor (CBC) Scheme (ABP Case Ref: HA29N.317679), which recorded six Common Tern chicks in 2-3 nests.

Table 2-10 Protected bird species recorded in the vicinity of the proposed works in the past decade (NBDC 2x2km Grid Squares: O13R, O13S, O13W, O13X) (NBDC, 2024)

Common Name	Scientific name
Bar-tailed Godwit*	*Limosa lapponica*
Black-headed Gull	*Larus ridibundus*
Black-tailed Godwit	*Limosa limosa*
Common Gull	*Larus canus*
Common Tern*	*Sterna hirundo*
Grey Heron	*Ardea cinerea*
Kingfisher*	*Alcedo atthis*
Knot	*Calidris canutus*
Lesser Black-backed Gull	*Larus fuscus*
Light-bellied Brent Goose	*Branta bernicla*
Mallard	*Anas platyrhynchos*
Oystercatcher	*Haematopus ostralegus*
Redshank	*Tringa totanus*

Common Name	Scientific name
Sand Martin	*Riparia riparia*
Tufted Duck	*Aythya fuligula*
Turnstone	*Arenaria interpres*
Whooper Swan*	*Cygnus cygnus*

* Listed on Annex I of the EU Birds Directive

Field Survey

Wintering Birds

A total of ten species were recorded during the 2022 – 2023 wintering bird season. Species recorded and the peak counts on each survey are presented in the Table 2-11 below. Also presented in the table below is the 1% all-Ireland threshold (Burke *et al*. 2018) for these species.

Table 2-11 Species and peak counts recorded during the wintering bird survey conducted for the proposed works

Common Name	Scientific Name	Peak count	1% All Ireland Threshold[10]
Black Guillemot	*Cepphus grylle*	1	-
Black-headed Gull	*Chroicocephalus ridibundus*	50	-
Common Gull	*Larus canus*	2	-
Cormorant	*Phalacrocorax carbo*	1	110
Great Black-backed Gull	*Larus marinus*	2	-
Grey Heron	*Ardea cinerea*	1	25
Herring Gull	*Larus argentatus*	25	-
Light-bellied Brent Goose	*Branta bernicla*	50	350
Mallard	*Anas platyrhynchos*	2	280
Mute Swan	*Cygnus olor*	4	90

2.3.6 Marine mammals

Desk Study

Records on the NBDC biodiversity database (NBDC, 2024) for a number of marine mammal species protected under Annex II of the EU Habitats Directive were identified within the vicinity of the proposed works [NBDC 2x2km Grid Squares: O13R, O13S, O13W, O13X] (Table 2-12 below).

Table 2-12 Annex II marine mammals recorded in the vicinity of the proposed works in the past decade (NBDC 2x2km Grid Squares: O13R, O13S, O13W, O13X)

Common Name	Scientific name
Common Dolphin	*Delphinus delphis*

[10] Gulls, terns and Black Guillemot do not have a 1% threshold as they are not routinely counted during core IWeBS counts.

Common Name	Scientific name
Common Seal	*Phoca vitulina*
Fin Whale	*Balaenoptera physalus*
Grey Seal	*Halichoerus grypus*
Harbour Porpoise	*Phocoena phocoena*

Records from the Irish Whale and Dolphin Group (IWDG) have reported recent sightings of Harbour Porpoise (*Phocoena phocoena*) (June 2024) and Common Dolphin (IWDG, 2024) in the wider Dublin Bay area to the east of the proposed works. A Marine Mammal Risk Assessment was carried out for the nearby the BusConnects Ringsend to City Centre Core Bus Corridor (CBC) Scheme (ABP Case Ref: HA29N.317679). This report was used to inform the risk to marine mammals in this NIS. This report is included in Appendix B.

Marine Mammals in Dublin Bay have been monitored as part of the Dublin Port Alexandra Basin Re-development (ABR) Project (Russell et al. 2017, 2018; 2019; 2020), which is in close proximity (c. 700m) to the location of the proposed works. These surveys recorded three species of marine mammal within the harbour walls, namely Grey Seal, Harbour Seal and Harbour Porpoise. These recordings are presented below in Figure 2-2 and Figure 2-3. The two seal species were recorded numerous times in Dublin Harbour however there were only three observations of Harbour Porpoise, all of which were only just inside the harbour walls which is approximately 5km from the proposed works.

The seal species are known to occur upstream in the Liffey within Dublin City Centre and use several sites in Dublin Bay to rest and feed. Harbour porpoise are the most widespread and abundant cetacean in inshore Irish waters, with highest abundances in the Irish Sea (Berrow et al. 2010).

Both Grey and Harbour Seal are widespread and abundant in Irish waters. It is considered likely that these species could occur within close proximity to the proposed works. The risk of Harbour Porpoise and Common Bottlenose Dolphin occurring in the Lower Liffey Estuary upstream of Dublin Port is much lower, but it is considered possible that these species could occur in the vicinity of the proposed works.

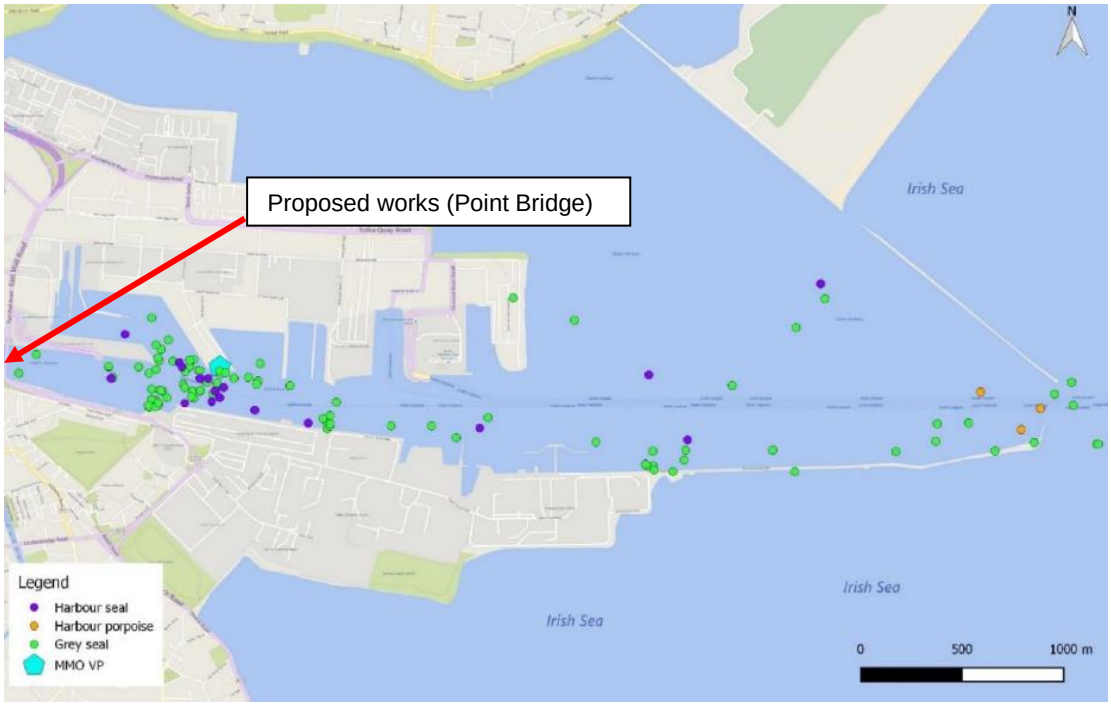

Figure 2-2 **Marine mammal sightings by the ABR project in the years 2017 – 2020 in Dublin Harbour up to the proposed works. (Source: IWDG, 2020)**

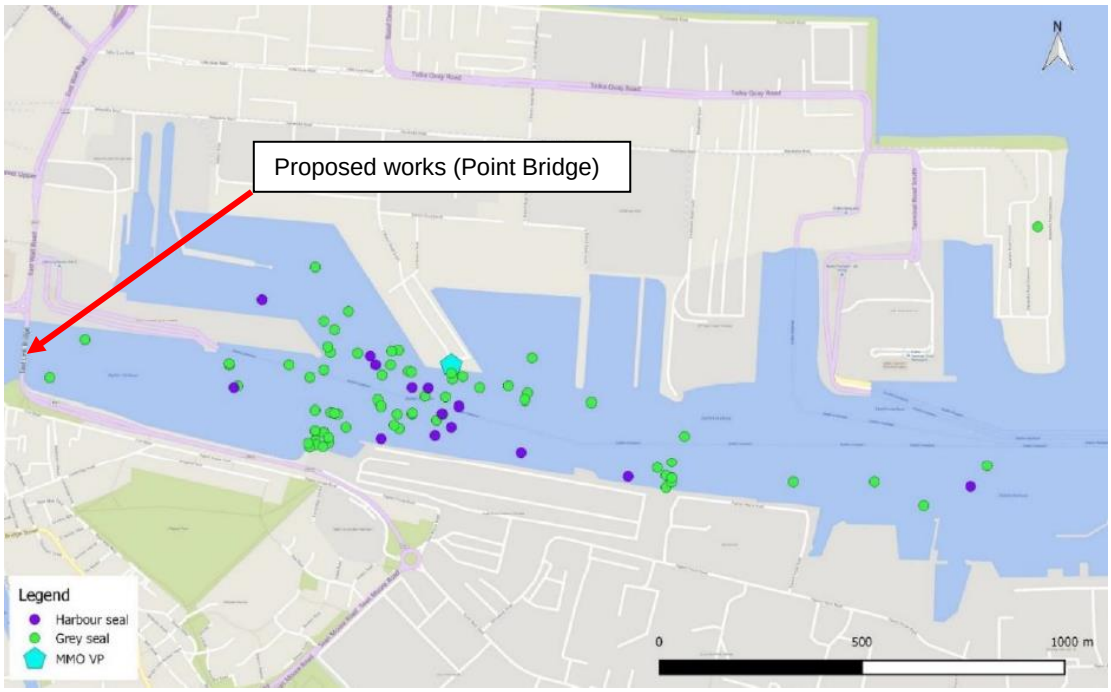

Figure 2-3 **Close up view of Figure 2-2 focusing on the Alexandra Basin and sightings in close proximity to the proposed works. (Source: IWDG, 2020)**

2.3.7 Fish Species

Desk Study

A search of the NBDC's online biodiversity database (NBDC, 2024) returned records for in the vicinity of the proposed works [NBDC 2x2km Grid Squares: O13R, O13S, O13W, O13X].

Numerous studies of the fish populations of the River Liffey provide detailed information on the species present within the catchment. Several fish species protected under Annex II of the Habitats Directive have been recorded in the Liffey Catchment including Atlantic Salmon (*Salmo salar*) and lamprey (*Lampetra sp*.). No other fish species protected under Annex II of the Habitats Directive have been recorded in the River Liffey catchment in recent studies (Delanty *et al*., 2022; Donovan *et al*., 2022; Trituris, 2020; IFI, 2019). Twaite Shad are distributed in the south and southeast river systems but are not present in the Liffey (NPWS, 2019).

2.4 Potential Impacts on the Natural Environment

Environmental surveys and GI Works

The environmental surveys will involve the use of an acoustic Sub-bottom profiler (SBP), a marine magnometer and a High Frequency Scanning Multibeam Echo Sounder (MBES). The GI works will involve rotary core and Geobore S drilling and concrete coring into an existing cofferdam concrete plug. Underwater noise emissions will come from the environmental surveys (e.g., acoustics from the Sub-bottom profiler, and the Multibeam Echo Sounder) and the GI works (e.g., jack-up barge and borehole drilling). The GI works also have the potential to give rise to airborne noise and visual disturbance.

Underwater noise

Marine Mammals are vulnerable to anthropogenic noise inputs into the aquatic environment. Underwater noise has the potential to cause a range of impacts to marine life including to injury (hearing damage) and behavioural changes. Hearing damage injury to marine mammals is known as threshold shift can be either permanent (permanent threshold shift, PTS) or temporary (temporary threshold shift, TTS). Behavioural changes can include communication disruption, altered foraging behaviour or displacement from the area. Noise from anthropogenic sources have been measured to assess the levels which could cause injury to marine mammals. These are used as thresholds and are commonly used to assess the level of risk associated with noise producing activities in the marine environment. The lowest threshold for TTS in cetaceans is 183 dB SEL and for pinnipeds it is 171dB SEL (Southall et al. 2007), these are presented below in Table 2-12.

Table 2-13 Marine mammal noise exposure criteria given by Southall et al. 2007

Species	Hearing group and estimated auditory bandwidth (kHz)	Exposure Criteria (SPL – sound pressure level[11], SEL – sound exposure level[12])		
		PTS – onset *	TTS-onset	Behavioural response
Harbour Porpoise (*Phocoena phocoena*)	High-frequency cetaceans 0.2 - 180 kHz	230 dB SPL 198 dB SEL	224 dB SPL 183 dB SEL	90-170 dB RL [13]
Common Bottlenose Dolphin (*Tursiops truncatus*)	Mid-frequency cetaceans 0.15 - 160 kHz	230 dB SPL 198 dB SEL	224 dB SPL 183 dB SEL	90-200 dB RL
Pinnipeds Harbour Seal (*Phoca vitulina)* Grey Seal (*Halichoerus grypus*)	Pinnipeds in water 0.075 - 75 kHz	218 dB SPL 203 dB SEL	212 dB SPL 171 dB SEL	100+ dB RL

[11] Sound Pressure Level (SPL) – A logarithmic measure in decibels (dB) of the average pressure level in water/air, with respect to a standard reference pressure (i.e., re. 1µPa in water or 20µPa in air). Commonly standardised to a distance of 1 metre from the source (i.e., @ 1m), SPL represents the amplitude of a sound's waveform and it may be measured in a number of ways including peak or peak-to-peak (for short duration sounds) and root mean square (i.e., rms) estimates (for continuous sounds).
[12] Sound Exposure Level (SEL) – A measure of sound energy over a given duration, i.e., time integral of instantaneous sound pressure squared, normalised to a 1 second period (dB re. µPa2–s or µPa2.s).
[13] Sound Received Level (RL) – the pressure level measured at the receiver, e.g., mammal.

Underwater noise emissions will come from the environmental surveys (e.g., acoustics from the Sub-bottom profiler, and the Multibeam Echo Sounder) and the GI works (e.g., jack-up barge and borehole drilling). See Table 2-13 for an overview of the underwater noise levels which are emitted by the proposed works equipment at 1m from the source.

Table 2-14 Underwater noise levels emitted by the proposed works equipment.

Sound Type	SPL_{peak} (dB re 1 µPa at 1 m)	Frequency (kHZ)	Within marine mammal frequency hearing ranges
High Frequency Scanning Multibeam Echo Sounder (MBES) *	210-229	200-450	No
Marine magnetometer	No sound emitted	No sound emitted	N/A
Underwater Ultrasonic Testing (UT)	Unknown	500 - 15000	No
Point Cloud Survey	No sound emitted	No sound emitted	N/A
Acoustic Sub-Bottom Profiling (SBP)	208-225	0.2-20[14]	Yes
Rotary Drill	191	0.02-50[15]	Yes

**Underwater noise is referenced to a pressure of 1 micro pascal (µPa)*

Ambient underwater noise in Dublin Bay has been estimated to range between 60 - 113 dB (McKeown 2014; Beck et al., 2013; O'Neill et al., 2020). This noise level is higher than that reported from Galway Bay and the Shannon Estuary and is due to the high level of shipping movements in Dublin Bay, the commercial activities of Dublin Port as well as its close proximity to urban activities in Dublin City Centre.

The NPWS guidance document (2014) Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters reports source sound pressure levels (SPL) = 145-191 dB re 1 µPa for drilling operations. 'Drilling operations' have been used to assess the noise produced by rotary core drilling which is one of the proposed activities of the licence, however most measurements of rotary drilling are significantly lower and levels between 120-150 dB re 1 µPa have been reported (Miller et al., 2000; Sigray & Öhman, 2016; ICES, 2017; Erbe & McPherson, 2017). NPWS 2014 Guidance also states that sound exposure levels (SEL) from drilling operations are thought to be below that expected to cause injury to a marine mammal. However, these levels do have the potential to cause lower-level disturbance, masking or behavioural impacts, for example.

The highest estimate for noise levels produced by rotary drilling underwater has been used in this NIS to assess potential impacts resulting from underwater noise, therefore 191 dB re 1 µPa has been used. This is the noise level at the source of production, as noise spreads out from the source it is reduced by 6 dB for each doubling of the distance from the source. Using this calculation 191dB at 1m would reduce to 185 dB at 2m and to179 dB at 4m etc.

[14] Depending on device type, manufacturer and power settings
[15] Erbe & McPherson, 2017

McKeown (2014) carried out measurements of underwater noise from pile driving activities at Alexandra Basin East (Dublin Port) in June 2014. NPWS, 2014 reports pile driving to produce a peak SPL of 192 - 261 dB re 1 µPa, which far exceeds the peak SPL of rotary core drilling. The McKeown (2014) study found that noise from piling reduces to background levels somewhere between 300m and 500m from the source in Alexandra Basin. The same range is assumed for the proposed GI works given that they are located in the same aquatic environment, and that drilling activities are much less noisy than pile driving (the maximum SPL estimate for drilling is lower than the minimum estimate for pile driving). If the GI works were located in open water, the sound would not dissipate to background levels until 8.2km from the source. In addition, the quay walls of the Bull Wall and Great South Wall act as sound reflectors and noise is effectively contained within the harbour walls and does not influence the wider Dublin Bay (Mc Keown, 2014). Underwater noise has the potential to cause a range of impacts to marine life including to injury (hearing damage) and behavioural changes. There is potential for mobile marine mammals and semi-aquatic mammals designated in nearby SACs to occur within close proximity to the GI works, therefore there is potential for the GI works to give rise to hydroacoustic impacts to these species.

Based on the sound pressures and frequencies that will be emitted during the proposed works, as listed in Table 2-12, and the hearing ranges of the marine mammals as listed in Table 2-13, there will be no impact to marine mammals as a result of the Multibeam Echo Sounder or Ultrasonic Testing as the frequency output is not within the hearing range of any marine mammals, nor will there be any impact to marine mammals as a result of the marine magnetometer and the Point Cloud Survey as no sound is emitted during these surveys. There will be no impacts to marine mammals as a result of these elements of the environmental surveys.

The Sub-bottom Profiler emits sound at frequencies between 0.2 – 20 kHz, which is within the frequency range of all marine mammals species listed in Table 2-12. This exceeds the TTS and PTS limits of all marine mammals. Therefore, all marine mammals are at risk of permanent or temporary loss of hearing due to auditory tissue impairment if they are in the vicinity of the proposed works.

Airborne noise

The GI works provide a source of airborne noise, noise has the potential to cause disturbance to terrestrial species such as otter and birds. Engines and generators operating can produce noise levels ranging from 80–120 dB(A) at the source. These noise sources would produce a regular source of sound above 70 dB(A) which may result in a 'moderate' response from birds (Cutts *et al.*, 2013). Regular or constant sources of noise result in lower disturbance responses from bird species regardless of noise level, e.g. a dropped piece of scaffold at 65 dB will cause a greater disturbance reaction than ongoing vibration piling at 80 dB(A).

An engine (or similar) producing noise of 120dB(A) at the source would reduce to acceptable dose levels between 170m and 341m from the source (Cutts *et al.*, 2013). 70dB(A) is considered acceptable for birds. An 'acceptable dose level' of noise is that which would not result in any impact to birds or that which may occasionally induce a low-level behavioural response such as a heads-up. 120 dB(A) would reduce to 70 dB(A) at a distance of 316m. Therefore, noise disturbance to birds may occur within 316m of the GI works.

However, given that the ground investigation works will take place in an urban area which has a higher level of ambient noise due to the industrial seaport, frequent

commercial shipping and road traffic along and over the river, the area that would be impacted by noise is likely to be much less. Furthermore, birds utilising this area are also likely to have a level of habituation to sources of noise due to the close proximity of Dublin Port.

Visual disturbance

The presence of humans and vessels working in the Liffey may cause visual disturbance to birds on the water or on the mudflats exposed at low tide. Disturbance due to visual stimuli may occur up to 500m from the source for some highly sensitive species (Cutts *et al.*, 2013).

GI works and human activity on land are unlikely to cause visual disturbance to bird species. This is due to the existing high level of human activity at this location, including humans on foot, vehicles and machinery. It is not considered that the land-based elements of the proposed works have any potential to result in visual disturbance.

Impacts to water quality

Threats to watercourses and associated habitats potentially include the release of sediment laden run-off from the land-based works and the mobilisation of sediment within the river during the in-stream works as well as the release of pollutants such as fuels, lubricants and hydraulic fluids, wastewater from on-site toilet and wash facilities. The works are of a nature and scale that any water quality impacts would be very localized and will dissipate in a very short time. The risk of pollution to the aquatic environment from such sources outlined above, particularly into the River Liffey, arising from the works is minimal. Owing to the nature, scale and location of the works, it is not considered to provide for any significant effects on the natural environment.

3. IDENTIFICATION OF ADVERSE 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 cumulative 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 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). A project may only lead to significant effects on the integrity of the European site where all three elements of Source-Pathway-Receptor are linked. In the absence of one element of this model, likely significant effects can be screened out with confidence. The assessment should make reference to the following key variables:

- The nature, size and location of the proposed works;
- The nature of the impacts which may arise from the proposed works;
- 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, a zone of influence was established for QI species and species groups that could potentially occur within the vicinity of the proposed works. Only QI's which may be vulnerable to the types of impacts arising from the proposed works have been included. Each zone of influence is presented below in Table 3-1.

Table 3-1 Zone of Influence for QI species

Receptor	Zone of Influence	Justification
Cetaceans	Management Unit	Cetaceans are highly mobile species, with populations ranging over very large areas. Therefore, the Management Unit (MU) as defined by the Inter-Agency Marine Mammal Working Group (JNCC, 2015) has been considered as the zone of influence for species of cetacean. Harbour Porpoise and Bottlenose Dolphin are the only cetacean species which are Qualifying Interest species designated in Irish Special Areas of Conservation.

Receptor	Zone of Influence	Justification
	Harbour porpoise (*Phocoena phocoena*) Management Unit	The relevant management unit for Harbour Porpoise in the vicinity of the proposed works is the Celtic and Irish Seas Management Unit. This area includes the coast of Ireland (excluding the north coast from Donegal to Antrim), the west and southwest coast of Great Britain (from the south of Scotland to Bournemouth), the northwest coast of France (approximately Brest to Cherbourg) and the seas within this area. This species could be impacted by underwater noise disturbance arising from the proposed works.
	Bottlenose dolphin (*Tursiops truncatus*) Management Unit	The relevant management unit for Bottlenose dolphin in the vicinity of the proposed works is the Irish Sea Management Unit. This area includes the east coast of Ireland (between Antrim and Waterford) and the west coast of Great Britain (between the south of Scotland and Pembrokeshire, Wales). This species could be impacted by underwater noise disturbance arising from the proposed works.
Grey Seal (*Halichoerus grypus*)	200km	Grey Seal typically forage up to 50-150 km from haul out sites, however this can extend to 200 km if resources are scarce (Brown & Thompson, 2013; Fedak et al, 2001; Sharples & McConnell, 1998), therefore the zone of influence has been defined as 200km. This species could be impacted by underwater noise disturbance arising from the proposed works.
Harbour Seal (*Phoca vitulina*)	100km	Harbour Seal typically forage up to 10-40 km from haul out sites, however this can extend to 100 km if resources are scarce (Vincent et al, 2017; Cunningham et al, 2009; Thompson and Miller, 1991), therefore the zone of influence has been defined as 100km. This species could be impacted by underwater noise disturbance arising from the proposed works.
Otter	80km	Otter typically have territories between 2km and 32km in length, however can be as long as 80km (Kruuk, 1995). Therefore, the zone of influence for otter is 80km. This species could be impacted by noise or visual disturbance arising from the proposed works.
Twaite Shad	The south and east coasts of Ireland, between Carlingford Lough and Cape Clear.	Shad species have an affinity for coastal habitats (Maitland & Hatton-Ellis, 2003). However, the specific behaviour of Twaite Shad at sea is poorly understood. Acoustic tagging of Twaite Shad in the River Severn detected one tagged fish in the Munster Blackwater, 950km from where it had been tagged. Given this distance the low densities these fish would occur at, and the nature of the proposed works, the zone of influence for Shad is the south and east coasts of Ireland, between Carlingford Lough and Cape Clear. Given that this species is a hearing specialist species, it may be vulnerable to noise disturbance arising from the proposed works.

Receptor	Zone of Influence	Justification
Lamprey Species	N/A	As adults, river Lamprey spend most of their life cycle in coastal and estuarine habitats and are regularly recorded in the River Liffey. However, these species are not vulnerable to the types of impact that may result from the proposed works (underwater noise). Therefore, no zone of influence has been determined for these species.
Non-breeding seabirds, wildfowl and waders	15km	Non-breeding seabirds, wildfowl and waders generally inhabit estuaries, migrating locally between feeding sites, roosts and between estuaries. The movements of QIs between these sites is likely to be between site that are close together (SNH, 2023). Considering this, European sites within 15km of the proposed works have been considered with regards to non-breeding seabirds, wildfowl and waders. These species could be impacted by noise or visual disturbance arising from the proposed works.
Breeding Seabirds	The south and east coasts of Ireland, between Carlingford Lough and Cape Clear and the western coast of Britain, from Lands End to Anglesey Island.	The zone of influence for breeding seabirds is based on the mean-max foraging ranges of the 15 breeding seabirds in Ireland (Woodward et al., 2019). The mean-max is the maximum range reported for colonies of each species averaged across studies/colonies. Considering the densities of seabirds will decrease over distance, as well as the nature and scale of the proposed works, the zone of influence for breeding seabirds is the south and east coasts of Ireland, between Carlingford Lough and Cape Clear and the western coast of Britain, from Lands End to Anglesey Island. Birds from European sites outside this area may occur in the area of the proposed works, however this would be restricted to small numbers of individuals. These species could be impacted by noise or visual disturbance arising from the proposed works.

European sites outside of the zones of influence identified above are excluded due to various factors such as lack of pathway for impacts (considerable distance, lack of hydrological connection and/or lack of supporting habitat for qualifying interest species in the vicinity of the proposed works) or lack of source of impact (species not vulnerable to the types of impact that may be produced by the proposed works). There are no pathways for impacts arising from the proposed works to reach those sites, therefore there is no potential for likely significant effects to occur to the qualifying interests of those European sites.

Mapping on QGIS 3.28.8 was used to identify sites within each respective zone of influence, using the boundary of the proposed works and publicly available Ordnance Survey Ireland maps. This was used in combination with NPWS shapefiles to identify the boundaries of European sites in relation to the zones of influence. The sites within the zone of influence for each QI is presented below in Table 3-2. Given the large number of European Sites which occur within the zone of influence for each QI, descriptions of these sites have not been provided.

Table 3-2 European sites within the zones of influence for each QI species

European site [site code]	Country	Are there potential pathways for impacts from the proposed works to this site? Explain.
European sites within the 'Celtic and Irish Seas' Management Unit of and designated for Harbour Porpoise (JNCC, 2015)		
Rockabill to Dalkey SAC (IE003000)	Ireland	**Yes.** Individuals from European sites within the Celtic and Irish Seas Marine Mammal Management Unit could be present in the area of the proposed works. *Summary: 35 No. sites designated for Harbour Porpoise lie within the ZoI.*
Lambay Island SAC (Site Code IE000204)	Ireland	
Codling Fault Zone SAC (Site code IE003015)	Ireland	
Roaringwater Bay and Islands SAC [Site code IE000101]	Ireland	
Carnsore Point SAC [Site code IE002269]	Ireland	
Blackwater Bank SAC [Site code IE002953]	Ireland	
Kenmare River SAC [Site code IE002158]	Ireland	
Kilkieran Bay and Islands SAC [Site Code IE002111]	Ireland	
West Connact Coast SAC [Site Code IE002998]	Ireland	
Hook Head SAC [Site Code IE000764]	Ireland	
Bunduff Lough and Machair/Trawalua/Mullaghmore SAC [Site Code IE000625]	Ireland	
Blasket Islands SAC [Site Code IE002172]	Ireland	
Inishmore Island SAC [Site code IE000213]	Ireland	
North Channel SAC [Site code UK0030399]	Northern Ireland	
North Anglesey Marine SAC [Site code UK0030398]	Wales	
Bristol Channel Approaches SAC [Site code UK003039]	Wales	
West Wales Marine SAC [Site Code UK0030397]	Wales	

European site [site code]	Country	Are there potential pathways for impacts from the proposed works to this site? Explain.
Récifs et landes de la Hague SAC [Site code FR2500084]	France	
Anse de Vauville SAC [Site code FR2502019]	France	
Chausey SAC [Site code FR2500079]	France	
Estuaire de la Rance SAC [Site code FR5300061]	France	
Cap d'Erquy-Cap Fréhel SAC [Site code FR5300011]	France	
Tregor Goëlo SAC [Site code FR5310070]	France	
Nord Bretagne DH SCI [Site code FR2502022	France	
Abers - Côte des légendes SCI [Site code FR5300017]	France	
Côtes de Crozon SAC [Site code FR5302006]	France	
Riviére Leguer, forêts de Beffou, Coat an Noz et Coat an Hay SAC [Site code FR5300008]	France	
Chaussée de Sein SAC [Site code FR5302007]	France	
Banc et récifs de Surtainville SAC [Site code FR2502018]	France	
Baie de Lancieux, Baie de l'Arguenon, Archipel de Saint Malo et Dinard SAC [Site code FR5300012]	France	
Baie de Saint-Brieuc - Est SAC [Site code FR5300066]	France	
Baie de Morlaix SAC [Site code FR5300015]	France	
Mers Celtiques – Talus du golfe de Gascogne SCI [Site code FR5302015]	France	
Baie du Mont Saint-Michel SAC [Site code FR2500077]	France	
Ouessant-Molène SAC [Site code FR5300018]	France	

European site [site code]	Country	Are there potential pathways for impacts from the proposed works to this site? Explain.
European sites within the 'Irish Sea' Marine Mammal Management Unit of and designated for Bottlenose Dolphin (JNCC, 2015)		
Hook Head SAC [Site code IE000764]	Ireland	**Yes.** Individuals from European sites within the Irish Seas Marine Mammal Management Unit could be present in the area of the proposed works. *Summary: 3 No. sites designated for Harbour Porpoise lie within the ZoI.*
Lleyn Peninsula and the Sarnau SAC [Site code UK0013117]	Wales	
Cardigan Bay/ Bae Ceredigion SAC [UK0012712]	Wales	
European sites within the Zone of Influence of and designated for Grey Seal.		
Saltee Islands SAC [000707]	Ireland	**Yes.** The proposed works are within the foraging range of Grey Seals from these SACs. *Summary: 3 No. sites designated for Grey Seal lie within the ZoI.*
Lambay Island SAC [000204]	Ireland	
Pembrokeshire Marine/ Sir Benfro Forol [UK0013116]	Wales	
European sites within the Zone of Influence of and designated for Harbour Seal.		
Lambay Island SAC [000204]	Ireland	**Yes.** The proposed works are within the foraging range of Harbour Seals from this SAC. *Summary: 1 No. sites designated for Harbour Seal lie within the ZoI.*
European sites within the Zone of Influence of and designated for Otter.		
River Barrow and River Nore SAC [Site code IE002162]	Ireland	**Yes.** The proposed works are within the potential home range of Otter from these SACs. *Summary: 3 No. sites designated for Otter lie within the ZoI.*
River Boyne and River Blackwater SAC [Site code IE002299]	Ireland	
Wicklow Mountains SAC [Site code IE002122]	Ireland	
European sites within the Zone of Influence of and designated for Shad Species (Twaite Shad and Allis Shad*). *There are no SACs designated for Allis Shad in Ireland.		
Slaney River Valley SAC [000781]	Ireland	**Yes**. For part of its life cycle, Twaite Shad inhabits coastal waters. Twaite Shad is also a hearing specialist that is vulnerable to underwater noise. *Summary: 3 No. sites designated for Twaite Shad lie within the ZoI.*
River Barrow and River Nore SAC [002162]	Ireland	
Lower River Suir SAC [002137]	Ireland	

European site [site code]	Country	Are there potential pathways for impacts from the proposed works to this site? Explain.
Blackwater River (Cork/Waterford) SAC [002170]	Ireland	
European sites within the Zone of Influence of and designated for non-breeding birds.		
South Dublin Bay and River Tolka Estuary SPA [Site code 004024]	Ireland	**Yes.** The shortest direct distances from the proposed works to this site are 1.3km north-east to the Tolka Estuary and 1.4km south-east to Sandymount Strand. The shortest distance from the proposed works to the site via a hydrological connection is 2.4km east (down the River Liffey) to the ESB Dolphin.
North Bull Island SPA [Site Code IE004006]	Ireland	The shortest direct distance from the proposed development to this site is 3.4km north-east. The shortest distance from the proposed development to the site via a hydrological connection is 4.2km north-east (down the River Liffey and across the River Tolka Estuary).
Baldoyle Bay SPA [Site code IE004016]	Ireland	**Yes.** The shortest direct distances from the proposed works to this site are 8.8km north-east to Baldoyle. The shortest distance from the proposed works to the site via a hydrological connection is 20.2km (out to Dublin Bay and around Howth Head).
Malahide Estuary SPA [Site Code IE004025]	Ireland	**Yes.** The shortest direct distance from the proposed works to this site are 8.km north-east to Malahide. The shortest distance from the proposed works to the site via a hydrological connection is 22.9km (out to Dublin Bay and around Howth Head).
North-west Irish Sea SPA	Ireland	**Yes.** The shortest direct distance from the proposed development to this site is 9.2km east. This distance is a hydrological connection (down the River Liffey and into Dublin Bay to the east).
European sites within the Zone of Influence of and designated for Breeding Seabirds.		
Dalkey Island SPA [Site Code IE004172]	Ireland	**Yes.** This site is 11.5km southeast of the proposed works and within the foraging range of the Qualifying Interests.
Howth Head Coast SPA [Site Code IE004113]	Ireland	**Yes**. This site is 11.5km northeast of the proposed works and within the foraging range of the Qualifying Interest species.
North Bull Island SPA [Site Code IE004006]	Ireland	**Yes**. This site is 1.4km northeast of the proposed works and within the foraging range of the Qualifying Interest species.
Ireland's Eye SPA [Site code IE004117]	Ireland	**Yes**. This site is 11.5km northeast of the proposed works and within the foraging range of the Qualifying Interests.

European site [site code]	Country	Are there potential pathways for impacts from the proposed works to this site? Explain.
South Dublin Bay and River Tolka Estuary SPA [Site code 004024]	Ireland	**Yes**. This site is 1.5km southeast of the proposed works and within the foraging range of the Qualifying Interest species.
North West Irish Sea [Site Code IE004236]	Ireland	**Yes.** This site is 5km east of the proposed works and within the foraging range of the Qualifying Interests.
Anglesey Terns / Morwenoliaid Ynys Môn SPA [UK9013061]	UK	**No.** This site is 95km from the proposed development. The maximum mean-max foraging distance of any of the Qualifying Interests of this is SPA is 33km for Common Tern (Woodward et al, 2019). Therefore, no pathways for impacts between the proposed works and this European site exist.
Glannau Aberdaron ac Ynys Enlli/ Aberdaron Coast and Bardsey Island SPA [UK9013121]	UK	**Yes.** This site is 106km from the proposed works and within the foraging range of the Qualifying Interest Manx Shearwater (mean-max 2365km).
Northern Cardigan Bay / Gogledd Bae Ceredigion SPA [UK9020327]	UK	**No.** This site is 134km from the proposed development. The maximum mean-max foraging distance of any of the Qualifying Interests of this is SPA is 9km for Red-throated Diver (Woodward et al, 2019). Therefore, no pathways for impacts between the proposed works and this European site exist.
Grassholm SPA [UK9014041]	UK	**Yes.** This site is 184km from the proposed works and within the foraging range of the Qualifying Interest Northern Gannet (mean-max 516km).
Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro SPA [UK9014051]	UK	**Yes.** This site is 184km from the proposed works and within the foraging range of the Qualifying Interests.
Bae Caerfyrddin/ Carmarthen Bay SPA [UK9014091]	UK	**Yes.** This site is 209km from the proposed works, the mean-max foraging range for Common Scoter is not reported in Woodward *et al,.* (2019), therefore it is considered possible that this species could forage within the location of the proposed works.
Burry Inlet SPA [UK9015011]	UK	**Yes.** This site is 227km from the proposed works, the mean-max foraging range for Oystercatcher and Shelduck are not reported in Woodward *et al,.* (2019), therefore it is considered possible that individuals from this site could forage within the location of the proposed works.
Severn Estuary SPA [UK9015022]	UK	**Yes**. This site is 295km from the proposed works, the mean-max foraging range for Gadwall and Shelduck are not reported in Woodward *et al,.* (2019), therefore it is considered possible that individuals from this site could forage within the location of the proposed works.

European site [site code]	Country	Are there potential pathways for impacts from the proposed works to this site? Explain.
Isles of Scilly SPA [UK9020288]	UK	**No.** This site is 373km from the proposed development. The maximum mean-max foraging distance of any of the Qualifying Interests of this is SPA is 336km for Storm Petrel (Woodward et al, 2019). Therefore, no pathways for impacts between the proposed works and this European site exist.

3.2 Evaluation against Conservation Objectives

Table 3-3 to Table 3-7 below detail the evaluation of the potential for adverse effects of the proposed works, as outlined in Section 2.13 above, in view of the Conservation Objectives of the sites identified in Section 3.1. As explained in Sections 1.3 and 1.4, AA is carried out in view of the Conservation Objectives of the relevant European sites, which are in turn defined by detailed Attributes and corresponding Targets. Therefore, the evaluation of whether or not an impact could have the potential to result in adverse effects (in view of the Conservation Objective in question) is made with regard to these Attributes and Targets.

The Conservation Objectives and associated Attributes and Targets for each respective QI species are the same for all sites in which the QI is designated, therefore the evaluation has been carried out in view of the type of impact which could result in an adverse effect. The evaluation thus applies for all sites within the zone of influence for which the QI is designated. To carry out the evaluation for each individual site would lead to undue repetition.

Table 3-3 Evaluation of the likely effects of underwater noise disturbance from the proposed works in view of the Conservation Objectives of the sites where marine mammals are a qualifying interest

Qualifying Interest	Conservation Objective	Does the proposed works provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets?	Adverse Effect
Harbour Porpoise (*Phocoena phocoena*)	To maintain (or restore) the favourable conservation condition of Harbour Porpoise in the sites in which it is designated.	Underwater noise has the potential to cause a range of impacts to marine life including to injury (hearing damage) and behavioural changes. Hearing damage injury to marine mammals is known as threshold shift can be either permanent (permanent threshold shift, PTS) or temporary (temporary threshold shift, TTS). Behavioural changes can include communication disruption, altered foraging behaviour or displacement from the area. Noise from anthropogenic sources have been measured to assess the levels which could cause injury to marine mammals. These are used as thresholds and are commonly used to assess the level of risk associated with noise producing activities in the marine environment. The lowest threshold for TTS in cetaceans is 183 dB SEL and for pinnipeds it is 171dB SEL (Southall et al. 2007**)**. The highest estimate for noise levels produced by rotary drilling underwater has been assumed for the proposed works (191 dB re 1 µPa). The Sub-bottom Profiler emits sound at frequencies between 0.2 – 20 kHz, which is within the frequency range of all marine mammal species listed in Table 2-12. This exceeds the TTS and PTS thresholds of all marine mammals. Therefore, the proposed works may produce noise levels in excess the injury thresholds for these QI species. **Therefore, adverse effects on the Conservation Objectives for these Qualifying Interest species resulting from the proposed works cannot be ruled out at this stage.**	**Yes**
Common Bottlenose Dolphin (*Tursiops truncatus*)	To maintain (or restore) the favourable conservation condition Bottlenose Dolphin in the sites in which it is designated.		**Yes**
Harbour Seal (*Phoca vitulina)*	To maintain (or restore) the favourable conservation condition of Harbour Seal in the sites in which it is designated.		**Yes**
Grey Seal (*Halichoerus grypus*)	To maintain (or restore) the favourable conservation condition of Grey Seal in the sites in which it is designated.		**Yes**

Table 3-4 Evaluation of the likely effects of airborne noise and visual disturbance from the proposed works in view of the Conservation Objectives of the sites where Otter is a qualifying interest

Qualifying Interest	Conservation Objective	Does the proposed works provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets?	Adverse Effect
Otter	To maintain (or restore) the favourable conservation condition of Otter in the sites in which it is designated.	Evidence of Otter was recorded in the vicinity of the proposed works (Trituris, (2023), ROD, (2024)). The closest record of an otter sign is located on the St Patricks Rowing Club pontoon, located within the red line boundary of the project (Trituris, 2023). The closest Otter holt to the proposed works is located c.155m southwest in a walled private garden near Camden Lock. The proposed works lies within the zone of influence for Otter. In Ireland, Otter territories are within the range of 7.5km for females and 19km for males (O'Neill et al., 2009), however they can be up to 80km (Kruuk, 1995). The Wicklow Mountains SAC is located at a hydrological distance of 16km from the proposed works. Therefore, the proposed works is potentially located within the home-range for the Otter population of the Wicklow Mountains SAC. The proposed works has the potential to cause noise and visual disturbance, which may displace Otter from the area surrounding the proposed works. The Otter holt at Grand Canal Dock is located c.155m from the proposed works and is therefore within the zone of influence for noise and visual disturbance (550m). Best practice guidance for Otter (NRA, 2008) recommends a minimum distance of 150m between any works and sensitive otter holts (breeding), to avoid impacts to otter holts. Given the works are >150m from the holts, and that the holt is located within a walled garden and effectively screened from the works, no impacts due to noise or visual disturbance are anticipated. However, the otters which utilise those holts would likely use the Liffey at the location of the proposed works for hunting and commuting and would therefore be within range of noise levels that could cause disturbance. However, given that the ground investigation works will take place in an urban area which has a higher level of ambient noise due to the industrialised seaport, frequent commercial shipping and traffic, otter utilising this area are also likely to have a level of habituation to loud constant sources of noise due to the close proximity of Dublin Port. Additionally given the short duration of the proposed works, and that the works would be undertaken within daylight hours, and that Otter are primarily nocturnal, their activity will not overlap with the timing of the works. Therefore, there is no potential for the works to cause disturbance to otter. **Therefore, there is no potential for the proposed works to result in adverse effects to the SACs designated for Otter, in view of its Conservation Objectives for this Qualifying Interest.**	**No**

Table 3-5 Evaluation of the likely effects of underwater noise disturbance from the proposed works in view of the Conservation Objectives of the sites where Twaite Shad is a qualifying interest

Qualifying Interest	Conservation Objective	Does the proposed works provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets?	Adverse Effect
Twaite Shad	To maintain (or restore) the favourable conservation condition of Twaite Shad in the sites in which it is designated.	Numerous studies of the fish populations of the River Liffey provide detailed information on the species present within the catchment. Twaite Shad have not been recorded in the Liffey Catchment despite the numerous studies (Delanty *et al*., 2022; Donovan *et al*., 2022; Trituris, 2020; IFI, 2019). Twaite Shad are distributed in the south and southeast river systems but are not present in the Liffey (NPWS, 2019). Given that Twaite Shad are absent from the Liffey system, and that noise impacts from the proposed works will not occur outside of Dublin Harbour, there is no potential to affect individuals which may be present in the wider Dublin Bay or Irish Sea. **Therefore, there is no potential for the proposed works to result in adverse effects to the SACs designated for Twaite Shad, in view of its Conservation Objectives for this Qualifying Interest.**	**No**

Table 3-6 Evaluation of the likely effects of airborne noise and visual disturbance from the proposed works in view of the Conservation Objectives of the sites where non-breeding seabirds are a qualifying interest

Qualifying Interest	Conservation Objective	Does the proposed works provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets?	Adverse Effect
Non-breeding Seabirds Including: Light-bellied Brent Goose Shelduck Ringed Plover Golden Plover Grey Plover Bar-tailed Godwit Great Crested Grebe Pintail Goldeneye Red-breasted Merganser Oystercatcher Knot Dunlin Black-tailed Godwit Redshank Teal Shoveler Sanderling Curlew Turnstone Great Northern Diver Little Gull	To maintain (or restore) the favourable conservation condition of non-breeding seabird species in the sites in which these species are designated.	**Non-breeding waders and waterfowl** Wintering waders and waterfowl forage on the intertidal mudflats around the proposed works area which are exposed at low tide. There is limited suitable habitat (c. 100m^2) for these species within 150 m of the proposed works. No wader species were recorded using this area during the wintering bird surveys which were carried out. Therefore, it can be concluded that wader species do not regularly occur in this location and that it does not represent and important foraging resource for these species. Therefore, there is no potential noise or visual disturbance from the proposed works to result in adverse effects on wader species. Waterfowl may also occur on mudflats or on the water surrounding the proposed works. Light-bellied Brent Goose were recorded during the wintering bird surveys in the area surrounding the proposed works (a peak count of 50 were recorded), no other waterfowl species were recorded in the Liffey during these surveys Brent Goose have a high sensitivity to visual and noise disturbance (Cutts *et al.,* 2013) and there is potential for low numbers of this species using the area within 550 m of the proposed works. Therefore, there is potential impacts resulting from visual and noise disturbance to occur during the proposed works. However, given that low numbers of this species use this area, and that they do not regularly occur in the area surrounding the proposed works, if any such effects were to occur, they will be limited to very few individuals and will not result in adverse effects on this Qualifying Interest. **<u>Non-breeding gulls and seabirds</u>** Black-headed Gull, Herring Gull, Common Gull, Great Black-backed Gull and Cormorant were all recorded in the vicinity of the proposed works during the wintering bird surveys. These species regularly occur in the area they are relatively tolerant of human activity and noise disturbance, given that they are frequently found in the area with regular shipping activity, around Dublin Port and the existing Tom Clarke Bridge. These species have habituated to the baseline levels of noise and human activity in the vicinity of the proposed works. Therefore, visual and noise that may occur during the proposed works, is unlikely to cause disturbance to these species. Therefore, will not result in adverse effects on these Qualifying Interests.	**No**

Qualifying Interest	Conservation Objective	Does the proposed works provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets?	Adverse Effect
Wetland and Waterbirds [A999]		**<u>Other Seabirds</u>** **Common Scoter, Red-throated Diver, Guillemot, Great Northern Diver, Razorbill, Fulmar** These species do not regularly occur in the area of the proposed works, nor does it provide suitable habitat for these species. Therefore, these species are unlikely to be impacted by the proposed works as they are absent from the location. **Therefore, there is no potential for the proposed works to result in adverse effects to the SACs designated for non-breeding seabird species, in view of its Conservation Objectives for these Qualifying Interests.**	

Table 3-7 Evaluation of the likely effects of airborne noise and visual disturbance from the proposed works in view of the Conservation Objectives of the sites where breeding seabirds are a qualifying interest

Qualifying Interest	Conservation Objective	Does the proposed works provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets?	Adverse Effect
Breeding Seabirds Storm Petrel Common Tern Arctic Tern Roseate Tern Little Tern Kittiwake Herring Gull Lesser Black-backed Gull Black-headed gull Great Black-backed Gull Common gull Cormorant Shag Razorbill Fulmar Red-throated diver Manx shearwater Puffin	To maintain (or restore) the favourable conservation condition of breeding seabirds in the sites in which these species are designated.	**<u>Breeding Terns</u>** **Common Tern, Roseate Tern, Arctic Tern, Little Tern** Common Tern nests have been recorded on the seaward ends of the walls between Camden, Buckingham and Westmoreland Locks, at the entrance to Grand Canal Docks from the River Dodder, approximately 100m from the proposed works. Common Tern has bred successfully at this high-disturbance site in Dublin Bay, despite regular human activity in very close proximity of the nest (within 10m on Camden Lock). Given that the proposed works will be undertaken >100m from the Camden Lock site, and that airborne noise arising from the proposed works will be constant rather than sudden in nature, it will not cause disturbance of the nest site at Camden Lock. Common Tern may forage or commute through the location of the proposed work, however given that this species primarily forages in open coastal waters, the area surrounding the proposed works does not provide optimal foraging habitat. Therefore, very few individuals are likely to occur within close proximity to the works, and they would only be within this area for a brief amount of time. Therefore, the proposed works do not have the potential to cause noise disturbance to foraging Common Tern. The closest known breeding site for Roseate Tern and Arctic Tern is at the Electricity Supply Board dolphin on the River Liffey between Poolbeg power station and the Pigeon House (c. 2.4km east of the proposed works). Roosting is known to occur between Martello towers at Sandymount and Williamstown (c. 2.6km southeast of the proposed works). These species also forage in open waters and would use Dublin Bay in preference to the Lower River Liffey, therefore foraging birds would be unlikely to occur in the proposed works area. Given the distance between the proposed works and the breeding site and the low numbers of Arctic and Roseate Tern using the area within 550 m of the proposed works, visual and noise disturbance are highly unlikely to occur to these species. Little Tern breeds at selected colonies in Louth, Wicklow, Wexford and Dublin and generally forages in deeper waters (20-30m) and forages close (<5km) to these colonies. The closest of these breeding colonies to the proposed works is located c. 19.5km to the north at Portrane, Co. Dublin. Given that this species primarily forages in deep coastal waters close to breeding colonies, the area surrounding the proposed works does not provide optimal foraging habitat, very few individuals are likely to occur within close proximity to the works. Therefore, the proposed works do not have the potential to cause noise disturbance to foraging Little Tern.	**No**

Qualifying Interest	Conservation Objective	Does the proposed works provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets?	Adverse Effect
		Therefore, it can be concluded that noise and visual disturbance is unlikely to occur, or any such impacts will be limited to very few individuals and will not interfere with the achievement of the Conservation Objectives for these Qualifying Interests tern species. **<u>Breeding Gulls</u>** **Herring Gull, Lesser Black-backed Gull, Black-headed Gull, Great Black-backed Gull, Common Gull** Herring Gull and Lesser Black-backed Gull commonly breed in urban environments (Keogh & Lauder (2021), often nesting on rooftops. The other Irish breeding gull species do not breed in urban environments. Urban breeding gulls are not considered part of the SPA breeding populations, given that they are not within the SPA boundaries. The gulls which commonly occur around the location of the proposed works are likely to be the individuals which also nest in the surrounding urban environment. No nests of these individuals will be impacted by the proposed works and these individuals would have a high level of habituation to human activity and noise. Therefore, the works will not result in disturbance of any nearby breeding Herring Gull or Lesser Black-backed Gull The breeding populations of the SPAs where these species are located on offshore islands, the closest of which being Irelands Eye SPA. Given that these birds will preferentially forage in the waters surrounding the colony, the area surrounding the proposed works does not provide optimal foraging habitat, very few individuals from breeding colonies are likely to occur within close proximity to the works. Therefore, the proposed works do not have the potential to cause noise disturbance resulting in adverse effects to foraging Herring Gull, Lesser Black-backed Gull, Black-headed Gull, Great Black-backed Gull or Common Gull. **<u>Other Breeding seabirds</u>** **Shag, Cormorant, Guillemot, Kittiwake, Manx Shearwater, Puffin, Razorbill, Fulmar** Shag and Cormorant forage in shallow waters (<10m) and breed in coastal areas. There is no suitable breeding habitat for these species in the vicinity of the proposed works, therefore breeding colonies will not be subjected to disturbance from the proposed works. Cormorant were recorded in the vicinity of the proposed works during the wintering bird surveys, these individuals may also forage in this area during the breeding season. However, cormorant and shag primarily forage in suitable habitat surrounding breeding colonies, the closest of which is on Irelands Eye. Given that very few individuals breeding on Irelands Eye would forage in the vicinity of the proposed works, there is no potential for the proposed works to cause noise or visual disturbance that would cause impacts to breeding colonies of cormorant or shag.	

Qualifying Interest	Conservation Objective	Does the proposed works provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets?	Adverse Effect
		Puffins, and Manx shearwater breed on islands off the coast of Ireland and forage in deep waters along the east coast during summer, spending winter further offshore and in the case of the Manx shearwater, in the southern hemisphere. Therefore, there is no potential for these species to occur within the vicinity of the proposed works and thus there is no potential for the proposed works to cause noise or visual disturbance that would cause impacts to these species. Kittiwake is a summer visitor and breeds in colonies located along the coast of Ireland, foraging over widespread marine waters throughout the year, with a general preference exhibited toward offshore areas during winter (Jessop et al., 2018). The closest known breeding colony of this species to the proposed works is located at Howth Head SPA c. 12km northeast of the proposed works. Therefore, there is no potential for this species to occur within the vicinity of the proposed works and therefore there is no potential for the proposed works to cause noise or visual disturbance that would cause impacts to this species. Razorbill and Fulmar breed in colonies located along the coast of Ireland, foraging over a widespread range of marine waters throughout the year, with a general preference exhibited toward offshore areas (Jessop et al., 2018). The closest known breeding colonies of these species to the proposed works are located at Howth Head c. 12km northeast of the proposed works. Fulmar primarily forage out to sea and are very unlikely to forage in the vicinity of the proposed works, therefore there is no potential for the proposed works to cause noise or visual disturbance that would cause impacts to breeding colonies of cormorant or shag. Therefore, the proposed works do not have the potential to cause noise disturbance resulting in adverse effects to foraging Shag, Cormorant, Guillemot, Kittiwake, Manx Shearwater, Puffin, Razorbill and Fulmar.	

3.3 Summary of Adverse Effects

In Section 3.1, it was established that European sites designated for the following Qualifying Interest species; Harbour Porpoise, Bottlenose Dolphin Grey Seal Harbour Seal, Otter, Twaite Shad, non-breeding seabirds and waders, and breeding seabirds occur in the zone of influence of the proposed works and that there are no pathways for effects between the proposed works and any other European sites.

In Section 3.3, it was established that, in the absence of appropriate mitigation, interruptions or delays in achieving Conservation Objectives for several of those sites, i.e., adverse effects on the integrity of those sites, as a result of the proposed works, cannot be ruled out. A summary of the sites and their qualifying interests for which potential adverse effects were identified is given in Table 3-8 below.

Table 3-8 Summary of the European sites and their Qualifying Interests for which, in view of their Conservation Objectives, adverse effects cannot be ruled out at this stage.

No. European sites	Qualifying Interest
35	Harbour Porpoise (*Phocoena Phocoena*) [1351]
2	Bottlenose Dolphin (*Tursiops truncatus*) [1349]
3	Grey Seal (*Haliochoerus grypus*) [1364]
1	Harbour Seal (*Phoca vitulina*) [1365]

4. ASSESSMENT OF ADVERSE EFFECTS

4.1 Attributes and Targets

In Section 3 of this NIS, adverse effects of the proposed works on the integrity of a number of European Sites designated for the Qualifying Interests; Harbour Porpoise, Bottlenose Dolphin, Harbour Seal and Grey Seal were identified. In accordance with EC (2021), the identification of these effects was focused on and limited to the Conservation Objectives of the sites concerned.

Section 4 provides a detailed analysis and evaluation of the adverse effects identified in Section 3 (as summarised in Section 3.4). In order to fully assess the implications of the proposed works for the European sites concerned, each of the adverse effects are evaluated with reference to the Attributes and Targets which define the Conservation Objectives of those sites.

Evaluation of adverse effects is presented below for the source and type of impact, and then for receptor and as, in this case, the affected receptors have been identified as being affected the same set of impacts, to evaluate the same impacts under the headings of the relevant receptors would lead to undue repetition. Therefore, the evaluation of impacts is carried out under the headings of the type of impact.

4.2 Underwater noise disturbance

Underwater noise arising from the proposed works may result adverse effects to the following QI species Harbour Porpoise, Common Bottlenose Dolphin, Harbour Seal and Grey Seal.

Underwater noise has the potential to cause a range of impacts to marine life including to injury (hearing damage) and behavioural changes. Hearing damage injury to marine mammals is known as threshold shift can be either permanent (permanent threshold shift, PTS) or temporary (temporary threshold shift, TTS). Behavioural changes can include communication disruption, altered foraging behaviour or displacement from the area. Noise from anthropogenic sources have been measured to assess the levels which could cause injury to marine mammals. These are used as thresholds and are commonly used to assess the level of risk associated with noise producing activities in the marine environment. These thresholds are presented below in Table 4-1 and are different for different species.

Table 4-1 Marine mammal noise exposure criteria given by Southall et al. 2007 which could result in effects to marine mammals

Species	Hearing group and estimated auditory bandwidth (kHz)	Exposure Criteria (SPL – sound pressure level[16], SEL – sound exposure level[17])			Could rotary core drilling (assumed at SPL 191 dB re 1 µPa) have an effect?	Could the sub-bottom profiler (assumed at SPL 225 dB re 1 µPa) have an effect
		PTS – onset *	TTS-onset	Behavioural response		
Harbour Porpoise (*Phocoena phocoena*)	High-frequency cetaceans 0.2 - 180 kHz	230 dB SPL 198 dB SEL	224 dB SPL 183 dB SEL	90-170 dB RL [18]	No potential for PTS Yes - potential for TTS and behavioural response at source	Yes – potential for PTS, TTS and behavioural response at source
Common Bottlenose Dolphin (*Tursiops truncatus*)	Mid-frequency cetaceans 0.15 - 160 kHz	230 dB SPL 198 dB SEL	224 dB SPL 183 dB SEL	90-200 dB RL	No potential for PTS Yes - potential for TTS and behavioural response at source	Yes – potential for PTS, TTS and behavioural response at source
Pinnipeds Harbour Seal (*Phoca vitulina)* Grey Seal (*Halichoerus grypus*)	Pinnipeds in water 0.075 - 75 kHz	218 dB SPL 203 dB SEL	212 dB SPL 171 dB SEL	100+ dB RL	No potential for PTS Yes - potential for TTS and behavioural response at source	Yes – potential for PTS, TTS and behavioural response at source

*This table uses the lowest estimate for impacts across single-pulse, multiple-pulse and non-pulse noise sources

Units of measurement:

Sound Pressure Level, SPL (in water): measured in dB re: 1 µPa (peak) (flat)

Sound Exposure Level, SEL (in water): measured in dB re: 1 µPa2-s

Sound Pressure Level, SPL (in air): measured in dB re: 20 µPa (peak) (flat)

Sound Exposure Level, SEL (in air): measured in dB re: (20 µPa)2-s

Potential for noise sources of the proposed works to impact on marine mammals

[16] Sound Pressure Level (SPL) – A logarithmic measure in decibels (dB) of the average pressure level in water/air, with respect to a standard reference pressure (i.e., re. 1µPa in water or 20µPa in air). Commonly standardised to a distance of 1 metre from the source (i.e., @ 1m), SPL represents the amplitude of a sound's waveform and it may be measured in a number of ways including peak or peak-to-peak (for short duration sounds) and root mean square (i.e., rms) estimates (for continuous sounds).
[17] Sound Exposure Level (SEL) – A measure of sound energy over a given duration, i.e., time integral of instantaneous sound pressure squared, normalised to a 1 second period (dB re. µPa2–s or µPa2.s).
[18] Sound Received Level (RL) – the pressure level measured at the receiver, e.g., mammal.

Based on Table 4-1, rotary core drilling theoretically has the potential to result in TTS and behavioural changes at the source of the noise. However, this threshold is for SEL rather than SPL and is therefore only applicable over a period of time, meaning that the marine mammal would have to be located within very close proximity of the drilling rig over a period of time to experience TTS (2.52m for cetaceans and 10m for seals). Noise levels however would reduce to below the lowest threshold levels for TTS at 2.52m for cetaceans (TTS threshold of 183dB) and at 10.08m for pinnipeds (TTS threshold of 171dB)) from the source. This is considered to be a conservative estimate and based on the maximum possible sound that could be emitted from rotary drilling. The noise would cause a behavioural changes to cetaceans and pinnipeds up to 500m from the source, at which distance it would attenuate to background levels (McKeown, 2014). Behavioural changes to marine mammals, were they to occur within 500m of the source, would not restrict access to haul out sites or key foraging areas as none are located within Dublin Harbour. Marine mammals are highly mobile creatures which utilise huge areas for foraging and for their life-cycle. The closest key haul-out site in Dublin Bay is located on the northern tip of Bull Island. There is no potential for the proposed activities to cause noise disturbance that would impact use of this site.

Sub-bottom profiler emits sound directed at the sea floor or target structures and records reflected sound waves. The sound is highly directional, usually directed vertically downwards and has minimal dispersion of noise in non-target directions. Therefore, marine mammals would only be exposed to peak SPL from this source if they were to swim underneath the profiler. Given that marine mammals infrequently occur within the survey area, and that this survey will be completed within a number of days (less than one week), the chances of marine mammals to be exposed to this noise is very unlikely. However, applying the precautionary principal, as there is a possibility that marine mammals could occur within underneath the sub-bottom profiler, and that noise within this range could result in TTS or PTS (to all species), there is potential for these surveys to cause auditory damage.

The evaluation of adverse effects of underwater noise disturbance must be made with reference to the specific conservation objectives of the SAC's for which the species are designated. This evaluation is presented below in Table 4-2.

Table 4-2 Evaluation of potential of the proposed works to result in likely significant effects to marine mammals.

Attribute	Measure	Target	Notes (as per conservation objectives supporting documentation)	Evaluation of potential adverse effects
Harbour Porpoise				
Access to suitable habitat	Number of artificial barriers	Species range within the site should not be restricted by artificial barriers to site use	• This target may be considered relevant to proposed activities or operations that will result in the permanent exclusion of harbour porpoise from part of its range within the site, or will permanently prevent access for the species to suitable habitat therein. • It does not refer to short-term or temporary restriction of access or range. • Early consultation or scoping with the Department in advance of formal application is advisable for proposals that are likely to result in permanent exclusion.	This attribute relates specifically to *permanent* exclusion of access to suitable habitat. The proposed works are temporary in nature and will be carried out over a period of less than 3 months. Therefore, proposed works do not have the potential to cause permanent (or temporary) exclusion of Harbour Porpoise from part of its range, or to prevent access to suitable habitat within their range. **There is no potential for adverse effects.**
Disturbance	Level of impact	Human activities should occur at levels that do not adversely affect the harbour porpoise community at the site	• Proposed activities or operations should not introduce man-made energy (e.g. aerial or underwater noise, light or thermal energy) at levels that could result in a significant negative impact on individuals and/or the community of harbour porpoise within the site. This refers to the aquatic habitats used by the species in addition to important natural behaviours during the species annual cycle. • This target also relates to proposed activities or operations that may result in the deterioration of key resources (e.g. water quality, feeding, etc) upon which harbour porpoises depend. In the absence of complete knowledge on the species ecological requirements in this site, such considerations should be assessed where appropriate on a case-by-case basis. • Proposed activities or operations should not cause death or injury to individuals to an extent	Given that the closest designated site for Harbour Porpoise is 9km from the proposed works, there is no potential for underwater noise from the proposed works to impact this species within the site, as sound would attenuate to below the thresholds to cause a behavioural response in this species, therefore there is no potential to in-situ impacts to Harbour Porpoise within this site or any other site. However, the proposed GI works may produce underwater noise that would be in excess of thresholds to cause TTS to Harbour Porpoise within 2.52m of the source during a prolonged exposure. However, in practice this is considered highly unlikely due to the low likelihood that Harbour Porpoise would be present in Dublin Bay and given that the noise produced by the works rapidly attenuates to below TTS threshold levels within 2.52m of the source. The sub-bottom profiler also has the potential to exceed PTS and TTS threshold levels, were a Harbour

Attribute	Measure	Target	Notes (as per conservation objectives supporting documentation)	Evaluation of potential adverse effects
			that may ultimately affect the harbour porpoise community at the site.	Porpoise to swim underneath the vessel, and therefore auditory damage could be caused. Thus, applying the precautionary principal, as there is a possibility that this species could occur within 2.52m of the proposed GI works or underneath the sub-bottom profiler, and that noise within this range could result in TTS or PTS (sub-bottom profiler). This would have the potential to result in adverse effects to the 'Disturbance' attribute of Harbour Porpoise. **Therefore, there is potential for adverse effects and mitigation is required.**
Common Bottlenose dolphin				
Access to suitable habitat	Number of artificial barriers	Species range within the site should not be restricted by artificial barriers to site us	• This target may be considered relevant to proposed activities or operations that will result in the permanent exclusion of bottlenose dolphin from part of its range within the site, or will permanently prevent access for the species to suitable habitat therein. • It does not refer to short-term or temporary restriction of access or range. • Early consultation or scoping with the Department in advance of formal application is advisable for proposals that are likely to result in permanent exclusion.	This attribute relates specifically to *permanent* exclusion of access to suitable habitat. The proposed works are temporary in nature and will be carried out over a period of less than 3 months. Therefore, proposed works do not have the potential to cause permanent (or temporary) exclusion of Bottlenose Dolphin from part of its range, or to prevent access to suitable habitat within their range. **There is no potential for adverse effects.**
Habitat use: critical areas	Location and hectares	Critical areas, representing habitat used preferentially by bottlenose dolphin, should be maintained in a natural condition	• This target is relevant to proposed activities or operations that will result in significant interference with or disturbance of (a) aquatic habitat used preferentially by bottlenose dolphin during the annual cycle and (b) the natural behaviour of bottlenose dolphin within such critical areas (i.e., preferred habitat). • Operations or activities that cause displacement of individuals from a critical area	The proposed activities are not located in aquatic habitat that could be considered preferred habitat / critical habitat for Bottlenose Dolphin given that this species was not recorded in Dublin Harbour over a period of 4 years (IWDG, 2020). Common Bottlenose Dolphin utilise the wider Dublin Bay however there is no potential for the proposed works to impact this area. **There is no potential for likely significant effects.**

Attribute	Measure	Target	Notes (as per conservation objectives supporting documentation)	Evaluation of potential adverse effects
			(i.e. preferred habitat) or alteration of natural behaviour to an extent that may ultimately interfere with key ecological functions would be regarded as significant and should therefore be avoided.	
Disturbance	Level of impact	Human activities should occur at levels that do not adversely affect the bottlenose dolphin population at the site	• Proposed activities or operations should not introduce man-made energy (e.g. aerial or underwater noise, light or thermal energy) at levels that could result in a significant negative impact on individuals and/or the population of bottlenose dolphin within the site. This refers to the aquatic habitats used by the species in addition to important natural behaviours during the species' annual cycle. • This target also relates to proposed activities or operations that may result in the deterioration of key resources (e.g. water quality, feeding, etc) upon which bottlenose dolphins depend. In the absence of complete knowledge on the species' ecological requirements in this site, such considerations should be assessed where appropriate on a case-by-case basis. • Proposed activities or operations should not cause death or injury to individuals to an extent that may ultimately affect the bottlenose dolphin population at the site.	Given that the closest designated site for Bottlenose Dolphin is 191km from the proposed works, there is no potential for underwater noise from the proposed works to impact this species within the site, as sound would attenuate to undetectable levels well before reaching this site, therefore there is no potential to in-situ impacts to Harbour Porpoise within this site or any other site. However, the proposed GI works may produce underwater noise that would be in excess of thresholds to cause TTS to Bottlenose Dolphin within 2.52m of the source during a prolonged exposure. However, in practice this is considered highly unlikely due to the low likelihood that Bottlenose Dolphin may be present in Dublin Bay during the works (given that they have not previously been recorded in Dublin Harbour) and given that the noise produced by the works rapidly attenuates to below TTS threshold levels within 2.52m of the source. The sub-bottom profiler also has the potential to exceed PTS and TTS threshold levels, were a Bottlenose Dolphin to swim underneath the vessel, and therefore auditory damage could be caused. Thus, applying the precautionary principal, as there is a possibility that this species could occur within 2.52m of the proposed GI works or underneath the sub-bottom profiler, and that noise within this range could result in TTS or PTS (sub-bottom profiler). This would have the potential to result in adverse effects to the 'Disturbance' attribute of Bottlenose Dolphin.

Attribute	Measure	Target	Notes (as per conservation objectives supporting documentation)	Evaluation of potential adverse effects
				Therefore, there is potential for adverse effects and mitigation is required.
Harbour Seal and Grey Seal				
Access to suitable habitat	Number of artificial barriers	Species range within the site should not be restricted by artificial barriers to site use.	• This target may be considered relevant to proposed activities or operations that will result in the permanent exclusion of harbour seal from part of its range within the site, or will permanently prevent access for the species to suitable habitat therein. • It does not refer to short-term or temporary restriction of access or range. • Early consultation or scoping with the Department in advance of formal application is advisable for proposals that are likely to result in permanent exclusion.	This attribute relates specifically to *permanent* exclusion of access to suitable habitat. The proposed works are temporary in nature and will be carried out over a period of less than 3 months. Therefore, proposed works do not have the potential to cause permanent (or temporary) exclusion of Harbour Seal or Grey Seal from part of their range, or to prevent access to suitable habitat within their range. **There is no potential for adverse effects.**
Breeding behaviour	Breeding sites	The breeding sites should be maintained in a natural condition.	• This target is relevant to proposed activities or operations that will result in significant interference with or disturbance of (a) breeding behaviour by harbour seal within the site and/or (b) aquatic/terrestrial/intertidal habitat used during the annual breeding season. • Operations or activities that cause displacement of individuals from a breeding site or alteration of natural breeding behaviour, and that may result in higher mortality or reduced reproductive success, would be regarded as significant and should therefore be avoided.	Harbour seals are known to haul out on Bull Island throughout the year and pup during the summer. Dublin Harbour may provide local foraging habitat and it is likely that seals encountered within the harbour are typically the same individuals occurring regularly, with the harbour also providing temporary haul out sites (IWDG, 2020). Grey seals forage locally and it is likely seals encountered within the harbour are typically the same individuals occurring regularly with the harbour providing foraging opportunities as well as temporary haul out sites (IWDG, 2020). They are known to haul out on Bull Island from May to November and pup at sites on Lambay Island, Ireland's Eye and Dalkey Island. Grey seals are still observed in the River Liffey during winter months during their breeding and moulting seasons. These individuals of Grey Seal and Harbour Seal likely have a high level of habituation to noise and vessel
Moulting behaviour	Moult haul-out sites	The moult haul-out sites should be maintained in a natural condition.	• This target is relevant to proposed activities or operations that will result in significant interference with or disturbance of (a) moulting behaviour by harbour seal within the site and/or	

Attribute	Measure	Target	Notes (as per conservation objectives supporting documentation)	Evaluation of potential adverse effects
			(b) aquatic/terrestrial/intertidal habitat used during the annual moult. • Operations or activities that cause displacement of individuals from a moult haul-out site or alteration of natural moulting behaviour to an extent that may ultimately interfere with key ecological functions would be regarded as significant and should therefore be avoided.	movements in Dublin Port as they regularly occur in this area with high levels of anthropogenic activity. It would be unlikely to experience disturbance at any temporary haul out sites. There is no potential for the proposed works to interfere with the breeding behaviour, moulting sites or resting haul out sites of these species or impact individuals with pups on Bull Island which is in the wider Dublin Bay. **There is no potential for likely significant effects.**
Resting behaviour	Resting haul-out sites	The resting haul-out sites should be maintained in a natural condition	• This target is relevant to proposed activities or operations that will result in significant interference with or disturbance of (a) resting behaviour by harbour seal within the site and/or (b) aquatic/terrestrial/intertidal habitat used for resting. • Operations or activities that cause displacement of individuals from a resting haul-out site to an extent that may ultimately interfere with key ecological functions would be regarded as significant and should therefore be avoided.	
Disturbance	Level of impact	Human activities should occur at levels that do not adversely affect the harbour seal population at the site	• Proposed activities or operations should not introduce man-made energy (e.g. aerial or underwater noise, light or thermal energy) at levels that could result in a significant negative impact on individuals and/or the population of harbour seal within the site. This refers to both the aquatic and terrestrial/intertidal habitats used by the species in addition to important natural behaviours during the species annual cycle. • This target also relates to proposed activities or operations that may result in the deterioration of key resources (e.g. water quality, feeding, etc) upon which harbour seals depend. In the	Given that the closest designated site for Harbour Seal and Grey Seal is 26 km from the proposed works, there is no potential for underwater noise from the proposed works to impact this species within the site, as sound would attenuate to undetectable levels well before reaching this site, therefore there is no potential to in-situ impacts to Harbour Seal and Grey Seal within this site or any other site. However, the proposed GI works may produce underwater noise that would be in excess of thresholds to cause TTS to Harbour Seal or Grey Seal within 10.08m of the source during a prolonged exposure, or PTS if underneath the sub-bottom profiler. However, in practice this is considered highly unlikely given that the seal

Attribute	Measure	Target	Notes (as per conservation objectives supporting documentation)	Evaluation of potential adverse effects
			absence of complete knowledge on the species' ecological requirements in this site, such considerations should be assessed where appropriate on a case-by-case basis. • Proposed activities or operations should not cause death or injury to individuals to an extent that may ultimately affect the harbour seal population at the site.	population which regularly use Dublin Harbour would be habituated to noise and vessel movements, and that the noise produced by the works rapidly attenuates to below TTS threshold levels within 10.08m of the source and that the sub-bottom profiler limits the dispersion of emitted noise. Thus, applying the precautionary principal, as there is a possibility that these species could occur within 10.08m of the GI works or underneath the sub-bottom profiler, and that noise within this range could result in TTS or PTS (sub-bottom profiler). This would have the potential to result in adverse effects to the 'Disturbance' attributes of Harbour Seal and Grey Seal. **Therefore, there is potential for adverse effects and mitigation is required.**

Conclusion

The proposed works have the potential to result in underwater noise disturbance which may cause TTS or PTS within close range or behavioural change within Dublin Harbour and therefore potential change use of habitat by Harbour Porpoise, Bottlenose Dolphin, Harbour Seal and Grey Seal. Therefore, it is considered that the proposed works has potential to lead to changes in the *disturbance* Attributes of Harbour Porpoise, Bottlenose Dolphin, Harbour Seal and Grey Seal, as such, the proposed works may result in adverse effects on these QI's and therefore, mitigation is required.

4.3 Summary

In Sections 4.2, it was established that for four Qualifying Interest species, namely, Harbour Porpoise, Bottlenose Dolphin, Harbour Seal and Grey Seal for European Sites identified in Table 3-2 , that in the absence of appropriate mitigation, interruptions or delays in achieving certain Conservation Objectives for those sites, i.e., adverse effects on the integrity of those sites, as a result of the proposed works, cannot be ruled out. Therefore, mitigation is required to avoid these adverse effects, mitigation is presented in Section 5.

5. MITIGATION

5.1 Principles and Approach

Section 4 of this NIS assessed the adverse effects likely to arise from the proposed works on the specific Attributes and Targets which define the Conservation Objectives for a the Qualifying Interests Harbour Porpoise, Bottlenose Dolphin, Harbour Seal and Grey Seal for the various European Sites in which they are designated. This section prescribes mitigation measures to ensure their full and proper implementation aimed at mitigating these adverse effects, thereby protecting the integrity of these European sites during the proposed works.

The mitigation measures prescribed in this NIS have been designed according to the principle of a mitigation hierarchy, as outlined in the European Commission's guidance document *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* (EC, 2021). According to this hierarchy, mitigation measures first suggest *avoidance* (i.e. preventing significant impacts from happening in the first place) and then *reduction* of impact (i.e. reducing the magnitude and/or likelihood of an impact).

As mitigation measures are related directly to impacts and only indirectly to receptors and as, in this case, all of the affected receptors have been identified as being affected the same set of impacts, to describe mitigation measures under the headings of the relevant receptors would lead to undue repetition. Therefore, the measures prescribed in this NIS are described under the headings of the types of impacts which they are intended to mitigate.

The mitigation measures are prescribed in Section 5.2 and a protocol to ensure their full and proper implementation is prescribed in Section 5.3. The significance of any residual effects following the inclusion of mitigation measures is evaluated in Section 5.4. As per the assessment of adverse effects in Section 4, this evaluation is made in view of the relevant Conservation Objectives.

5.2 Mitigation Measures

5.2.1 Underwater noise disturbance

This section presents the mitigation measures that are required to be implemented during the proposed GI works to avoid potential underwater noise impacts on marine mammals, as adapted from the Marine Mammal Risk Assessment (MMRA) (IWDG, 2020) prepared for the adjacent proposed Dodder Bridge (DPTOB). All of the mitigation measures shall be implemented in full. This MMRA specifies adoption of the NPWS Guidelines to Manage Risk to Marine Mammals from Man–Made Sounds in Irish Waters (NPWS, 2014d). The mitigation measures are set out below:

(1) A qualified and experienced marine mammal observer (MMO) shall be appointed to monitor for marine mammals and to log all relevant events using standardised data forms.

(2) Unless information specific to the location and/or plan/project is otherwise available to inform the mitigation process (e.g., specific sound propagation and/or attenuation data) and a distance modification has been agreed with the Regulatory Authority, drilling activity shall not commence if marine mammals are detected within a **1,000m radial distance of the drilling sound source**, i.e., within the Monitored Zone.

(3) **Drilling activities shall only commence in daylight hours where effective visual monitoring, as performed and determined by the MMO, has been achieved**. Where effective visual monitoring, as determined by the MMO, is not possible the sound-producing activities shall be postponed until effective visual monitoring is possible.

(4) An agreed and clear on-site communication signal must be used between the MMO and the works Superintendent as to whether the relevant activity may or may not proceed, or resume following a break. It shall only proceed on positive confirmation with the MMO.

(5) In waters up to 200m deep, the MMO shall conduct **pre-start-up constant effort monitoring at least 30 minutes before the sound-producing activity is due to commence**. Sound-producing activity shall not commence until at least 30 minutes have elapsed with no marine mammals detected within the Monitored Zone by the MMO.

(6) This prescribed Pre-Start Monitoring shall subsequently be followed by an appropriate Ramp-Up Procedure which should include continued monitoring by the MMO.

(7) In commencing a drilling operation where the output peak sound pressure level (in water) from any source including equipment testing exceeds 170 dB re: 1µPa @1m an appropriate Ramp-up Procedure (i.e., "soft-start") must be used.

(8) Where it is possible according to the operational parameters of the equipment and materials concerned, the underwater acoustic energy output shall commence from a lower energy start-up (i.e., a peak sound pressure level not exceeding 170 dB re: 1µPa @1m) and thereafter be allowed to gradually build up to the necessary maximum output over a period of 20-40 minutes.

(9) This controlled build-up of acoustic energy output shall occur in consistent stages to provide a steady and gradual increase over the ramp-up period.

(10) Where the measures outlined in steps 8 and 9 are not possible, alternatives must be examined whereby the underwater output of acoustic energy is introduced in a consistent, sequential and gradual manner over a period of 20-40 minutes prior to commencement of the full necessary output.

(11) In all cases where a Ramp-Up Procedure is employed the delay between the end of ramp-up and the necessary full output must be minimised to prevent unnecessary high-level sound introduction into the environment.

(12) Once an appropriate and full Ramp-Up Procedure commences, there is no requirement to halt or discontinue the procedure at night-time (if permitted), nor if weather or visibility conditions deteriorate nor if marine mammals occur within a 1,000m radial distance of the sound source, i.e., within the Monitored Zone.

(13) If there is a break in drilling sound output for a period greater than 30 minutes (e.g., due to equipment failure, shut-down or location change) then all Pre-Start Monitoring and a subsequent Ramp-up Procedure (where appropriate following Pre-Start Monitoring) must be undertaken.

(14) For higher output drilling operations which have the potential to produce injurious levels of underwater sound as informed by the associated risk assessment, there is likely to be a regulatory requirement to adopt shorter 5-10 minute break limit after which period all Pre-Start Monitoring and a subsequent Ramp-up Procedure (where appropriate following Pre-Start Monitoring) shall recommence as for start-up.

5.3 Implementation

In order to give effect to the mitigation prescribed in this NIS, it should be a condition of any consent granted in respect of the proposed works that all of the mitigation, including monitoring and enforcement, prescribed in this NIS be binding, during the works phase, on the Contractor. Accordingly, all of the mitigation prescribed herein shall be transposed into the Contract Documents for the ground investigation works.

During the works, all works must comply with relevant legislation and guidelines in order to reduce and minimise environmental impacts and to protect all ecological receptors. In particular, there must be full compliance with the following:

- The mitigation prescribed in this NIS.
- Any conditions which might be attached to the proposed works licence conditions.
- Any requirements of stakeholders and statutory bodies, e.g., the NPWS and IFI, including:
    - *Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters* (NPWS, 2014).
- All applicable legislative requirements in relation to environmental protection.
- The Transport Infrastructure Ireland (TII) Environmental Assessment and Construction Guidelines, specifically:
    - *Guidelines for the Treatment of Noise and Vibration in National Road Schemes.*

This list is non-exhaustive. All environmental commitments/requirements and relevant legislation and guidelines which are current at the time of construction will be followed.

5.4 Residual Effects

5.4.1 Marine Mammals

Following the inclusion of the mitigation measures in Section 5.2.2 (Underwater Noise Disturbance) above, and conclusion of the MMRA (IWDG, 2020), the probability of impacts from underwater noise disturbance arising from the construction of the proposed works are very low and the significance of any such impacts, if they were to occur, would be negligible. Therefore, it can be concluded beyond reasonable scientific doubt that any residual impacts from underwater noise disturbance arising from the proposed works will not constitute adverse effects on Harbour Porpoise, Bottlenose Dolphin, Harbour Seal and Grey Seal.

Therefore, given the full and proper implementation of the mitigation prescribed in this NIS, it can be concluded beyond all reasonable scientific doubt that the proposed works will not adversely affect the integrity of any European Site, in view of the Conservation Objectives for Harbour Porpoise, Bottlenose Dolphin, Harbour Seal and Grey Seal.

6. IN-COMBINATION EFFECTS

6.1 Introduction

Article 6(3) of the Habitats Directive requires that AA be carried out in respect of plans and projects that are likely to have significant effects on European sites, "either individually or in combination with other plans or projects". Therefore, the combined effects of the plan or project under assessment and other past, present or foreseeable future plans or projects must also be examined, analysed and evaluated.

6.2 Methodology

An area of 10km in the Foreshore area from the proposed works was selected for the assessment of in-combination effects to include developments with reasonable potential for in-combination impacts, whilst excluding those areas which are non-viable because of issues such as topography and distance. Land-based projects in the urban surroundings of the Tom Clarke bridge were excluded as they are within an urban environment that does not contain suitable supporting habitat for QI species.

In-combination or cumulative effects result from incremental changes caused by other past, present or reasonably foreseeable projects together with the proposed works. Such effects were assessed by examining previous plans and projects, current plans and projects in planning and proposed future plans and projects within the specified geographic area around the proposed works from 2020 to the present. There is too much uncertainty associated with proposals beyond 5 years into the future and this NIS must be based on data that is readily available. The assessment in this NIS has considered in-combination effects that are:

(a) Likely;

(b) Significant; and,

(c) Relating to a future event which is reasonably foreseeable.

The following data sources have been consulted to identify the plans and projects within the specified geographic area:

- Dublin City Council Planning Portal (DCC, 2024)
- An Bord Pleanála Website (ABP, 2024);
- Projects listed on the EIA Portal (DoHLG, 2024); and
- Foreshore Licence Application Website.

6.3 Assessment of Effects

Table 6-1 below details the assessment of the likelihood of significant effects arising from the proposed works in combination with other plans or projects. This assessment was undertaken in view of the Conservation Objectives of the relevant European sites and found that, given the implementation of the mitigation measures in Section 5 of this NIS, the proposed works does not have the potential to significantly affect any European site in combination with other plans or projects.

Table 6-1 Assessment of adverse effects arising from the proposed works in-combination with other plans or projects.

Existing Project	Description of project	Likely In-combination Effects
Applicant: National Transport Authority **Competent Authority:** An Bord Pleanála **EIAR Portal Reference No.:** 2023129 **ABP Reference No.:** 317679 **Location:** Ringsend to City Centre Core Bus Corridor, closest to the proposed development from Sir John Rogerson's Quay to York Road over the River Dodder. Route includes Custom House Quay, North Wall Quay, City Quay, Sir John Rogerson's Quay, York Road, Pembroke Cottages, Cambridge Park, Ringsend Park, Strand Street, Pembroke Street and Sean Moore Road. **Status:** ABP decision to grant permission with conditions with conditions was made in August 2024.	This project is located immediately adjacent to the works area as the project is connected to the proposed Point Bridge and Tom Clarke Widening Project, which the proposed works are to inform. The Ringsend to City Centre Core Bus Corridor Scheme, which has an overall length of approximately 3.2km on both sides of the River Liffey, and is routed for 1.6km along the R801 road on Custom House Quay and North Wall Quay on the northside of the River Liffey, and for 1.6km along the R813 road on City Quay and Sir John Rogerson's Quay on the southside of the River Liffey including the provision of a new opening public transport bridge (Dodder Bridge) over the River Dodder from Sir John Rogerson's Quay to the R131 East Link Road at Ringsend. In addition, a cycle route will continue over a length of 1.1km from York Road, Ringsend, via Pembroke Cottages and Cambridge Park through Ringsend Park and along Strand Street and Pembroke Street, Irishtown, terminating at Sean Moore Road. Public Realm works including landscaping, planting, street furniture, street lighting, boundary walls and sustainable urban drainage (SUDs) measures. A Natura Impact Statement has been submitted as part of the application. The report concluded that '*following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the Proposed Scheme, and the effective implementation of the mitigation measures proposed, that the Proposed Scheme will not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in combination with other plans or projects'*.	Considering the nature, scale and location of the project, the timing of the proposed works, the mitigation for the proposed works, as well as the conclusion of the Natura Impact Statement, there will be no adverse effects in-combination with the proposed works.
Applicant: Dublin Port Company	The project ('3FM Project') is directly adjacent to the east of the proposed works	Considering the nature, scale and location of the project, the timing of the proposed works,

Existing Project	Description of project	Likely In-combination Effects
Competent Authority: Dublin City Council **EIAR Portal Reference No.:** 2024127 **ABP Reference No:** 320250 **Location:** Bond Drive, Promenade Road, T10 Link Road, Tolka Quay Road, Alexandra Road, East Wall Road, North Wall Quay Extension (protected structure), Oil Berth No. 4 and Berth 52/53 in Dublin 1 and 3; east of Tom Clarke Bridge, north of the R131 and over the River Liffey; Pigeon House Road, South Bank Road, Whitebank Road and Shellybanks Road; Poolbeg Yacht & Boat Club, Stella Maris Rowing Club and Marina off Pigeon House Road; Marine Terminals Limited (MTL) Lift-on Lift-off (Lo-Lo) container terminal and Berths 41-45 off Pigeon House Road, South Bank Road and Whitebank Road; quayside yards associated with South Bank Quay off Pigeon House Road; sludge jetty and Berth 47A off Pigeon House Road; Poolbeg Oil Jetty and Berth 48 off Pigeon House Road; and; a site to the south and east of South Bank Road and south of Shellybanks Road at Poolbeg, Dublin 4 **Status:** Application was registered in July 2024 ABP decision is due in February 2025.	The project t has a site area of c. 100ha. The project includes: • Construction of a new public road (c.2.3km long), including the Southern Port Access Route (SPAR) opening bridge (c.220m long) at North Wall Quay Extension (protected structure) over the River Liffey to the east of Tom Clarke Bridge, a viaduct (c.595m long) parallel to the south bank of the River Liffey together with active travel associated infrastructure and facilities • Construction of a Lift-on/Lift-off Container Terminal • Construction of a Roll-on/roll-off Freight Terminal • Ship turning circle c. 325m in diameter for vessels up to 240m long • Maritime Village improvements to rowing and yacht clubs, maritime training centres, maintenance buildings, slipways and ancillary public realm development • New 'Port Park' (c. 2.5 ha) to the southeast of South Bank Road. The proposed park will feature a sports pitch, parkland, wildflower meadow, active travel pathways, landscaping, play tower, park furniture, toilets, and lighting • Ancillary works including landscaping, public street/park lighting, CCTV, solar PV roof panels, waste management facilities, permanent diversion of utilities and services, provision for new services and utilities. A Natura Impact Statement has been submitted as part of the application. The report concluded that '*the construction and operation of the 3FM Project, whether considered alone or in combination with other plans and projects, will not adversely affect the integrity of any European site'*.	the mitigation for the proposed works, as well as the conclusion of the Natura Impact Statement, there will be no adverse effects in-combination with the proposed works.
Applicant: Dublin Port Company	The project 'Dublin Port Capital Dredging Project' is located c.430m east of the proposed works at its closest point. A Foreshore application in respect of Capital Dredging at various locations around Dublin Port. The works proposed in	Considering the nature, scale and location of the project, the timing of the proposed works, the mitigation for the proposed works, as well as the conclusion of the Natura Impact

Existing Project	Description of project	Likely In-combination Effects
Competent Authority: Minister for Housing, Local Government and Heritage **EIAR Portal Reference No.:** 2022002 **Foreshore Notice Reference No.:** FS007164 **Location:** Dublin Port. **Status:** A notice of determination to grant a Foreshore Licence subject to conditions was made in January 2024.	the Dublin Harbour Capital Dredging Project comprise a number of elements: • Deepening the navigation channel between North Wall Quay Extension and the Western Oil Jetty, including riverside Berth 35; • Deepening of Alexandra Basin East and deepening/widening of berths; • Deepening of the Oil Basin and widening of berths; • Deepening of the Ferryport Basin; • Deepening of riverside Berth 52; • Widening the South Port (Berths 42 - 47) berths, and • Removal of ridge between the navigation channel and the Poolbeg Oil Jetty (Berth 48). A Natura Impact Statement has been submitted as part of the application. The report concluded that having applied mitigation measures where necessary '*there will be no adverse effects upon the integrity of any European site and no scientific doubt remains as to the absence of such effects*' as a result of the Capital Dredging Project.	Statement, there will be no adverse effects in-combination with the proposed works.
Applicant: Dublin Port Company **Competent Authority:** Dublin City Council **Foreshore Notice Reference No.:** FS007132 **Location:** Dublin Port **Status:** A notice of determination to grant a Foreshore Licence subject to conditions was made in August 2022.	The project 'Dublin Port Maintennce Dredging Campaign 2022 – 2029' is located c.430m east of the proposed works at its closest point. A Foreshore application in respect of maintenance dredging at various locations in Dublin Port for the years 2022 to 2029. Dublin Port Company requires regular maintenance dredging of the Port's navigation channel, basins and berthing pockets to maintain sufficient water depth to allow the safe passage of cargo and passengers to and from the Port. A Natura Impact Statement has been submitted as part of the application. The report concluded that having applied mitigation measures where necessary, '*there will be no adverse effects upon the integrity of any European site and no scientific doubt remains as to the absence of such effects*'	Considering the nature, scale and location of the project, the timing of the proposed works, the mitigation for the proposed works, as well as the conclusion of the Natura Impact Statement, there will be no adverse effects in-combination with the proposed works.

Existing Project	Description of project	Likely In-combination Effects
	as a result of the Maintenance Dredging Campaign 2022 - 2029.	
Applicant: Dublin Port Company **Competent Authority:** Minister for Housing, Local Government and Heritage **EIAR Portal Reference No.:** 2020196 **ABP Reference No.:** 304888 **Foreshore Notice Reference No.:** FS006893 **Location:** Dublin Port, off Jetty Road and Breakwater Road South, Terminal Road South, Alexandra Road Extension, Alexandra Road, Tolka Quay Road and Promenade Road, Dublin 1 and 3. **Status:** ABP Decision to grant permission with conditions was made in July 2020.	The project ('MP2 Project') is located c. 1.3km east of the proposed works at its closest point. The development consists of a 15-year permission for development at Oil Berth 3 and Oil Berth 4, Eastern Oil Jetty and at Berths 50A, 50N, 50S, 51, 51A, 49, 52, 53 and associated terminal yards to provide for various elements including new Ro-Ro jetty and consolidation of passenger terminal buildings. A Natura Impact Statement (incuding an updated version in 2022) has been submitted as part of the application. Both reports concluded that the proposed development '*beyond reasonable scientific doubt, that the construction and operation of the MP2 project will not adversely affect the integrity of any European site'*.	Considering the nature, scale and location of the project, the timing of the proposed works, the mitigation for the proposed works, as well as the conclusion of the Natura Impact Statement, there will be no adverse effects in-combination with the proposed works.
Application reference no.: FS007546 **Project:** Codling Wind Park Site investigation **Distance:** Overlaps with proposed works application area **Project Status:** Proposed application submitted 22/04/20	These projects have spatial overlap with the proposed works area, are located within the 10km Foreshore Area. The timing of these projects may also overlap with the proposed works.	Considering the nature, scale and location of the project, the timing of the proposed works, the mitigation for the proposed works, as well as the conclusion of the Natura Impact Statement, there will be no adverse effects in-combination with the proposed works.
Application reference no.: FS007472 / FS007392 **Project:** LIR Offshore Array Ltd Site Investigations for proposed offshore windfarm		Considering the nature, scale and location of the project, the timing of the proposed works, the mitigation for the proposed works, as well as the conclusion of the Natura Impact

Existing Project	Description of project	Likely In-combination Effects
Distance: Overlaps with proposed works application area **Project Status:** Proposed application submitted 22/09/22		Statement, there will be no adverse effects in-combination with the proposed works.
Application reference no.: S0024-02 **Project:** Dublin Port Company Dumping at Sea Permit **Distance:** Overlaps with proposed works application area **Project Status:** Approved but not completed permit granted 27/07/2022		Considering the nature, scale and location of the project, the timing of the proposed works, the mitigation for the proposed works, as well as the conclusion of the Natura Impact Statement, there will be no adverse effects in-combination with the proposed works.
Application reference no.: S0004-03 **Project:** Dublin Port maintenance dredging permit **Distance:** Overlaps with proposed works application area **Project Status:** Approved but not completed permit granted 04/10/2022		Considering the nature, scale and location of the project, the timing of the proposed works, the mitigation for the proposed works, as well as the conclusion of the Natura Impact Statement, there will be no adverse effects in-combination with the proposed works.
Application reference no.: FS007367 **Project:** Greystones (Windfarm Ltd. proposing to develop windfarm off Dublin/Wicklow **Distance:** Overlaps with proposed works application area **Project Status:** Proposed application submitted 29/06/22		Considering the nature, scale and location of the project, the timing of the proposed works, the mitigation for the proposed works, as well as the conclusion of the Natura Impact Statement, there will be no adverse effects in-combination with the proposed works.
Application reference no.: FS007188 **Project:** RWE Dublin Array Offshore Windfarm **Distance:** Overlaps with proposed works application area **Project Status:** Proposed Foreshore licence submitted 01/10/21		Considering the nature, scale and location of the project, the timing of the proposed works, the mitigation for the proposed works, as well as the conclusion of the Natura Impact Statement, there will be no adverse effects in-combination with the proposed works.

Existing Project	Description of project	Likely In-combination Effects
Application reference no.: 3872/20 **Project:** Irish Bitumen Storage Ltd **Distance:** Less than 5km from the proposed works area **Project Status:** Permission granted 08/04/21	These projects do not have spatial overlap with the proposed works area, but are located within 10km of the proposed works and are located within the 10km Foreshore Area. The timing of these projects may also overlap with the proposed works.	Considering the nature, scale and location of the project, the timing of the proposed works, the mitigation for the proposed works, as well as the conclusion of the Natura Impact Statement, there will be no adverse effects in-combination with the proposed works.
Application reference no.: 3623/20 **Project:** Poolbeg generating Station demolition and remediation project **Distance:** Less than 5km from the proposed works area **Project Status:** Permission Granted 07/05/21		Considering the nature, scale and location of the project, the timing of the proposed works, the mitigation for the proposed works, as well as the conclusion of the Natura Impact Statement, there will be no adverse effects in-combination with the proposed works.
Application reference no.: 3711/18 **Project:** Lands at berth 47A adjacent to Pigeon House Road **Distance:** Less than 5km from the proposed works area **Project Status:** Permission Granted 03/07/19		Considering the nature, scale and location of the project, the timing of the proposed works, the mitigation for the proposed works, as well as the conclusion of the Natura Impact Statement, there will be no adverse effects in-combination with the proposed works.
Application reference no.: 3638/18 **Project:** Former Calor Yard and Ferry Terminals 1 and 2, Dublin Port **Distance:** Less than 5km from the proposed works area **Project Status:** Permission Granted 28/11/18		Considering the nature, scale and location of the project, the timing of the proposed works, the mitigation for the proposed works, as well as the conclusion of the Natura Impact Statement, there will be no adverse effects in-combination with the proposed works.
Application reference no.: 3540/18 **Project:** Calor Office Site, Tolka Quay Road, Dublin Port, Dublin 1 **Distance:** Less than 5km from the proposed works area **Project Status:** Permission Granted 13/09/18		Considering the nature, scale and location of the project, the timing of the proposed works, the mitigation for the proposed works, as well as the conclusion of the Natura Impact Statement, there will be no adverse effects in-combination with the proposed works.

Existing Project	Description of project	Likely In-combination Effects
Application reference no.: 3540/18 **Project:** The Hammond Lane Metal Company Ltd. **Distance:** Less than 5km from the proposed works area **Project Status:** Permission Granted 20/03/18		Considering the nature, scale and location of the project, the timing of the proposed works, the mitigation for the proposed works, as well as the conclusion of the Natura Impact Statement, there will be no adverse effects in-combination with the proposed works.
Application reference no.: 3084/16 **Project:** Dublin Port, Alexandria Road, Dublin 1 Application for internal and external roads and associated works **Distance:** Less than 5km from the proposed works area **Project Status:** Permission Granted 06/06/17		Considering the nature, scale and location of the project, the timing of the proposed works, the mitigation for the proposed works, as well as the conclusion of the Natura Impact Statement, there will be no adverse effects in-combination with the proposed works.
Application reference no.: FS007605 **Project:** Irish water benthic Survey **Distance:** Less than 10km from the proposed works area **Project Status:** Proposed Foreshore licence submitted 25/11/22		Considering the nature, scale and location of the project, the timing of the proposed works, the mitigation for the proposed works, as well as the conclusion of the Natura Impact Statement, there will be no adverse effects in-combination with the proposed works.
Application reference no.: LIC230016 **Project:** Microsoft Dublin Port **Distance:** Less than 10km from the proposed works area **Project Status:** Proposed Maritime Usage Licence issued 28/06/2024		Considering the nature, scale and location of the project, the timing of the proposed works, the mitigation for the proposed works, as well as the conclusion of the Natura Impact Statement, there will be no adverse effects in-combination with the proposed works.

7. CONCLUSION

This NIS has been prepared in accordance with the relevant provisions of the Habitats Directive, the Habitats Regulations and the Planning and Development Act, as well as the relevant case law and current guidance. It has demonstrated that, in the absence of appropriate mitigation, the proposed works, individually or in combination with other plans or projects, would adversely affect the integrity of European sites designated for the Qualifying Interests Harbour Porpoise, Bottlenose Dolphin, Harbour Seal and Grey Seal. In light of this finding, this NIS has prescribed appropriate mitigation to eliminate or minimise such effects. Any residual effects, either individually or in combination with other plans or projects, have been assessed as not constituting adverse effects on the integrity of any European site. This assessment has been undertaken on the basis of the best scientific knowledge in the field and the Precautionary Principle and no reasonable scientific doubt remains as to the absence of such effects.

It is the considered opinion of ROD, as the author of this NIS, that, in making its AA in respect of the proposed works, MARA, as the Competent Authority in this case, should determine that, given the full and proper implementation of the mitigation prescribed in this NIS, the proposed development, either individually or in combination with other plans or projects, will not adversely affect the integrity of European sites designated for the Qualifying Interests Harbour Porpoise, Bottlenose Dolphin, Harbour Seal and Grey Seal or any other European site.

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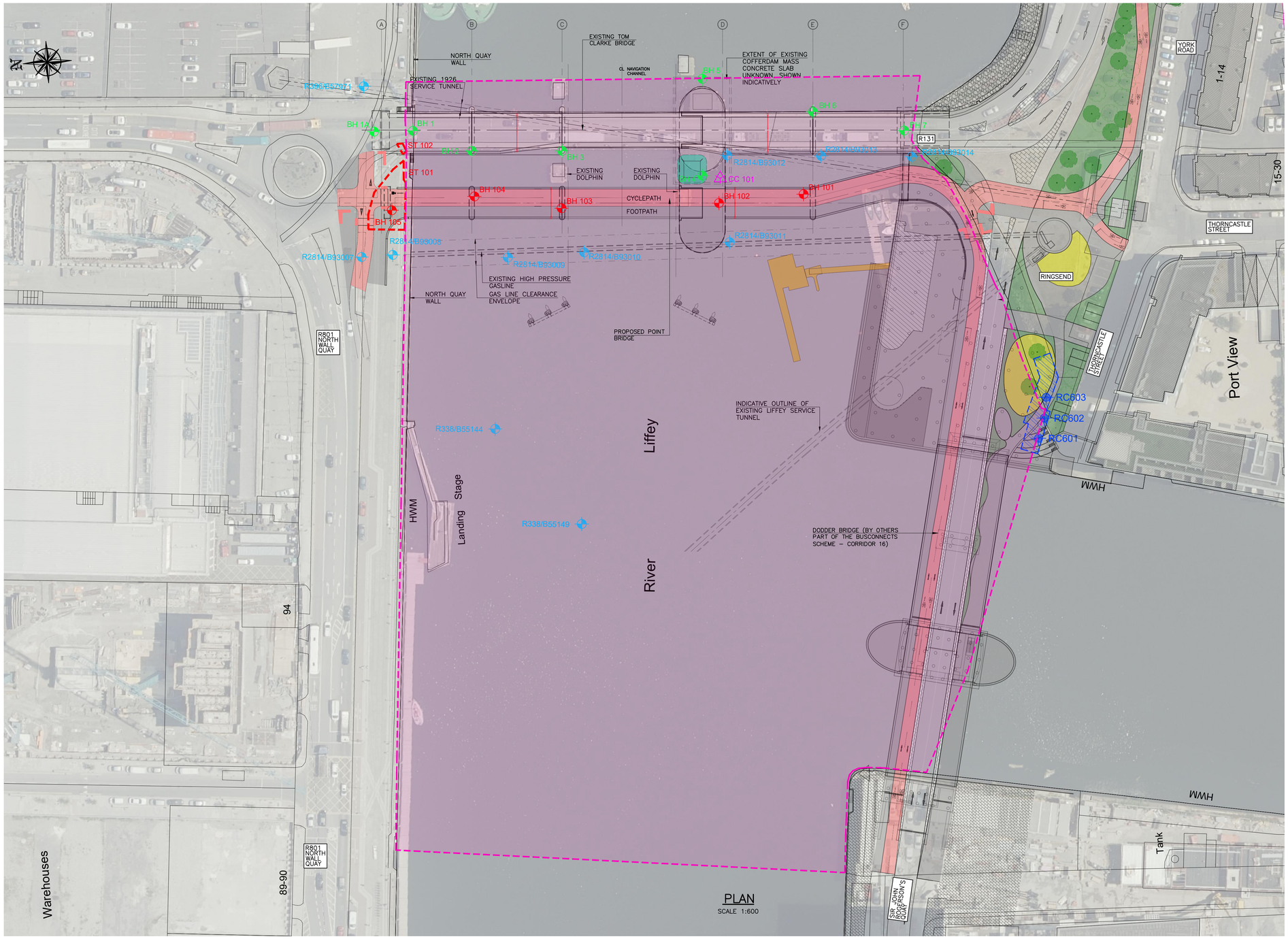
APPENDIX A
Location of Ground Investigation Works



PLAN
SCALE 1:600

LEGEND :

DENOTES AREA OF RELEVANT SURVEYS:
- POINT CLOUD SURVEY

DENOTES AREA OF RELEVANT SURVEYS:
- ACOUSTIC SUB-BOTTOM PROFILING SURVEY
- MARINE MAGNETOMETER SURVEY

RC6XX — PROPOSED GI BOREHOLE LOCATIONS FOR DODDER BRIDGE PILE SUPPORTED SLAB STRUCTURE

BH 1XX — PROPOSED GI BOREHOLE LOCATIONS FOR POINT FOOTBRIDGE STRUCTURE

CC 1XX — PROPOSED CONCRETE CORING LOCATION FOR EXISTING COFFERDAM MASS CONCRETE SLAB

ST 1XX — PROPOSED SLIT TRENCH –INDICATIVE LOCATION FOR POINT FOOTBRIDGE STRUCTURE

BH XX — EXISTING BOREHOLE LOCATIONS (TOM CLARKE BRIDGE)

R2814/BXX — EXISTING BOREHOLE LOCATIONS (GSI)

Note:
Location of window samples, sediment grab samples and any other sampling required to inform the Contamination Assessment Report are to be determined by the Contractor's Environmental Scientist

Client: Comhairle Cathrach Bhaile Átha Cliath Dublin City Council; NTA Údarás Náisiúnta Iompair National Transport Authority; Project Ireland 2040 Building Ireland's Future

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DQ	PC	PC	CS	S2 - Information/Planning

Project Stage: PRELIMINARY DESIGN

Project Title: POINT BRIDGE AND TOM CLARKE BRIDGE WIDENING PROJECT

Drawing Title: PROPOSED GROUND INVESTIGATION

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number — PTCB - ROD - GEN - AE - SK - CS - 301052

Scale (A1): AS SHOWN | Date: Dec.2024 | Job No: 21.124 | Rev: P01

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APPENDIX B
Marine Mammal Risk Assessment

MARINE MAMMAL RISK ASSESSMENT OF PROPOSED DODDER PUBLIC TRANSPORTATION OPENING BRIDGE

Prepared by
Dr Simon Berrow

IWDG Consulting, Merchants Quay, Kilrush, Co Clare

1 | INTRODUCTION

The Irish Whale and Dolphin Group (IWDG) was contracted by Roughan and O'Donovan to carry out a Marine Mammal Risk Assessment of the proposed Dodder Public Transportation Opening Bridge where the River Dodder joins the Liffey in Dublin City.

The proposed Dodder Public Transportation Opening Bridge is a three-span bridge which will span from Sir John Rogerson's Quay to the R131 adjacent to Tom Clarke Bridge. The bridge will accommodate pedestrians, cyclists, buses and taxis. The bridge accommodates an opening section adjacent to Sir John Rogerson's Quay which facilitates navigation of vessels between the river Liffey and the river Dodder / Grand Canal Basin. In the closed position, the bridge will accommodate a navigation envelope to permit the passage of small boats. An opening span is required to permit the passage of larger vessels between the Dodder River / Grand Canal Dock and the Liffey River.

Figure 1: Location of the proposed Dodder Public Transportation Opening Bridge

Proposed works

The proposed development consists of a new public transportation opening bridge over the River Dodder at its confluence with the River Liffey. The following elements are also included in the scope of the proposed development:

- The construction of the approach roads associated with the bridge
- The construction of a new control building for operating the bridge
- The provision of a new club house and facilities for the St Patrick's Rowing Club (SPRC)
- The reclamation of land to the west of Tom Clarke Bridge to facilitate the build; and

This development is anticipated to take 18 months to complete. Stage 1 which includes installing cofferdams will take around 3 months and Stage 2 around 12 months. Earliest start is late in 2021 or more likely mid-2022. Work is planned for 7 days a week with earlier finishes at the weekend compared to week days.

2 | METHODS

This risk assessment was based on a review of the available literature and original data collected by the IWDG during the Dublin Port Alexandra Basin Re-development Project (Russell *et al.* 2017, 2018; 2019; 2020). The marine mammal community adjacent to the proposed development site is well known following extensive survey and monitoring work over the past three years.

3 | LEGAL STATUS

Irish cetaceans and pinnipeds are protected under national legislation and under a number of international directives and agreements which Ireland is signatory to. All cetaceans as well as grey and harbour seals are protected under the Wildlife Act (1976) and amendments (2000, 2005, 2010 and 2012). Under the act and its amendments it is an offence to hunt, injure or wilfully interfere with, disturb or destroy the resting or breeding place of a protected species (except under license or permit). The act applies out to the 12 nm limit of Irish territorial waters.

All cetaceans and pinnipeds are protected under the EU Habitats Directive. All cetaceans are included in Annex IV of the Directive as species '*in need of strict protection*'. Under this Directive, the harbour porpoise (*Phocoena phocoena*), bottlenose dolphin (*Tursiops truncatus*), grey seal (*Halichoerus grypus*) and harbour seal (*Phoca vitulina*) are designated Annex II species which are of community interest and whose conservation requires the designation of special areas of conservation.

Ireland is also signatory to conservation agreements such as the Bonn Convention on Migratory Species (1983), the OSPAR Convention for the Protection of the Marine Environment of the northeast Atlantic (1992) and the Berne Convention on Conservation of European Wildlife and Natural Habitats (1979).

Under the EU Marine Strategy Framework Directive with respect to maintaining good environmental status (GES), "*human activities should occur at levels that do not adversely affect the harbour porpoise community at the site*" and "*proposed activities or operations should not introduce man-made energy at levels that could result in a significant negative impact on individuals and/or the community of harbour porpoise within the site*". This refers

to the "*aquatic habitats used by the species in addition to important natural behaviours during the species annual cycle*".

In 2007, the National Parks and Wildlife Service (NPWS) of the Department of Arts, Heritage and the Gaeltacht produced a '*Code of Practice for the Protection of Marine Mammals during Acoustic Seafloor Surveys in Irish Waters* (NPWS, 2007). These were subsequently reviewed and amended to produce '*Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters*' (NPWS, 2014) which include mitigation measures specific to piling. The guidelines recommend that listed coastal and marine activities (including dredging) be subject to a risk assessment for anthropogenic sound-related impacts on relevant protected marine mammal species to address any area-specific sensitivities, both in timing and spatial extent, and to inform the consenting process. Once the listed activity has been subject to a risk assessment, the regulator may decide to refuse consent, to grant consent with no requirement for mitigation, or to grant consent subject to specified mitigation measures.

4 | BASELINE ENVIRONMENT

4.1 | Ambient Noise Levels

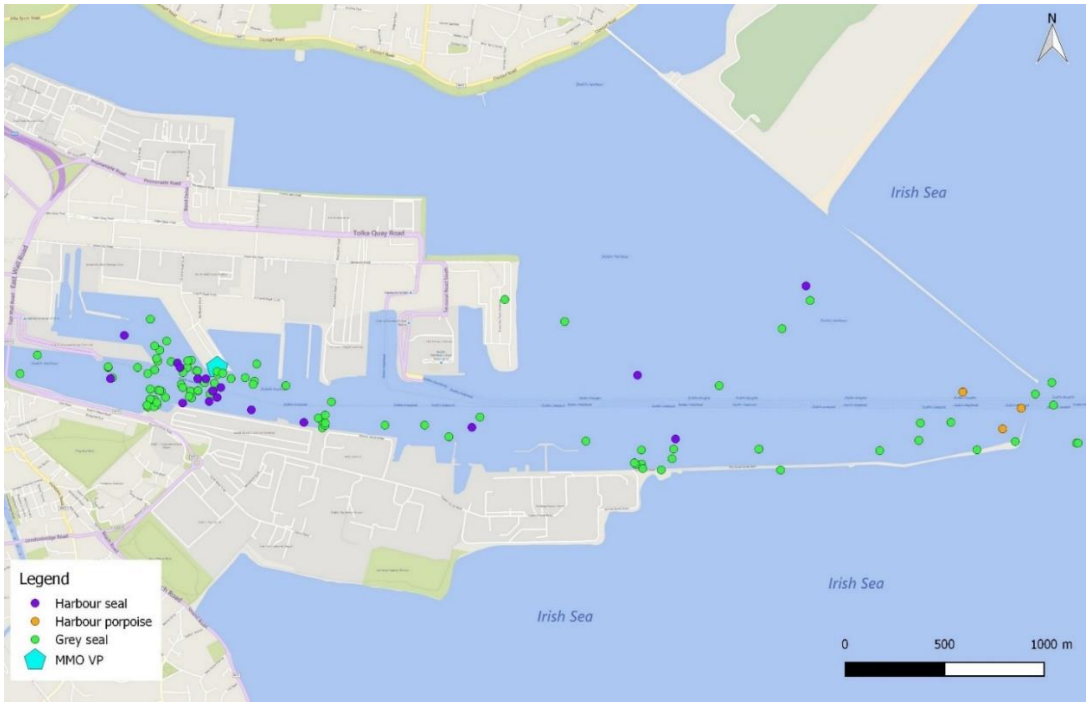
Ambient, or background noise, is defined as any sound other than the sound being monitored (primary sound) and, in the marine environment, is a combination of naturally occurring biologically and physical sound sources including sediment transfer, waves and rain and that of a biological origin including fish, crustaceans and from marine mammals. The impact of noise created by human activity is strongly influenced by background or ambient noise, the impact is less in a noisy environment compared to a quiet environment and it's the intensity and frequency of this increased noise compared to the ambient levels at a site, which defines its impact. As ambient noise levels increase, the ability to detect a biologically important sound decreases. The point at which a sound is no longer detectable over ambient noise is known as acoustic masking. The range at which an animal is able to detect these signals reduces with increasing levels of ambient noise (Richardson *et al.* 1995). This is important when considering the impact of sound sources on marine mammals by the proposed works.

Ambient noise levels worldwide have been on the rise in recent decades with developments in industry and, in particular, in commercial shipping. In the North Pacific, low frequency background noise has approximately doubled in each of the past four decades (Andrew *et al.* 2002), resulting in at least a 15- to 20-dB increase in ambient noise. In recent years, interest has grown in the effects of anthropogenic noise on marine life. Ambient noise in Dublin Bay has been estimated at around 113 db by Beck *et al.* (2013) and by McKeown (2014). This level is higher than that reported from Galway Bay and the Shannon Estuary and reflects the greater vessel traffic at this site.

4.2 | Marine Mammals

Marine mammal mitigation has been carried out as part of the ABR project since 2016 (Russell *et al.* 2017, 2018; 2019; 2020). This involves carrying our pre-watches by experienced marine mammal biologists prior to any sound producing activities which may impact on marine mammals. During these pre-watches all marine mammal sightings are recorded. These pre-watches have occurred throughout the year.

a)



b)

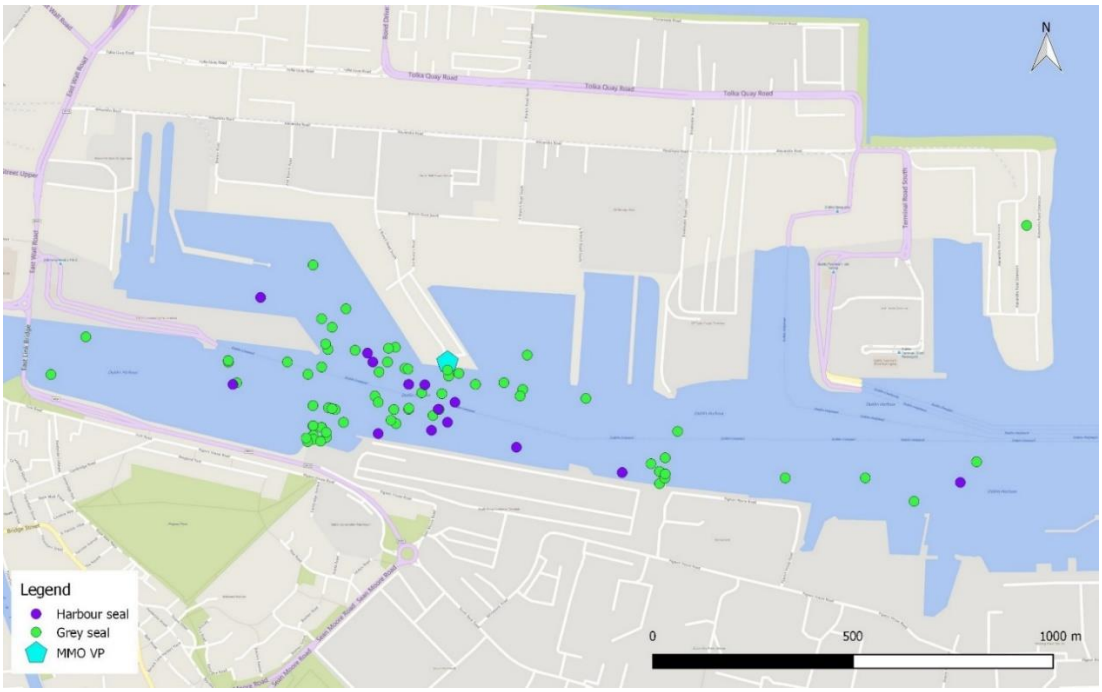


Figure 2: Sightings of marine mammals in the (a) outer basin and (b) inner basin from

Marine mammal sightings within Dublin Harbour are shown in Figure 2. Three species have been recorded. The only cetacean species was harbor porpoise and two species of seal; grey and common (harbour) seal. All three sightings of harbour porpoise were just inside the harbor entrance while seals were distributed through the harbor and especially in the inner basins (Fig. 2b).

Grey seals were more frequently observed than common seals and were the species recorded closest to the proposed bridge location. Grey seals have been observed with 50m of the proposed development (Fig 2b).

4.2.1. Harbour porpoise (*Phocoena phocoena*)

Harbour porpoise are the most widespread and abundant cetacean in inshore Irish waters, with highest abundances in the Irish Sea (Berrow *et al*. 2010). Harbour porpoise are the most frequently recorded cetacean species during Dublin Bay but are rarely seen within the harbour. O'Dwyer *et al.* (2016) reported three sightings within Dublin Harbour during maintenance dredging, but just inside the north and south walls.

4.2.2 Pinnipeds (Seals)

Grey seals (*Halichoerus grypus*) are regularly and frequently recorded within Dublin Harbour and up the River Liffey into Dublin city. They were the most frequently recorded marine mammal marine mammal monitoring within the harbor between 2016 and 2020 (Russell *et al.* 2018; 2019; 2020). Grey seals forage locally and it is likely seals encountered within the harbour are typically the same individuals with the harbour providing foraging opportunities as well as temporary haul out sites. They are known to haul out on Bull Island from May to November and pup at sites on Lambay Island, Ireland's Eye and Dalkey Island. Grey seals are still observed in the River Liffey during winter months during their breeding and moulting seasons.

Harbour (or Common) seals (*Phoca vitulina*) are observed less frequently recorded within Dublin Harbour (Russell *et al.* 2017; 2018; 2019; 2020). Harbour seals are known to haul out on Bull Island throughout the year and pup during the summer. Dublin Harbour may provide local foraging and it is likely seals encountered within the harbour are typically the same individuals with the harbour also providing temporary haul out sites.

4 | IMPACT ASSESSMENT

The potential effects of the proposed construction and especially piling on marine mammals was addressed by assessing the likelihood that marine mammals would be exposed, or interact, with the activity. Impacts assessed include likelihood of disturbance especially from noise emitted during piling operations. Acoustic disturbance includes the ability of the individual to detect increased noise levels over ambient levels, masking, Temporary Threshold Shift (TTS) and Permanent Threshold Shift (PTS) and behavioural impacts, i.e. resulting in a behavioural change by individuals. The potential effects of increased turbidity and indirect impacts on preferred prey are also considered.

5.1 | Description of Activities

5.1.1 Piling Operations

All foundations except the bridge approach retaining walls will be made up of in-situ reinforced concrete piles. Piles to the bridge will be bored, 800mm in diameter and socketed into bed rock. Piles for the reclaimed land will be bored, cast-in place, also 800mm in diameter and socketed into bedrock. The reclaimed land edges will be retained by permanent embedded sheet pile retaining walls. The sheet pile toes will be at bedrock level. All foundations and sheet pile toes will be deep. In-situ piles are reinforced concrete, grade to be chosen at detailed design. Permanent sheet piles are grade S275 or S355. Piles will be of Larssen type, size to be confirmed at the detailed design stage. Construction of both bored cast-in-place and drilled-in tubular steel piles is considered technically feasible at this site and could enable drilling into bedrock to achieve sufficient end bearing capacity.

Around 80-90 piles will be fitted in Stage 1 for land reclamation and around 40 for the bridge support.

5.1.2 Vessel noise

Construction of the transportation bridge may lead to an increase in vessel noise relative to the daily traffic accessing Dublin Port through provision of a jack up barge and safety boats. However the number and duration of noise making activities is very low and is unlikely to cause any significant disturbance as ferries, tankers, small recreational boats and other vessels regularly use the river and port area.

5.1.3. Impact of suspended material and contaminants

Seabed disturbance through can result in increased turbidity and creation of sediment plumes (Todd *et al.* 2014). Marine mammals often inhabit turbid environments and many utilize acoustic techniques to communicate and navigate. Disturbance to seals if it occurs will only be of very short duration and have no long-term effect.

5.1.5 Indirect impacts on prey

Indirect impacts may occur on marine mammals if the distribution or abundance of their preferred prey is impacted by piling and construction activities. The diet of seals in the River Liffey is not known but it is likely to be quite opportunistic including both benthic and pelagic or migratory fish species if available.

5.2 | Literature Review of Impacts and Mitigation

The NPWS '*Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters – January 2014*' recommends that listed coastal and marine activities, undergo a risk assessment for anthropogenic sound-related impacts on relevant protected marine mammal species to address any area-specific sensitivities, both in timing and spatial extent, and to inform the consenting process. It is required that such an assessment must competently identify the risks according to the available evidence and consider (i) direct, (ii) indirect and (iii) cumulative effects of anthropogenic sound (NPWS, 2014).

Marine mammals and noise

Construction activity can have potential impacts on marine mammals through elevated noise levels leading to disturbance. Prolonged exposure to pile installation could lead to disturbance and TTS without mitigation measures. The main noise producing activities in the marine environment are

a) Pile installation activity and construction noise
b) Noise from additional vessels associated with the construction period

<u>Ambient Noise</u>

Ambient, or background noise, is defined as any sound other than the sound being monitored (primary sound) and, in the marine environment, is a combination of naturally occurring biologically and physical sound sources including sediment transfer, waves and rain and that of a biological origin including fish, crustaceans and from marine mammals. The impact of noise created by human activity is strongly influenced by background or ambient noise, the impact is less in a noisy environment compared to a quiet environment and it's the intensity and frequency of this increased noise compared to the ambient levels at a site, which defines its impact. As ambient noise levels increase, the ability to detect a biologically important sound decreases. The point at which a sound is no longer detectable over ambient noise is known as acoustic masking. The range at which an animal is able to

detect these signals reduces with increasing levels of ambient noise (Richardson *et al.* 1995). This is important when considering the impact of sound sources on marine mammals by the proposed works.

Ambient noise levels worldwide have been on the rise in recent decades with developments in industry and, in particular, in commercial shipping. In the North Pacific, low frequency background noise has approximately doubled in each of the past four decades (Andrew *et al.* 2002), resulting in at least a 15- to 20-dB increase in ambient noise. In recent years, interest has grown in the effects of anthropogenic noise on marine life. Ambient noise in Dublin Bay has been estimated at around 113 db by Beck *et al*. (2013) and by McKeown (2014). This level is higher than that reported from Galway Bay and the Shannon Estuary and reflects the greater vessel traffic at this site.

Marine mammals are often seen in close proximity to human activity and exhibit some tolerance to anthropogenic noise and other stimuli (Richardson *et al*. 1995). Baleen whales use shipping lanes and feed in rich fishing grounds occupied by large fishing vessels. Odontocetes are often even more tolerant, being repeatedly exposed to many vessels, small and large. Pinnipeds also exhibit much tolerance and often haul out on man-made structures where there is considerable human activity. This exposure may lead to some chronic exposure to man-made noise, with which they tolerate. Ecological or physiological requirements may leave some marine mammals with no choice but to remain in these areas and continue to become chronically exposed to the effects of noise. In areas with repeated exposure, mammals may become habituated with a decline in avoidance responses and thus become less sensitive to noise and disturbance (Richardson *et al*. 1995).

Pile Installation and Construction noise

Piling is proposed to take place in two phases. In phase 1 piling is in the area of reclaimed land and will continue for three months with 70-80 piles required at an estimated piling rate of 2 piles per day. A second phase of piling associated with the cofferdams with 40-50 piles in the river will commence thereafter. Thus piling will be fairly continuous at the development site for a period of 18 months. The main impact of piling is from sound generated and the transmission of this sound into the marine environment.

Impacts of piling on marine mammals

If a marine mammal's received sound exposures, irrespective of the anthropogenic source (pulse or nonpulse), exceed the relevant criterion, auditory injury (PTS) is assumed to be likely. Pile driving is classed as a multi-pulse source of impulsive sound. Its measured effects on marine mammals are largely based on work by Southall *et al.* (2007), who proposed a dual criterion based on peak sound pressure level (SPL) and sound exposure level (SEL), where the level that is exceeded first is what should be used as the working injury criterion (i.e. the precautionary of the two measures) (Table 1). The potential impacts on marine mammals from piling activity include Permanent Threshold Shift (PTS), Temporary Threshold Shift (TTS) and behavioural disturbance; each of which have varying degrees of severity for exposed individuals.

As all marine mammals do not hear equally across all frequencies, the use of frequency weightings is applied to compensate for differential frequency responses of their sensory systems (Tables 2 and 3). The M-weighting (for marine mammals) is similar to the C-weighting for measuring high amplitude sounds in humans. At present there are no data available to represent the onset of PTS in marine mammals but Southall *et al.* (2007) estimated it as 6 dB above the SPL (unweighted) and 15 dB above the SEL (M-weighted according to the relevant marine mammal functional group, see Figure 1) based on the onset of TTS. Therefore, Southall *et al.* (2007) proposed SPL criteria of 230 dB re 1 µPa (peak broadband level) for PTS onset in cetaceans and 218 dB re 1 µPa for pinnipeds. They also recommended TTS can occur at 224 dB re 1 µPa (peak broadband level) for cetaceans and 212 dB re 1 µPa for

pinnipeds (Southall *et al.* 2007; Bailey *et al.* 2010) (Table 2). While, the SEL criteria proposed by Southall et al. (2007) include TTS onset at 183 dB re 1 µPa^2 -s for cetaceans and 171 dB re 1 µPa2 -s for pinnipeds, and PTS onset is expected at 15 dB additional exposure (Bailey *et al.* 2010) (Table 3).

Table 1. Functional marine mammal hearing groups, and group specific (m) frequency weightings (from Southall et al. 2007)

Functional hearing group	Estimated auditory bandwidth	Genera represented (Number species/subspecies)	Frequency-weighting network
Low-frequency cetaceans	7 Hz to 22 kHz	*Balaena, Caperea, Eschrichtius, Megaptera, Balaenoptera* (13 species/subspecies)	M_{lf} (lf: low-frequency cetacean)
Mid-frequency cetaceans	150 Hz to 160 kHz	*Steno, Sousa, Sotalia, Tursiops, Stenella, Delphinus, Lagenodelphis, Lagenorhynchus, Lissodelphis, Grampus, Peponocephala, Feresa, Pseudorca, Orcinus, Globicephala, Orcaella, Physeter, Delphinapterus, Monodon, Ziphius, Berardius, Tasmacetus, Hyperoodon, Mesoplodon* (57 species/subspecies)	M_{mf} (mf: mid-frequency cetaceans)
High-frequency cetaceans	200 Hz to 180 kHz	*Phocoena, Neophocaena, Phocoenoides, Platanista, Inia, Kogia, Lipotes, Pontoporia, Cephalorhynchus* (20 species/subspecies)	M_{hf} (hf: high-frequency cetaceans)
Pinnipeds in water	75 Hz to 75 kHz	*Arctocephalus, Callorhinus, Zalophus, Eumetopias, Neophoca, Phocarctos, Otaria, Erignathus, Phoca, Pusa, Halichoerus, Histriophoca, Pagophilus, Cystophora, Monachus, Mirounga, Leptonychotes, Ommatophoca, Lobodon, Hydrurga,* and *Odobenus* (41 species/subspecies)	M_{pw} (pw: pinnipeds in water)
Pinnipeds in air	75 Hz to 30 kHz	Same species as pinnipeds in water (41 species/subspecies)	M_{pa} (pa: pinnipeds in air)

Table 2. Proposed injury criteria for individual marine mammals from Southall et al. (2007)

Marine mammal group	Sound type		
	Single pulses	Multiple pulses	Nonpulses
Low-frequency cetaceans	Cell 1	Cell 2	Cell 3
Sound pressure level	230 dB re: 1 µPa (peak) (flat)	230 dB re: 1 µPa (peak) (flat)	230 dB re: 1 µPa (peak) (flat)
Sound exposure level	198 dB re: 1 µPa^2-s (M_{lf})	198 dB re: 1 µPa^2-s (M_{lf})	215 dB re: 1 µPa^2-s (M_{lf})
Mid-frequency cetaceans	Cell 4	Cell 5	Cell 6
Sound pressure level	230 dB re: 1 µPa (peak) (flat)	230 dB re: 1 µPa (peak) (flat)	230 dB re: 1 µPa (peak) (flat)
Sound exposure level	198 dB re: 1 µPa^2-s (M_{mf})	198 dB re: 1 µPa^2-s (M_{mf})	215 dB re: 1 µPa^2-s (M_{mf})
High-frequency cetaceans	Cell 7	Cell 8	Cell 9
Sound pressure level	230 dB re: 1 µPa (peak) (flat)	230 dB re: 1 µPa (peak) (flat)	230 dB re: 1 µPa (peak) (flat)
Sound exposure level	198 dB re: 1 µPa^2-s (M_{hf})	198 dB re: 1 µPa^2-s (M_{hf})	215 dB re: 1 µPa^2-s (M_{hf})
Pinnipeds (in water)	Cell 10	Cell 11	Cell 12
Sound pressure level	218 dB re: 1 µPa (peak) (flat)	218 dB re: 1 µPa (peak) (flat)	218 dB re: 1 µPa (peak) (flat)
Sound exposure level	186 dB re: 1 µPa^2-s (M_{pw})	186 dB re: 1 µPa^2-s (M_{pw})	203 dB re: 1 µPa^2-s (M_{pw})
Pinnipeds (in air)	Cell 13	Cell 14	Cell 15
Sound pressure level	149 dB re: 20 µPa (peak) (flat)	149 dB re: 20 µPa (peak) (flat)	149 dB re: 20 µPa (peak) (flat)
Sound exposure level	144 dB re: (20 µPa)^2-s (M_{pa})	144 dB re: (20 µPa)^2-s (M_{pa})	144.5 dB re: (20 µPa)^2-s (M_{pa})

Table 3. Proposed behavioral response criteria for individual marine mammals exposed to various sound types

Marine mammal group	Sound type		
	Single pulses	Multiple pulses	Nonpulses
Low-frequency cetaceans	Cell 1	Cell 2[1]	Cell 3[b]
Sound pressure level	224 dB re: 1 µPa (peak) (flat)	Tables 6 & 7	Tables 14 & 15
Sound exposure level	183 dB re: 1 µPa²-s (M_{lf})	Not applicable	Not applicable
Mid-frequency cetaceans	Cell 4	Cell 5[c]	Cell 6[f]
Sound pressure level	224 dB re: 1 µPa (peak) (flat)	Tables 8 & 9	Tables 16 & 17
Sound exposure level	183 dB re: 1 µPa²-s (M_{mf})	Not applicable	Not applicable
High-frequency cetaceans	Cell 7	Cell 8[g]	Cell 9[h]
Sound pressure level	224 dB re: 1 µPa (peak) (flat)	[Tables 18 & 19]	Tables 18 & 19
Sound exposure level	183 dB re: 1 µPa²-s (M_{hf})	Not applicable	Not applicable
Pinnipeds (in water)	Cell 10	Cell 11[e]	Cell 12[g]
Sound pressure level	212 dB re: 1 µPa (peak) (flat)	Tables 10 & 11	Tables 20 & 21
Sound exposure level	171 dB re: 1 µPa²-s (M_{pw})	Not applicable	Not applicable
Pinnipeds (in air)	Cell 13	Cell 14[g]	Cell 15[gg]
Sound pressure level	109 dB re: 20 µPa (peak) (flat)	Tables 12 & 13	Tables 22 & 23
Sound exposure level	100 dB re: (20 µPa)²-s (M_{pw})	Not applicable	Not applicable

Bailey *et al.* (2010) found that based on the broadband peak to peak sound level during piling for offshore windfarms, PTS onset would have occurred within 5m of the pile-driving operation for cetaceans and within 20m for pinnipeds. The level for TTS onset would have been exceeded within 10m and 40m of the pile-driving for cetaceans and pinnipeds respectively. They found that the closest measurement of the pile-driving noise recorded at 100m, had an M-weighted SEL of 166 dB re 1 µPa2 –s which was less than the PTS and TTS SEL criteria for cetaceans and pinnipeds. They suggest that this indicated that no form of injury or hearing impairment should have occurred at ranges greater than 100m from the pile-driving operation. The piles to be used in the proposed development are much smaller than those in this study and sound exposure levels will be less.

Based on work by Southall *et al.* (2007), it is possible that harbour porpoise can experience behavioural disturbance up to 70km from the pile-driving, while Bailey *et al.* (2010) presented results which indicated that strong avoidance behaviour would only be expected within 20km of the sound source. They also suggested that bottlenose dolphins and minke whales may exhibit behavioural disturbance within 50km and 40km from the source respectively (Bailey *et al.* 2010). Regarding pinnipeds, this zone is smaller, estimated within 14km of the source. Based on this literature piling has the potential to impact on common and grey seals and harbour porpoise within Dublin Harbour. Due to the nature of the harbor with the North and South Walls at the entrance, sound generated during piling is very unlikely to travel outside the harbor walls.

McKeown (2014) carried out measurements of underwater noise from pile driving activities at Alexandra Basin East in June 2014 to determine the ensonification of the underwater environment (i.e. acoustic noise) during pile driving in the Alexandra Basin East. The measurements on which this report is based took place while H-section piles with a cross sectional area of 333 cm^2 were being driven to depths of 35m in Alexandra Basin East (ABE). Noise measurements were made at four stations (A-D) in Alexandra Basin East: along a transect (Transect 1) from the piling location in the ABE, across the channel to the opposite pier (Figure 3). Measurements were also made at three stations (D-H) in the River Liffey Channel: along a transect (Transect 2) starting upriver from the source and continuing parallel to the channel, to Location H, 3.5 km from the source (Figure 3).

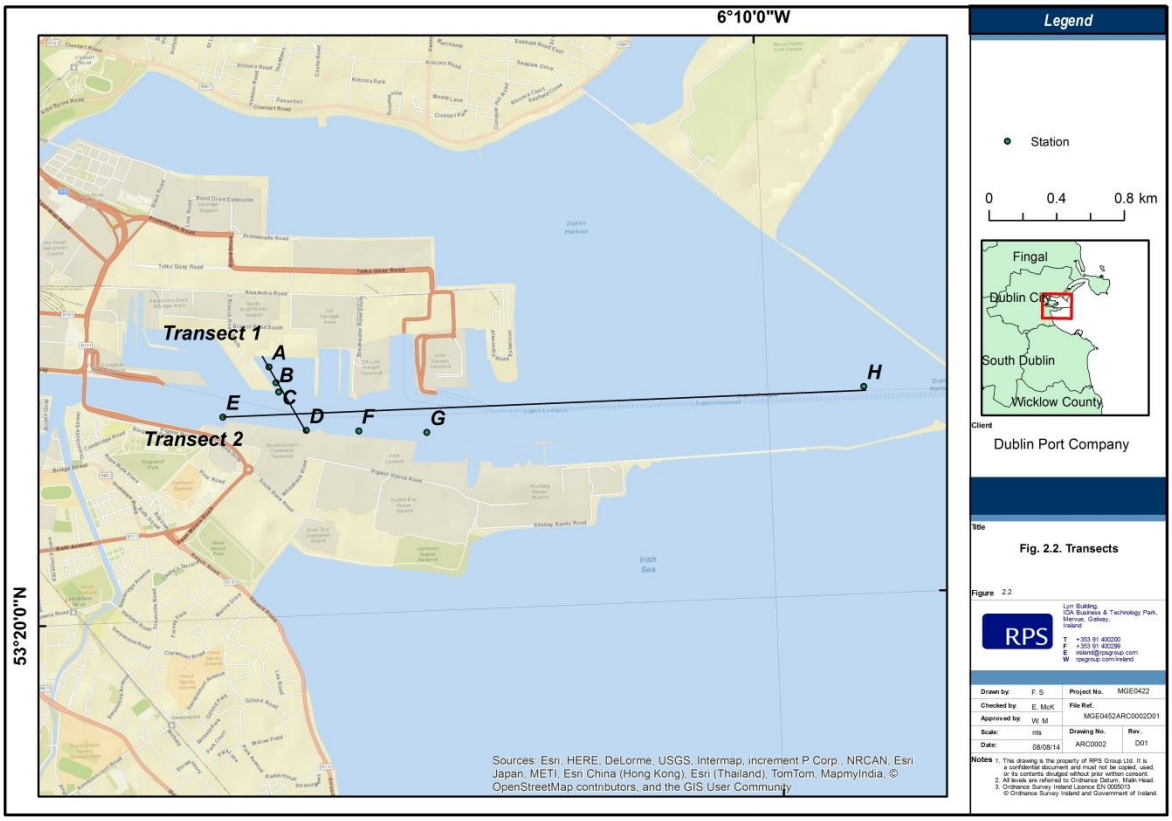


Figure 3. Location of noise measurements taken during piling (McKeown 2014)

The SCOOTER code was based on open water propagation, with losses spreading in all directions (McKeown 2014). The Alexandra Basin and Dublin Port navigation channel operates as a confined environment with significant reverberation within the basin and the channel. The surfaces within this area are comprised of hard quay walls which act as near perfect reflectors. The model will therefore overestimate the transmission loss close to the source due to the reverberation. In the river and navigation channel the transmission losses revert to modelled rates albeit with an over-estimate of initial values (McKeown 2014).

The measured values at Location C and D across the river channel and Locations E and F a short distance up and down river from the Alexandra Basin. At Locations C and D the SPL averages 140 dB whereas at Location E (500m upriver) the SPL was 108 dB which was at background levels. The SEL at this location is 156 dB. At Location F (300m downriver) the SPL was 127 dB and the SEL was 173 dB.

Within 500m of the source the intensity decreased rapidly at increasing range. Close to source the sound was highly broadband. Peak sound energy occurred at below 1000Hz but there was substantial energy up to 10 kHz. High frequencies were rapidly attenuated with distance and beyond 500m the majority of the impulsive pile driving sound was attenuated. This study suggests that noise from piling reduces to background levels somewhere between 300 and 500m from the source in Alexandra Basin. Noise levels arising from 1.6m diameter piles being driven in the Alexandra Basin in the River Liffey channel and the Alexandra Basin area will be higher by approximately 6 dB. The levels in this area are significantly increased due to the reverberation within the confined space. At distances beyond this the noise level attenuates rapidly so that at 500m the levels are at background noise levels (McKeown 2014).

5.2.2 Turbidity

Sedimentation and any increases in turbidity are unlikely to affect marine mammals, which use echolocation. Marine mammals often inhabit turbid environments, and many utilise sophisticated sonar systems to sense the environment around them (Au *et al.* 2000). Pinnipeds do not produce sonar for prey detection purposes, however Newby *et al.* (1970) reported apparent blindness in three harbour seals on Gertrude Island, Puget Sound, Washington and found them to appear healthy suggesting their ability to forage was unaffected by blindness. McConnell *et al.* (1999) tracked grey seals in the North Sea and included one blind seal in their study. No significant difference in foraging behaviour was found indicating vision is not essential to pinnipeds' survival or ability to forage.

5.2.3 Preferred prey

A fish survey of the inner basin was carried out as part of the ABR project (Morgan 2014). The inner basin sites were notable for such species as solitary sea squirts (Ascidians) and comparatively low fish diversity densities. Several benthic species are resident in this part of the river basin including juvenile mullet at Ringsend. Seasonally species such as salmon, trout and lamprey and eels pass through the site when transiting the river. A trawl survey indicated a low diversity of widely occurring fish species occurred (Morgan 2014). The surface layer contained all the associated macroinvertebrate infauna which most of the more abundant species taken in trawls namely dab, plaice and sand gobies feed on. Small shoaling fish that occur regularly in the diet of seals and porpoises (Rogan 2008) and are unlikely to be affected during operations.

4.3 Risk Assessment

The potential impacts of this project are prolonged elevated noise levels associated with piling. The piling element is likely to take 18 months to complete while additional vessel traffic could occur throughout the construction period but is very unlikely to have any potential impacts.

4.3.1 Acoustic disturbance

Noise associated with piling

The potential for disturbance to marine mammals is greatest when elevated levels of underwater noise are considered. Marine mammals, especially cetaceans, have well developed acoustic capabilities and are sensitive to sound at much higher frequencies than humans (Richardson *et al.* 1995). They are less sensitive to the lower frequencies but there is still great uncertainty over the effects of sound pressure levels on marine mammals and thus the assessment of its impact.

Pile driving emits a low-frequency impulsive sound with peak energy between 100 and 200 Hz (OSPAR 2009). Source levels from pile driving activity depends on many factors and levels as high as 243–257 dB (P-P) re 1 µPa at 1 m (Nedwell *et al.* 2004) have been reported. Source levels are dependent on a number of factors including the diameter of the pile. Smaller piles tend to have higher frequency noise emissions.

Audiograms for bottlenose dolphins show peak sensitivity between 50-60 kHz and no sensitivity below 2 kHz and above around 130 Khz (Richardson *et al.* 1995). Because of rapid attenuation of low frequencies in shallow water dredge noise normally is undetectable underwater at ranges beyond 20-25km (Richardson *et al.* 1995). The effects of low frequency (4-8 kHz) noise level and duration in causing threshold shifts in bottlenose dolphins were

predicted by Mooney *et al.* (2009). They found that if the Sound Exposure Level was kept constant significant shifts were induced by longer duration exposures but not for shorter exposures.

NPWS (2014) identify increased sound pressure levels above ambient do occur due to piling which could be detected up to 10km from shore. These levels could potentially cause TTS if marine mammals are within 10-20m during full sound production and masking or behavioural effects at greater distances but are not thought to cause injury to a marine mammal.

5.3.2 Noise associated with shipping

Shipping produces low broadband and "tonal" narrowband sounds. The primary sources are propeller cavitation and singing and propulsion of other machinery (Richardson *et al.* 1995). For large and medium vessels tones dominate up to around 50Hz and broadband components may extend to 100Hz.

Many odontocetes show considerable tolerance to vessel traffic. Harbour porpoise are frequently observed near vessels but tend to change behaviour and move away and this avoidance may occur up to 1-1.5km from a ship but is stronger with 400m (cited from Richardson *et al.* 1995). Seals show considerable tolerance to vessel activity but this does not exclude the possibility that it has an effect.

5.3.5 Physical Disturbance

The risk of injury or mortality is considered extremely low as marine mammals in Dublin Harbour are exposed to considerable vessel traffic on a daily basis and would be aware of their presence.

5.3.6 Turbidity

Short term increase in turbidity caused during the construction period at worse may have a very local impact of short duration and will have no impact on marine mammals or their preferred prey. Even when increased turbidity has been shown to substantially reduce visual acuity in seals, which are not known to use sonar for prey detection, there is no evidence of reduced foraging efficiency (*Todd et al.* 2015).

5.3.7 Indirect impacts on preferred prey

No adverse effects on fish species is expected from proposed operations.

5.3.8 Potential disturbance to life-cycle

The construction of the proposed transportation bridge across the Dodder will not cause any adverse effects on cetaceans or seals in the area providing mitigation measures are in place. Any displacement resulting from indirect impacts on available prey will be short-term and local, with fish returning to the area at the completion of piling activity.

5.3.10. Cumulative Effects

There is potential for cumulative effects as there is other piling activity within the inner harbour. The proposed construction will take 18 months to complete and the earliest start is late in 2021 or more likely mid-2022. Piling and demolition at Dublin port is underway or planned. These include:

- Piling associated with the ABR Project
    - Piling Berth 34 and 35: September – November 2020
- Dredging associated with the ABR Project
    - Dredging in Alexandra Basin West: November 2019 – February 2021
    - Maintenance Dredging: April August – September 2022
    - Capital Dredging: October 2021- March 2022
- Demolition of Ramp 3 at Dublin Port
    - 2021-2022

Depending on the actual timing of the proposed bridge at the River Dodder, piling for ABR should be finished but dredging campaigns will still be underway. There are no cumulative impacts between pressures associated with dredging and piling but it is recommended that piling for other adjacent projects has been completed prior to piling starting on this project.

6 | Mitigation Measures

Potential mitigation measures during the piling operation are limited. Similar activities both nationally and internationally have been monitored through the provision of a Marine Mammal Observer (MMO) who ensures that there are no marine mammals within a pre-agreed distance prior to piling during daylight hours. The MMO can also record any reaction to the piling operation. However, this mitigation measure will only be effective during daylight hours.

Figure 4. Proposed Mitigation Zone (1000m) as recommended by NPWS (2014)

The National Parks and Wildlife Service recommend a distance of 1000m radial distance of the piling sound source in water depths of <200m (NPWS 2014) on commencement. Noise measurements by McKeown (2014) suggests an exclusion zone of 1000m is sufficient, beyond which marine mammals are unlikely to detect the activity over ambient noise. If a significant negative change in behaviour are recorded such as rapid movement away from vessel or distress then the MMO should have the authority to cease operations. Marine mammals are allowed to enter the buffer zone once piling has reached maximum sound output.

It is expected that animals would habituate to additional vessels and would not be displaced. Any disturbance due to piling will be short-term and temporary and seals would return to affected areas when operations area completed.

6.1 Disturbance

The most effective way of mitigating the potential effects of disturbance is through the provision of an MMO ensuring no marine mammals are present within an agreed Mitigation Zone.

6.2 Collision, injury and mortality

The most effective way of mitigating the potential effects of injury and/or mortality is through the provision of an MMO ensuring no marine mammals are present within an agreed Mitigation Zone.

6.3 Disruption of normal behaviour

Piling activity is local to the inner basin and of relatively short duration resulting in any displacement being short term. Monthly seal counts at a haul out site on Bull Island are underway by Dublin port as part of the ABR project. This will continue throughout the proposed construction period. Sound exposure levels from piling are below to cause TTS to a marine mammal and the potential to cause low level disturbance, masking or behavioural impacts. With mitigation it is very unlikely to have a significant impact on marine mammals, though it may lead to short term displacement of seals from the dump site.

7 | NPWS Assessment Criteria

1. **Do individuals or populations of marine mammal species occur within the proposed area?**

   Grey seals are the most frequently observed marine mammal species at the construction site followed by common seals. Harbour porpoise are only found in the outer basin at the entrance to Dublin Harbour. There is an important haul out site for grey and harbor seals nearby on Bull Island. All marine mammals are part of a larger population and are very mobile.

2. **Is the plan or project likely to result in death, injury or disturbance of individuals?**

   The project will not cause injury or death but could lead to very local disturbance of seals, from noise associated with the project.

Noise Impact

The activities proposed during this project, which could lead to negative impacts, consist of piling operations. It is extremely unlikely any noise generated will be capable of causing permanent or temporary hearing injury to a marine mammal. Localised disturbance to marine mammals in the works area may occur during operations.

Physical Impact

The risk of injury or mortality is considered extremely low as marine mammals in the immediate vicinity of the construction site (seals) are exposed to human activity on a daily basis and would be accommodated.

3. Is it possible to estimate the number of individuals of each species that are likely to be affected?

Abundance estimates for marine mammals exposed to the proposed activity are limited to only the occasional seal within 100m and low numbers within Dublin Harbour. Monitoring during the ABR Project suggest some 10's of seals may occur within Dublin Port. Abundance estimates are available for grey and harbour seals from a haul out site at Bull Island immediately north of the harbour. The numbers of grey seals ranged from 2-19 between May and November and harbour seals from 2-22 and occur throughout the year (Russell *et al.* 2017; 2018; 2019; 2020). Monitoring of Bull Island haul out site consistent records peak counts of 20-25 grey seal and a similar number of harbour seals but peaking at different times of year (Russell *et al.* 2017; 2018; 2019; 2020).

Abundance of grey seals at nearby Lambay Island was estimated at 49 pups, with small numbers of pup's present (<3) at Irelands Eye, Dalkey Island and St. Patricks Island during a national census in 2005 (Ó Cadhla *et al.* 2007). A further Island. Further surveys 77 pups were recorded on Lambay Island and Ireland's Eye in 2009 (Ó Cadhla *et al.* 2013). Abundance of harbour seals during at nearby Lambay Island, was estimated at approximately 30 during a national census in 2003 (Cronin *et al.* 2004) and 2012 (Duck and Morris, 2012).

4. Will individuals be disturbed at a sensitive location or sensitive time during their life cycle?

The proposed works that could impact on marine mammals are to be carried out for an 18 month period. This includes both grey and common seal pupping and breeding seasons. As grey seals are only known to pup at Lambay Island which is >15km from Dublin Harbour it is unlikely to have any effect as grey seal pups remain ashore for the first 3 weeks of life. Adults rearing calves may forage great distances from the breeding site and may include Dublin Harbour. Harbour seals are also only known to pup at Lambay Island and occasionally on Bull Island. It is unlikely that construction work will have any effect as harbour seal pups remain close to shore and females forage close to pupping sites during this period.

5. Are the impacts likely to focus on a particular section of the species' population, e.g., adults vs. juveniles, males vs. females?

There are no data to suggest that any particular gender or age group for seals or cetaceans predominates in the area. As temporary haul out sites for seals occur in Dublin Harbour it is likely all age groups and both gender occur.

6. **Will the plan or project cause displacement from key functional areas, e.g., for breeding, foraging, resting or migration?**

As seals occasionally occur at the construction site and may be exposed to noise associated with piling, there may be temporary disturbance to some individuals. However, they are accommodated to human activities and are likely to not be affected.

7. **How quickly is the affected population likely to recover once the plan or project has ceased?**

While there may be temporary disturbance of some seals in the area, they are accommodated to human activities and are likely to recover from any temporary disturbance within hours or days.

8| Mitigation

Timing of Piling

Both grey seals and harbour porpoise can potentially be affected by proposed piling operations and are listed on Annex II of the EU Habitats Directive. Piling at worse may lead to TTS if close to the site at start up and temporary disturbance. To minimise any disturbance effects on seals and harbour porpoise we recommend adoption of the NPWS Guidelines for minimising impacts of man –made sounds in Irish waters.

Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters

The mitigation measures recommended by the NPWS are for the presence of a trained and experienced Marine Observer (MMO) and the use of "ramp up" procedures for noise and vibration emitting operations. The proposed mitigation measures (Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters) recommended by the Department of Arts, Heritage and the Gaeltacht in 2014 are designed to mitigate any possible effects.

The following mitigation measures are proposed to minimise the potential impacts on marine mammals and to allow animals move away from the area of piling operations:

1. A qualified and experienced marine mammal observer (MMO) shall be appointed to monitor for marine mammals and to log all relevant events using standardised data forms.

2. Unless information specific to the location and/or plan/project is otherwise available to inform the mitigation process (e.g., specific sound propagation and/or attenuation data) and a distance modification has been agreed with the Regulatory Authority, pile driving activity shall not commence if marine mammals are detected within a **1,000m radial distance of the pile driving sound source**, i.e., within the Monitored Zone.

3. **Pile driving activities shall only commence in daylight hours where effective visual monitoring, as performed and determined by the MMO, has been achieved**. Where effective visual monitoring, as

determined by the MMO, is not possible the sound-producing activities shall be postponed until effective visual monitoring is possible.

4. An agreed and clear on-site communication signal must be used between the MMO and the Works Superintendent as to whether the relevant activity may or may not proceed, or resume following a break. It shall only proceed on positive confirmation with the MMO.

5. In waters up to 200m deep, the MMO shall conduct **pre-start-up constant effort monitoring at least 30 minutes before the sound-producing activity is due to commence**. Sound-producing activity shall not commence until at least 30 minutes have elapsed with no marine mammals detected within the Monitored Zone by the MMO.

6. This prescribed Pre-Start Monitoring shall subsequently be followed by an appropriate Ramp-Up Procedure which should include continued monitoring by the MMO.

7. In commencing a pile driving operation where the output peak sound pressure level (in water) from any source including equipment testing exceeds 170 dB re: 1µPa @1m an appropriate Ramp-up Procedure (i.e., "soft-start") must be used. The procedure for use should be informed by the risk assessment undertaken giving due consideration to the pile specification, the driving mechanism, the receiving substrate, the duration of the activity, the receiving environment and species therein, and other information.

8. Where it is possible according to the operational parameters of the equipment and materials concerned, the underwater acoustic energy output shall commence from a lower energy start-up (i.e., a peak sound pressure level not exceeding 170 dB re: 1µPa @1m) and thereafter be allowed to gradually build up to the necessary maximum output over a period of 20-40 minutes.

9. This controlled build-up of acoustic energy output shall occur in consistent stages to provide a steady and gradual increase over the ramp-up period.

10. Where the measures outlined in steps 8 and 9 are not possible, alternatives must be examined whereby the underwater output of acoustic energy is introduced in a consistent, sequential and gradual manner over a period of 20-40 minutes prior to commencement of the full necessary output.

11. In all cases where a Ramp-Up Procedure is employed the delay between the end of ramp-up and the necessary full output must be minimised to prevent unnecessary high-level sound introduction into the environment.

12. Once an appropriate and effective Ramp-Up Procedure commences, there is no requirement to halt or discontinue the procedure at night-time, nor if weather or visibility conditions deteriorate nor if marine mammals occur within a 1,000m radial distance of the sound source, i.e., within the Monitored Zone.

13. **If there is a break in pile driving sound output for a period greater than 30 minutes** (e.g., due to equipment failure, shut-down or location change) then all Pre-Start Monitoring and a subsequent Ramp-up Procedure (where appropriate following Pre-Start Monitoring) must be undertaken.

14. For higher output pile driving operations which have the potential to produce injurious levels of underwater sound as informed by the associated risk assessment, there is likely to be a regulatory requirement to adopt a shorter 5-10 minute break limit after which period all Pre-Start Monitoring and a subsequent Ramp-up Procedure (where appropriate following Pre-Start Monitoring) shall recommence as for start-up.

8.1| Residual Impacts

With implementation of the above mitigation measures, it is very unlikely that there will be negative residual impacts from the proposed works on marine mammals in the area. It is also very unlikely that any animals will be injured as a result of the proposed works. Seals using the area are likely to be tolerant of vessel noise and any displaced animals can be expected to quickly re-establish use of the area following cessation of the works.

9 | SUMMARY

Dublin Harbour is frequently used by marine mammals in small numbers, especially grey and common/harbour seals with harbour porpoise very occasionally observed just within the harbour entrance. Adjacent to the site only single seals have been recorded. As seals are protected and could be impacted on by piling activities we recommend the NPWS (2014) Guidelines are implemented to minimise the acoustic impacts which will result in no significant impacts to marine mammals.

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