Prepared by
Roughan & O'Donovan
Arena House, Arena Road, Sandyford, Dublin 18
Tel: +353 1 2940800 Fax: +353 1 2940820
Email: info@rod.ie www.rod.ie

Point Bridge and Tom Clarke Bridge Widening Project

Ground Investigation Works and Environmental Surveys

Assessment of Impacts of the Maritime Usage Report

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ROD
ROUGHAN & O'DONOVAN

Point Bridge and Tom Clarke Bridge Widening Project

Ground Investigation Works

Assessment of Impacts of the Maritime Usage Report

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1. INTRODUCTION

1.1 Background

Roughan & O'Donovan (ROD) was appointed by Dublin City Council to undertake, on its behalf, an Assessment of Impacts of the Maritime Usage (AIMU) Report in respect of ground investigation works and environmental surveys (also referred to as "the proposed works") which are required to inform the design of the Point Bridge and Tom Clarke Bridge Widening Project in Dublin City. The purpose of the AIMU Report is to assist the Maritime Area Regulatory Authority (MARA) to fully assess all potential impacts (negative and positive) of or on the proposed maritime usage.

1.2 Maritime Area Planning legislation relating to the preparation of the AIMU Report

In December 2021, the Government passed legislation in the form of the Maritime Area Planning (MAP) Act, 2021 to regulate the maritime area. The MAP Act will achieve this through the National Marine Planning Framework, maritime area consents for the occupation of the maritime area for the purposes of maritime usages for undefined or long periods of time, and licences for marine usages for a relatively short periods of time. MARA has been established to oversee the enforcement of this Act. As part of this role, MARA will review applications for consents and licences within the maritime area.

The proposed environmental surveys and ground investigation works are located in a maritime area and are required to inform the design of the Point Bridge and Tom Clarke Bridge Widening Project. These works fall under Schedule 7(3) of the MAP Act, 2021 relating to the 'Maritime Usages which may be undertaken in Maritime Area pursuant to Licence':

> "3. *Marine environmental surveys for the purposes of site investigation or in support of an application under Part XXI of the Act of 2000"*.

In accordance with the Act, the proposed works are required to hold a valid licence prior to their commencement.

This Report has been prepared to support the licence application for the proposed works in accordance with the MARA Applicant Technical Guidance Note (2023)[1]. According to the Note, the chapters of the Report should include, but not necessarily be limited to, the following:

- Introduction
- Project Description (including Construction, Operation, Maintenance and Decommissioning)
- Need & Alternatives
- Planning & Development (including Statement of consistency with the National Marine Planning Framework)
- Land & Soils
- Water
- Biodiversity
- Fisheries and Aquaculture

[1] Obtaining a Licence to Carry Out Specified Maritime Usages in the Maritime Area under the Maritime Area Planning Act 2021 – Applicant Technical Guidance Note (2023)

- Air Quality
- Noise & Vibration
- Landscape/Seascape
- Traffic & Transport (including navigation)
- Cultural Heritage (including underwater archaeology)
- Population & Human Health
- Major Accidents & Disasters
- Climate
- Waste
- Material Assets
- Interactions
- Summary of Mitigations
- Consideration and Reasoned Conclusions in relation to the:
    - EIA Directive (not of a class)
    - WFD Directive
    - MSFD Directive

This report has been prepared in accordance with the Technical Guidance Note.

1.3 Assessment Methodology

This AIMU Report has been developed in accordance with the relevant legislative provisions and with reference to the relevant guidance documents. Particular reference has been given to the following:

- *Environmental Impact Assessment (EIA): Guidance for Consent Authorities Regarding Sub-Threshold Development (Department of Housing, Planning and Local Government* (DoHPLG), 2003);
- *Environmental Impact Assessment of Projects: Guidance on Screening* (European Commission, 2017)*;*
- *Guidelines for Planning Authorities and An Bord Pleanála on Carrying Out Environmental Impact Assessment* (DoHPLG, 2018)*; and*
- *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (Environmental Protection Agency (EPA), 2022).
- *Obtaining a Licence to Carry Out Specified Maritime Usages in the Maritime Area under the Maritime Area Planning Act 2021 – Applicant Technical Guidance Note* (MARA, 2023)

1.3.1 Description of Effects

Table 1.1 presents the definitions of the types of environmental effects put forth in the *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (EPA, 2022). These definitions are used as the basis for the description of environmental effects identified in this report. The consideration of effects also takes into account direct, indirect, secondary and cumulative effects, as appropriate.

Table 1.1 Definitions of effect types, as per EPA (2022)

Quality	
Positive	A change which improves the quality of the environment
Neutral	No effects, or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error
Negative	A change which reduces the quality of the environment
Significance	
Imperceptible	An effect capable of measurement but without significant consequences
Not Significant	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends
Significant	An effect which, by its character, magnitude, duration or intensity significantly alters a sensitive aspect of the environment
Very significant	An effect which, by its character, magnitude, duration or intensity significant alters most of a sensitive aspect of the environment
Profound	An effect which obliterates sensitive characteristics
Extent and Context	
Extent	Describe the size of the area, the number of sites, and the proportion of a population affected by an effect
Context	Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the greatest, longest effect ever?)
Probability	
Likely	The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented
Unlikely	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented
Duration and Frequency	
Momentary	Effects lasting from seconds to minutes
Brief	Effects last less than a day
Temporary	Effects lasting less than a year
Short-term	Effects lasting one to seven years
Medium-term	Effects lasting seven to fifteen years
Long-term	Effects lasting fifteen to sixty years
Permanent	Effects lasting over sixty years
Reversible	Effects that can be undone, e.g. through remediation or restoration
Frequency	Describe how often the effect will occur (i.e. once, rarely, occasionally, frequently, constantly; or hourly, daily, weekly, monthly, annually, etc.)

2. DESCRIPTION OF THE PROPOSED WORKS

2.1 Environmental Surveys

2.1.1 Gas Main Survey

The use of acoustic Sub-bottom profiling and a vertical magnetic gradiometer are proposed for the detection of the buried infrastructure. A UniPact, which is a remotely operated unmanned surface vessel (USV), will be used for both sets of apparatus, and will locate the pipe acoustically. This will be installed with an Innomar Standard Sub-bottom Profiler. There will be no excavations / soil disturbance / structures erected in the maritime area for these survey works.

2.1.2 Inspection of Pier Wall

A Norbit Winghead High Frequency Scanning Multibeam Echo Sounder will be used on the USV to provide a detailed topographical survey of the north quay wall and Tom Clarke Bridge. There will be no excavations / soil disturbance / structures erected in the maritime area for these survey works.

2.1.3 Additional structural inspection works for widening works

Structural inspection works at Tom Clarke Bridge piers will comprise 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). There will be no excavations / soil disturbance / structures erected in the maritime area for these survey works.

2.2 Ground Investigation works

2.2.1 Overview

The ground investigations involve the gathering, and compilation of ground investigation data to enable the planning, design and construction of the Point Bridge and Tom Clarke Bridge Widening Project. The ground investigation works will include rotary core and Geobore S drilling, slit trenching, concrete coring into a cofferdam concrete plug installed during the construction of Tom Clarke Bridge, standpipes / piezometer installations and monitoring, in-situ testing and laboratory testing.

2.2.2 Location

The in-river investigation works will be undertaken within a tidal reach of the River Liffey and in close proximity to both the upstream and downstream sides of the existing Tom Clarke Bridge structure and protective dolphins. 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) Geobore S drilling, sampling and *in situ* testing;

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

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

d) Concrete Coring;

e) Monitoring of groundwater levels in standpipes and piezometers;

f) Detailed borehole and coring;

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

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

i) 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.

j) Specific trial pits, 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;

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

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

m) 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;

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

o) 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.

p) 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;

q) 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*".

r) 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;

s) 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;

t) Liaison and compliance with Health & Safety requirements of PSCS and general contractor; and

u) 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-301051 in Appendix A.

2.2.4 Schedule of Investigations

Table 2.1, Table 2.2, Table 2.3 and Table 2.4 below detail the Schedule of Investigations. Where CP = cable percussion; RO = Rotary Open Hole; RC = Rotary Coring with core recovery; PG = Polymer Gel Geobor S rotary coring with plastic liner continuous sampling.

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
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.							

The Environmental Scientist shall identify the locations of up to 4 No. window samples and 4 No. sediment grab samples to be carried out for the purpose of contamination assessment at the site. These locations shall be subject to approval of the Investigation Supervisor.

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:734 389.3	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

Notes

1. CP = Cable Percussion, RO = Rotary Open Hole, RC = Rotary Core, PG = Polymer Gel Geobor-S Rotary, 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.

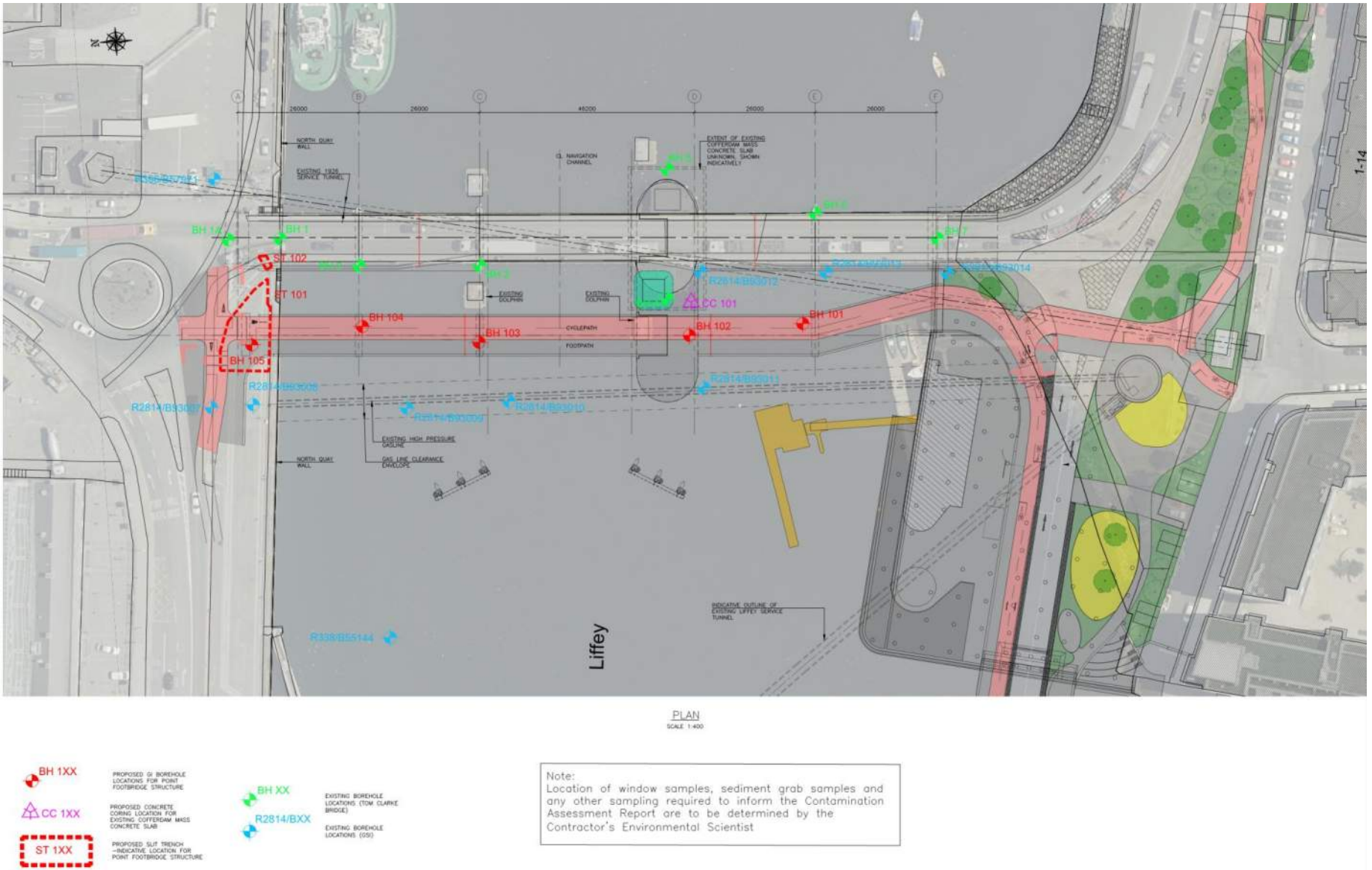


Figure 2.1 Locations of Proposed Ground Investigation Works

2.2.5 Timing and Duration

The duration of all of the works will be less than three months, commencing in February 2024 and completing in April 2024, inclusive. Detailed breakdown of timing and duration of each of the survey works is provided in Table 2.5 below.

Table 2.5 Timing and Duration of Environmental Surveys and Ground Investigation Works.

Survey Type	Commencement	Duration
Gas Main Survey	Feb 2024	2 days
Inspection of Pier Wall	Feb 2024	2 days
Structural Inspection works	Feb 2024	One week
Ground Investigation works	Feb 2024	3 months
Note [1] Gas Main Survey and Inspection of Pier Wall will be carried out at the same time.		

2.2.6 Working Hours

The working hours will be limited to the following:

- Monday to Friday between 08.00 hrs and 18.00 hrs.
- Saturday between 09:00 hrs and 16:30 hrs.

Work on site outside of these hours will only be permitted on approval from the Investigation Supervisor. Movement of marine barges to / from the site and to borehole locations must follow all relevant restrictions to marine traffic by Dublin Port Authority.

Timing of the Slit Trench works at North Wall Quay may be limited by the local authority as part of the Road Opening Licencing / Permit process. Slit trench works extending out into the trafficked lane on North Wall Quay / Tom Clarke Bridge will be restricted to Monday to Friday between 21:00 hrs and 00:00hrs (midnight) and 00:00 hrs (midnight) and 06:00 hrs. Saturday between 00:00 hrs (midnight) and 06:00 hrs.

3. NEED FOR THE WORKS AND ALTERNATIVES

3.1 Need for the works

The proposed investigative works are required to inform the design of the proposed Point Bridge and Tom Clarke Widening Project.

3.2 Alternatives

No alternatives have been considered for the ground investigation works and environmental surveys. The chosen locations have been selected based on preliminary review of the study area for the Point Bridge and Tom Clarke Widening Project. Where gaps in information were identified, these locations have been selected for additional investigation works which consist of intrusive and non-intrusive surveys described in Section 2 of this Report.

4. PLANNING AND DEVELOPMENT

4.1 Legislation

4.1.1 Environmental Impact Assessment (EIA) Directive

The requirement for environmental impact assessment is imposed by Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (as amended by Directive 2014/52/EU) (the EIA Directive). The requirements of these directives have been transposed into Irish law through the Planning and Development Acts 2000 (as amended), the Regulations made under the European Communities Act (1972) including the European Communities (Environmental Impact Assessment) Regulations 1989 – 2006, the European Union (Environmental Impact Assessment and Habitats) Regulations 2011 and the European Communities (Birds and Natural Habitats Regulations) 2011. Directive 2014/52/EU of the European Parliament has recently been transposed into Irish law through the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018).

The potential impacts of the proposed environmental surveys and ground investigation works are addressed in Section 5 of this Report with respect to the environmental factors listed in Article 3(1) of the 2014 Directive, which include:

(a) population and human health

(b) biodiversity, with particular attention to the species and habitats protected under Directive 92/43EEC and Directive 2009/147/EC

(c) land, soil, water, air quality and climate

(d) material assets, cultural heritage and the landscape

(e) the interaction between the factors referred to in points (a) to (d).

4.1.2 Water Framework Directive

Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for action in the field of water policy (as amended) ('EU Water Framework Directive') requires all Member States to protect and improve water quality in all waterbodies so that they achieve good ecological status by 2015 or, at the latest, by 2027. It has been given legal effect in Ireland by, inter alia, the European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003) (as amended) and the European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272 of 2009). It applies to rivers, lakes, groundwater, transitional and coastal waters. The Directive requires that management plans be prepared on a river basin basis and specifies a structured method for developing these plans.

The Directive needs to be taken into account in the planning of all new activities in the water environment. Objectives of Article 4.1 of the Water Framework Directive regarding surface waters are summarised below:

- Prevent deterioration of the status of all bodies of surface water.
- Protect, enhance and restore all bodies of surface water.
- Protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status at the latest 15 years from the date of entry into force of this Directive.
- Progressively reduce pollution from priority substances and ceasing or phasing out emissions, discharges and losses of priority hazardous substances.

Objectives of Article 4.2 of the Water Framework Directive regarding groundwater are summarised below:

- Prevent or limit the input of pollutants into groundwater and to prevent the deterioration of the status of all bodies of groundwater.
- Protect, enhance and restore all bodies of groundwater, ensure a balance between abstraction and recharge of groundwater, with the aim of achieving good groundwater status.
- Reverse any significant and sustained upward trend in the concentration of any pollutant resulting from the impact of human activity in order progressively to reduce pollution of groundwater.

River Basin Management Plan 2018-2021

The second cycle River Basin Management Plan (RBMP) 2018-2021 has been prepared to set out a national approach to protecting Ireland's water bodies over the next four years, outlining key actions in areas such as agriculture, wastewater treatment, source protection and resource management.

Section 5.6 of this Report assesses the potential of the proposed works to have an impact on the implementation of the actions set out in the RBMP 2018-2021 to meet the objectives set out in the Water Framework Directive.

The third cycle Draft River Basin Management Plan for Ireland 2022-2027 has been published for public consultation in 2023 and once adopted, will replace the 2nd cycle RBMP 2018-2021. The measures identified in the draft RBMP 2022-2027 have also been reviewed to inform this Report.

4.1.3 Maritime Spatial Planning Directive

Directive 2014/89/EU of the European Parliament and of the Council of 23 July 2014 establishing a framework for maritime spatial planning ('the Marine Spatial Planning Directive') all coastal Member States of the European Union to prepare national maritime spatial plans. Ireland's Marine Spatial Plan is called the National Marine Planning Framework (NMPF) and was formally launched on the 1st of July 2021.

National Marine Planning Framework

The National Marine Planning Framework (NMPF) prepared by the Department of Housing, Local Government and Heritage in 2021 is a national plan for Ireland's seas, setting out, over a 20-year horizon, how we want to use, protect and enjoy our seas. The NMPF sits at the top of the hierarchy of plans and sectoral policies for the marine area. The NMPF "*enables the Government to set a clear direction for managing our seas, to clarify objectives and priorities, and to direct decision makers, users and stakeholders towards more strategic and efficient use of marine resources. It will inform decisions about the current and future development of the marine area, aiming to integrate needs"*.

The current and future development of the marine area relates to projects that relate to the marine sector or activities which include, but are not limited to aquaculture, energy, fisheries, ports, harbours and shipping.

The proposed ground investigation works and environmental surveys are to inform the design of the Point Bridge and Tom Clarke Widening Project. This project is a road transport project which is intended for pedestrian and cyclist use only, and is not attributed to marine sector or marine activities identified in the NMPF. Therefore, the

National Marine Planning Framework is not applicable for this project and the associated ground investigation works and environmental surveys.

4.2 Planning Policy

4.2.1 Project Ireland 2040

Project Ireland 2040 was launched in February 2018 and comprises the National Planning Framework, Our Plan 2040, and the updated National Development Plan 2021 – 2030. Project 2040 is a long-term overarching strategy which aligns investment decisions with a clearly defined development strategy including ten National Strategic Outcomes (NSO), as shown in Figure 4.1.

The NPF together with the NDP sets the context for each of the three regional assemblies to develop their Regional Spatial and Economic Strategies (RSESs) taking account of and co-ordinating local authority Development Plans in a consistent manner to ensure national regional and local plans align with each other.

National Planning Framework 2040

The NPF sets out a strategic plan to accommodate future growth and development of Ireland to the year 2040. The NPF is a framework to provide guidance to investors from public and private sectors in relation to development, to promote opportunities for the residents, as well as protecting and conserving the national environment. The NPF incorporates the policies and objectives of the National Development Plan 2018 – 2027. The NPF succeeded the previous National Spatial Strategy and has a statutory basis.

There are ten National Strategic Outcomes (NSOs) identified within the NPF and shown in Figure 4.1 below.

Figure 4.1 National Strategic Outcomes and Priorities of the NPF

The need for investment in walking and cycling infrastructure is prevalent in several NSOs, including Compact Growth, Strengthened Rural Economies and Communities, Sustainable Mobility, and Amenities and Heritage which are ranked on Strategic Investment Priorities as Priorities 1, 4, and 7 respectively:

- **Compact Growth NSO 1** '*Ensure transition to more sustainable modes of travel (Walking, cycling, public transport) and energy consumption (efficiency, renewables) within smaller towns and villages and rural areas*.'

  '*Improve accessibility to and between centres of mass and scale and better integration with their surrounding areas*.'

  Crucially, NSO 1 emphasises the requirement to secure the sustainable growth of more compact urban and rural settlements supported by jobs, housing, community services, and amenities, rather than sprawl and unplanned, uneconomic growth.

- **Sustainable Mobility NSO 4** '*Develop a comprehensive network of safe cycling routes in metropolitan areas to address travel needs and to provide similar facilities in towns and villages where appropriate'*.

  '*Expand attractive public transport alternatives to car transport to reduce congestion and emissions and enable the transport sector to cater for the demands associated with longer term population and employment growth in a sustainable manner through the following measures*.'

  The NPF recognises the importance of significant investment in sustainable mobility (active travel and public transport) networks if the NPF population growth targets are to be achieved. Investing in high-quality sustainable mobility will improve citizens' quality of life, support our transition to a low-carbon society, and enhance our economic competitiveness. This NPF represents a step-change in the approach towards funding active travel in Ireland. Over the next 10 years approximately €360 million per annum will be invested in walking and cycling infrastructure in cities, towns, and villages across the country, including Greenways.

- **Amenities and Heritage NSO 7** *'Implementation of planning and transport strategies for the five cities and other urban areas will be progressed with a major focus on improving walking and cycling routes, including continuous greenway networks and targeted measures to enhance permeability and connectivity.'*

  'Invest in and enable access to recreational facilities, including trails networks, designed and delivered with a strong emphasis on conservation, allowing the protection and preservation of our most fragile environments and providing a wellbeing benefit for all.'

  Investment in our heritage has the dual benefit of protecting our natural and historic built environment while improving health, wellbeing and providing a catalyst for the economy through the development of recreational activities and the expansion of tourism as appropriate within heritage sites. Keeping this national tourism product intact, enhanced, developed, and promoted will help secure the long-term viability of sustainable tourism incomes and will need to be a priority going forward. Specific projects within the plan include the delivery of new walking and cycling trails.

The incorporation of cycling and walking infrastructure into the NSOs is supported by several National Policy Objectives (NPOs) within the NPF:

- **NPO 27** *'Ensure the integration of safe and convenient alternatives to the car into the design of our communities, by prioritising walking and cycling*

accessibility to both existing and proposed developments and integrating physical activity facilities for all ages.'

- **NPO 28** '*Plan for a more diverse and socially inclusive society that targets equality of opportunity and a better quality of life for all citizens, through improved integration and greater accessibility in the delivery of sustainable communities and the provision of associated services.'*
- ***NPO 54*** *'Reduce our carbon footprint by integrating climate action into the planning system in support of national targets for climate policy mitigation and adaptation objectives, as well as targets for greenhouse gas emissions reductions.'*
- **NPO 64** *'Improve air quality and help prevent people being exposed to unacceptable levels of pollution in our urban and rural areas through integrated land use and spatial planning that supports public transport, walking, and cycling as more favourable modes of transport to the private car, the promotion of energy-efficient buildings and homes, heating systems with zero local emissions, green infrastructure planning and innovative design solutions.*'

The proposed ground investigation works and environmental surveys will inform the design of the Point Bridge and Tom Clarke Widening Project which will provide safer walking and cycling infrastructure in Dublin City, connecting the North and South Docklands. It will improve access for the local communities to travel over short journeys to places of work, school, and college, providing sustainable alternatives to vehicular modes of transportation.

4.2.2 Transport Strategy for the Greater Dublin Area 2022-2042

The Transport Strategy for the Greater Dublin Area (GDA) 2022-2042 was finalised in January 2023. It is a key document guiding transport across the GDA. The strategy aims to provide good quality cycling and walking infrastructure and public transport, to reduce the reliance on private cars and to promote active travel.

The Transport Strategy aligns with the national policies on sustainability, including climate action and low carbon legislation, as well as climate national plans. The main objective of this strategy is to establish a sustainable, accessible, and efficient transportation system for the Greater Dublin Area.

The overall aim of the Transport Strategy is *"to provide a sustainable, accessible and effective transport system for the Greater Dublin Area which meets the region's climate change requirements, serves the needs of urban and rural communities, and supports the regional economy"*.

A key Strategy Objective that the Point Bridge and Tom Clarke Bridge Widening Project is consistent with is 'Connected Communities and Better Quality of Life' which aims to *"enhance the health and quality of life of our society by improving connectivity between people and places, delivering safe and integrated transport options, and increasing opportunities for walking and cycling".*

4.2.3 Greater Dublin Area Cycle Network Plan (2022)

The National Transport Authority (NTA) prepared the Greater Dublin Area (GDA) Cycle Network Plan 2022. The GDA Transport Strategy 2022- 2042 supports the Plan through Measure CYC1 – GDA Cycle Network *"it is the intention of the NTA and the local authorities to deliver a safe, comprehensive, attractive and legible cycle network in accordance with the updated Greater Dublin Area Cycle Network".*

The GDA Cycle Network represents a progressive and forward-looking approach, enabling cycling across a broader geographic area to accommodate the region's growing population. Notably, the network expands to encompass various areas of the GDA, including district centres, towns, urban fringe areas, and Strategic Development Zones (SDZs).

The GDA Cycle Network consists of Primary, Secondary, Feeder, Greenway and Inter-urban cycle routes for the region, including dedicated town networks for all settlements. The network also incorporates those elements of the Dublin-Galway Euro-Velo 2 route that are within the GDA.

An extract from the GDA Cycle Network Plan for Dublin City Centre is shown in Figure 4.2 below, which identifies a 'proposed crossing point' at location of Point Bridge and Tom Clarke Widening Project.

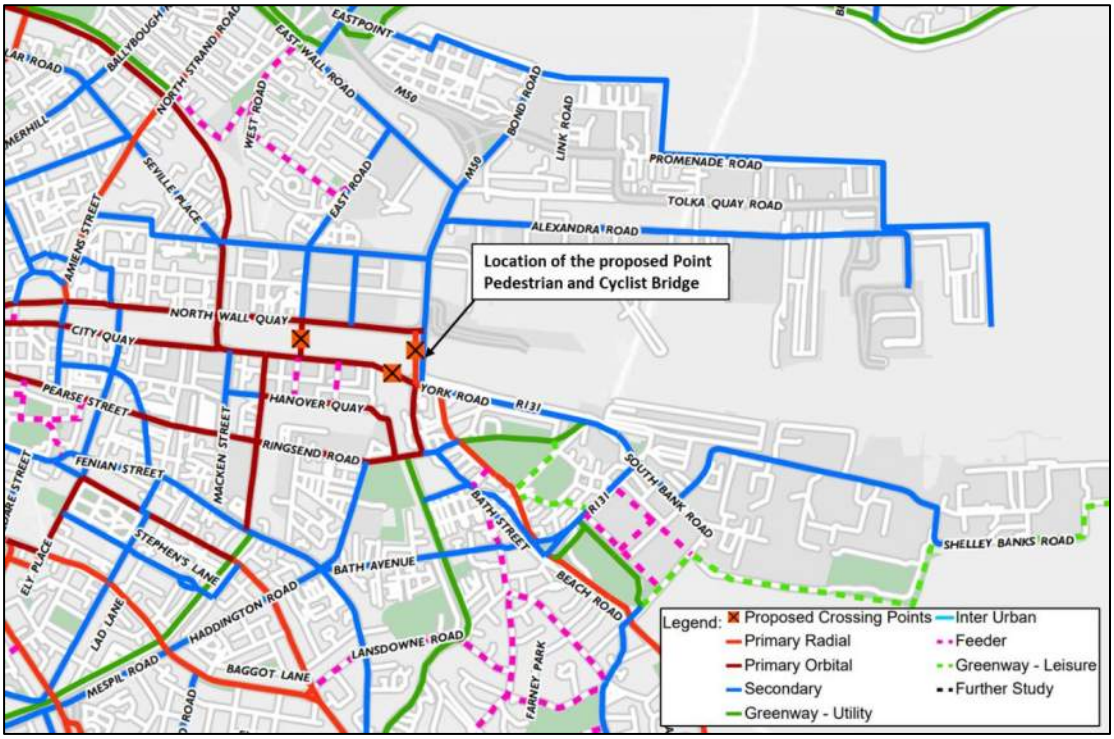


Figure 4.2 **Greater Dublin Area Cycle Network in the vicinity of the Point Bridge and Tom Clarke Widening Project as depicted in the Greater Dublin Area Cycle Network Plan 2022.**

The proposed ground investigation works and environmental surveys will inform the design of the Point Bridge and Tom Clarke Widening Project which is supported by the GDA Cycle Network Plan and will provide safer walking and cycling infrastructure in Dublin City, connecting the North and South Docklands. It will improve access for the local communities to travel over short journeys to places of work, school, and college, providing alternatives to vehicular modes of transportation.

5. ASSESSMENT OF IMPACTS OF THE MARITIME USAGE

5.1 Introduction

The potential impacts associated with the proposed ground investigation works and environmental surveys for the proposed Point Bridge and Tom Clarke Widening Project have been assessed under the following headings in accordance with the MARA Applicant Technical Note (2023):

- Traffic and Transport (including navigation)
- Population and Human Health
- Biodiversity
- Land and Soils
- Water
- Air Quality and Climate
- Noise and Vibration
- Landscape / Seascape
- Cultural Heritage
- Material Assets
    - Utilities
    - Fisheries and Aquaculture
    - Waste
- Interactions

Unless otherwise stated, desktop review of the study area informed the assessment.

5.2 Traffic and Transport (including navigation)

5.2.1 Receiving Environment

Road Infrastructure

At the location of the proposed works, the main road network consists of North Wall Quay and Toll Bridge Road along the banks of the River Liffey. The existing Tom Clarke Bridge carries the R131 Regional Road over the River Liffey providing the main connection between Point Village and Ringsend on the north and south side of the river respectively. The bridge itself experiences very high volumes of general traffic on the bridge carriageway, including Heavy Goods Vehicles (HGVs). Pedestrian footpaths are also provided on either side of the bridge.

River Navigation

The River Liffey is the main navigational channel for recreational and commercial vessels in Dublin City. Dublin Port is located to the west of the existing Tom Clarke Bridge (and the proposed project) and generates a high volume of commercial marine traffic.

5.2.2 Potential Impacts

Road Infrastructure

The proposed in-river ground investigation works and environmental surveys are not likely to have a significant impact on road traffic. Land-based ground investigation works, namely slit trenching (ST101 and ST102) are likely to cause temporary traffic disruptions for the duration of the works. As the proposed works will be carried out at

night time when traffic volumes are at their lowest, *negative, not significant to slight and temporary* effects on traffic movements are likely.

River Navigation

The ground investigation works will occur over a 3 month period from February 2024 to April 2024 inclusive. During this period, drilling of 4 no. boreholes will be required from a jack up barge. The jack up barge is likely to partially obstruct the navigational channel during the works for 2 no. of these boreholes, likely having a *negative moderate to significant, temporary* effect on marine based traffic should a large vessel be required to pass through.

5.2.3 Mitigation

The Contractor will be required to be in continuous communication with the Harbour Master throughout the proposed works. Marine operators and the public will be informed of the potential disruptions in advance of all ground investigation works that will impact on the navigational channel. The works will be timed to avoid / minimise disruption.

5.2.4 Residual Effects

Due to the nature and scale of the proposed works, *negative, slight to moderate and temporary* effects on river navigation are likely to occur.

Residual effects on land-based traffic as a result of the proposed works are as stated in Section 5.2.2.

5.3 Population and Human Health

5.3.1 Receiving Environment

The proposed works are located in Dublin City within the Pembroke East A Electoral Division (ED) which encompasses the Ringsend / Poolbeg area, and North Dock ED which captures the southern extent of the Dublin Docklands area, including Dublin Port. According to Corine Land Cover map (2018)[2] the land use at the proposed in-river works is described as estuaries, with land-based proposed works located on land with industrial and commercial units. Dublin Port is located east of the proposed works, with land cover identified as sea ports.

Central Statistics Office (CSO) Census 2022 recorded the combined population of Pembroke East A ED and South Dock ED to be 15,190 persons, which represents a 15.9% increase in population since the 2016 Census.

General Amenity

There is a wide range of local amenities (indoor and outdoor areas), community facilities, employment, educational facilities within 500m of the proposed works. The closest amenity to the proposed works is St. Patrick's Rowing Club located on the southern banks of the River Liffey.

Transport Infrastructure

At the location of the proposed works, the North Wall Quay and Toll Bridge Road along the banks of the River Liffey is the main road infrastructure providing access to all road users. The existing Tom Clarke Bridge carries the R131 Regional Road over the River Liffey providing the main connection between Point Village and Ringsend on the north and south side of the river respectively for all users.

[2] Corine Land Cover Maps https://land.copernicus.eu/pan-european/corine-land-cover/clc2018 [09 November 2023]

Marine Based Infrastructure

The River Liffey serves as an amenity as well as a transport corridor in Dublin City. There are a number of marine-related tourism and recreational activities with direct access to the River Liffey such as the Poolbeg Marina, and the Grand Canal Marina. There is also a small pontoon located along the North Quays and serves as a docking station for the City Kayaking tourist amenity. The Dublin Sightseeing Boat Tours also utilise the navigational channel and offer tourists the chance to see a number of Dublin City sights including the Custom House, the Jeanie Johnston, and the Samuel Beckett Bridge. St. Patrick's Rowing Club is located on the southern banks of the River Liffey in vicinity of the proposed ground investigation works.

Dublin port is located immediately downstream of proposed works (on both sides of the Liffey Estuary), which is a major docking facility for commercial and recreational fleets. There are four ferry companies operating up to thirteen sailing trips daily. Destinations include Holyhead, Liverpool, Heysham, Cherbourg, the Isle of Man and Douglas.

5.3.2 Potential Impacts

General Amenity

The proposed works are localised and temporary and are not likely to have significant effects on general amenities. St. Patrick's Rowing Club will likely be affected during the in-river ground investigation works at Tom Clarke Bridge. The navigational channel upstream of the proposed works will not be affected and therefore, the potential impacts on the users of the St. Patrick's Rowing Club are likely to be *negative, slight to moderate and temporary*.

Journey Characteristics and Journey Amenity

Transport Infrastructure

The proposed works have the potential to impact on journey characteristics and journey amenity during specific periods for all road users travelling along R131 over the existing Tom Clarke Bridge. Land-based ground investigation works, namely slit trenching (ST101 and ST102) are likely to cause temporary traffic disruptions for the duration of the works. As the proposed land based works will be localised and carried out at night time when the volume of vehicular road users, cyclists and pedestrians is at its lowest, significant negative effects on journey characteristics and journey amenity of vehicular and non-vehicular users are not likely.

Marine Based Infrastructure

As discussed in section 5.2.2 of this report, a number of proposed boreholes are located within the navigation channel at and in the vicinity of the existing Tom Clarke Bridge and can potentially have a direct impact on marine based traffic should a large vessel be required to pass through.

As the proposed works will be carried out outside of the peak tourism season (in the months of February to April inclusive), impacts on journey characteristics and journey amenity of recreational marine users of the River Liffey are not likely be significant.

5.3.3 Mitigation

The Contractor will be required to be in continuous communication with the Harbour Master throughout the proposed works. Marine operators, including St. Patrick's Rowing Club and the public will be informed of the potential disruptions in advance of all ground investigation works that will impact on the navigational channel.

5.3.4 Residual Effects

Due to the nature and scale of the proposed works, *negative, temporary, and moderate* effects on river navigation are likely to occur.

5.4 Biodiversity

This section provides a summary of the receiving environment at the location of the proposed works and identify potential impacts it may have on biodiversity. The assessment was informed by a desk study, wintering bird surveys conducted by ROD in 2018, 2019, 2022 and 2023, and ecological surveys conducted by ROD in 2022 and 2023 which surveyed protected and invasive species and habitats. The habitats were categorised according to *A Guide to Habitats in Ireland*[3] and any habitats corresponding to Annex I of the Directive 2014/52/EU (as amended) using the *Interpretation Manual of European Union Habitats* (as per EC, 2013) were identified. A Supporting Information for Screening for Appropriate Assessment Report was prepared for the proposed works.

The desktop study included a review and analysis of various data sources, documentation, and mapping. The study area focused on the area within 2km of the proposed works. During the desk study, the statutory consultee, the National Parks & Wildlife Service (NPWS) provided data on designations of sites, habitats and species of conservation interest. 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, 2023), which provided information on the locations of protected sites, the National Biodiversity Data Centre's *Biodiversity Maps* (NBDC, 2023), which provided recent and historic records of rare and protected species in the area as well as the Environmental Protection Agency's *Unified GIS Application* (EPA, 2023) which provided additional information on the wider environment.

The proposed works may give rise to noise, hydroacoustic noise, vibration and changes in water quality. The proposed works were assessed if they may give rise to significant impacts to ecological receptors.

5.4.1 Receiving Environment and Potential Impacts

The proposed works are situated in the Liffey Estuary and are hydrologically connected to Dublin Bay. The surrounding area of the proposed works is urban, with an industrial seaport (Dublin Port) directly adjacent to it.

Habitat surveys conducted by ROD identified the following habitats in the study area:

- Buildings and Artificial Surfaces (BL3)
- Sea walls, piers and jetties (CC1)
- Amenity grassland (GA1)
- Mud shores (LS4)
- Estuaries (MW4)
- Subtidal muds (SS3)
- Scattered trees and park land (WD5)
- Scrub (WS1)

[3] Fossitt, J. (2000). *A Guide to Habitats in Ireland*. The Heritage Council of Ireland.

The proposed works will take place primarily on artificial surfaces including roads, bridges and buildings. Three Fossitt habitats were recorded in the study area which correspond with Annex I habitats. Estuaries (MW4) corresponds with 'Estuaries' [1130]. Mud Shores (LS4) and Infralittoral Muds (SS3) also correspond with 'Estuaries' [1130], and when exposed by low tide, with 'Mudflats & Sandflats not covered by seawater at low tide' [1140].

The risk of pollution to the aquatic environment arising from the proposed works is minimal and therefore water quality impacts will not significantly affect the biological communities in these habitats downstream. Therefore, given the nature, scale and location of the proposed works, significant effects on aquatic habitats are not likely.

5.4.1.1 Designated Sites

Dublin Bay has a number of designations for nature conservation, including Special Areas of Conservation (SACs), Special Protection Areas (SPAs), proposed Natural Heritage Areas (pNHAs), a Ramsar Site and a UNESCO Biosphere Reserve. European designated sites which are hydrologically connected to the proposed works are the South Dublin Bay & River Tolka Estuary SPA, the North Bull Island SPA, the North Dublin Bay SAC and North-west Irish Sea SPA. Rockabill to Dalkey Island SAC and Wicklow Mountains SAC have Qualifying Interest Species which are highly mobile and could occur within proximity of the proposed works. Grand Canal pNHA, Royal Canal pNHA, North Dublin Bay pNHA, South Dublin Bay pNHA and Dolphins, Dublin Docks pNHA are hydrologically connected to the proposed works. Sandymount Strand / Tolka Estuary RASMAR site and Dublin Bay UNESCO Biosphere are also hydrologically connected to the proposed works. These sites are displayed below in Table 5.1.

Table 5.1 Designated sites within 2km and hydrologically connected to the proposed works

Site Name	Site Code	Approximate Distance (km)
Natura 2000 Sites		
South Dublin Bay and River Tolka Estuary SPA	004024	1.4km northeast
North Bull Island SPA	004006	3.5km northeast
North Dublin Bay SAC	000206	5.1km east
North-west Irish Sea SPA	004236	5.1km east
Rockabill to Dalkey Island SAC	003000	9.2km east
Wicklow Mountains SAC	002122	12.8km south
Proposed National Heritage Areas (pNHAs)		
Grand Canal pNHA	002104	259m southwest
Royal Canal pNHA	002103	875m west
North Dublin Bay pNHA	000206	1.3km northeast
South Dublin Bay pNHA	000210	1.4km southeast
Dolphins, Dublin Docks pNHA	000201	2km east
Other Sites		

Site Name	Site Code	Approximate Distance (km)
Sandymount Strand / Tolka Estuary RASMAR site	3IE004	3.4km southeast
Dublin Bay UNESCO Biosphere	N/A	7.9km east

An Appropriate Assessment (AA) Screening Report was completed for the proposed works to assess the potential impacts on Natura 2000 sites. It concluded that the proposed works, either individually or in combination with other plans or projects, in view of best scientific knowledge, do not have the potential to result in likely significant effects on European sites. Further, the works do not have the potential to impact on any other sites including pNHA, RAMSAR or UNESCO.

5.4.1.2 Species

National Biodiversity Data Centre (NBDC) records[4] of designated species in grid squares O13S, O13X, O13R, O13W, O23C and O23B are displayed in Appendix B.

Birds

The study area supports a range of water and wetland and bird species, including a number of Birds of Conservation Concern (BoCCI) amber and red-listed species. These species could be present and foraging in proximity to the proposed works. From NBDC records, there are 21 amber-listed and five red-listed BoCCI in proximity to the proposed works. There are three records of Annex I bird species: Common Kingfisher (*Alcedo atthis*), Peregrine Falcon (*Falco peregrinus*) and Whooper Swan (*Cygnus cygnus*). Table 5.2 shows bird species recorded during wintering bird and ecological surveys conducted by ROD.

Table 5.2 Bird species recorded during the wintering bird and ecological surveys

Common Name	Species Name	BoCCI Status[5]
Blackbird	*Turdus merula*	Green
Black Guillemot	*Cepphus grylle*	Amber
Black-headed Gull	*Chroicocephalus ridibundus*	Amber
Brent Goose	*Branta bernicula*	Amber
Common Gull	*Larus canus*	Amber
Common Tern	*Sterna hirundo*	Amber
Cormorant	*Phalacrocorax carbo*	Amber
Feral Pigeon	*Columba livia f. domestica*	Green
Grasshopper Warbler	*Locustella naevia*	Green
Great Black-backed Gull	*Larus marinus*	Amber
Grey Heron	*Ardea cincera*	Green
Grey Wagtail	*Motacilla cinerea*	Red
Herring Gull	*Larus argentatus*	Amber

[4] NBDC (2023) *Biodiversity Maps* <https://maps.biodiversityireland.ie> [Accessed November 2023]. National Biodiversity Data Centre, Waterford.
[5] Gilbert, G., Stanbury, A. & Lewis, L. (2021). *Birds of Conservation Concern in Ireland 4: 2020–2026*. BirdWatch Ireland, Greystones, Co. Wicklow, A63 RW83.

Common Name	Species Name	BoCCI Status[5]
Hooded Crow	*Corvus cornix*	Green
Jackdaw	*Corvus monedula*	Green
Lesser Black-backed Gull	*Larus fuscus*	Amber
Light-bellied Brent Goose	*Branta bernicla hrota*	Amber
Magpie	*Pica pica*	Green
Mallard	*Anas platyrhynchos*	Green
Mute Swan	*Cygnus olor*	Amber
Pied Wagtail	*Motacilla alba yarrellii*	Green
Redshank	*Tringa totanus*	Red
Rook	*Corvus frugilegus*	Green

An internationally important population of Light-bellied Brent Goose (*Branta bernicla hrota)* regularly utilises a foraging site at Merion Gates[6], approximately 3.3km southeast of the proposed works. Additionally, another known feeding site for this species is located approximately 1.4km north of the proposed works[7]. This species was recorded in the relevant grid squares and during the ecological surveys conducted by ROD. This species is protected under the Wildlife Acts and the EU Birds Directive 2009/141/ECC (as amended), and amber-listed as a species of conservation concern. This species is also a qualifying interest for the South Dublin Bay and River Tolka Estuary SPA and the North Bull Island SPA, and use the proposed works area occasionally, as confirmed during ecological surveys undertaken by ROD in 2018 and 2019.

Records were returned for Common Tern (*Sterna hirundo*) at the location of the proposed works and have been recorded nesting in small numbers in the vicinity of the Grand Canal Sea Lock during surveys undertaken by ROD in 2018 and 2019 next to the proposed works area. A known breeding site for Roseate Tern (*Sterna dougallii*) and Artic Tern (*Sterna paradisaea*) is located 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)[8]. Roosting is known to occur between the Martello towers at Sandymount and Williamstown (c. 2.6.km southeast of the proposed works)[9].

The proposed works will not lead to likely significant effects on bird species as the impacts of visual and noise disturbance arising from the proposed works, considering the ambient visual and noise disturbance levels in the area, will be limited to very few individuals. The occurrence of breeding and roosting sites are of a sufficient distance from the proposed works to ensure that these sites will not be disturbed by the proposed works. Furthermore, the proposed works are of a nature and scale that any water quality impacts will be very localised and will dissipate over a very short distance, and certainly before reaching hydrologically connected SPAs for which these species are qualifying interests.

[6] Roughan & O'Donovan (ROD) and IDOM. (2022). *DART+ West Natura Impact Statement*. Roughan & O'Donovan and IDOM for Córas Iompair Éireann (CIÉ), Dublin.
[7] Roughan & O'Donovan (ROD) and IDOM. (2022). *DART+ West Natura Impact Statement*. Roughan & O'Donovan and IDOM for Córas Iompair Éireann (CIÉ), Dublin.
[8] Newton, S., Tierney, N. & Whelan, R. (2014). *Dublin Bay Birds Project - Dublin Port Tern Conservation Project; report for the 2014 season.* BirdWatch Ireland and Dublin Port Company.
[9] Merne, O. J., Madden, B., Archer, E. and Porter, B. (2008). *Autumn roosting by terns in south Dublin Bay*. Irish Birds 8: 335-340.

Otter

Otter (*Lutra lutra*) are listed under Annex II and IV of the EU Habitats Directive, and the Fifth Schedule of the Wildlife Acts. Otter are also a qualifying interest of Wicklow Mountains SAC. Ecological surveys conducted by ROD in 2022 recorded Otter spraint in three locations on the north quay wall of the Liffey, adjacent to the proposed works. No holts or couches recorded in the vicinity of the proposed works. Additionally, though there are no NBDC records of Otter since 2017, there are records prior to this of Otter using the Liffey Estuary Lower for breeding and foraging. The closest record of an Otter sign is located on the St Patricks Rowing Club pontoon[10], which is approximately 15m from the proposed works. In addition, there is an Otter holt located 200m southwest of the proposed works in a walled private garden near Camden Lock. In Ireland, Otter territories are within the range of 7.5km for females and 21km for males[11]. Therefore, the proposed works lie within the possible territories of male otter associated with the Wicklow Mountains SAC, which is located at a hydrological distance of 16km away.

The proposed works provide for potential to cause noise and visual disturbance to Otter and result in displacement around the proposed works area, however the impacts of visual and noise disturbance arising from the proposed works for foraging Otter, considering the ambient visual and noise disturbance levels in the area, will be minor. Furthermore, the survey methods for the proposed works will be non-invasive and will utilize small vessels for a few hours per day. Otters utilizing this area are habituated to high levels of disturbance from the city centre, the active port and existing activities within the river channel. Otter holts are located at a minimum of 200m from the proposed works. Guidance[12] recommends a minimum distance of 150m between any works and sensitive otter holts, to avoid impacts to Otter holts. Given that the proposed works are over 150m from the holts, and that the holt is located within a walled garden and effectively screened from the proposed works, no impacts due to noise or visual disturbance are anticipated. The proposed works are of a nature and scale that any water quality impacts will be very localised and will dissipate over a very short distance. Changes in water quality will be minor and not likely to affect Otter prey populations. Therefore, there is no potential for likely significant effects on Otter as a result of the proposed ground investigation works.

Bats

All bat species are listed on Annex IV of the Habitats Directive and the Fifth Schedule of the Wildlife Acts. Ecological surveys conducted by ROD in 2022 recorded the following bat species displayed in Table 5.3.

Table 5.3 Bat species recorded by ROD during ecological surveys in 2022

Common Name	Species Name
Common Pipistrelle	*Pipistrellus pipistrellus*
Soprano Pipistrelle	*Pipistrellus pygmaeus*
Nathusius' Pipistrelle	*Pipistrellus nathusii*
Leisler's Bat	*Nyctalus leisleri*

[10] Triturus (2023). *Point Junction otter survey on the River Liffey, Dublin City*. Triturus Environmental Ltd. for Dublin City Council. March 2023.
[11] O'Neill, L., Veldhuizen, T., De Jongh, A. & Rochford, J. (2009). Rang*ing behaviour and socio-biology of Eurasian otters (Lutra lutra) on lowland mesotrophic river systems*. European Journal of Wildlife Research.
[12] NRA, 2008. '*Guidelines for Treatment of Otters Prior to the Construction of National Road Schemes*'. National Roads Authority. Dublin, Ireland.

These species were recorded in low numbers. Furthermore, no roosts were identified during the surveys. The proposed works will give rise to noise, vibration and artificial lighting. The environmental surveys are non-invasive and will utilise small vessels for a few hours per day. As bats are nocturnal, the environmental surveys will not cause disturbance to bats. Furthermore, considering the ambient lighting, visual and noise disturbance levels in the area, disturbance to bats is not expected to increase significantly from the baseline as a result of the proposed works. There is no potential for the proposed works to result in significant impacts to bats.

Marine Mammals

Common Dolphin (*Delphinus delphis*), Common Porpoise (*Phocoena phocoena*), Fin Whale (*Balaenoptera physalus*), Common Seal (*Phoca vitulina*) and Grey Seal (*Halichoerus grypus*) were recorded in the study area. These species are protected under the Wildlife Acts, and Common Porpoise, Common Seal and Grey Seal and listed under Annex II of the EU Habitats Directive. The proposed works have the potential to cause habitat degradation through changes in water quality as a result of pollution. This could impact the biological communities where these species forage and affect the quality and / or quantity of prey items for these species. However, due to the assimilative capacity of Dublin Bay, the large aquatic environment available for refuge and / or foraging within Dublin Bay and the Irish Sea and the scale and nature of the proposed ground investigation works; there is no potential for water quality impacts from the proposed ground investigation works to result in likely significant effects on the on these species. These species also have the potential to be impacted by underwater noise during the proposed works. Noise impacts and construction activities could include disturbance, injury or mortality. An Annex IV Risk Assessment has been produced by ROD for the proposed works; see Appendix C, this assessed the impacts of noise on marine mammals from the project and the study area included the area which will be impacted by the proposed works. This report concluded that there is no potential for the proposed works to result in significant impacts to marine mammals.

Other Terrestrial Mammals

Records of Pine Marten (*Martes martes*) and West European Hedgehog (*Erinaceus europaeus*) have been recorded within the relevant grid squares and are protected under the Wildlife Acts. The location of the proposed works does not contain suitable habitat for these species. Therefore, it can be concluded that this species is not present within proximity of the proposed works, and there is no potential for negative impacts as a result of the proposed works.

Amphibians and Reptiles

Common Frog (*Rana temporaria*) are protected under the Wildlife Acts and were recorded within the relevant grid squares. Common frogs are found in terrestrial and freshwater environments. The location of the proposed works does not contain suitable habitat for these species. Therefore, it can be concluded that this species is not present within proximity of the proposed works, and there is no potential for negative impacts as a result of the proposed works.

Fish and Marine Invertebrates

Fish species such Brown Trout (*Salmo trouta*), European Eel (*Anguilla anguilla*), Atlantic Salmon (*Salmo salar*), Brook (*Lampetra planeri*), River (*Lampetra fluviatilis*) and Sea Lamprey (*Petromyzon marinus*) are known to be widespread in Irish rivers are estuaries. Common Oyster (*Ostrea edulis*), Dog Whelk (*Nucella lapillus*) and Icelandic Cyprine (*Arctica islandica*) have all been recorded in the relevant grid

squares and are listed as threatened species under the OSPAR Convention. The proposed works have the potential to cause minor water quality impacts through uplift of sediment, however, the proposed works are of a nature and scale that any water quality impacts will be very localised and will dissipate over a very short distance, therefore there is no potential for these species to be impacted by changes in water quality.

Invasive Species

Records were returned for ten terrestrial invasive plant species listed under Regulation S.I. 477 (Ireland) in the study area. No invasive plant species were recorded at the location of the proposed works during the field survey. As the works will be undertaken within the River Liffey there is no potential to result in the spread of invasive species to or from this site.

5.4.2 Mitigation

Though significant negative impacts to water quality through sedimentation and the release of pollutants such as fuels, lubricants, hydraulic fluids, and wastewater would be localized and relatively minimal, however, standard mitigation measures should be implemented to ensure there is no release of pollutants to waterbodies. The proposed works will follow best practice guidance, as per the following documents:

- Guidelines on Protection of Fisheries during Construction Works in and adjacent to Waters[13].
- C532 Control of water pollution from construction sites: guidance for consultants and contractors[14].
- Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes[15].

Hydrocarbons and other chemicals

- Land-based vehicles and plant shall be refuelled off-site, where possible.
- All land-based fuelling of machinery shall be undertaken on an impermeable base in bunded areas at least 50 m from the edge of the river.
- Marine based fuelling will only be undertaken using specifically designed nozzles to prevent spillages and spill kits will be available.
- All fuelling equipment shall be regularly inspected and serviced.
- Any petrol- or diesel-fuelled pumps or other machinery shall be located within temporary bunded units.
- All fuel, oils, chemicals, hydraulic fluids, on-site toilets etc. shall be stored in the construction site compound, on an impermeable base which shall be bunded to 110% capacity and appropriately secured.
- All plant and construction vehicles shall be inspected daily for oil leaks and a full-service record shall be kept for all plant and machinery.
- All waste oils, empty oil containers and hazardous wastes shall be disposed of in accordance with the Waste Management Act, 1996 (as amended).

[13] IFI. (2016). *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters*. Inland Fisheries Ireland, Citywest Business Campus, Dublin.
[14] Masters-Williams, H., Heap, A., Kitts, H., Greenshaw, L., Davis, S., Fisher, P., Hendrie, M. and Owens, D. (2001). *Control of water pollution from construction sites. Guidance for consultants and contractors.* Construction Industry Research and Information Association (CIRIA).
[15] TII. (2006). *Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes.* Transport Infrastructure Ireland (TII), Dublin 8.

5.4.3 Residual Effects

The environmental surveys are non-invasive and will utilise small vessels for a few hours per day. The surveys will be undertaken in an area that has frequent vessel traffic, adjacent to an industrial port and therefore has a high level of existing disturbance. The environmental surveys are not likely to lead to any significant impacts on the natural environment.

The proposed ground investigation works will give rise to noise, vibration and artificial lighting. However, the individual ground investigation points will take place in discreet and small areas in the marine environment for a limited time which is located in an urban area in proximity to Dublin Port which is already subject to high levels of noise, navigational traffic and disturbance. Any potential impacts will be localised, temporary and not significant. There is potential for mobile marine mammals and semi-aquatic mammals to occur within close proximity to the proposed works, there is potential for minor hydroacoustic impacts on these species, however these are assessed as not significant.

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 proposed 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, particularly into the River Liffey, arising from the proposed works is minimal.

Due to the nature, duration and scale of the proposed ground investigation works and environmental surveys, these are not likely to have significant negative direct or indirect effects on biodiversity.

5.5 Land and Soils

5.5.1 Receiving Environment

Based on the GSI Bedrock map viewer at 1:100,000 scale, the bedrock at the site of the proposed works belongs to the Lucan bedrock formation and is composed of Dark Limestone and Shale. This bedrock ranges from 300m to 800m in thickness. The quaternary sediments are urban in the area. The Teagasc soil categorization for both sides of the river are categorised as made ground and the subsoil categorisation is urban. Made ground is likely to exhibit variable strength and compressibility characteristics due to residential, retail, industrial developments, and existing road connections. There are no karst landscapes in the area. There are no active quarries or pits located within the site of the proposed ground investigation works and environmental surveys.

5.5.2 Potential Impacts

The proposed ground investigation works will be undertaken to inform on the ground conditions of the area which will feed into the design of the Point Bridge and Tom Clarke Widening Project. Under the scope of the contaminated land risk assessments, soil samples will be collected from the boreholes, and grab samples will be collected from the bed of the River Liffey. These samples will be tested for a variety of potential contaminants and will inform the mitigation measures to be included in the EIAR for the Point Bridge and Tom Clarke Widening Project.

No significant negative effects from these ground investigation works and environmental surveys are likely on land and soils.

5.5.3 Mitigation

As there are no significant negative effects as a result of the proposed works, mitigation measures are not required.

5.5.4 Residual Effects

As there are no mitigation measures proposed for the proposed works, the residual effects remain as per the potential impacts outlined above.

5.6 Water

5.6.1 Receiving Environment

The EPA carries out water quality assessments of rivers, transitional and coastal water bodies as part of a nationwide monitoring program required as part of national commitments to the implementation of the EU Water Framework Directive. Data is collected from physio-chemical and biological surveys, sampling both river water and the benthic substrate (sediment). Sampling is carried out throughout the year and the main parameters analysed include: conductivity, pH, colour, alkalinity, hardness, dissolved oxygen, biochemical oxygen demand (BOD), ammonia, chloride, ortho-phosphate, oxidised nitrogen and temperature.

The proposed works are located within the Liffey sub-catchment (Liffey_SC_100) which forms part of the Liffey Estuary Lower transitional waterbody. This transitional waterbody received a Water Framework Directive (WFD) rating of 'good' for the 2013-2018 monitoring period. The quality status of Liffey Estuary Lower dropped down to 'Intermediate' for the 2018-2021 period, and is 'at risk' of not achieving a good status in the next Water Framework Cycle.

The closest water quality monitoring station is "LIFFEY - d/s East Link Toll Br" (Station ID RS09L013300) at the existing Tom Clarke bridge where the proposed environmental surveys and ground investigation works will be undertaken. According to the station's monitoring records for the 2013-2018 period, the ecological water quality status was 'good', the chemical surface water status was 'good' and the specific pollutant conditions received a 'pass' mark.

The River Dodder and the Grand Canal merge with the River Liffey immediately to the northeast of the proposed works, part of which are located within the Liffey Estuary Lower transitional waterbody. The river waterbody WFD water quality status of the River Dodder and the Grand Canal was 'moderate' for the 2013-2018 period. However, both The Grand Canal and The River Dodder's standards are deemed to be 'at risk'.

In terms of groundwater, the receiving environment is characterised by a bedrock aquifer of local importance (Ll) which is moderately productive, but only in local zones. The groundwater vulnerability is 'low' for the areas on the north and south sides of the proposed ground investigation works. The groundwater in the area was deemed to not be 'at risk' for the 2013-2018 period.

5.6.2 Potential Impacts

The environmental surveys are non-intrusive and are not likely to have significant effects on hydrology and hydrogeology.

There is potential for water quality impacts as a result of proposed ground investigation works within or in close proximity to the River Liffey, namely from the proposed in-river

borehole drilling and slit trenching on the northern banks of the river. These works have the potential to lead to increased turbidity through re-suspension of bed sediments and release of new sediments. However, considering the size of the river channel at this location, and the small scale of the proposed works, any water quality impacts will be very localised and will dissipate over a very short distance. Therefore, the potential effects on surface water quality are likely to be *negative, not significant to slight, and temporary*.

Construction runoff from the site can pose a risk to groundwater due to potential infiltration of contaminated surface water to groundwater. Borehole drilling may provide a pathway to the groundwater table from overlaying soils. Due to the small scale of the proposed borehole drilling works, the potential impact is considered to be *negative, not significant to slight, and temporary*.

5.6.3 Mitigation

Notwithstanding the fact that there are no significant negative effects as a result of the proposed works, the following standard mitigation measures will be implemented:

- The contractor shall be cognisant of the following guidance documents for construction work on, over or near water to effectively control the risk of any spillage of pollutants and to further restrict any pathways for pollutants between the works and watercourses:
    - Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites (Eastern Regional Fisheries Board).
    - Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI, 2016).
    - Central Fisheries Board Channels and Challenges – The enhancement of Salmonid Rivers.
    - CIRIA C532 Control of Water Pollution from Construction Sites Guidance for Consultants and Contractors.
    - CIRIA C648 Control of water pollution from linear construction projects. Technical guidance..
    - Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (TII, 2006).
- In order to prevent emission of pollutants to the River Liffey and hydrologically connected sites during the proposed works, the successful Contractor(s) will ensure that any arisings from the associated boring / drilling works (e.g. stone / cement dust, sediments, drilling lubricants / coolants) are collected, stored (where necessary) and disposed of in accordance with the Waste Management Act 1996, as amended, and are not allowed to enter the river.
- Owing to the nature and scale of the proposed works, there will be minimal stockpiling of materials on site. However, any material stockpiled shall be located as far from the riverbank as practicable, covered and remain stockpiled for as short a time as possible.

Water Framework Directive Assessment

Any works which could affect the biological, physiochemical or hydromorphological quality of a waterbody requires an assessment in line with the WFD to demonstrate how the proposed works will not lead to a degradation status and where possible, enhance waterbody status in order to achieve the required Good status target as set out in the directive.

The proposed works are located within, or in vicinity of one water body, the Liffey Estuary Lower (IE_EA_090_0300). An assessment of likely impacts to Liffey Estuary Lower (IE_EA_090_0300) has been completed and is provided in Table 5.4 below. The assessment concludes that the proposed works will have negligible effects on waterbody status and the attainment of Good status.

Table 5.4 Compliance of the proposed works with objectives of WFD

Water body affected (WFD Code)	Ecological Status or Potential	Significant Pressures	Significant Pressures	River Basin Management Plan (RBMP) Measures	Do the proposed works prevent the achievement of the subjective watercourses WFD Objectives
Liffey Estuary Lower (IE_EA_090_0300)	Good	Biological Status or Potential	Urban Waste Water	Actions to address pollution from urban waste-water and urban runoff are set out in Section 7.2.3 of the 2nd Cycle RBMP. The Draft 3rd Cycle RBMP 2022-2027 which will replace the 2nd Cycle RBMP also contains actions in Section 5.4.4 and Section 5.4.5 to address pollution from urban waste water and urban runoff, respectively.	The proposed environmental surveys and ground investigation works will be caried out within or in the vicinity of the Liffey Estuary Lower. However, these works are small scale and temporary in nature and will be carried out in accordance with best practice guidance. The proposed works will not hinder implementation of measures outlined in the 2nd Cycle RBMP. The proposed works will not prevent the attainment of Good Ecological Potential.

5.6.4 Residual Effects

Through application of identified standard mitigation measures and the assimilative capacity of the receiving water body, it is considered that the proposed ground investigation works are likely to have *negative, not significant, temporary* effects on hydrology and hydrogeology.

5.7 Air Quality and Climate

5.7.1 Receiving Environment

The proposed ground investigation works are located in an urban environment of Dublin City as such there are a range of potentially sensitive air quality receptors surrounding the proposed works. This includes on the southern bank: residential uses, along York Road and Thorncastle Street, with the closest residential properties located approximately 70m south and southeast of the proposed works. Community and amenity uses include St. Patrick's Rowing Club. On their northern bank, the dominant land use is commercial and industrial, including the 3Arena (approximately 20m north of the proposed works) and the Dublin Port Terminal 3 (approximately 20m east of the proposed works).

The populations living and visiting this area including vehicular and non-vehicular users of the Tom Clarke Bridge and along the R131 Toll Bridge Road and the R801 North Wall Quay are also considered to be sensitive receptors.

5.7.2 Potential Impacts

Due to the nature, duration and scale of the proposed ground investigation works and environmental surveys, these are not likely to have significant negative effects on air quality and climate.

5.7.3 Mitigation

As there are no significant negative effects as a result of the proposed works, mitigation measures are not required.

5.7.4 Residual Effects

As there are no mitigation measures proposed for the proposed works, the residual impacts remain as per the potential impacts outlined above.

5.8 Noise and Vibration

5.8.1 Receiving Environment

The existing environment is an urban soundscape including noise associated with vehicular traffic on the existing Tom Clarke Bridge, a regional road (R131) and the surrounding local road network. The R131 Toll Bridge Road and the R801 North Wall Quay carry road traffic along the south and north quays of the River Liffey respectively. According to the EPA noise maps, the level of noise along the road network in vicinity of the proposed works ranges from 55 decibels (dB) to greater than 75dB. Small sections of the road on approach to the Tom Clarke bridge as well as on the bridge itself are identified as experiencing noise greater than 75dB during the day.

The area is also influenced by activities arising from Dublin Port and the ferry terminal 3, which is adjacent to the existing Tom Clarke Bridge. Marine vessels navigating through the River Liffey and the nearby River Dodder (approximately 70m southeast of the project) can also be sources of temporary noise.

To the south of the proposed works is the Ringsend area that includes sensitive residential and commercial uses along York Road and Thorncastle Street, with the closest residential properties located approximately 70m south and southeast of the proposed works. On their northern bank, the dominant land use is commercial and industrial, including the 3Arena (approximately 20m north of the project) and the Dublin Port Terminal 3 (approximately 20m east of the project).

5.8.2 Potential Impacts

The proposed environmental surveys are non-intrusive and are not likely to have significant negative effects on noise and vibration.

The proposed ground investigation works are likely to temporarily elevate noise levels in the area. The noisiest activities are associated with borehole drilling which will occur within the river channel and on the northern banks of the river. These activities will be limited to the daytime working hours. Slit trenching on the northern banks of the River Liffey are the only works to occur during the nighttime. Taking into consideration the prevalent noise environment of the area, as well as the nature, duration and scale of the proposed works, the potential effects on noise are likely to be localised, *negative, not significant and temporary*.

5.8.3 Mitigation

As there are no significant negative effects as a result of the proposed works, mitigation measures are not required.

5.8.4 Residual Effects

As there are no mitigation measures proposed for the proposed works, the residual impacts remain as per the potential impacts outlined above.

5.9 Landscape / Seascape

5.9.1 Receiving Environment

The proposed works are located within the Liffey River corridor in Dublin City which in landscape terms, can be described as a character area which is a combination of historic and cultural significance combined with contemporary architecture. The corridor encompasses the Liffey River, North Wall Quay and Ringsend riverside and Dublin Port edge to the River Liffey.

5.9.2 Potential Impacts

The proposed ground investigation works will require the presence of construction machinery on the banks of the River Liffey and within the river channel itself. Due to the small scale, duration and the temporary nature of the proposed works, no likely significant negative direct and indirect effects are envisaged on landscape and visual amenity.

5.9.3 Mitigation

As there are no significant negative effects as a result of the proposed works, mitigation measures are not required.

5.9.4 Residual Effects

As there are no mitigation measures proposed for the proposed works, the residual impacts remain as per the potential impacts outlined above.

5.10 Architectural, Archaeological and Cultural Heritage

5.10.1 Receiving Environment

Architectural Heritage

North Wall Quay (RPS no. 5835) is the only structure listed on the Record of Protected Structures (RPS) within the Dublin City Development Plan 2022-2028 in proximity to the proposed works. It encompasses granite ashlar quay walls, stone setts, mooring hooks, ladders, hand rails and steps. The proposed slit trenching (ST101) and borehole drilling (BH105) will be carried out adjacent of the North Wall Quay.

The National Inventory of Architectural Heritage (NIAH) also lists two buildings located within 100m of the proposed works:

- The 3Arena, North Wall Quay, East Wall Road, Dublin (NIAH Reg. No. 50011169) located approximately 20m north of the proposed project options; and
- 94 North Wall Quay, Dublin (NIAH Reg. No. 50011168) located approximately 80m west of the proposed works.

Archaeological and Cultural Heritage

There are no known features of archaeological significance located at the proposed ground investigation works. The land-based investigation works however are located on the existing North Quay Wall Campshires adjacent to the historic quay wall (SMR ref. no. DU018-020564-) and the structure supporting the left turn lane from Tom Clarke bridge to North wall quay road.

Underwater Archaeological Impact Assessment: *Underwater Archaeological Impact Assessment (UAIA) Proposed Bridge Location Point Bridge and Tom Clarke Bridge Widening Project River Liffey, Dublin City 22D0070, 22R0234* (ADCO 22.11.2022) was prepared for the proposed Point Bridge and Tom Clarke Widening Project, including the proposed ground investigation works.

The assessment included a dive and metal detection survey of the proposed in-stream development area, which concluded that *"no archaeologically significant material, structures, or deposits were encountered as part of the underwater survey. However, given that deep deposits of silty-clay comprise the upper riverbed layer (within which frequent modern debris is present at depth), the potential for archaeological material to remain buried at depth, located within deeper / older sub-stratum, should still be a consideration. Although, this potential is also tempered by nineteenth-century channel deepening (dredging) works that took place along this section of the River Liffey. In addition, construction works for Tom Clarke Bridge are also likely to have reduced the archaeological potential of the riverbed surrounding its footprint".*

5.10.2 Potential Impacts

Architectural Heritage

The proposed slit trenching (ST101) and borehole drilling (BH105) will be carried out in vicinity of North Wall Quay (RPS no. 5835) but will not have a direct impact on the structures protected under this RPS, namely the granite ashlar quay walls, stone setts, mooring hooks, ladders, hand rails and steps. The proposed works will be carried out on a surfaced footpath areas in proximity to the protected structure. Indirect effects are likely but these will be temporary in nature and small in scale. The proposed north quay wall inspection surveys will be non-intrusive and will have no significant negative direct and indirect effects.

The proposed ground investigation works and environmental surveys will not have any negative direct or indirect significant effects on the 3Arena (NIAH Reg. No. 50011169) and 94 North Wall Quay (NIAH Reg. No. 50011168).

Archaeological and Cultural Heritage

The proposed slit trenching (ST101) and borehole drilling (BH105) will have a direct impact on the North Quay Wall Campshires. The proposed works are temporary nature, small scale, and will reinstate the ground following completion. As such, the effects are likely to be *negative, temporary and moderate* in magnitude.

The proposed ground investigation works may have a direct negative impact on any previously unrecorded archaeological features, deposits or artefacts, which have the potential to survive within the estuarine silts of the riverbed or the more recent reclamation deposits.

5.10.3 Mitigation

Architectural Heritage

As there are no significant negative effects as a result of the proposed works, mitigation measures are not required.

Archaeological and Cultural Heritage

In consultation with the Department of Housing, Local Government and Heritage, the following mitigation measures will be implemented:

1. All recommendations and mitigations set out in Section 6.0 of the report Underwater Archaeological Impact Assessment (UAIA) Proposed Bridge Location Point Bridge and Tom Clarke Bridge Widening Project River Liffey, Dublin City 22D0070, 22R0234 (ADCO 22.11.2022) shall be implemented in full – see Appendix D of this report.
2. In order to ensure the preservation of underwater cultural heritage, wrecks, submerged landscape deposits, features and objects, it is recommended that Archaeological Monitoring, as described below, be carried out of all geotechnical investigation works for the proposed works:
    a) The Contractor is required to engage the services of a suitably qualified and experienced underwater archaeologist to monitor all geotechnical investigations and related works that physically impact on the riverbed / banks associated with the development. The archaeological monitoring shall be licensed under Section 26 of the National Monuments Act 1930. A detailed method statement shall accompany the licence application and shall include details on the proposed works, extent and duration of works, archaeological monitoring team proposed and a finds retrieval strategy.
    b) Should archaeological materials or potential archaeological materials be identified during the course of archaeological monitoring, all works shall cease in the area of archaeological interest pending a decision, in consultation with the Department, regarding appropriate mitigation (dive survey, exclusion zones, test-excavations, preservation in-situ / excavation).
    c) The developer shall facilitate the archaeologist in recording any remains identified and undertaking any mitigation recommended by the Department. Any further archaeological mitigation requirements specified by the planning authority, following consultation with the Department, shall be complied with by the developer.
    d) An archaeological dive team should be retained on standby in the event that archaeological material is uncovered during the dredging works. A dive / survey

licence (Section 3 1987 National Monuments Act) and Detection Device consent (Section 2 1987 National Monuments Act) should be obtained in advance of the works commencing to prevent delays to potential archaeological diving work associated with the project.

e) Following the completion of all geotechnical works the licensee shall furnish the project archaeologist with the results of all site investigation works and shall provide them access to site investigation cores and physical samples for review.

3. Where potential archaeological materials and / or submerged palaeolandscape deposits are identified they shall be, where suitable samples are available, radiocarbon dated and assessed by an archaeobotanist in agreement with the Department and subject to approval of Licences to Alter and Export from the National Museum of Ireland. Following the completion of all archaeological works and any necessary post-excavation specialist analysis, the planning authority and the Department shall be furnished with a final archaeological report describing the results of the monitoring and any subsequent required archaeological investigative work/excavation required. All resulting and associated archaeological costs shall be borne by the developer.

5.10.4 Residual Effects

Architectural Heritage

As there are no mitigation measures proposed for the proposed works, the residual impacts remain as per the potential impacts outlined above.

Archaeological and Cultural Heritage

Following the implementation of the aforementioned mitigation measures, the potential impacts on the North Wall Quay Campshires are likely to be *negative, slight and temporary*.

Significant negative effects on known and unknown features of archaeological and cultural heritage significance are not likely to occur.

5.11 Material Assets

5.11.1 Receiving Environment

Utilities

The proposed works are located within and along the northern banks of the River Liffey. The existing utilities are likely to be present along Tom Clarke Bridge and along the northern banks of the River Liffey. An existing high pressure gas line runs along the riverbed to the west of the existing Tom Clarke Bridge.

Fisheries and Aquaculture

There are no licensed aquaculture sites or fisheries located at, or in the vicinity of the proposed works.

5.11.2 Potential Impacts

Utilities

The proposed slit trenching works and inspection works will be carried out to identify the existing utilities at the north wall quay campshires and of the location of the existing high pressure gas pipeline crossing the River Liffey. The proposed works are to inform the design of the proposed Point Bridge will tie in. No interruptions to the associated services are anticipated as a result of the proposed works. No significant effects on utilities are envisaged.

Fisheries and Aquaculture
As there are no licensed aquaculture sites or fisheries located at, or in the vicinity of the proposed works, significant negative effects are not likely to occur.

5.11.3 Waste

The proposed works are not likely to produce waste.

5.12 Interactions

Interactions during the ground investigation works will occur between Population and Human Health and Noise and Vibration. The predicted negative effects will be temporary and standard control measures will be implemented to reduce nuisances and visual obstructions. No likely significant environmental effects are expected to occur.

Interactions will also occur between Hydrology and Hydrogeology and Biodiversity. Standard mitigation measures outlined in Sections 5.4 and 5.6 of this report will mitigate any significant effects.

There are not likely to be any interactions associated within environmental surveys.

5.13 Summary of Mitigation

Mitigation measures are as outlined under the relevant environmental assessment sections 5.1 to 5.2.

6. CONSIDERATION AND REASONED CONCLUSIONS

6.1 EIA Directive

This Report has been undertaken to determine the potential significant impact of the proposed works on the environment. The assessment had regard to the following:

1. Characteristics of the proposed works;
2. Location of the proposed development;
3. Characteristics of potential impacts; and
4. The possibility of effectively reducing the impacts of the proposed works (particularly relating to traffic, emissions (noise and air) and surface water runoff).

The potential impacts of the proposed works have addressed under all relevant headings with respect to the environmental factors listed in Article 3(1) of the 2014 Directive, which include:

(a) population and human health

(b) biodiversity, with particular attention to the species and habitats protected under Directive 92/43EEC and Directive 2009/147/EC

(c) land, soil, water, air quality and climate

(d) material assets, cultural heritage and the landscape

(e) the interaction between the factors referred to in points (a) to (d).

An assessment of the likely significant effects on the environment is detailed in Section 5 of this Report under each of the environmental factors. The assessment found following the implementation of mitigation measures detailed in Section 5 there will be no significant direct, indirect cumulative negative effects arising from the proposed environmental surveys and ground investigation works on the environment.

While there are no significant negative impacts identified on the environment, the assessment has found there is potential for some negative, effects during the construction stage. The main negative effects associated with the proposed works are summarised in the paragraphs below.

Traffic and Transport: Land-based ground investigation works are likely to cause temporary traffic disruptions for the duration of the works. As the proposed works will be carried out at night time when traffic volumes are at their lowest, *negative, not significant to slight and temporary* effects on traffic movements are likely. The proposed in-river ground investigation works are likely to obstruct the passage of marine-based traffic during drilling for 2 no. boreholes. Following the implementation of mitigation measures, *negative, slight to moderate and temporary* effects on river navigation are likely to occur.

Biodiversity: The proposed works provide for potential to cause noise and visual disturbance to marine mammal species. The proposed works also have the potential to cause habitat degradation through changes in water quality as a result of pollution. However, due to the assimilative capacity of Dublin Bay, the large aquatic environment available for refuge and / or foraging within Dublin Bay and the Irish Sea and the scale and nature of the proposed ground investigation works; there is no potential for water quality impacts from the proposed ground investigation works to result in likely significant effects on the on these species. Following the implementation of mitigation and monitoring measures and due to the nature, duration and scale of the proposed

ground investigation works and environmental surveys, these are not likely to have significant negative direct or indirect effects on biodiversity.

Water: There is potential for water quality impacts as a result of proposed ground investigation works within or in close proximity to the River Liffey, namely from the proposed in-river borehole drilling and slit trenching on the northern banks of the river. However, considering the size of the river channel at this location, and the small scale of the proposed works, any water quality impacts will be very localised and will dissipate over a very short distance. Following the implementation of mitigation and monitoring measures, the potential effects on surface water and ground water quality are likely to be *negative, not significant, temporary*.

Architectural, Archaeological and Cultural Heritage: The proposed slit trenching (ST101) and borehole drilling (BH105) will have a direct impact on the North Quay Wall Campshires. The proposed works are temporary nature, small scale, and will reinstate the ground following completion. Following the implementation of the aforementioned mitigation measures, the potential impacts on the North Wall Quay Campshires are likely to be *negative, moderate and temporary*.

The proposed ground investigation works may have a direct negative impact on any previously unrecorded archaeological features, deposits or artefacts, which have the potential to survive within the estuarine silts of the riverbed or the more recent reclamation deposits. Following the implementation of mitigation measures, Significant negative effects on known and unknown features of archaeological and cultural heritage significance are not likely to occur.

It is RODs recommendation that should MARA **Grant** the licence, as the proposed works would not have significant effects on the environment.

6.2 Water Framework Directive

The proposed works are located within, or in vicinity of one water body, the Liffey Estuary Lower (IE_EA_090_0300). An assessment of likely impacts to Liffey Estuary Lower (IE_EA_090_0300) has been completed and is provided in Table 5.4 of this Report.

It is RODs recommendation that should MARA **Grant** the licence, as the proposed works will have negligible effects on waterbody status and the attainment of Good status.

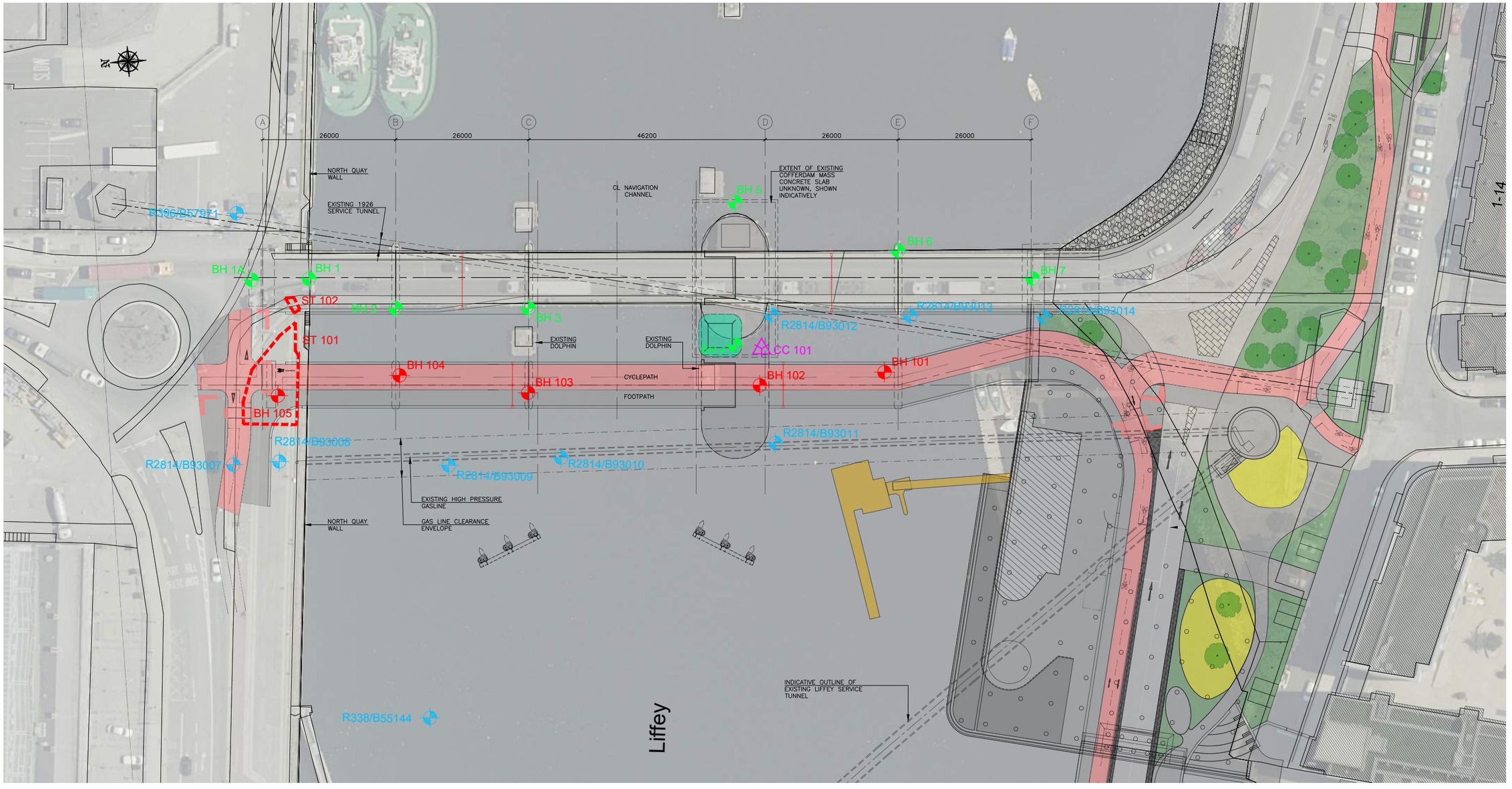
6.3 Maritime Spatial Planning Directive

In accordance with the Maritime Spatial Planning Directive, a National Marime Planning Framework (NMPF) was launched by Ireland in 2021 which sits at the top of the hierarchy of plans and sectoral policies for the marine area.

The proposed ground investigation works and environmental surveys are to inform the design of the Point Bridge and Tom Clarke Widening Project. This project is a road transport project which is intended for pedestrian and cyclist use only, and is not attributed to marine sector or marine activities identified in the NMPF. Therefore, the National Marine Planning Framework is not applicable for this project and the associated ground investigation works and environmental surveys.

APPENDIX A

LOCATION OF GROUND INVESTIGATION WORKS



PLAN
SCALE 1:400

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

SEÁN HARRINGTON ARCHITECTS

JOINT VENTURE: ROD Roughan & O'Donovan; Hardesty & Hanover engineering that moves you

No.	Revision	Date	By	Chk'd	App'd
P01	ISSUED FOR INFORMATION	05/04/22	PE	PK	TD
P02	ISSUED FOR TENDER	26/05/22	CS	PK	TD
P03	PROJECT BACKGROUND UPDATED	23/10/2023	CS	CS	CS

ROD Roughan & O'Donovan
ARENA HOUSE
ARENA ROAD
SANDYFORD
DUBLIN 18
IRELAND
t +353 (0) 1 294 0800
www.rod.ie
Consulting Engineers
Civil - Structural - Transportation - Environmental

Drawn	Designed	Checked	Approved	Suitability Code - Description
PE	JC	JC	TD	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 - 301051

Scale (A1): AS SHOWN | Date: April 2022 | Job No: 21.124 | Rev: P03

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APPENDIX B

NBDC RECORDS

National Biodiversity Data Centre (NBDC) Records

Table 1 NBDC records[1] of Protected and Invasive species since 2017 in Grid squares O13S, O13X, O13R, O13W, O23C and O23B.

Common name	Species name	Date of last record	Designation[2]
Protected Species			
Birds			
Black Guillemot	*Cepphus grylle*	10/02/2023	WA; Birds of Conservation Concern - Amber List
Black-headed Gull	*Larus ridibundus*	27/03/2023	WA; Birds of Conservation Concern - Red List
Black-legged Kittiwake	*Rissa tridactyla*	27/03/2023	WA; Birds of Conservation Concern - Amber List
Black-tailed Godwit	*Limosa limosa*	12/01/2019	WA; Birds of Conservation Concern - Amber List
Brent Goose	*Branta bernicla*	27/03/2023	WA; Birds of Conservation Concern - Amber List
Common Coot	*Fulica atra*	04/01/2018	WA; EU BD Annex II, Section I Bird Species, Annex III, Section II Bird Species; Birds of Conservation Concern - Amber List
Common Kingfisher	*Alcedo atthis*	19/02/2023	WA; EU BD Annex I Bird Species; Birds of Conservation Concern - Amber List

[1] NBDC (2023) *Biodiversity Maps* <https://maps.biodiversityireland.ie> [Accessed November 2023]. National Biodiversity Data Centre, Waterford.
[2] BD = Birds Directive; HD = Habitats Directive; WA = Wildlife Acts

Common name	Species name	Date of last record	Designation[2]
Common Redshank	*Tringa tetanus*	12/01/2019	WA; Birds of Conservation Concern - Red List
Common Starling	*Sturnus vulgaris*	04/02/2023	WA; Birds of Conservation Concern - Amber List
Common Swift	*Apus apus*	29/06/2023	WA; Birds of Conservation Concern - Amber List
Common Tern	*Sterna hirundo*	18/06/2017	WA; EU BD Annex I Bird Species; Birds of Conservation Concern - Amber List
Common Wood Pigeon	*Columba palumbus*	17/09/2017	WA; EU BD Annex II, Section I Bird Species, Annex III, Section I Bird Species
Eurasian Curlew	*Numenius arquata*	14/08/2021	WA; EU BD Annex II, Section II Bird Species; Birds of Conservation Concern - Red List
Eurasian Oystercatcher	*Haematopus ostralegus*	23/01/2023	WA; Birds of Conservation Concern - Amber List
Eurasian Teal	*Anas crecca*	27/03/2023	WA; EU BD Annex II, Section I Bird Species, Annex III, Section II Bird Species; Birds of Conservation Concern - Amber List
Eurasian Wigeon	*Anas penelope*	12/01/2019	WA; EU BD Annex II, Section I Bird Species, Annex III, Section II Bird Species; Birds of Conservation Concern - Amber List
European Shag	*Phalacrocorax aristotelis*	12/01/2019	WA; Birds of Conservation Concern - Amber List
Great Black-backed Gull	*Larus marinus*	12/01/2019	WA; Birds of Conservation Concern - Amber List

Common name	Species name	Date of last record	Designation[2]
Great Cormorant	*Phalacrocorax carbo*	10/02/2023	WA; Birds of Conservation Concern - Amber List
Great Northern Diver	*Gavia immer*	19/02/2020	WA; EU BD Annex I Bird Species
Herring Gull	*Larus argentatus*	29/01/2023	WA; Birds of Conservation Concern - Red List
House Sparrow	*Passer domesticus*	14/12/2022	WA; Birds of Conservation Concern - Amber List
Little Egret	*Egretta garzetta*	29/01/2023	WA; EU BD Annex I Bird Species
Little Grebe	*Tachybaptus ruficollis*	07/01/2023	WA; Birds of Conservation Concern - Amber List
Lesser Black-backed Gull	*Larus fuscus*	26/06/2017	WA; Birds of Conservation Concern - Amber List
Mallard	*Anas platyrhynchos*	29/01/2023	WA; EU BD Annex II, Section I Bird Species, Annex III, Section I Bird Species
Mute Swan	*Cygnus olor*	29/01/2023	WA; Birds of Conservation Concern - Amber List
Northern Wheateater	*Oenanthe oenanthe*	06/05/2019	WA; Birds of Conservation Concern - Amber List
Red-breasted Merganser	*Mergus serrator*	14/01/2023	WA; EU BD Annex II, Section II Bird Species

Common name	Species name	Date of last record	Designation[2]
Red Knot	*Calidris canutus*	23/03/2023	WA; Birds of Conservation Concern - Red List
Rock Pigeon	*Columba livia*	26/01/2023	WA; EU BD Annex II, Section I Bird Species
Peregrine Falcon	*Falco peregrinus*	27/03/2023	WA; EU BD Annex I Bird Species
Sand Martin	*Riparia riparia*	30/03/2023	WA; Birds of Conservation Concern - Amber List
Whooper Swan	*Cygnus cygnus*	04/03/2020	WA; EU BD Annex I Bird Species; Birds of Conservation Concern - Amber List
Mammals			
Common Dolphin	*Delphinus delphis*	28/11/2018	EU HD Annex IV; WA
Common Porpoise	*Phocoena phocoena*	07/02/2021	EU HD Annex II, Annex IV; WA; Threatened Species: OSPAR Convention
Common Seal	*Phoca vitulina*	27/07/2018	EU HD Annex II, Annex V; WA
Grey Seal	*Halichoerus grypus*	10/04/2019	EU HD Annex II, Annex V; WA
Fin Whale	*Balaenoptera physalus*	04/10/2019	EU HD Annex IV; WA
Pine Marten	*Martes martes*	09/02/2020	EU HD Annex V; WA
West European Hedgehog	*Erinaceus europaeus*	25/07/2021	WA

Common name	Species name	Date of last record	Designation[2]
Amphibians			
Common Frog	*Rana temporaria*	14/03/2023	EU HD Annex V; WA
Invertebrates			
Common Oyster	*Ostrea edulis*	05/03/2020	Threatened Species: OSPAR Convention
Dog Whelk	*Nucella lapillus*	17/08/2022	Threatened Species: OSPAR Convention
Icelandic Cyprine	*Arctica islandica*	13/03/2020	Threatened Species: OSPAR Convention
Invasive Species			
Brown Rat	*Rattus norvegicus*	10/10/2018	High Impact Invasive Species Regulation S.I. 477 (Ireland)
Eastern Grey Squirrel	*Sciurus carolinensis*	27/03/2023	High Impact Invasive Species EU Regulation No. 1143/2014 Regulation S.I. 477 (Ireland)
Harlequin Ladybird	*Harmonia axyridis*	31/08/2023	High Impact Invasive Species Regulation S.I. 477 (Ireland)
New Zealand Flatworm	*Australoplana sanguinea*	01/03/2021	Medium Impact Invasive Species
Butterfly-bush	*Buddleja davidii*	18/04/2023	Medium Impact Invasive Species
Cherry Laurel	*Prunus laurocerasus*	04/01/2018	High Impact Invasive Species
False-acacia	*Robinia pseudoacacia*	20/06/2021	Medium Impact Invasive Species

Common name	Species name	Date of last record	Designation[2]
Giant Hogweed	*Heracleum mantegazzianum*	18/09/2012	High Impact Invasive Species Regulation S.I. 477 (Ireland)
Giant Rhubarb	*Gunnera tinctoria*	28/06/2020	High Impact Invasive Species Regulation S.I. 477 (Ireland)
Himalayan Honeysuckle	*Leycesteria formosa*	26/11/2021	Medium Impact Invasive Species
Indian Balsam	*Impatiens glandulifera*	29/08/2022	High Impact Invasive Species Regulation S.I. 477 (Ireland)
Japanese Knotweed	*Fallopia japonica*	23/11/2022	High Impact Invasive Species Regulation S.I. 477 (Ireland)
Narrow-leaved Ragwort	*Senecio inaequidens*	18/06/2023	Medium Impact Invasive Species
Pampas-grass	*Cortaderia selloana*	15/01/2019	Medium Impact Invasive Species
Ragweed	*Ambrosia artemisiifolia*	06/09/2022	Medium Impact Invasive Species
Sea-buckthorn	*Hippophae rhamnoides*	08/08/2022	Medium Impact Invasive Species Regulation S.I. 477 (Ireland)
Spanish Bluebell	*Hyacinthoides hispanica*	15/04/2022	Regulation S.I. 477 (Ireland)
Sycamore	*Acer pseudoplatanus*	26/04/2020	Medium Impact Invasive Species
Three-cornered Garlic	*Allium triquetrum*	05/05/2021	Medium Impact Invasive Species Regulation S.I. 477 (Ireland)
Traveller's-joy	*Clematis vitalba*	23/07/2021	Medium Impact Invasive Species

APPENDIX C

ANNEX IV RISK ASSESSMENT

Prepared by
Roughan & O'Donovan
Arena House, Arena Road, Sandyford, Dublin 18
Tel: +353 1 2940800 Fax: +353 1 2940820
Email: info@rod.ie www.rod.ie

Point Bridge and Tom Clarke Bridge Widening Project

Ground Investigation Works and Environmental Surveys

Risk Assessment For Annex IV Species

Doc. Ref.: PTCB-ROD-ENV-AE-RP-EN-405004

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Client:
Dublin City Council
Civic Offices
Wood Quay
Dublin 8

ROD
ROUGHAN & O'DONOVAN

Maritime Usage Licence Application for Point Bride and Tom Clarke Bridge Widening Project

Ground Investigation Works and Environmental Surveys

Risk Assessment for Annex IV Species

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1.0 INTRODUCTION

1.1 Project Overview

Roughan & O'Donovan (ROD) was appointed by Dublin City Council to undertake, on its behalf, an Annex IV Species Risk Assessment in support of a licence application to Maritime Area Regulatory Authority (MARA), for Maritime Usage. The licence application is in respect of marine environmental surveys and ground investigation works ("the Works") for the purposes of site investigation to inform the design of the Point Bridge and Tom Clarke Bridge Widening Project in Dublin City.

1.2 Legislative Context

1.2.1 Maritime Area Planning legislation

In December 2021, the Government passed the Maritime Area Planning (MAP) Act, 2021 to regulate the maritime area. The MAP Act will achieve this through the National Marine Planning Framework, maritime area consents for the occupation of the maritime area for the purposes of maritime usages for undefined or long periods of time, and licences for marine usages for a relatively short periods of time. The Maritime Area Regulatory Authority (MARA) has been established to oversee the enforcement of this Act. As part of this role, MARA will review applications for consents and licences within the maritime area.

The Works are located in a maritime area and are required to inform the design of the Point Bridge and Tom Clarke Bridge Widening Project. These works fall under Schedule 7(3) of the MAP Act, 2021 relating to the 'Maritime Usages which may be undertaken in Maritime Area pursuant to Licence':

> "*3. Marine environmental surveys for the purposes of site investigation or in support of an application under Part XXI of the Act of 2000*".

In accordance with the Act, the Works are required to hold a valid licence prior to their commencement.

This report has been prepared to inform the licence application for the Works in accordance with the MARA Applicant Technical Guidance Note (2023), for the requirement to complete an Annex IV Risk Assessment.

1.2.2 Annex IV Species Legislation

The Habitats Directive (92/43EEC) is the principal instrument of EU legislation for the protection of natural habitats and wild species. Article 12 of the Directive requires all Member States to "*establish a system of strict protection for the animal species listed in Annex IV (a) in their natural range*". This requirement is transposed into Irish law by Section 51 of the European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No. 477/2011, as amended) ("the Habitats Regulations").

Section 51 of the Habitats Regulations protects Annex IV fauna from deliberate capture, killing, disturbance (particularly during sensitive periods), taking or destruction of eggs, damage or destruction of breeding and resting places, and trade or trafficking by making all such activities an offence (save where done in accordance with a licence granted under Section 54 of the Regulations). This applies to all the life stages of the species concerned.

The Annex IV fauna which are relevant in an Irish context include the following:

- 'Microchiroptera – All species' (all bat species present in Ireland);
- Otter (*Lutra lutra*);
- 'Cetacea – All species' (all whales, dolphins and porpoises),
- A number of sea turtles, including the regularly occurring Leatherback Turtle (*Dermochelys coriacea*) and the less frequent Loggerhead Turtle (*Caretta caretta*);
- Natterjack Toad (*Epidalea calamita*);
- Kerry Slug (*Geomalacus maculosus*).

In addition, the relevant Minister is required to monitor the incidental capture and killing of Annex IV fauna and ensure that any incidental capture and killing does not have a significant negative impact on the species concerned.

This Annex IV Species Risk Assessment has been prepared to support the MARA licence application for the Works in accordance with the MARA Applicant Technical Guidance Note (2023)[1].

1.3 Methodology

This assessment has been carried out with regard to the relevant legislation and guidance, as well as the documentation submitted with the Application and other information which is publicly available. The documents and sources of information which informed this assessment are as follows:

- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive). Official Journal of the European Communities, *L206/7*.
- Council Directive 2008/56/EC of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive). Official Journal of the European Communities, *L164/19*.
- Council Decision 98/249/EC of 7 October 1997 on the conclusion of the Convention for the protection of the marine environment of the north-east Atlantic. Official Journal of the European Communities, *L104/1*.
- DHLGH (2021) *Marine Strategy Framework Directive 2008/56/EC: Article 17 update to Ireland's Marine Strategy Part 2: Monitoring Programme (Article 11).* Department of Housing, Local Government and Heritage.
- EC (2021) *Guidance document on the strict protection of animal species of Community interest under the Habitats Directive 92/43/EEC*. European Commission, Brussels.

[1] Obtaining a Licence to Carry Out Specified Maritime Usages in the Maritime Area under the Maritime Area Planning Act 2021 – Applicant Technical Guidance Note (2023)

- NPWS (2007) Circular Letter NPWS 2/07. Guidance on Compliance with Regulation 23 of the Habitats Regulations 1997 – strict protection of certain species/ applications for derogation licences. National Parks & Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin
- European Communities (Birds and Natural Habitats) Regulations, 2011. *SI No. 477/2011* (as amended).
- MARA (2023) *Obtaining a Licence to Carry Out Specified Maritime Usages in the Maritime Area under the Maritime Area Planning Act 2021: Applicant Technical Guidance Note.* Maritime Area Regulatory Authority, Wexford.
- DAHG (2014) *Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters.* Department of Arts, Heritage and the Gaeltacht, Dublin.
- DEHLG (2007) *Code of Practice for the Protection of Marine Mammals during Acoustic Seafloor Surveys in Irish Waters.* Department if the Environment, Heritage and Local Government, Dublin.
- NPWS (2021) *Guidance on the Strict Protection of Certain Animal and Plant Species under the Haitats Directive in Ireland.* National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Dublin.
- IWDG (2023) *Sightings Map* <https://iwdg.ie/browsers/sightings-map.php?foundrecords=2434> [accessed November 2023]. Irish Whale and Dolphin Group, Kilrush.
- Marine Institute (2023) *Ireland's Marine Atlas* <https://atlas.marine.ie/> [accessed November 2023]. Marine Institute, Oranmore.
- NBDC (2023) *Biodiversity Maps* <https://maps.biodiversityireland.ie/Map> [accessed November 2023]. National Biodiversity Data Centre, Waterford.

1.4 Statement of Authority

This report has been prepared by Rachel Heaphy. Rachel is an Ecologist with two years' experience in ecological assessment. She holds a BSc (Hons) in Zoology from University College Cork and an MRes degree (with distinction) from the University of Roehampton. Rachel is a Qualifying Member of the Chartered Institute of Ecological and Environmental Management (QualCIEEM).

Patrick is a Principal Ecologist over eleven years' experience in ecological consultancy. He holds a bachelor's degree (with honours) in Botany from Trinity College Dublin, and an MSc in Ecological Management and Conservation Biology from Queen's University Belfast. He is a full member of the Chartered Institute of Ecology and Environmental Management (MCIEEM) and holds a licence issued by the National Parks & Wildlife Service for bat roost disturbance during the course of his work.

2.0 DESCRIPTION OF THE PROPOSED WORKS

2.1 Overview

The Works involve the gathering, and compilation of ground investigation data to enable the planning, design and construction of the Point Bridge and Tom Clarke Bridge Widening Project. The environmental surveys involve a gas main survey, an inspection of the pier wall and additional structural inspection works, as described in Section 2.3 below. The Works will include rotary core and Geobore S drilling, slit trenching, concrete coring into a cofferdam concrete plug installed during the construction of Tom Clarke Bridge, standpipes/piezometer installations and monitoring, in-situ testing and laboratory testing.

2.2 Location

The in-river investigation works will be undertaken within a tidal reach of the River Liffey and in close proximity to both the upstream and downstream sides of the existing Tom Clarke Bridge structure and protective dolphins. 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.

The locations of all ground investigations and environmental surveys are shown on the Proposed Ground Investigation Plan, Drawing No: PTCB-ROD-GEN-AE-SK-CS-301051 in Appendix A.

2.3 Environmental Surveys

2.3.1 Gas Main Survey

The use of acoustic Sub-bottom profiling and a vertical magnetic gradiometer are proposed for the detection of the buried infrastructure. A UniPact, which is a remotely operated unmanned surface vessel (USV), will be used for both sets of apparatus, and will locate the pipe acoustically. This will be installed with an Innomar Standard Sub-bottom Profiler.

2.3.2 Inspection of Pier Wall

A Norbit Winghead High Frequency Scanning Multibeam Echo Sounder will be used on the USV to provide a detailed topographical survey of the north quay wall and Tom Clarke Bridge.

2.3.3 Additional structural inspection works for widening works

Structural inspection works at Tom Clarke Bridge piers will comprise 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).

2.4 Ground Investigations

2.4.1 General Layout

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

a) Geobore S drilling, sampling and in situ testing;
b) Rock coring, proving rock to a specified depth and in situ testing;
c) Slit trenching, sampling and in situ testing;
d) Concrete Coring;
e) Monitoring of groundwater levels in standpipes and piezometers;
f) Detailed borehole and coring;
g) Sampling to IS EN 22475-1 requirements, predominantly providing Category A samples for laboratory testing of strength and stiffness;
h) Logs as described in IS EN14688-1; IS EN1489-1; and BS5930 and the specification;
i) 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;
j) Specific trial pits, 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;
k) Laboratory testing of rock samples for engineering properties, behaviour and suitability;
l) Laboratory testing of soil and ground water samples for environmental contamination, waste classification and offshore marine disposal of excavated spoil;
m) 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;
n) Preparation of an interpretive Ground Investigation Report in accordance with IS EN1997-2, Section 6 as per S1.21.9;
o) 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;
p) 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;
q) 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";
r) 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;
s) 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;
t) Liaison and compliance with Health & Safety requirements of PSCS and general contractor;
u) Provision of temporary traffic management.

2.4.2 Schedule of Investigations

Tables 2.1, 2.3, 2.3 and 2.4 below detail the Schedule of Investigations. CP = cable percussion; RO = Rotary Open Hole; RC = Rotary Coring with core recovery; PG = Polymer Gel Geobor S rotary coring with plastic liner continuous sampling.

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

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**
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.							

The Environmental Scientist shall identify the locations of up to 4 No. window samples and 4 No. sediment grab samples to be carried out for the purpose of contamination assessment at the site. These locations shall be subject to approval of the Investigation Supervisor.

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

Contamination Assessment Window Sampling / Grab Sample Locations					
Hole ID.	**Type**	**Schedule Depth (m bGL)**	**Remarks**	**Coordinates (ITM Grid)**	
				Easting	**Northing**
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:734389.3	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

Notes

1. CP = Cable Percussion, RO = Rotary Open Hole, RC = Rotary Core, PG = Polymer Gel Geobor-S Rotary, 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.

2.4.3 Timing and Duration

The duration of all the works will be less than three months, commencing in February 2024 and completed by the end of April 2024. A detailed breakdown of the timing and duration of each of the survey works is provided in Table 2.1 below.

Table 2.1 Timing and Duration of Environmental Surveys and Ground Investigation Works.

Survey Type	Commencement	Duration
Gas Main Survey	Feb 2024	2 days
Inspection of Pier Wall	Feb 2024	2 days
Structural Inspection works	Feb 2024	One week
Ground Investigation works	Feb 2024	3 months

Note [1] Gas Main Survey and Inspection of Pier Wall will be carried out at the same time.

2.4.4 Working Hours

The working hours will be limited to the following:

- Monday to Friday between 08.00 hrs and 18.00 hrs.
- Saturday between 09:00 hrs and 16:30 hrs.

Work on site outside of these hours will only be permitted on approval from the Investigation Supervisor. Movement of marine barges to / from the site and to borehole locations must follow all relevant restrictions on marine traffic imposed by the Dublin Port Authority.

Timing of the Slit Trench works at North Wall Quay may be limited by the local authority as part of Road Opening Licencing / Permit process. Slit trench works extending out into the trafficked lane on North Wall Quay / Tom Clarke Bridge will be restricted to Monday to Friday between 21:00 hrs and 00:00hrs (midnight) and 00:00 hrs (midnight) and 06:00 hrs. Saturday between 00:00 hrs (midnight) and 06:00 hrs.

3.0 ANNEX IV RISK ASSESSMENT

3.1 Zone of Influence

The "Zone of Influence" of a project is the geographic extent over which significant ecological effects are likely to occur. Best practice guidance recognises that the Zone of Influence on a case-by-case basis using the Source-Pathway-Receptor Model. 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 project;
- The nature of the impacts which may arise from the project;
- The sensitivities of the ecological receptors; and,
- The potential for in-combination effects.

In the marine environment, Zones of Influence can be extensive e.g. pollution and materials can easily be transported elsewhere, currents and waves can be altered causing effects well beyond the site and effects on mobile species may be manifest elsewhere (CIEEM, 2018).

In order to assess the potential impacts on Annex IV species and considering the nature and scale of the Works, the Zone of Influence is defined as:

- The immediate area around the Works;
- The Liffey Estuary Lower Transitional Waterbody
- Dublin Bay Coastal Waterbody.

The Liffey Estuary Lower Transitional Waterbody and the Dublin Bay Coastal Waterbody are the extents to which hydrological impacts could potentially occur upstream and downstream of the Works in the River Liffey and Dublin Bay[2] .

A search for records of Annex IV species within the Zone of Influence was undertaken as part of the assessment.

The Zone of Influence is presented in Appendix B.

[2] As defined in Directive 2000/60/EC of 23 October 2000 establishing a framework for Community action in the field of water policy (the "Water Framework Directive"), transitional waters are as bodies of surface water in the vicinity of river mouths which are partly saline in character as a result of their proximity to coastal waters but which are substantially influenced by freshwater flows.

3.2 Annex IV Fauna

Based on a review of the Irish Whale and Dolphin Group's *Sightings Map* (IWDG, 2023), National Biodiversity Data Centre's *Biodiversity Maps* (NBDC, 2023) and *Ireland's Marine Atlas* (Marine Institute, 2023), Table 3.1 presents the Annex IV fauna that were recorded within the Zone of Influence of the Works.

Table 3.1 Annex IV fauna recorded within the Zone of Influence of the Works.

Common Name	Scientific Name
Cetaceans	
Bottlenose Dolphin	*Tursiops truncatus*
Common Dolphin	*Delphinus delphis*
Fin Whale	*Balaenoptera physalus*
Harbour Porpoise	*Phocoena phocoena*
Pygmy Sperm Whale	*Kogia breviceps*
Bats	
Common Pipistrelle	*Pipistrellus pipistrellus*
Soprano Pipistrelle	*Pipistrellus pygmaeus*
Leisler's Bat	*Nyctalus leisleri*
Semi-aquatic mammals	
Otter	*Lutra lutra*

Other Annex IV fauna, such as those listed above in Section 1.2 were deemed to either not occur within the Zone of Influence or occur only very infrequently or in exceptional cases (NBDC, 2023). The assessment in the following subsections focusses on the species listed above in this section.

3.3 Assessment of Impacts

This section provides an assessment of the impacts arising from the Works on the Annex IV fauna listed in Section 2.2 above, as described in the documents listed in Section 1.2.

3.3.1 Bat Species

Common Pipistrelle (*Pipistrellus pipistrellus*), Soprano Pipistrelle (*P. pygmaeus*) and Leisler's Bat (*Nyctalus leisleri*), have all been recorded in Dublin Port in the vicinity of the Works (NBDC, 2023). A preliminary bat roost suitability assessment undertaken by ROD ecologists in 2023 did not identify and structures or trees in the vicinity of the Works with the potential to support roosting bats. Bat activity surveys, conducted by ROD between June – September 2022 recorded Common Pipistrelle, Soprano Pipistrelle and Leisler's Bat in the area of the Works.

Given the nature, timing and location of the Works, as well as existing ambient visual and noise disturbance levels in the area, there will be no significant impacts on bat species as a result of the Works. Therefore, as a result of this conclusion, there will be no offence to bat species under Section 51 of the Habitats Regulations as a result of the Works.

3.3.2 Otter

Otter has been recorded in the vicinity of the Works (Trituris, 2022) and there are multiple records of otter using the Liffey Estuary Lower for breeding and foraging (NBDC, 2023). Evidence of otter was recorded as close as the St Patricks Rowing Club pontoon, which is within the Works boundary (Trituris, 2022). An otter holt has also been recorded approx. 200 m southwest of the Works near Camden Lock (Triturus, 2022). Otter territories are typically between 2 – 32 km in length but can be up to 80 km (Kruuk, 1995). Otter are likely to be in the River Liffey during the Works. The Works provide the potential for displacement, noise and visual disturbance impacts to Otter as well as potential water quality impacts from sediment mobilisation and pollutant discharge.

The location of the Works is within Dublin Port which is a very busy and active port with constant movement of boat traffic in and out of the area. Any otters in the area are already habituated to high levels of disturbance due to the nature and location of the port in the centre of a capital city. The tidal nature of the Liffey means there is already elevated levels of suspended solids. Any potential mobilisation of sediment or potential spillage of pollutant as a result of the Works would be immeasurable. The location of the known otter holt is located at least 200 m from the Works. There is a recommended minimum distance of 150 m between any works and sensitive otter holts to avoid impacts to otter (NRA, 2008).

Given the nature, timing and location of the Works, as well as the existing ambient visual and noise disturbance levels and sediment mobilisation already occurring in the area, there will be no significant impacts to otter as a result of the Works. Therefore, as a result of this conclusion, there will be no offence to otter under Section 51 of the Habitats Regulations as a result of the Works.

3.3.3 Cetaceans

Five cetacean species, namely Harbour Porpoise (*Phocoena phocoena*), Bottlenose Dolphin (*Tursiops truncates*), Common Dolphin (*Delphinus delphis*), Fin Whale (*Balaenoptera physalus*) and Pygmy Sperm Whale (*Kogia breviceps*) have been recorded within the zone of influence (NBDC, 2023; IWDG, 2023) and are likely to occur near the location of the Works on a regular or occasional basis. All are protected under Annex IV of the Habitats Directive and Harbour Porpoise and Bottlenose Dolphin are also protected under Annex II of the Habitats Directive.

Cetaceans are particularly sensitive to underwater noise and hydroacoustic impacts given their reliance on sound as their primary sense. All cetaceans that have been recorded within the zone of influence are either Low-Frequency, Mid-Frequency or High-Frequency Cetaceans, with hearing ranges of 0.007 kHz – 22 kHz, 0.15 kHz – 160 kHz and 0.2 kHz – 180 kHz, respectively. The impacts which noise can have on cetaceans include, in order of increasing severity: behavioural disturbance/response, avoidance/masking, auditory tissue damage, which can be temporary, i.e., Temporary Threshold Shift (TTS) or permanent, i.e., Permanent Threshold Shift (PTS), traumatic injury and death. Each cetacean group has a different limit of TTS and PTS (Table 3.2).

Table 3.2 Low-, Mid- and High-Frequency Whale Groupings in Ireland (NPWS, 2014; NMFS, 2023)

Cetaceans		
Low-Frequency 0.007 kHz-22 kHz	**Mid-Frequency** 0.15 kHz-160 kHz	**High-Frequency** 0.2 kHz-180 kHz
PTS threshold: 219	**PTS threshold:** 230	**PTS threshold:** 202
TTS threshold: 213	**TTS threshold:** 224	**TTS threshold:** 196
Baleen whales	Most toothed whales, dolphins	Certain toothed whales, porpoises
• Humpback whale • Blue whale • Fin whale • Sei whale • Minke whale	• Sperm whale • Killer whale • Long-finned pilot whale • Beaked whale species • Dolphin species	• Pygmy sperm whale • Harbour porpoise

The PTS and TTS thresholds listed above are for pulsed sound sources. The PTS limit for non-pulsed sound is 230 for all cetaceans.

The environmental surveys will involve the use of an acoustic Sub-bottom profiler (SBP), a vertical magnetic gradiometer 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 Works (e.g., jack-up barge and borehole drilling). See Table 3.3 for an example of the Peak Sound Pressures and frequencies which are emitted by the Works equipment.

Table 3.3 Peak Sound Level Pressure

Sound Type	SPL_{peak} (dB re 1 µPa at 1 m)	Frequency (kHZ)
Sub-bottom Profiler	208-225	0.2-16
Magnetic Gradiometer	No sound emitted	No sound emitted
Multibeam Echo Sounder*	210-229	200-450
Rotary Drill	148-151	0.12

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

Based on the sound pressures and frequencies that will be emitted during the Works, as listed in Table 3.3, and the hearing ranges of the cetaceans as listed in Table 3.2, there will be no impact to cetaceans as a result of the Multibeam Echo Sounder as the frequency output is not within the hearing range of any cetacean, nor will there be any impact to cetaceans as a result of the vertical magnetic gradiometer as no sound is emitted during this survey. There will be no impacts to cetaceans as a result of these elements of the environmental surveys.

The Sub-bottom Profiler emits sound at frequencies between 0.2 – 16 kHz, which is within the frequency range of all cetacean species listed in Table 3.2. This exceeds the TTS limits of all cetaceans, and exceeds the PTS limits of Low-frequency and High-frequency cetaceans. Therefore, all cetaceans are at risk of temporary loss of hearing due to auditory tissue impairment if they are in the vicinity of the Works, and Low and High frequency cetaceans are at risk of permanent auditory injury and loss of hearing if they are in the vicinity of the Works.

The frequency that will be emitted during the borehole drilling is within the hearing range of Low-frequency cetaceans only but is below their TTS and PTS limits. Therefore, there will be no impacts to cetaceans as a result of the borehole drilling. With regard to sound produced by general construction activities, such as the operation of the jack-up barge, these are unlikely to exceed background noise levels at this location. The risk of injury or mortality is considered extremely low as marine mammals as the vessels will be moving at low speeds.

Given to the nature and location of the Works, there is a risk of significant impacts to Harbour Porpoise, Bottlenose Dolphin, Common Dolphin, Fin Whale and Pygmy Sperm Whale. In the absence of mitigation, significant impacts to cetaceans afforded strict protection under Article 12 of the Habitats Directive as a result of the Works would constitute offences under Section 51 of the Habitats Regulations. Therefore, mitigation measures are proposed in Section 4 of this report.

4.0 MITIGATION MEASURES

This report has assessed the potential for the Works to give rise to impacts on species afforded strict protection under Article 12 of the Habitats Directive which would constitute offences under Section 51 of the Habitats Regulations. In Section 3.3.1 and Section 3.3.2 it was concluded that there will be no deliberate capture, killing, disturbance (particularly during sensitive periods), damage or destruction of breeding and resting places to bat species or otter.

In Section 3.3.3, it was determined that, in the absence of mitigation, significant impacts to cetaceans are possible if they are close enough to the Works to receive sound levels above their threshold injury levels as a result of the Sub-bottom Profiler. Therefore, mitigation measures are proposed in order to endure there will be no significant impacts to cetaceans afforded strict protection under Article 12 of the Habitats Directive as a result of the Works which would constitute offences under Section 51 of the Habitats Regulations.

Adhering to *Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters* (DAHG, 2014), the following mitigation measures are proposed to minimise potential impacts to cetaceans due to the environmental surveys:

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, which can be found appended to DAHG, 2014.

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, acoustic surveying using the above equipment shall not commence if marine mammals are detected within a 500m radial distance of the sound source intended for use, i.e., within the Monitored Zone.

3. Sound-producing 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 (see below). 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 a Ramp-Up Procedure which should include continued monitoring by the MMO.

7. In commencing an acoustic survey operation using the above equipment, the following Ramp-up Procedure (i.e., “soft-start”) must be used, including during any testing of acoustic sources, where the output peak sound pressure level from any source exceeds 170 dB re: 1µPa @1m:

   (a) Where it is possible according to the operational parameters of the equipment concerned, the device’s 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 minutes.

   (b) 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.

   (c) Where the acoustic output measures outlined in steps (a) and (b) are not possible according to the operational parameters of any such equipment, the device shall be switched “on” and “off” in a consistent sequential manner over a period of 20 minutes prior to commencement of the full necessary output.

8. 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.

9. Once the 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 500m radial distance of the sound source, i.e., within the Monitored Zone.

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

11. For higher output survey operations which have the potential to produce injurious levels of underwater sound (see sections 2.4, 3.2) 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.

4.1 Recommended Conditions

It is recommended that the mitigation measures presented in Section 4 above are conditions to be attached to any license granted

4.2 Residual Impacts

Following the full and complete implementation of the mitigation measures presented in Section 4 above, there will be no negative residual impacts from the Works on cetaceans in the area. Provided these mitigation measures are implemented in full, it is unlikely that any animals will be injured as a result of the Works.

5.0 CONCLUSION

This report has assessed the potential for the Works to give rise to impacts on species afforded strict protection under Article 12 of the Habitats Directive which would constitute offences under Section 51 of the Habitats Regulations. The above sections have provided the assessment and has concluded that following the full and successful implementation of the mitigation measures, there will be no deliberate capture, killing, disturbance (particularly during sensitive periods), damage or destruction of breeding and resting places on bat species, otter or cetaceans species. Therefore, no offence under Section 51 of the Habitats Regulations will be committed as a result of the proposed development, and as a result, no derogation licence will be required.

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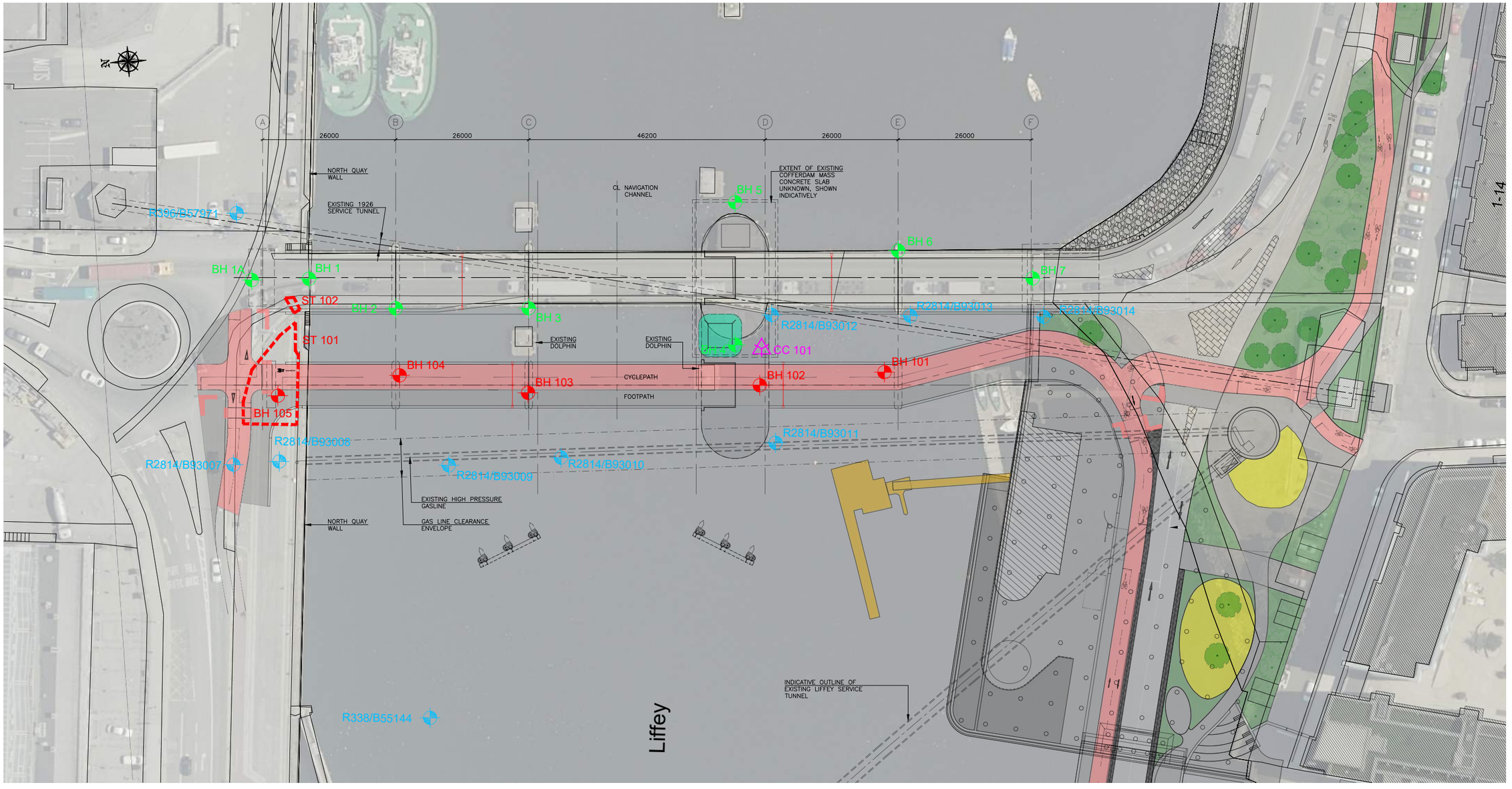
APPENDIX A
GROUND INVESTIGATION LOCATIONS



PLAN
SCALE 1:400

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

SEÁN HARRINGTON ARCHITECTS

JOINT VENTURE: ROD Roughan & O'Donovan; Hardesty & Hanover engineering that moves you

No.	Revision	Date	By	Chk'd	App'd
P01	ISSUED FOR INFORMATION	05/04/22	PE	PK	TD
P02	ISSUED FOR TENDER	26/05/22	CS	PK	TD
P03	PROJECT BACKGROUND UPDATED	23/10/2023	CS	CS	CS

ROD Roughan & O'Donovan
ARENA HOUSE
ARENA ROAD
SANDYFORD
DUBLIN 18
IRELAND
t +353 (0) 1 294 0800
www.rod.ie
Consulting Engineers
Civil - Structural - Transportation - Environmental

Drawn	Designed	Checked	Approved	Suitability Code - Description
PE	JC	JC	TD	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 - 301051

Scale (A1): AS SHOWN | Date: April 2022 | Job No: 21.124 | Rev: P03

Monday, 23 October 2023 08:51:58

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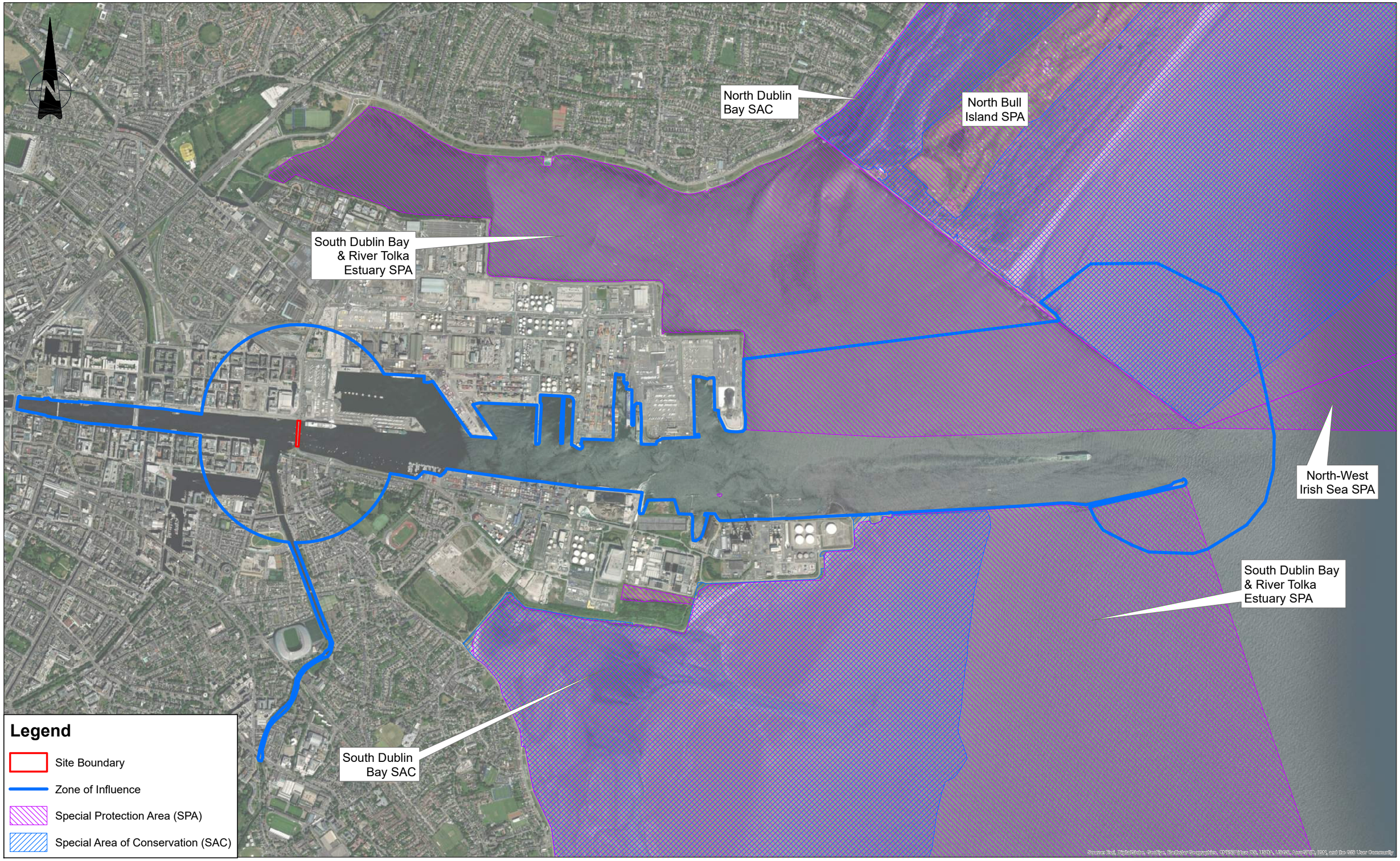
APPENDIX B
ZONE OF INFLUENCE



Client:

Comhairle Cathrach Bhaile Átha Cliath
Dublin City Council

NTA
Údarás Náisiúnta Iompair
National Transport Authority

Project Ireland 2040
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No.	Revision	Date	By	Chk'd	App'd
V1.0	ISSUE FOR INFORMATION	March '23	KM	PO'S	FO'K
V2.0	ISSUE FOR INFORMATION	Oct. '23	MMC	JS	PO'S

ROD ROUGHAN & O'DONOVAN
Consulting Engineers
Civil - Structural - Transportation - Environmental

ARENA HOUSE
ARENA ROAD
SANDYFORD
DUBLIN 18
IRELAND
t +353 (0) 1 294 0800
www.rod.ie

Drawn	Designed	Checked	Approved	Suitability Code - Description
RoH	KM	PO'S	BC	S3 - Review & Comment

Project Stage: OPTIONS AND PRELIMINARY DESIGN

Project Title: POINT BRIDGE AND TOM CLARKE BRIDGE WIDENING PROJECT

Drawing Title: ZONE OF INFLUENCE

Drawing Number: Project PTCB - Originator ROD - Volume ENV - Location SW_AE - Type DR - Role EN - Number Fig. 1.1

Scale (A1): 1:10,000 | Date: June 2022 | Job No: 21.124 | Rev: V2.0

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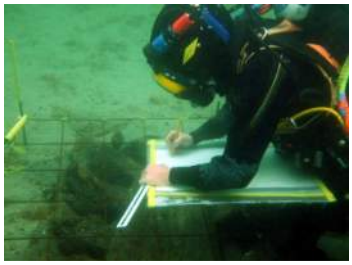
APPENDIX D

UNDERWATER ARCHAEOLOGICAL IMPACT ASSESSMENT

Underwater Archaeological Impact Assessment (UAIA)
Proposed Bridge Location
Point Bridge and
Tom Clarke Bridge Widening Project
River Liffey, Dublin City

22D0070, 22R0234

Underwater Archaeological Impact Assessment (UAIA)
Proposed Bridge Location
Point Bridge and
Tom Clarke Bridge Widening Project
River Liffey, Dublin City

22D0070, 22R0234

22 November 2022

Client **ROD for DCC**

Project Director **Rex Bangerter MA**

ADCO, Beverley Studios, Church Terrace, Bray, Co. Wicklow www.adco-ie.com

CONTENTS

LIST OF ABBREVIATIONS

ADCO	The Archaeological Diving Company Ltd
ACA	Architectural Conservation Area
DCIHR	Dublin City Industrial Heritage Record
DHLGH	Department of Housing, Local Government and Heritage
DGPS	Differential Geographic Positioning System
DPA	Dublin Port Archives
DSV	Dive Support Vessel
ING	Irish National Grid
ITM	Irish Transverse Mercator
LWM	Low Water Mark
E	Easting
N	Northing
NGR	National Grid Reference
NIAH	National Inventory of Architectural Heritage
OD	Ordnance Datum
OS	Ordnance Survey
RMP	Record of Monuments and Places
RPS	Record of Protected Structures
SSDE	Surface Supplied Diving Equipment
SMR	Sites and Monuments Record
UAIA	Underwater Archaeological Impact Assessment
UAU	The Underwater Archaeology Unit

EXECUTIVE SUMMARY

The Archaeological Diving Company Ltd (ADCO) was appointed by Roughan & O'Donovan, on behalf of Dublin City Council (DCC), to carry out an Underwater Archaeological Impact Assessment (UAIA) across the footprint of the proposed Point Bridge, a structure that is to be positioned on the upstream (west) side of Tom Clarke (East-link) Bridge.

The new bridge will carry pedestrian and cyclist paths, accommodate left and right turn vehicle traffic lanes to North Wall Quay and Sir John Rogerson's Quay (across the proposed Dodder Bridge) respectively, and provide space for public amenity areas. The approaches to the Point Bridge on the north and south side are being designed and constructed as part of separate infrastructure projects, namely the Point Junction Improvement Scheme and the Dodder Bridge Project.

The bridge will maintain the same span arrangement and overall bridge length as Tom Clarke Bridge; comprising five (5) spans (four fixed-spans and a central movable span) with an overall bridge length of *c.* 150m. In addition, the substructure and piers are to align with the pier locations of the existing bridge, providing matching deck-span lengths between the two structures.

The bridge will impact the riverbed at six (6) locations, comprising three (3) intermediate piers, two (2) abutment piers, and one (1) bascule pier. The pier structures will be formed using precast (reinforced) concrete shell units, backfilled with poured mass concrete, and supported by a series of tubular steel piles, measuring 900mm in diameter. The bridge will also impact a *c.* 21m section of the North Wall Quay (RMP DU018-020564-/ NIAH 50010011); requiring the removal of the uppermost courses of quayside masonry to a depth of 1.5m.

The UAIA comprised systematic visual inspection of the in-water and quayside extent of the proposed bridge development. The assessment sought to record riverbed topography, assess the potential of riverbed deposits to retain archaeological material, and identify any additional features/structures of archaeological or historic significance that are present. This work also included detailed recording (Laser-scan) of the North Wall Quay and a walkover survey of the adjacent *campshire* area. In addition, targeted metal-detection was employed to help assess the riverbed and highlight any metallic concentrations present.

The assessment area lies within a historically rich landscape, highlighted by the development of this section of the River Liffey for maritime use in the late eighteenth- and early/mid-nineteenth century.

The on-site work was carried out on 30th August 2022, under licence from the DHLGH; licence numbers 22D0070, and 22R0234.

The current report, based on the current level of information available, recommends that further onsite archaeological assessment of the riverbed in advance of construction is not required. However, it is recommended that archaeological monitoring of ground/ riverbed disturbances during construction be undertaken, by a suitably qualified and experienced maritime archaeologist, with the proviso to resolve fully any archaeological material observed at that point. Particular attention should be paid to the removal of masonry from the North Wall Quay and any impacts to the adjacent *campshire* area, allowing additional detailed recording to be undertaken. This work should include an assessment and full recording of the internal fabric of the quay structure, as/when it becomes exposed. In addition, any quayside masonry or associated fixtures/fittings (e.g. wrought iron mooring hoops/hooks) that are to be removed as part of the development should retained and subject to additional recording.

The recommendations in the report are subject to the approval of the National Monuments Service at the Department of the Housing, Local Government, and Heritage (DHLGH).

LIST OF FIGURES

LIST OF PLATES

1.0 INTRODUCTION

The Archaeological Diving Company Ltd was appointed by Roughan and O'Donovan (ROD), on behalf of Dublin City Council (DCC), to carry out an Underwater Archaeological Impact Assessment (UAIA) across the footprint of the proposed Point Bridge and Tom Clarke Bridge Widening Project, River Liffey, Ringsend, Dublin City (Figure 1); this work being undertaken as part of the pre-planning and EIAR requirement for the bridge project.

The project proposes the construction of a new bridge across the River Liffey, directly adjacent to the upstream (west side) of the existing Tom Clarke (East-link) Bridge (Figures 1-2). The Point Bridge will carry pedestrian and cyclist paths, accommodate left and right turn vehicle traffic lanes to North Wall Quay and Sir John Rogerson's Quay (across the proposed Dodder Bridge) respectively, and provide space for public amenity areas. The approaches to the Point Bridge on the north and south side are being designed and constructed as part of separate infrastructure projects, namely the Point Junction Improvement Scheme and the Dodder Bridge Project.

ADCO is familiar with the section of the River Liffey under assessment, having carried out previous underwater archaeological impact assessments within the vicinity, including for the following projects: Dublin Bridges project (2016), the Dodder Opening Public Transport Bridge project (2019), the Dublin Dockland Area Opening Bridges (Blood Stoney Bridge) project (2019), and the Bus Connects Ringsend to City Centre Core Bus Corridor Scheme (2021).

The archaeological work was carried out in accordance with Section 5 of the National Monuments Act (2004 Amendment) by a team of underwater archaeologists and a certified surveyor on the 30th August 2022, under licence from the DHLGH; licence numbers 22D0070 and 22R0234. The UAIA included the following items:

1. Comprehensive underwater assessment, including targeted metal-detection, of the riverbed across the footprint of the proposed bridge structure, extending the survey beyond any construction impacts arising from the project. This work recorded riverbed topography and provides a detailed account of the existing riverine environment.
2. Systematic inspection of the quay wall, *campshires*, and any associated quayside features present, extending across a 48m section of the North Wall Quay.
3. Detailed recording (laser scanning) of the upper parts of the quay wall, covering the proposed impact area associated with the bridge tie-in location.
4. Walkover survey along the south side of the river, where the bridge tie-in interfaces with the proposed Dodder Opening Public Transport Bridge project.

The survey was position-fixed using Total Station and GNSS (RTK) recording, with the resulting data referenced to Irish Transverse Mercator and to Malin Head Ordnance Datum.

The UAIA report presents the following: a desktop review of the development area (Section 3.0); the findings from the onsite work (Section 5.0); the methodology applied to that work

(Section 4.0); assess the level of impacts arising from the proposed development (Section 6.0); and makes general recommendations for future archaeological mitigation associated with the development (Section 7.0). An outline of the bridge development is provided below in Section 2.0.

2.0 PROPOSED DEVELOPMENT

The Point Bridge will maintain the same span arrangement and overall bridge length as Tom Clarke Bridge; comprising five (5) spans, four (4) fixed-spans and a single (central) movable span, with an overall bridge length of *c.* 150m (Figure 2). In addition, the substructure and piers are to align with the pier locations of the existing bridge, providing matching deck-span lengths between the two structures. The central, movable, span will measure *c.* 46m length and comprise a single-leaf rolling *bascule* with an integrated (below deck) counterweight.

The deck areas on the four (4) fixed-spans of the bridge are to typically measure 21m width, with local deck widening present on the upstream (west) side of the bridge's intermediate piers; resulting in a maximum deck width of 26m for those locations. The bridge-deck and associated substructures (piers and abutments) that support the fixed spans are to abut, but remain structurally separate, from the existing bridge structure.

The intermediate piers and abutment structures are to be formed using single (hollow) precast reinforced concrete shell units, acting as permanent formwork, which are to be filled (*in-situ*) with poured mass-concrete. Each concrete pier will be supported on a single line of large diameter bore, steel-encased, concrete piles (*c.* 900mmØ) that will be socketed into the underlying bedrock.

The following items/ structures require either full or partial removal as part of the proposed development.

Item	Description
1	• The reinforced concrete retaining wall that supports the left turn lane to North Wall Quay, located on the north-west end of Tom Clarke Bridge, will need to be fully removed.
2	• Removal of utilities on North Wall Quay, to include: surface water drainage gullies, pipes and chambers, public lighting poles, ducts and chambers.
3	• Removal of the upper 1.5m section of the North Wall Quay (masonry wall structure) and river access-steps, over the *c.* 21m width of the proposed bridge tie-in, is required. Demolition of the pedestrian parapets along the edge of North Wall Quay, across the same extent, will also be required.
4	• The upstream (west) edge/side of the fixed spans on Tom Clarke Bridge will require partial removal. The demolition works will comprise the following: removal of *c.* 97m of 800mm wide reinforced concrete deck-slab (43m on the northern fixed spans and 54m on the southern fixed spans); removal of reinforced concrete bridge

Item	Description
	fascia-beam and bridge metal parapet, public lighting poles, ducts and chambers, road traffic light, bascule span road traffic barriers, road signage poles, footpath, and drainage outfall units.
5	• The *bascule* pier wall on the upstream (west) side of Tom Clarke Bridge (1m thick walls x 11m high x 20m long) will require local demolition to allow its integration into a widened *bascule* pier to serve both the existing and proposed bridge structures. The cutting out of local openings in the concrete internal and external walls for access and utility connections is also required between the new and existing *bascule* sections.
6	• Removal of sections of the upstream (west) side/edge of the reinforced concrete south abutment (front abutment wall, wing-wall) of Tom Clarke Bridge, along with the removal of associated metal parapet.
7	• The bridge vessel collision protection/ mooring dolphins to the upstream (west) of Tom Clarke Bridge will need to be removed; each structure consists of a reinforced concrete pile cap with 12 number 350mm square timber piles.

Table 2: Items that require removal to facilitate the proposed Point Bridge structure [quayside impact item highlighted in blue].

3.0 RECEIVING ENVIRONMENT

This following section provides a concise account of the heritage asset surrounding the section of river under assessment. For a detailed account of the wider heritage landscape present, the reader is directed to the EIAR Chapter prepared for the project by Irish Archaeological Consultancy (IAC) Ltd.[1]

The River Liffey rises at an elevation of 540m above sea level near Kippure in the Wicklow Mountains, *c.* 20km south of Dublin. The river forms a large arc as it flows westward, then northward, and finally eastwards through Dublin City to its confluence with the Irish Sea in Dublin Bay. It has a drainage catchment area of just over 1380 km² and flows over a range of different geological formations including granite, to sandstone, sandstone-limestone, and limestone.

Extensive reclamation of the river floodplain has been undertaken since at least the seventeenth-century. This reclamation and adaptation of the natural environment was extended to the river as it flowed through the city; the river currently being delineated by a series of eighteenth and nineteenth-century quayside structures.

Maritime activity within the River Liffey is documented from the eighth-century onwards and it is clear that the area under assessment has a long history of human landscape intervention, adapting the topography of the river to conditions favourable for navigation and anchorage of vessels within the area. City Centre excavations at Winetavern Street and Wood Quay

[1] Vol. 2, Chapter 15, Archaeology and Cultural Heritage.

uncovered large wooden revetments dating to around 1200AD. These structures are thought to form part of an early reclamation and dockside area at Wood Quay.[2] In addition, extensive seventeenth to nineteenth-century land reclamation was also undertaken, dramatically changing the landscape along the river's mouth. Indeed, this reclamation process, coupled with the eastward shift in bridge construction across the Liffey, resulted in the movement of port and shipping activity from the city centre to the easternmost parts of the river. Early maps of Dublin, including John Speed's Map of 1610 and Hermon Moll's of 1714, show a largely unaltered estuary environment. In contrast, it is evident when viewing John Roque's map of 1756, that extensive reclamation has taken place with the construction of the north wall (1710-1718), facing the river channel, and the East Wall (1718-1729); running northwards along the line of the present day East Wall Road. These constructions provided a tidal barrier behind which extensive land reclamation could take place, a process that lasted until the early part of the nineteenth-century and significantly extended the land mass on the north side of the River Liffey. As a result, a total of 263 plots of land, ranging in size from an acre to three-and-a-half acres, were created and sold by the City Council.[3]

This historic reclamation process has been highlighted by recent excavations undertaken along Ormond Quay and Custom House Quay. These excavations have produced evidence of seventeenth-century reclamation deposits, with eighteenth-century structures built above (see Section 3.7). Moreover, excavations at the site of Building C, Spencer Dock, North Wall Quay (Excavations Bulletin Entry 2004:565) identified three principle phases of activity.[4] These included a series of Late Mesolithic fish traps located on the old shoreline of the Liffey channel, artefacts from the eighteen and nineteenth-century reclamation of that area, and structures from the nineteenth and twentieth-century development of that reclamation land.

Further development within the vicinity included the construction of a new Custom House in 1791, Custom House Dock in 1796 (DU18-020564A), a boat-building/repair yard and Patent Slipway, completed in 1833, and the construction of Dublin's first dry-dock, completed in 1860. Prior to these constructions, the majority of the port trade took place on the south side of the river, however, the establishment of the Custom House and associated quayside structures facilitated a lasting shift in port development to the north side of the waterway (Plate 1).

Construction of the Grand Canal began in 1755 to link Dublin with the River Shannon, to the west, and the River Barrow to the southeast. It forms the southernmost of two waterways that

[2] Halpin, Andrew, *The Port of Medieval Dublin*, Four Courts Press, Dublin, pp.179-80.
[3] De Courcy, J.W., *Anna Liffey, The River of Dublin*, (O'Brien Press, Dublin 1988), p.47.
[4] McQuade, Melanie, *'Building C, Spencer Dock, North Wall Quay, Dublin'*, in Isabel Bennett (ed.), Excavations 2004, (Dublin, 2007), 128-9.565; McQuade, Melanie, *'Gone Fishing'*, Archaeology Ireland, (2008), 22 (1), 8-11.

almost encircle the inner city of Dublin; the other being the Royal Canal located on the north side of the River Liffey. The canal reached Ringsend in 1791 and the Grand Canal Docks were completed in 1796.

The present day river area, extending between Talbot Bridge and the Tom Clarke (East-link) Bridge, is delineated by four (4) quayside structures, constructed at the end of the eighteenth and in the early part nineteenth-century. Custom House Quay leading onto North Wall Quay forms the north side of the river channel, with City Quay leading onto Sir John Rogerson's Quay the south. A chronology relating to the construction of the various quay structures located along the River Liffey is tabulated in Appendix 1.[5]

3.1 Cartographic Information

A series of historic maps and drawings exist for the area under assessment and these provide valuable insight into land use and quayside development from the eighteenth-century onwards.

John Rocque's Maps (1756 & 1750)

The two editions produced by John Rocque show extensively reclaimed areas of river estuary with increased use/development of water-frontage along the river (Figure 3).[6] Aston Quay, Georges Quay, and Sir John Rogerson's Quay delineate the south side of the river, with Bachelors Walk and the North Wall Quay to the north. In addition, large scale reclamation works are evident on the north side of the river estuary with the construction of the North Wall (1710-1718) and the East Wall (1718-1729), allowing for extensive reclamation of the area in the seventeenth and eighteenth centuries.

A large amount of shipping is depicted along these quays, alluding to the navigable nature and concentrated use of the river at that time (Plate 2). These maps depict the river area prior to construction of the Grand Canal Docks, at a time when little or no development had taken place on the southern side of the Liffey. According to the mapping, the eastern side of the River Dodder was largely undeveloped and no housing or warehouse plots were present along the south side of the River Liffey; the present day location of Sir John Rogerson's Quay. However, the mapping does depict a quay wall at this location, constructed in 1716 in order to prevent flooding and allow reclamation of the adjacent mudflats; a process of reclamation that is clearly evident by 1760.

Greater development is depicted for the north side of the Liffey, the river channel being delineated by a quayside that runs the length of the North Wall, behind which the reclaimed

[5] De Courcey, J.w., *Anna Liffey: The River of Dublin*, O'Brien, Dublin, 1988, 16
[6] John Roque, Exact Survey of the City and Suburbs of Dublin, 1756.

land (*The North Lotts*) has been subdivided by the insertion of a grid-iron street pattern, annotated with the following (north-south orientated) streets: '*Commons Street'*, '*Guild Street'*, '*Wapping Street'*, and '*Fish Street'*.

OS First Edition Map (1837)

The OS First Edition map (Figure 4) shows wide-scale development across the north and south sides of the River Liffey, depicting a similar ground plan and street layout to that of the present-day.

The North Wall is shown forming two (2) long sections of quayside, with a combined length of 1543m, intersected by a sea-lock that provides access to the '*Royal Canal Docks*' at a point *c.* 545m east of the quay's upstream terminus (Figure 4; Map Item 1). A small bridge, providing access between the upstream/downstream sections of the North Wall, is also shown at this location.

The provision of maritime related infrastructure and services are well-established for the upstream section of the North Wall. In contrast, the downstream section of waterfrontage remains largely undeveloped; mapped development being restricted to a series of buildings located to the west of Wapping Street and a '*Vitriol* Works' located a little to the east (Figure 4; Map Item 2). Towards the downstream terminus of the North Wall, a lighthouse, associated port billings, and a small slipway are positioned along the seaward side of the East Wall (Figure 4; Map Item 3). A cluster of buildings, annotated '*Baths*', are also sited at the junction between the East Wall road and Mayor Street (Figure 4; Map Item 4). Further to the north, a newly built '*Patent Slip'* is located along the East Wall Quay, an area (Alexandra Basin) that was to undergo considerable development to in the mid to late 1800s (Figure 4; Map Item 5).

No bridges or in-river structures are shown for the River Liffey, extending between Carlisle Bridge (built 1794 and replaced by O'Connell Bridge in 1880) and the river's mouth. Transport across the river being serviced by two (2) ferries, one running between City Quay and Custom House Quay, the other between Sir John Rogerson's and the North Wall.

Intertidal mudflats are shown, extending from the base of the quay walls, on both sides of the river channel, ranging between 12m-30m in width (Figure 4; Map Item 6). In contrast, none are shown alongside Customs House Quay or the upstream part of the North Wall Quay, indicating the presence of deeper water for this section of the river channel; perhaps corresponding with increased marine traffic/channel deepening works on this side of the river.
By the late 1700s a tradition of boat-building had been established along Sir John Rogerson's Quay, Ringsend, and within the Grand Canal Basin. This activity is highlighted by the presence of three substantial graving docks located on the basin's east side, as shown on the

OS First Edition map (Figure 4; Map Item 7). The Dublin Dockyard Company leased two of these docks between 1851 and 1881, subsequently being leased to the Ringsend Dockyard Ltd, who built/ repaired boats in the Grand Canal Basin up until the 1960s. A number of '*Rope Walks'* are also included on the OS First Edition map, situated on the east side of Ringsend (Figure 4; Map Item 8). A small quay is also shown at the terminus of York Road (formerly Ringsend Point), located on the east side of the River Dodder, at its confluence with the Liffey (Figure 4; Map Item 9).

Despite the presence of the Grand Canal Docks, it is clear from the OS First Edition map that, by the early-mid nineteenth-century, the main focus of maritime activity was to be on the north side of the river; extending between the Custom House and the newly built Patent Slip at East Wall Quay.

OS 25-inch Edition Map (1906-1909)

The OS 25-inch map (Figure 5) depicts continued development on the north side the river, primarily for industrial reasons, much of which is focussed across land extending eastward from Commons Street. This development included a series of goods sheds and bonded stores, saw mills, iron works and the establishment of a railway station, '*North Wall Station*'. Moving downstream, to the east of Fish Street (later renamed Castleforbes Road), the mapping shows extensive development of the waterfront area with the establishment of a '*Saw Mills'*, '*Timber Yard*', '*Coal Yard*', and large '*Goods Station'*; the latter structure accommodating the transportation of goods offloaded via a crane-and-rail system that was situated at the terminus of North Wall Quay and along much of the North Quay Extension (Figure 5; Map Item 10). Two (2) sets of river access steps are depicted at the terminus of the North Wall Quay, one of which remains *in situ* today, the other having been removed during the construction of Tom Clarke Bridge (Figure 5; Map Item 11).

A '*Harbour Master's Office'* is also now shown a short distance along the East Wall Road (Map Item 12), located within the confines of Alexandra Basin; a marine infrastructure project which reclaimed a significant area of intertidal foreshore and was to permanently shift maritime traffic/trade to the mouth of the River Liffey, laying the foundations of the present-day Dublin Port (Map Item 13, Plate 3).

The OS 25-inch map also depicts some minor reclamation of the riverbed, located on the west side of the River Dodder, adjacent to '*Great Britain Quay*' (Map Item 14); undertaken in the late 1800s to facilitate the eastward expansion of the aforementioned quayside.
The intertidal mudflats previously depicted are no longer present on this map addition, their absence relating to channel deepening (dredging) works undertaken in the late nineteenth-century.

Other noteworthy cartographic items include the presence of two (2) ferry services, one running between North Wall Quay and the terminus of Great Brittan Quay (crossing the Liffey), the other between Great Britain Quay and a small, unnamed, quay located at the terminus of York Road (crossing the mouth of the Dodder); Figure 5, Map Items 15-16, respectively. Formal, river access steps are located at the corresponding landing points for the above crossings. In addition, the unnamed quayside is shown in greater detail than on the previous map edition, the structure now including a '*Crane*', positioned on its north side, and a '*Wooden Pier'*, located on its west side (Map Item 17).

3.2 Dublin Port Archives

The Dublin Port Archives (DPA) provides a wealth of information relating to maritime development within the River Liffey Estuary, since the early eighteenth-century. The collections are currently being catalogued and a number of records are available online, including a series engineering drawings that relate to the North Quay Wall.

DPA Drawing No. 8277 (Figure 6) dates to the early 1900s. This drawing presents a construction sequence for the North Wall Quay, at a point *c.* 20m upstream of Wapping Street, and is derived from a series of earlier nineteenth-century drawings. The North Wall is shown in cross-section, with corresponding locational details beneath.

Drawing Item 1 depicts the original quay (built in 1718-26); comprising a quay structure that measures 18.28ft (60m) in overall width, delineated on its the north/south sides by quay-walls that rise to a minimum height of 15.2ft/4.64m.

Drawing Item 2 depicts the presence of a more substantial quay wall (dated 1817), built at a location 19ftm (5.84m) to the south (channel side) of the original structure; permanently shifting the quay's alignment further into the river channel. A timber wharf is also shown extending from the quay wall. The original quay wall is now shown buried within the main body of the quay, with the adjacent quay wall also covered over by reclamation comprising the North Lotts.

Drawing Item 3, depicts the quay wall, much as it is today, forming a considerably improved structure that was able accommodate the mooring of larger vessels alongside; the quayside now measuring 40ft (12.19m) in height with an increased channel depth of between 10.8ft and 13.7ft (3.3m-4.2m).

DPA Drawing No. 8853 (Figure 7) dates to the late nineteen-century and comprises the source material for much of the information presented within Drawing Item 3 of the drawing

discussed above. It depicts the '*Positons of the Old Quay Walls, exposed during the reconstruction of Quay in 1872-3'* and also indicates a corresponding channel depth to the build phases included.

Drawing Item 1 shows the location of the '*Oldest Quay Wall, built abt. 1714*', constructed upon the original foreshore, this topographic feature now being backfilled to a depth of *c.* 14.5ft (*c.* 4.4m). The quay wall measures 14ft (4.27m) in height by 3.57ft (1.09m) width and an overall width for the original quay is indicted at 62.6ft (19m).

Drawing Item 2 shows the location of the '*Old Quay Wall, built since 1800'*, which extended the quay structure into the river channel by 17.6ft (5.36m). The new quay measures 15.58ft (5.74m) in height by 6.2ft (1.89m) in maximum width and includes a stepped footing along its base. The overall width of the intermediate quay is indicted at 80ft (24.34m); as '*per Gile's map of 1818-1819*.' The channel depth at that time is shown to be *c.* 15ft (4.52m) at High Water and 4ft (1.21m) at Low Water.

Drawing Item 3 shows the final build phase (1872-1873) at this quayside location, the construction of a significantly larger quay-wall, measuring 35.4ft (10.80m) in height by 15.2ft (4.64m) in maximum width, having removed the intermediate quay wall. In addition, the adjacent bed-level is shown to have been deepened to a depth of 30.7ft (9.3m) at High Water and 17.7ft (5.39) at Low Water, with a tidal difference of 13ft (3.96m) indicated. The quay wall is now shown to extend 5ft (1.52m) above the high water mark. The overall width of the quay structure is also increased to 105ft (32m); the '*Quay Widened 20*(ft) *to 23ft in 1873 by the Port Board*.' The works detailed were carried out to accommodate the larger vessels requiring access, from the mid-nineteenth century onwards, to the River Liffey and its attendant quays.

DPA Drawing No. 7199 provides detailed records of Custom House Quay and North Wall Quay in the form of nineteenth-century cross-sectional drawings, a selection of which have been included in Figure 8 of this report; section A-D (dated 1866-1867), section B-C (dated 1867-1869), and section D-E (dated 1869). These sectional drawings are taken from points along the downstream extent of North Wall Quay, final *c.* 19m leading onto the structure's interface with North Wall Extension.

Section D-E depicts the composition of the existing quay structure, as built in the late eighteen-century, at a location that falls within the footprint of the proposed bridge development. The quay wall comprises thirty-two (32) courses of masonry, including: two (2) foundation blocks, thirty-four (34) facing-stones, and one (1) capstone. The overall height shown is 39.3ft (11.97m), with a water column depth of 31.52ft (9.61m) at High Water and 18.37ft (5.6m) at Low Water. The facing stones are shown to alternate in length, being keyed

into the main body of the quay wall behind. The capstone measures 4.6ft (1.4m) in length by 2ft (600mm) in depth. The facings stones measure between 1.64ft (500mm) and 3.28ft (1m) in length and have a uniform depth of 98-inches (300mm). Section D-E also indicates a batter of 1" in 12ft for the upper part of the structure (first 29 no. courses) and a batter of 1" in 6ft for the lower part (8 no. bottom courses). Inspection of the visible extents of the present day quayside confirms that the quay structure remains, in the most part, unchanged to that shown within these drawings.

DPA Drawing No. 5F.BBS (Figure 9A), entitled '*North Quay Deeping Steam Berths* shows' was produced by Bindon Blood Stoney, Chief Engineer to Dublin Port and Bocks Board, and is dated 28th February, 1870. The drawing shows a series of quay wall cross-sections, including supplementary details (quay fixtures/fittings, etc.), for the North Wall Quay, at a location downstream to the entrance to the Royal Canal. Included in the drawing is a scaled representation of a set of river access steps, annotated '*Ferry Steps*'(see Figure 9A); the design of which was replicated for all access steps located along the North Wall Quay, the location of which, as previously discussed, is shown on the OS 25-inch mapping. One of the river access steps is located within the footprint of the proposed bridge development and has been subject to detailed recording as part of the current assessment (see Figures 14-15).

DPA Drawing No. 5074 (Figure 9B), is entitled '*North Wall Goods Terminal, Arrangement of rail in Connexion with Travelling Cranes'* (by Chris Mulrany) and is dated 24th February, 1881. It details the track arrangement at the terminus of the North Wall Quay and also shows a cross section of the quay/ *champshire* with track positons indicated; highlighted Items 1-4. Today the outer crane-track (Item 1) remains *in situ,* while the inner crane-track has been subject to twentieth-century removal (Item 2). In addition, the associated carriage tracks, extending west along the *campshire* (Items 3-4), also remain *in situ*.

DPA Drawing No. 1014a (Figure 10) suggests a location for a propped subway beneath the River Liffey, running between an unnamed quay (at the terminus of York Road) and a location on East Wall Road (immediately to the south of the Harbour Master's Office). The drawing was commissioned by the Dublin Port and Docks Board and was produced by J. Mallagh, dated 1925. The plan view shows the '*Goods Station'* (G.S. & W.R.) and associated track work in some detail, including the crane and carriage tracks that adorned the North Wall Quay. Moreover, the drawing presents the findings from two (2) boreholes, take at the either end of the proposed subway route; Points A and B (as highlighted in Figure 10; Location Plan).

Borehole A was located on the south side of the river, at a location now under the southern terminus of the Tom Clarke Bridge. Borehole B was located on the north side of the river, *c.*

16m to the north-northwest of the North Wall Quay, at the present-day location of the East Wall round-a-bout. The borehole data provides useful insight into the underlying geology and extent of the made ground present at that time, the details of which are included in Figure 10; Borehole Data.

3.3 Known Sites and Monuments

The Record of Monuments and Places (RMP) is a list of archaeological sites based on the Sites and Monuments Record (SMR) files, maintained by the National Monuments Section at the DHLGH. SMR entries include detailed descriptions of archaeological sites based on site visits and historic studies and associated mapping where available. The SMR focuses on sites that are pre-1700AD in date. While later buildings are not well represented in the archive, all structures that are more than 100 years old are considered as archaeological sites today.

The area under assessment is located within the zone of archaeological potential defined for the historic city of Dublin, RMP DU018-020. However, only one (1) historically significant structure is listed in the Record of Monuments and Places (RMP) for the immediate river area under assessment (Table 2, Figure 11); North Quay Wall (DU018-020-564). Three (3) sites, located within a 500m radius, are also listed and include: Sir John Rogerson's Quay (DU018-020-201), the location of a Sea Wall (DU018-066----), and a Settlement Cluster in Ringsend (DU018-053----).

RMP Number	Classification	ITM	Proximity
DU018-020	Dublin Historic City, Zone of Archaeological Potential	------	------
DU18-020564-	Historic Quay [North Wall Quay]	717148E, 734461N-718021E, 734384N	0m
DU018-020201-	Historic Quay [Sir John Rogerson's Quay]	716773E, 734374N-717805E, 734273N	200m West-southwest
DU018-066----	Sea Wall	718491E, 734086N	500m Southeast
DU018-053----	Settlement Cluster	718006E, 734003N	360m South

Table 2: Known sites and monuments listed in the RMP within a 500m radius of the river area under assessment.

3.3 National Inventory of Architectural Heritage

The National Inventory of Architectural Heritage (NIAH) is a county-by-county database that identifies, records, and evaluates the post-1700 architectural heritage of Ireland as an aid to the protection and conservation of the nations' built heritage. The NIAH surveys provide the basis for the recommendations of the Minister for the DHLGH to the planning authorities for the inclusion of particular structures in their Record of Protected Structures (RPS).

The NIAH includes fourteen (14) entries, located within the vicinity of the waterway/ assessment area (as shown in Figure 11), that directly relate to maritime/ industrial developments along the River Liffey (Table 3). These include: North Wall Quay, the Grand Canal Docks and associated structures, and a number of nineteenth-century buildings that still remain (in varying state of presentation) part of the waterfrontage along the North Wall Quay.

Registration No.	Date	ITM	Description
500606556 [North Wall Quay]	1780-1820	717746E, 73419N	Stone quay, built c.1800, in two sections, located between Sean O'Casey Bridge and East Link bridge. Mixed cobbled, granite, sandstone and resin-bonded gravel marking modern landscaped paving scheme. Remains of old railway tracks remain embedded within paving scheme to eastern section. Steps and ramps with granite nosed boundary stones to road side. Bounded by modern steel railings. North Wall Quay retains remnants of nineteenth-century railway infrastructure.
50011165 [Commercial Building]	1860-1865	717634E, 734461N	Detached multiple-bay three-storey brick commercial building, built 1862, with central pediment. The building was built for the Dublin & Glasgow Steam Packet Company. The building comprises the original façade with a modern building to the rear.
50011166 [Public House]	1860-1900	717634E, 734461N	Attached two-bay three-storey house over concealed basement, built c.1880, with pub shopfront inserted to ground floor. While no longer in use, it still remains the last residential structure along North Wall Quay.
5011167 [Warehouse]	1890-1910	717688E, 734452E	Attached gable-fronted three-storey warehouse, built c.1900, having three-bay front and eight-bay east side elevation. Now derelict. It is a utilitarian industrial structure associated with the Dublin docks, forming part of the maritime and industrial heritage of the area.
5011168 [Industrial Building]	1860-1900	717898E, 734436N	Detached three-bay two-storey industrial building, built c.1880. Now derelict. Pitched corrugated-asbestos roof behind parapet wall with central gable. The building is a utilitarian structure with a decorative neo-Classical front. It is one of the few remaining dock buildings that evoke the nineteenth-century industrial heritage of North Wall Quay.
50011169 [Train Shed]	1875-1880	717961E, 734487N	Detached sixteen-bay two-storey former train depot, dated 1878, with sixteen-bay east side elevation and triple-gabled rear elevation. Gutted and extended above roof and to west c.2008, with front block retained and east and north elevations to triple-gabled shed retained. The front block remains largely as built and presents a very handsome elevation onto North Wall Quay and announces the end of the north quays as well as the end of nineteenth-century developments along the River Liffey. Fine stone masonry is evident throughout with decorative arcades and door-cases to the front block, constituting an attractive, if altered, remnant from the heyday of Dublin's freight industries on the quays.

Registration No.	Date	ITM	Description
50011185 [Substations; electricity]	1890-1910	717709E, 734473N	Two detached single-storey electricity substations, built c.1900. These diminutive structures were built as utilitarian pieces of electrical infrastructure in the industrial docklands area.
50020465 [Sir John Rogerson's Quay]	1860-1880	716920E, 734361N	Ashlar granite quay wall, erected c.1870, with ashlar granite coping. Cast-iron mooring hooks and mooring rings. Timber fenders to north of B. J. Marine building. Granite steps with cast-iron railings. Stone setts and inset cast-iron rails to *campshire*. Raised in height to east and west of Samuel Beckett Bridge as part of recent works.
50020499 [Dam/ Reservoir/ Basin]	1795-1800	717603E, 734016N	L-plan canal basin, built 1796, as docks for Grand Canal, having trio of sea locks to north-east and dry docks to east end. Roughly coursed Calp limestone walls, with squared Calp coping and tooled granite coping, some replacement coping, having cast-iron bollards and mooring posts. Dressed granite and recent render steps. Recent road bridge, replacing earlier drawbridge, carrying Pearse Street over basin. Situated to east of city centre, south of River Liffey.
50020465 [Quay]	1860-1880	717407E, 734316N	Ashlar granite quay wall, erected c.1870, with ashlar granite coping. Cast-iron mooring hooks and mooring rings. Timber fenders to north of B. J. Marine building. Granite steps with cast-iron railings. Stone setts and inset cast-iron rails to *campshire*. Raised in height to east and west of Samuel Beckett Bridge as part of recent works.
50020468 [Diving Bell]	1860-1880	717288E, 734320N	Cast-iron and riveted plate-iron diving bell, fabricated c.1870, with chamber 23 feet square by 6.5 feet high, accessed by vertical shaft with iron rungs, incorporating air lock. Located to quay side of Sir John Rogerson's Quay, mounted on modern display structure.
50020495 [Warehouse]	1880-1900	717768E, 734095N	Attached triple-gable-fronted nine-bay single-storey former warehouse, built c.1890, now disused. Pitched corrugated roof with recent half-dormer windows, carved limestone coping having metal flashing to parapets to front (south) elevation, yellow brick eaves course with cogged brick, and cast-iron rainwater goods. Brown brick, laid in Flemish bond, to wall to front, carved granite string course and raised dressed granite and dressed Calp limestone plinth course.
50020496 [Sea Locks]	1795-1800	717817E, 734074N	Group of three sea locks, built 1796, connecting Grand Canal Dock with the River Liffey. Two central dock platforms having tooled granite walls and coping, inscribed lettering to walls showing names and dates, notches for machinery, and lock-gate emplacements to each elevation. Sign marking locks with name 'Grand Canal Docks'. Some cast-iron ladders and rings inset to walls. Three sets of double-leaf timber gates, with timber beams and some recent metal panels, to lock to west, pair of replacement gates to central and east lock. Stone sets and limestone paving to surface of platforms, winch mechanisms to platforms to

Registration No.	Date	ITM	Description
			east and centre. Adjoining south bank of River Liffey.
50020497 [Dry Docks]	1795-1800	717821E, 733972N	Two former graving docks, built 1796, now disused. Cut limestone retaining walls. Recent smooth rendered enclosing wall to north, east and south boundaries. Situated on east side of Grand Canal Basin.

Table 3: NIAH entries, located within the vicinity of the assessment area that are associated with nineteenth and twentieth-century development along and/or of the River Liffey.

3.4 Dublin City Industrial Heritage Records

The Dublin City Industrial Heritage Record (DCIHR) was developed between 2016 and 2021. This record provides a catalogue of entries that refer to industrial activities of the past and associated infrastructure that includes a range of buildings, artefacts, features and ancillary features. The DCIHR survey makes recommendations for sites to be added to the list of Protected Structures. Entries located within the vicinity of the River Liffey/ assessment area are tabulated below (Table 4) and are also included in Figure 11.

Reg. No.	ITM	Site Type/Location
DCIHR 18-12-073	717353E, 734453N	Goods Shed (site of), North Wall Quay
DCIHR 18-12-076	717617E, 734427N	Goods Shed (site of), North Wall Quay
DCIHR 18-12-077	717746E, 734502N	Saw Mills (site of)
DCIHR 18-12-078	717787E, 734455N	Packing case factory (site of)
DCIHR 18-12-079	717965E, 734471N	Goods Shed, North Wall Quay
DCHIR 18-12-082	718063E, 734414N	Harbour Master's Office (site of); East Wall
DCIHR 18-12-092	718058E, 734412N	Light House (site of), North Wall Quay
DCIHR 18-12-094	718085E, 734396N	Landing Stage (site of)
DCIHR 18-12-096	717592E, 734499	Iron Works (site of)
DCIHR 18-12-102	717547E, 734201	Chemical, Manure, works (site of)
DCIHR 18-12-103	717734E, 734169N	Chemical, Manure, and Oilcake works (site of)
DCIHR 18-12-104	717718E, 734106N	Granary (Corn Store)
DCIHR 18-12-106	717808E, 734083N	Canal Lock
DCIHR 18-12-107	717816E, 734053N	Canal Lock
DCIHR 18-12-108	717838E, 734075N	Canal Lock
DCIHR 18-12-118	717922E, 734196N	Boat Slip (Wooden Pier)
DCIHR 18-12-119	717950E, 734155N	Bottle Works (site of)
DCIHR 18-12-149	718042E, 734106N	Rope Walk (site of)

Table 4: DCIHR entries located within the vicinity of the River Liffey and assessment area.

3.5 Shipwreck Inventory

The Shipwreck Inventory in the DHLGH archive is a list of recorded instances of wrecking since 1750. The details provided describe the type of vessel, the journey it foundered on, and information on the ultimate plight of the vessel and its crew, where possible. In describing the wrecking event, the records will locate the incident in relation to the nearest headland or other topographic marker where known. This is not however a record of where the wreckage lies, since the historic records generally only deal with the vessel before it sunk. Such finer details emerge from other sources, such as fishermens' records of snag points and diver records of sites located underwater. These are included in the Inventory wherever possible but it is true to say that most entries lack this final level of data. Finally, it should be pointed out that while the Inventory provides a record of wrecking incidents since 1750, it does not claim to be a comprehensive record for earlier events, and therefore the medieval and prehistoric periods are not represented in this archive.

A total of four-hundred and sixty-three (463) shipwrecks are listed in the inventory for the Dublin Bay. Topographic references from the list include: The Horrocks, west side of Dublin Harbour, Old pier at Dublin, Behind the piles at Dublin, 1 mile off Dun Laoghaire east pier, Near Dublin, Dublin Bay, Dublin Bar, Dublin Harbour/Port, Dublin, McCarthy's wharf, River Liffey/Dublin River, Quay Wall/River Liffey, North Wall, South Wall, St John's Quay, Pigeon House (Fort), Bailey Light, Poolbeg (Harbour), North Bull, South Bull, Bull Island, Clontarf, Sutton, Blackrock, Ringsend (Point), Howth (off Howth, Howth Head, near Howth and Howth harbour), Dalkey.

A total of twenty-six (26) wrecks are listed in the inventory for the River Liffey and surrounding area (Appendix 2). This includes: seventeen listed as River Liffey/Dublin River, five for Ringsend, one for Sir John's Quay, one for the South Wall, one for Pigeon Hole, one for Halpin's Pond, and one for Pigeon House. The earliest of the listed wrecks date from the 1760s, with the latest recorded dating to 1892. There are no entries listed for the River Liffey at North Wall Quay or along Sir John Rogerson's Quay.

3.6 Topographic Archive

The National Museum of Ireland Topographical Files is the national archive of all known antiquities recorded by the National Museum. These files relate primarily to artefacts but also include references to monuments and also contain a unique archive of records of previous archaeological excavations. The Museum's files present an accurate catalogue of objects reported to that institution from 1928. There is a computerised database of finds from the 1980s onwards. They are categorised by their location into county and further into townland, town, city, street or river where they come from. There are rarely any grid co-ordinates to precisely locate find-spots. However, where find-spots of artefacts are established they can

prove an important indication of the archaeological potential of the related or surrounding area.

A large number of artefacts have been recovered form excavations undertaken close to the existing River Liffey. Among the earliest artefacts encountered were those recovered from excavations at Fishamble Street, these included: two flint blades of Larnian style (similar pieces dated to about 3350BC at Sutton and on Dalkey Island), a Neolithic polished stone axe-head, and a barbed and tanged flint arrowhead of Early Bronze Age type. [7] However, only total of twenty-six artefacts have been listed in the topographic files for the River Liffey and its associated quay structures (Appendix 3). Listed artefacts range in date from the early Bronze Age (axe-head, 1922:4) to nineteenth-century material (clay pipe fragments, etc., 1937: 2379-2416). Only eleven artefacts are listed as coming from the River Liffey itself, the rest being recovered during quayside excavation works. One artefact, an iron sword (1964:1), is listed as coming directly form riverbed deposits; recovered from the River Liffey, *c.*10ft from the edge of Arran Quay.

An iron knife-shaped object (1954:168) was also recovered during the excavation of foundations on East Wall Road by Hugh O'Neill and Company Ltd. in 1954. Mr. O'Neill provides a context for the find in his letter to the Irish Antiquities Division at the National Museum of Ireland which states '*the object mentioned was found in the foundation excavations at New Church on the East Wall Road. These foundations are approximately six feet deep and are sitting on a gravel bed which was formerly a foreshore of the River Liffey. During the excavation, shells, etc. came to light. The top portion of the excavation was filled-in ground*.'[8]

While there is no specific reference to archaeological material being recovered from the riverbed area under assessment, it should be noted that the systematic recording of maritime/riverine data is a recent phenomenon. Moreover, it is clear that the River Liffey has a long history of maritime activity and has been of importance form at least the medieval period. However, this is counter-balanced by the fact that both the River Liffey would have undergone successive dredging works from the nineteenth-century onwards, an activity that could greatly limit the archaeological potential of the riverbed. Indeed, this activity is evident for the downstream section of North Wall Quay, where quayside berths were deepened in the mid to late nineteenth century in order to accommodate the mooring of larger vessels alongside.

[7] Mitchell, G.F., *Archaeology and Environment in Early Dublin*, Royal Irish Academy, Dublin, p.7.
[8] This letter, dated 23rd June 1954, forms part of the file comprising of Topographic Archive entry 1954:169.

3.7 Excavations Bulletin

The *excavations bulletin* provides a published and online summary of accounts of archaeological excavations undertaken throughout Ireland.[9] Summaries may also be submitted for inter-tidal survey, underwater assessments, and the archaeological monitoring of marine dredging works. The majority of the entries relate to development-led archaeological work. Appendix 4 summarizes the entries relating to the River Liffey and its surrounding environs, including: River Liffey, River Liffey Quays, and the North Wall.

As previously discussed, one entry is of particular interest and refers to the excavations at the site of Building C, Spencer Dock, North Wall Quay (Bulletin entry 2004: 565). The excavation identified three principle phases of activity. These included a series of Late Mesolithic fish traps located on the old shoreline of the Liffey channel, artefacts from the eighteen and nineteenth-century reclamation of that area, and structures from the nineteenth and twentieth-century development of that reclamation land.

3.8 Conclusion

The River Liffey provided an essential artery for trade imports and exports to and from the city, this maritime mercantile activity stimulating a continued seaward development of the river estuary. The degree of maritime activity is reflected in the number of shipwreck events listed in shipwreck inventory, which records four-hundred and sixty four (464 wrecks) around Dublin and includes twenty-six (26) wrecks near or from the River Liffey; the majority dating from the eighteenth and nineteenth century, when use of the river by shipping was at its peak.

The river area under assessment retrains two (2) features associated with the nineteenth-century development of the river area, namely North Wall Quay and a small, unnamed, quay to the south. These structures, while of historic/ industrial archaeological value in their own right, should also be viewed within the wider context of the Dublin's maritime trade and marine infrastructural development.

No other structures of archaeological significance were identified in the desktop study for the immediate development area under assessment. However, the potential that features, deposits, and/or artefacts of archaeological significance remain buried within riverbed and reclamation deposits should be considered high.

[9] Isabel Bennett (ed.) Excavations Bulletin: summary accounts of archaeological excavations in Ireland, Wordwell./ www.excavations.ie

4.0 SURVEY METHODOLOGY

The UAIA comprised the following items:

1. Comprehensive underwater assessment, including targeted metal-detection, of the riverbed across the footprint of the proposed bridge structure, extending the survey beyond any construction impacts arising from the project. This work recorded riverbed topography and provides a detailed account of the existing riverine environment.
2. Systematic inspection of the quay wall, *campshires*, and any associated quayside features present, extending across a 78m section of the North Wall Quay.
3. Detailed recording (laser scanning) of the upper parts of the quay wall, covering the proposed impact area associated with the bridge tie-in location.
4. Walkover survey along the south side of the river, where the bridge tie-in interfaces with the proposed Dodder Opening Public Transport Bridge project.

The survey was position-fixed using Total Station and GNSS (RTK) recording, with the resulting data referenced to Irish Transverse Mercator and to Malin Head Ordnance Datum.

The underwater survey was carried out on a suitable Low Water tide cycle. It recorded riverbed topography and sought to provide a detailed account of the existing riverine environment. The survey covered a 78m (max.) east-west x 180m (max.) north-south area of riverbed, extending well beyond any riverbed/quayside impacts associated with the proposed development (Figure 12). Particular attention was paid to the riverbed at the pier/ abutment locations for the proposed bridge.

In addition, a metal detection survey was undertaken to plot the distribution of metallic objects across the riverbed survey area; highlighting any material concentrations that may be present. A Fisher *Aquanaut* 1280U metal detector was used for the magnetometer survey. A finds retrieval strategy dealing with conservation issues, cataloguing, and locational recording was in place to deal with any artefacts recovered during the survey.

Dive operations were carried out to HSA/HSE standards, using surface supplied equipment, from a licensed Dive Support Vessel (Plate 4). All work was carried out in accordance with the Safety in Industry (Diving Operations) Regulations 1981, SI 422 and the recently updated HSA diving regulations (2019). Mobile/ VHF communications to the Port Operations Centre at Dublin Port were also maintained throughout. The on-site work was carried out on the 30th August 2022, under licence from the DHLGH; licence numbers 21D0070 (dive survey) and 21R0234 (detection device).[10]

The in-water work was completed by a six (6) man dive-team comprising, maritime archaeologists, a diving engineer, and Dive Supervisor. Underwater visibility of 500mm-1.5m

[10] The onsite work is below the threshold of DSDP requirements (comprising non-disturbance survey); however, the Project Supervisor for the Design Process was notified by ROD and a detailed RAMS was also submitted in advance of the works taking place.

was present and a maximum depth of 9m was recorded. No limitations to the completion of the UAIA were experienced on the day of the survey, although the low visibility and degree of sediment backscatter present did not allow for suitable underwater photography and/or video capture.

An inspection of the above water elements of North Wall Quay was also carried out. This included the quay facade, cap-stones, and associated fixtures and fittings. A walkover survey of the *campshire* area was also undertaken. Any features encountered were subject to written and photographic record and positioned according to Irish Transverse Mercator (ITM).

A laser-scan survey of the upper part of the façade of the North Wall Quay, encompassing the proposed bridge landing location, was also carried out (Plate 5). The survey extended beyond the identified quayside impact location and sought to provide a detailed record of the exiting condition of the masonry walls that from the in-river extent of North Quay Wall. As a result, a series of scaled point-cloud elevations were produced, these are included as Figures 13-15 in this report. Although falling outside the development boundary, an unnamed quay (located on the southern side of the river, adjacent to Thorncastle Court) was also subject to a laser scan survey and is presented in Figure 16.

4.1 Terminology

When referring to the degree of compaction observed for the riverbed deposits under inspection, the terms loose, medium, and hard are relative and do not relate to the measured properties of these deposits. All dimensions in this report are provided in either millimetres or meters according to scale. When referring to sediment grain size, the Wentworth scale has been adopted, as detailed in Table 5.

Size (mm)	Grade
>256	Boulder
>64	Cobble
>4	Pebble
>2	Granule (gravel)
>1	Very coarse sand
>1/2	Coarse sand
>1/4	Medium sand
>1/8	Fine sand
>1/16	Very fine sand
>1/32	Coarse silt
>1/64	Medium silt
>1/128	Fine silt
>1/256	Very fine silt
<1/256	Clay

Table 5: Sediment grain size categories as applied to the riverbed deposits discussed in this report.

5.0 ARCHAEOLOGICAL ASSESSMENT

5.1 River Topography

The riverbed on the upstream side of Tom Clarke Bridge is composed of a light-grey to white silt (100mm sediment depth), overlaying a compact dark-grey silty-clay that measures 1m+ in depth. An average water-column depth of 6.6m was recorded, with deeper channels measuring 8.6m-9m in depth also present; these channels corresponding to the openings between the bridge piers/abutments of Tom Clarke Bridge.

The riverbed, extending from the North Wall Quay, slopes gently at a *c.* 20 degree angle towards the channel centre. The surface of the riverbed was observed to be relatively sterile in nature. However, frequent modern debris was encountered deeper within this deposit, predominantly lying at depths of between 200mm and 450mm below the existing bed-level. The presence of modern material, located at depth within the riverbed, attests to the good-holding content present. As such, it is likely that any archaeological/historic layers and /or material would likely remain buried at considerable depth with riverbed sub-stratum.

The riverbed on the southern side of the channel is intertidal in character, exposing *c.* 30m-40m of riverbed on at Low Water. This area is composed of a deep deposit of grey-black silty-clay of medium compaction with frequent organic inclusions (leaf-litter, etc.). Dumped modern debris is frequent across this area. A number of pronounced ridges (east-west orientation) are located immediately to the north of the intertidal zone. These topographic features are consistent with marks left from boat traffic using a series pontoons, located adjacent.

5.2 Visual Survey and Assessment

A systematic visual survey was conducted along the extent of the proposed bridge development, with particular attention being paid to the North Wall Quay impact location. No archaeologically significant material was encountered as part of the underwater survey.

A detailed description of the North Wall Quay and its *campshire* area is provided below. A summary description of the unnamed quay to the south (adjacent to Thorncastle Court) is also included.

North Wall Quay [Figures 12-15, Plates 6-18]

The North Wall Quay is listed in both the RMP (DU018-020-564) and NIAH (500606556) (Plate 6). The section of quayside under assessment dates to the late nineteenth century and, in the most part, appears to correspond to the build-design as depicted in an engineer's drawings of the quay-wall, dated 1869 (see Figure 8).[11] It also retains the remnants of the track-work for a number of travelling cranes and associated goods carriages that once

[11] DPC, Dublin Port Archive, Drawing No. 7199, '*Cross Sections of River Quay Walls*.'

operated along the downstream part of North Wall Quay, leading onto the North Wall extension (as detailed in Figure 9B).[12]

Neat-cut, granite, capstones adorn the top of the quay wall and measure between 800mm-1.2m length (max.), 600mm in depth (vertical dimension), and *c.* 600m in visible width (horizontal dimension) (Plate 7). Seven (7) uniform courses of granite masonry, excluding the capping stones, comprise the upper 2.5m of the quay's façade (Plate 8). The uppermost course of masonry measures between 900mm-1.2m length and has a uniform depth of 420mm. The other six (6) courses comprise masonry that measures between 800mm and 1.5m in length, with a uniform depth of 30mm.

A number quayside fixtures and fittings are located within the assessment area. Three (3) mooring hooks (MH01-MH03) adorn the top of the quay wall, as detailed in Figure 12: MH01 ITM 718002E, 734387N; MH02 ITM 717983E, 734389N; MH03 ITM 717965E, 734391N. These fittings are formed of robust iron-work, comprising paired hooks that have been ring-forged onto small iron-hoops that are inset into the upper part of the capstones (Plates 9-11). Similar and more elaborate versions of these hooks, comprising paired-hooks that are fastened using a swivel-bracket, are present along the full extent of the North Wall quay.

A single river access ladder (AL01) is located at a point 61m upstream of Tom Clark Bridge, ITM 717965E, 734391N (Plate 12). This feature has been recessed into the quay wall and is integral to its construction. However, the original wrought-iron ladder does not remain *in situ*, having been replaced by more recent version. Only the 'grab handle' component of the ladder assemblage retains some age, being an earlier replacement. This handle feature forms a simple wrought-iron loop, inset into the cap-stone at the recessed ladder location; positioned at a point 100mm from the edge of the quay. River access ladders can be found at regular intervals along the North Wall Quay and remain similar to that described above, none retaining their original ladder-work.

A single, recessed, mooring-ring (MR01) is located along the quay façade, at a point 36m upstream of Tom Clarke Bridge, ITM 717990E, 734388N (Plates 13-14). The recess in the quay wall measures 250mm depth, 500mm width, and 600mm height. The mooring comprises a wrought-iron ring measuring 400m in diameter (internal) and 70mm in thickness. The mooring-ring is heavily corroded, particularly along is upper circumference. Similar, recessed, mooring-rings can be found elsewhere along the quay and appear to be of a particular design associated with the North Wall Quay (Plate 15).

[12] DPC, Dublin Port Archive, Drawing No. 5074, '*North Wall Goods Terminus: Dublin, Arrangement of Rail in Connexion with Traveling Cranes, Chris Mulrany, 1881.'*

A flight of masonry steps is also present, located immediately upstream of Tom Clarke Bridge, ITM 7182021E, 734386N (Plate 16). These steps are recessed into the quayside and are designed to provide access to the river during all tide states. The structure measures *c.*7m in length and 1.7m in width. It comprises twenty-four (24) steps, fifteen (15) of which were above water at the time of survey. A *c.* 1.7m by 1.7m landing area is located at the base of the stairs. A wrought-iron hand-rail remains *in situ*, but has suffered considerable erosion. A series of boat tie-off points are located on the river-side of every second step. These comprise a wrought-iron ball (*c.* 100mm Ø) which has been inset into the upper surface of the step (Plate 17). The quayside masonry located on the upstream (west) side of this feature incorporates a bullnose to the downstream face of each (cascading) masonry course (Plate 18).

The river access steps (RAS-01) under examination conform to a similar design to those present elsewhere along the North Wall Quay; these quayside features originally servicing a number of ferries that once operated downstream of Butt Bridge. Indeed, part of a nineteenth-century engineer's drawing details the design of these river access steps, referring to them as '*Ferry Steps*' (as shown in Figure 9A).[13]

No foundation elements were evident along the bottom of the North Wall Quay, these lying at considerable depth below the existing bed-level.

Campshire [Figure 12, Plate 19]

The *campshire* comprises a paved pedestrian walkway that runs parallel to the top of the quay wall. The surface of the *campshire* area is largely composed of cobbled blocks, granite and sandstone fabric, with a walkway that is delineated using contemporary paving slabs. The remnants of the track-work that once facilitated a series of travelling cranes and associated goods carriages are also clearly visible along its extent (Plate 19). Modern railing (steel) bounds the top of the quay wall and granite-nosed boundary stones delineate the road-side extent.

Unnamed Quay, Thorncastle Court [Figure 16, Plates 20-27]

An historic quayside (DCIHR 18-12-118) is located adjacent to the Thorncastle Court apartment block, occupying the east side of the River Dodder (70m+ section) and the south side of the River Liffey (12m visible section) (Plate 20). A modern slipway, measuring 27m in length, obscures the downstream extent of the quay wall on its west side; only a *c.* 4m section being visible at this location. A wooden ladder with iron rungs has been retro-fitted to the quayside at this location.

[13] DPC, Dublin Port Archive, Drawing No. 5F.BBS '*North Quay Deepening Steam Berths, B.B. Stoney, 1870*.'

The quayside is composed of neat-cut granite blocks measuring between 500mm-1m length and 300mm in height. The structure measures 3.60m in height above the Low Water Mark and curves eastward to run along the south side of the Liffey (for a distance of 12m), at which point the quay becomes buried within rock-armour and the reclaimed ground behind (Plates 21-22). A large oval shaped mooring (wrought-iron) ring is located at ITM 717924E, 734211N and measures 500m length, 250mm width, 100mm thickness (Plate 23). A flight of river access steps (numbering 12 in total) are present at a point 9m along the quay wall, located at ITM 717932E, 734208N (Plate 24). As noted for the access steps located along the North Wall Quay, each step has a small wrought-iron tying-point inset on its outer side. A large granite mooring bollard is located close to the northwest corner of the quay at ITM 717928E, 734209N (Plate 25). The remains of a small iron-derrick or similar is also located close by (Plate 26).

Moving to the east, c. 30m from the visible extent of the aforementioned masonry quay, the shoreline is composed of a mass of rock-armour, behind which lies made-ground (Plate 27); both of which are contemporary to the construction of Tom Clarke Bridge. Understandably, no surface features of historic or archaeological interest are visible across this area of reclamation.

5.3 Metal-detection Survey

Metal-detection survey of the riverbed proved impractical across much the underwater survey areas, due to the large number of targets encountered. The survey revealed an almost constant hit ratio and, as such, it was not possible to tune out the background metallic signature generated by the volume of modern metallic debris present. The majority of these represented of sub-surface targets, all of which proved to be of modern origin upon inspection and included aluminium drinks can, bottle tops/caps, lead fishing-weights, mobile phones, modern coins, keys, etc.

5.4 Conclusion

The archaeological assessment was systematic and comprehensive, extending well beyond the construction footprint associated with the proposed bridge structure.

No archaeologically significant material, structures, or deposits were encountered as part of the underwater survey. However, given that deep deposits of silty-clay comprise the upper riverbed layer (within which frequent modern debris is present at depth), the potential for archaeological material to remain buried at depth, located within deeper/older sub-stratum, should still be a consideration. Although, this potential is also tempered by nineteenth-century channel deepening (dredging) works that took place along this section of the River Liffey. In addition, construction works for Tom Clarke Bridge are also likely to have reduced the archaeological potential of the riverbed surrounding its footprint.

The North Wall Quay remains a significant structure that delineates the north side of the waterway between Seán O'Casey Bridge and Tom Clarke Bridge. It comprises a series of build phases and includes two (2) distinct quay wall designs; the downstream section, extending eastward from the entrance to the Royal Canal being of a different build-type to that of the upstream section.

A 78m section of the North Wall Quay was subject to detailed archaeological assessment, extending well beyond the boundaries proposed bridge development (see Figure 12; survey extent). The upper courses of the quay wall (topmost 1.5m) and a flight of river assess steps (RAS01) will require removal in order to facilitate the bridge development. Three (3) quayside fittings lie within the wider development boundary and may be subject to secondary impacts as a result. Archaeological mitigation requirements for the above have been provided in Section 7 of this report.

An unnamed quay, located adjacent to Thorncastle Court, on the south side of the river, was also assessed, falling within the wider survey area. However, this feature remains outside any impacts associated with the current development.

6.0 POTENTIAL IMPACTS[14]

The riverbed will be impacted by the following bridge supports: three (3) intermediate piers, one (1) bascule pier, and two (2) abutment structures. These are to be formed using single (hollow) precast reinforced concrete shell units, acting as permanent formwork, which are to be filled (*in-situ*) with poured mass-concrete. Each concrete pier will be supported on a single line of large diameter bore, steel-encased, concrete piles (*c.* 900mmØ) that will be socketed into the underlying bedrock.

The southern terminus of the bridge landfall will impact made (reclaimed) ground to the south. While the archaeological potential of this area remains low, the possibility that riverine features/ structures may remain buried at depth within this area should also be a consideration.

Removal of the upper 1.5m section of the North Wall Quay (masonry wall structure) and river access-steps, over the *c.* 21m width of the proposed bridge tie-in, is required. Demolition of the pedestrian parapets along the edge of North Wall Quay, across the same extent, will also be required.

[14] This section does not purport to relate to precise engineering details but is rather an attempt to understand the nature of the impact on the potential archaeological environment, based on the supplied data.

6.1 Impact Categories

Impact/effect categories will typically have regard to those set out in the EPA 'Guidelines for Information to be Contained in EIAR' 2022, 'Guidelines on the information to be contained in Environmental Impact Statements', 2002; 'Advice notes on Current Practice (in preparation of Environmental Impact Statements), 2003 and Revised Draft 2015, EPA; and Guidelines for the Assessment of Archaeological Heritage Impacts of National Road Schemes, 2006, National Roads Authority. Impacts/effects are generally categorised as either being a direct impact, an indirect impact or as having no predicted impact.

Impacts are generally categorised as either being a direct impact, an indirect impact or as having no predicted impact:

Direct impact occurs when an item of archaeological or architectural heritage is located within the centreline of the proposed route alignment and entails the removal of part, or all, of the monument or feature.

Indirect impact may be caused where a feature or site of archaeological or architectural interest is located in close proximity of the proposed development.

No predicted impact occurs when the proposed route option does not adversely or positively affect an archaeological or architectural heritage site.

These impact categories can be further assessed in terms of their quality i.e. positive, negative, neutral (or direct and indirect).

Negative Impact is a change that will detract from or permanently remove an archaeological or architectural monument from the landscape.

Neutral Impact is a change that does not affect the archaeological or architectural heritage.

Positive Impact is a change that improves or enhances the setting of an archaeological or architectural monument.

A significance rating for these impacts is then given i.e. slight, moderate, significant or profound.

Profound applies where mitigation would be unlikely to remove adverse effects. This is reserved for adverse, negative effects only. These effects arise where an archaeological or architectural site is completely and irreversibly destroyed by a proposed development.

Significant is an impact that, by its magnitude, duration or intensity alters an important aspect of the environment. An impact like this would be where the part of a site would be permanently impacted upon leading to a loss of character, integrity and data about the archaeological or architectural feature/site.

Moderate is a moderate direct impact that arises where a change to the site is proposed which, though noticeable, is not such that the archaeological integrity of the site is compromised and which is reversible. This arises where an archaeological or architectural feature can be incorporated into a modern day development without damage and that all procedures used to facilitate this are reversible.

Slight is an impact that causes changes in the character of the environment that are not significant or profound and do not directly impact or affect an archaeological or architectural feature or monument.

Imperceptible is an impact capable of measurement but without noticeable consequences.

In addition, the duration of Impacts is assessed and has been sub-divided into the following categories:

- **Temporary Impact**, where an Impact lasts for one year or less
- **Short-term Impacts**, where an Impact lasts one to seven years
- **Medium-term Impact**, where an Impact lasts seven to fifteen years
- **Long-term Impact**, where an Impact lasts fifteen to sixty years.
- **Permanent Impact**, where an Impact lasts over sixty years.

Potential impacts associated with the bridge development and corresponding impact classifications have been tabulated in Table 6 below.

Description	Proposed works	Potential Impacts	Classification of Impact
Riverbed (River Liffey)	Six (6 no.) in-river piers/abutments to be installed; supported by series of steel-encased concrete piles (900mm Ø) that are to be driven into the riverbed/ underlying bedrock.	• No known impact to any visible archaeologically or historically significant features. However, the potential for *in situ*, buried (sub-surface), features still remains.	N/A
North Wall Quay [DU018-020-564/ NIAH500606556] Nineteenth-century masonry quayside on north side of the River.	Bridge tie-in/ landing location, leading onto North Wall Quay.	• Removal of masonry from upper 1.5m of the façade of the North Wall Quay, extending across a 21m section of quay wall. • Removal of a set of River Access Steps (**RAS01**). • Potential secondary impact to mooring hook s **MH01** and **MH02**; these items fall outside the impact area, but remain within the development boundary. • Potential impact to lower courses of masonry during construction.	• Direct, negative, impact; moderate and permanent in nature.
Campshire [DU018-020-564/ NIAH500606556]	Bridge tie-in/ landing area, north terminus of bridge.	• Ground disturbance to an anticipated depth of 1.5m. • Removal of four (4) section of iron-track.	• Direct, negative, impact to remnants of crane/carriage tracks and any sub-surface features that may be present; moderate and permanent in nature.
Southern Shoreline (rock-armour/ area of reclamation)	Bridge tie-in/ landing area, south terminus of bridge.	• No known impact to any visible archaeologically or historically	N/A

Description	Proposed works	Potential Impacts	Classification of Impact
		significant features.	

Table 6: Nature and classification of impacts arising from the construction of proposed bridge development.

7.0 RECOMMENDATIONS

7.1 Pre-construction Measures

At present, no further ameliorative measures are recommended in advance of construction work commencing. However, in the event that in-river/ quayside preparatory works and/or geotechnical site investigation woks are required in advance of construction, Archaeological Monitoring of these works would be required. In addition, should any alterations to the current project design take place, extending the proposed impacts outside the limits of survey area identified for the current UAIA, additional archaeological assessment/reporting would be required in advance of construction taking place.

7.2 Construction Phase Measures

It is understood that the bridge piers/abutments will be supported by a series of steel-encased concrete piles which are to be driven into the riverbed and underlying bedrock. As such, there is limited scope for archaeological mitigation during construction for this element. However, should the removal of any riverbed deposits become necessary during the construction process, such work is to be subject to Archaeological Monitoring.

North Wall Quay will be directly impacted by the proposed development; masonry from a 21m by 1.5m section of the quay wall being subject to removal. In addition, a set of river assess steps (RAS01), located immediately upstream of Tom Clarke Bridge, are to be removed. Both the quay wall and associated access steps have been recorded in detail as part of the UAIA.

Archaeological Monitoring of all excavation works and/or interventions upon/alongside the historic quay structure (North Wall Quay) is required. This is to include any excavation work carried out within the *campshire*, comprising the area between the quay wall and the adjacent roadway. This will ensure that appropriate recording of the internal fabric of the quay structures and any associated (buried) features is undertaken during the construction process.

The removal of quayside masonry from the upper 1.5m of the quay wall should be carried out under archaeological supervision, allowing the archaeologist to obtain additional information and undertake supplementary recording, as may become required during that process. It is recommended that the masonry is retained and placed in suitable storage as part of the

removal process. In addition, any quayside fixtures or fittings that are subject to impact should be removed under archaeological supervision and retained as part of the development; to include, as required mooring hooks (MH01-MH02), a wrought iron mooring-ring (MR-01), and any iron components associated with the river access steps (RAS01).

The four (4) sections of iron-track that run east-west along the top of the quay (*campshire* area) will require sympathetic removal. It is recommended, as part of the construction process, that the track-sections are fully exposed and subject to additional recording, prior to their cutting and removal to suitable storage.

Archaeological monitoring of the southern tie-in location for the proposed bridge structure is also recommended, ensuring any potential sub-surface material, deposits, or features that may be present are dealt with in an appropriate manner.

The archaeological work should be carried out in accordance with the terms of Section 5 of the National Monuments Act (2004 Amendment).

RETAINING AN ARCHAEOLOGIST/S. An archaeologist should be retained for the duration of the relevant works. The archaeologist should be familiar with and experienced in river/estuarine environments and have a good understanding of riverine archaeology and its associated features.

THE TIME SCALE for the construction phase should be made available to the archaeologist, with information on where and when ground disturbances and/or dredging will take place.

SUFFICIENT NOTICE. It is essential for the developer to give sufficient notice to the archaeologist/s in advance of the construction works commencing. This will allow for prompt arrival on site to monitor the ground disturbances. As often happens, intervals may occur during the construction phase. In this case, it is also necessary to inform the archaeologist/s as to when ground disturbance works will recommence.

DISCOVERY OF ARCHAEOLOGICAL MATERIAL. In the event of archaeological features or material being uncovered during the construction phase, it is crucial that any machine work cease in the immediate area to allow the archaeologist/s to inspect any such material.

ARCHAEOLOGICAL MATERIAL. Once the presence of archaeologically significant material is established, full archaeological recording of such material is recommended. If it is not possible for the construction works to avoid the material, full excavation would be

recommended. The extent and duration of excavation would be a matter for discussion between the client and the statutory authorities.

ARCHAEOLOGICAL TEAM. It is recommended that the core of a suitable archaeological team be on standby to deal with any such rescue excavation. This would be complimented in the event of a full excavation.

SECURE SITE OFFICES and facilities should be provided on or near those sites where excavation is required.

FENCING of any such areas would be necessary once discovered and during excavation.
ADEQUATE FUNDS to cover excavation, post-excavation analysis, and any testing or conservation work required should be made available.

MACHINERY TRAFFIC during construction must be restricted as to avoid any of the selected sites and their environs.

SPOIL should not be dumped on any of the selected sites or their environs.

PLEASE NOTE: All of the above recommendations are based on the information supplied for the proposed Point Bridge and Tom Clarke Bridge Widening Project. Should any alteration occur, further assessment maybe required.

PLEASE NOTE: Recommendations are subject to the approval of The Department Housing, Local Government and Heritage.

8.0 ACKNOWLEDGEMENTS

Thanks are extended to Christian Smith, Associate (Bridges), and Yanna Bersunukayeva, Environment Scientist, at Roughan O'Donovan for their assistance with the project. The Survey Team comprised Rex Bangerter (Archaeological Director/ HSE Diver), Matthew Conway (Archaeologist/ HSE Diver), Daniel Lenehan (Archaeologist/ Dive Tender), Feargal Morrissey (HSE Diver/ Engineer), Des Brennan (HSE Diver), Brian McAllister (Diver Supervisor), Liam O'Shea (coxswain), and Derek Copeland (Surveyor). The report was written by Bangerter.

Appendix 1: Chronological List of Quay Structures built along the River Liffey on the North and South sides of the river.

Location	Name	Approximate Construction Date
South Quay	Wood Quay (Coal Quay)	900
South Quay	Merchants Quay (Bridge Street Quay and, jointly with Wood Quay, Dublin Quay)	1300
South Quay	Blind Quay	Early 1700s
South Quay	Old Custom House Quay	1620
South Quay	Usher's, Quay	1650
South Quay	Usher's, Quay	1650
South Quay	Essex Quay	1680
South Quay	Aston Quay	1700
South Quay	Saint George's Quay; known as Georges Quay and included Whites Quay.	1700
South Quay	City Quay	1700
South Quay	Sir John Rogerson's Quay	1720 [replaced *c.* 1875]
South Quay	Burgh Quay	1800
South Quay	Wellington Quay	1820
South Quay	Victoria Quay	1850
South Quay	South Quay; South Bank Quay.	1960
North Quay	Inns Quay; developed in 1700 (King's Inns Quay)	1250
North Quay	Ormond Quay Lower	1700
North Quay	Ormond Quay Upper	1700
North Quay	Arran Quay	1700
North Quay	Bachelors Walk; this originally included part of Eden Quay.	1700
North Quay	**North Wall Quay (North Quay)**	**1800**
North Quay	Ellis Quay, eastern part built 1760 and called Black Quay.	1750
North Quay	Eden Quay; included the earlier Iron Quay.	1800
North Quay	**Custom House**	**1800**
North Quay	**Custom House Quay**	**1820**
North Quay	Sarsfield Quay; built Pembroke Quay and included earlier Sand Quay.	1830
North Quay	Wofle Tone Quay (Albert Quay).	1800
North Quay	North Quay (North Wall Extension)	1890
North Quay	Alexandra Quay	1935
North Quay	Alexandra Quay East	1955

Appendix 2: Shipwrecks listed in the Shipwreck Inventory for the River Liffey Area.

Location	Name	Date	Ship Type	Information
Opposite the old coastguard station at Ringsend, River Liffey	*Argo*	10/12/1892	31-year old, 46-ton, Dublin, wooden fishing smack	Moored in the River Liffey.
Between the walls at Dublin	*Britannia*	6/5/1774	----	This vessel was en route from London, under Captain Williams, when she hit an anchor. She went ashore.
River Liffey	*Carolina*	5/10/1799	Galliot of Oporto	Ran aground and sank.
Dublin River	*Commerce*	25/10/1811		En route from Dublin when sank.
Between the city of Dublin Company's jetty and breakwater head	*Edith*	8/9/1875	London and Noth-Western Railway Company Steamer aboard.	En route from the company's wharf to Greenore. She departed at around 1.25am but collided with another London and North-Western Railway Company vessel, the Duchess of Sutherland. This vessel was under the command of Captain Beaumont and was en route from North Wall Dublin. The Edith was violently struck on the starboard bow and sank within a quarter of an hour. A fireman called Jones and his brother who slept in the forecastle were drowned. The weather was clear and calm at the time of the incident. Cargo: 60 to 80 passengers
Sir John's Quay, Dublin	*Emma*	17/06/1851	Smack	En route from Liverpool ran aground and listed on her beam ends. She was seriously strained and brought to Eden Quay where she filled. The cargo was damaged. Cargo: Wheat and staves
South Wall	*Henry*	23/11/1798	Brig of Liverpool	Wrecked
River Liffey	*Hibernia*	22/03/1776	----	Vessel was burnt
Pigeon Hole, Dublin River	*James and Ann*	7/2/1812	----	En route from Drogheda was hit by a collier brig and sank.
'Dublin River'	*Langston*	21/03/1812	----	Portsmouth vessel was reported lost.
River Liffey, Dublin	*Leonard*	10/01/1853	----	Struck by a steamer.
Entrance to Dublin River	*Maria Carolina*	16/8/1799	----	En route from Oporto to Dublin when she sank. The cargo was landed.

Location	Name	Date	Ship Type	Information
Abreast of no 2 bouy, River Liffey	*Mermaid*	16/07/1892	Unregistered wooden yacht/cutter was 5 yrs old and weighed 1 ton.	The master and owner was P. Carolan, Clontarf, Dublin. She was en route from Clontarf to Dublin, in ballast, with 6 crew. She sank in an easterly force 6 wind but was later raised. 4 lives were lost
The Liffey	*Newport*	20/05/1851	Montrose schooner	En-route up the Liffey when she came in contact with Hebden from Barbados, which made a hole in her stern.
Dublin River	*Nosha Squera de Bonamo*	28/06/1798	Brig of Oporto	Ran onto a bank.
Ringsend, R. Liffey	*Pelican*	8/4/1889	37-ton 32-year old wooden smack of Dublin	At anchor at Ringsend when burnt. Vessel in ballst
Behind piles at Dublin	*Providence*	5/02/1771	----	En route from London, under Capt Mayne, when she was lost
Opposite Halpins Pond, River Liffey	*Rat*	25/05/1891	10-year old wooden pleasure sailing boat	Capsized and was wrecked during pleasure trip.
River Liffey	*Times*	1-2/06/1853	Dublin vessel	En route from Dublin to Liverpool encountered easterly wind. Her boilers burst while in river. Cargo: Passengers
Off Pigeon House	*Times*	13/09-29/11/1851	Steamer	Steamer plying to and from Dublin went ashore but got off again after discharging some cargo.
Dublin River	*William*	10/01/1812	----	Went aground.
Ringsend	Unknown	1760s (Oct.)	----	A severe gale in Dublin Bay wrecked two ships.
Dublin River	*Usk*	8/10/1856	----	This vessel, en route from Dublin to Wexford, became stranded.

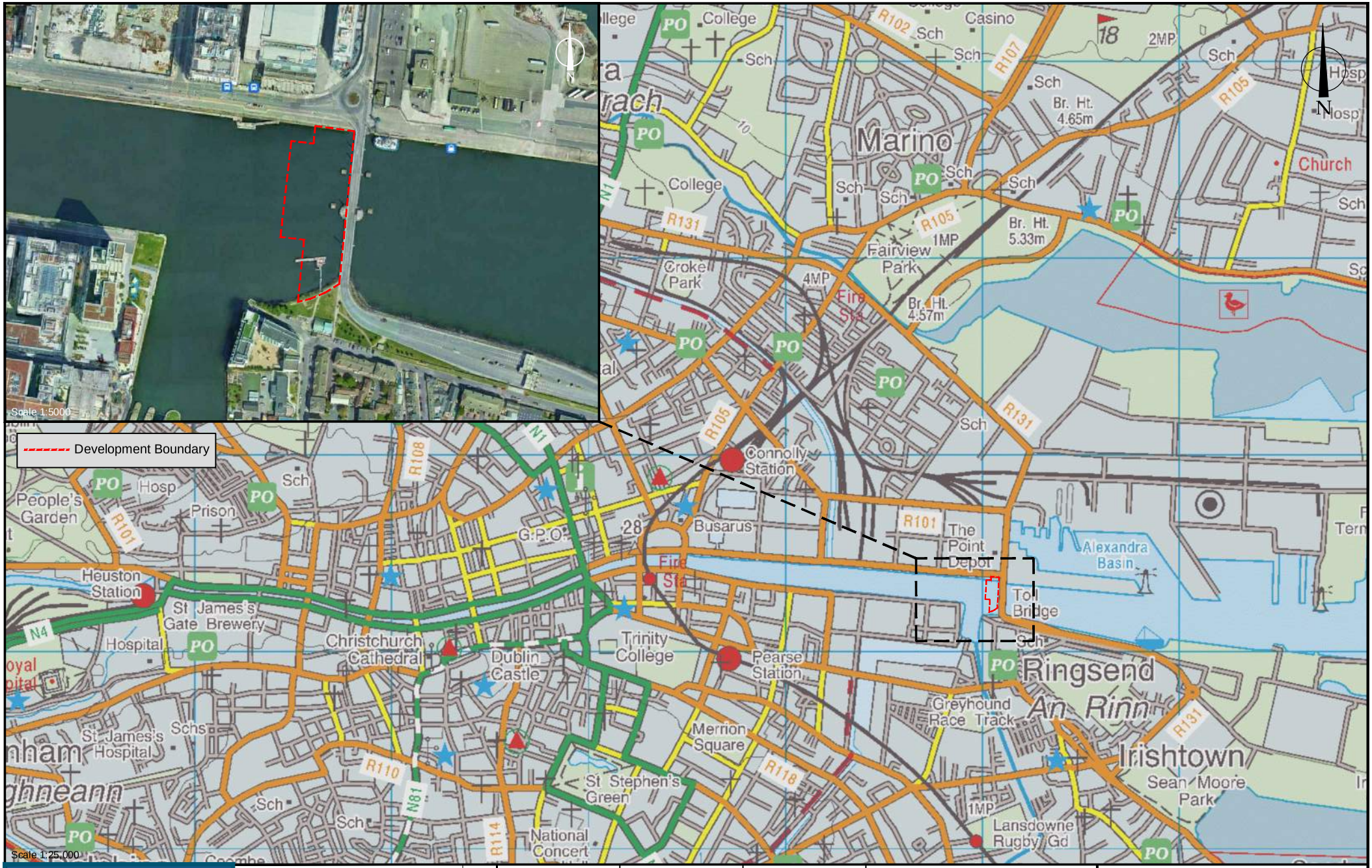
Appendix 3: Artefact Entries from the Topographic Files at the National Museum of Ireland listed for the River Liffey.

Artefact	Find place	NMI Reg. No.	Description
Glass Bead	River Liffey	4042:WK428	Found with other beads and an iron sword pommel
Glass Bead	River Liffey	4041:WK427	Found with other beads and an iron sword pommel
Glass Bead	River Liffey	4034:WK420	Found with other beads and an iron sword pommel
Glass Bead	River Liffey	4034:WK419	Found with other beads and an iron sword pommel
Glass ring	River Liffey	4031:WK417	Found with other beads and an iron sword pommel
Glass Bead	River Liffey	4030:WK416	------
Glass Bead	River Liffey	4029:WK415	------
Iron sword, Sudanese?	River Liffey at Arran Quay	1964:1	Found in the bed of the River Liffey about 10ft out from the edge at Arran Quay. It is Sudanese dating from fourteenth to nineteenth century. Length 100cm, length of blade 88cm, width across cross-guard 15.5cm. The blade is long tapered and flexible tapering to a blunt rounded point.

Appendix 4: Summary of Excavations Bulletin Entries for River Liffey, River Liffey Quays, and the North Wall.

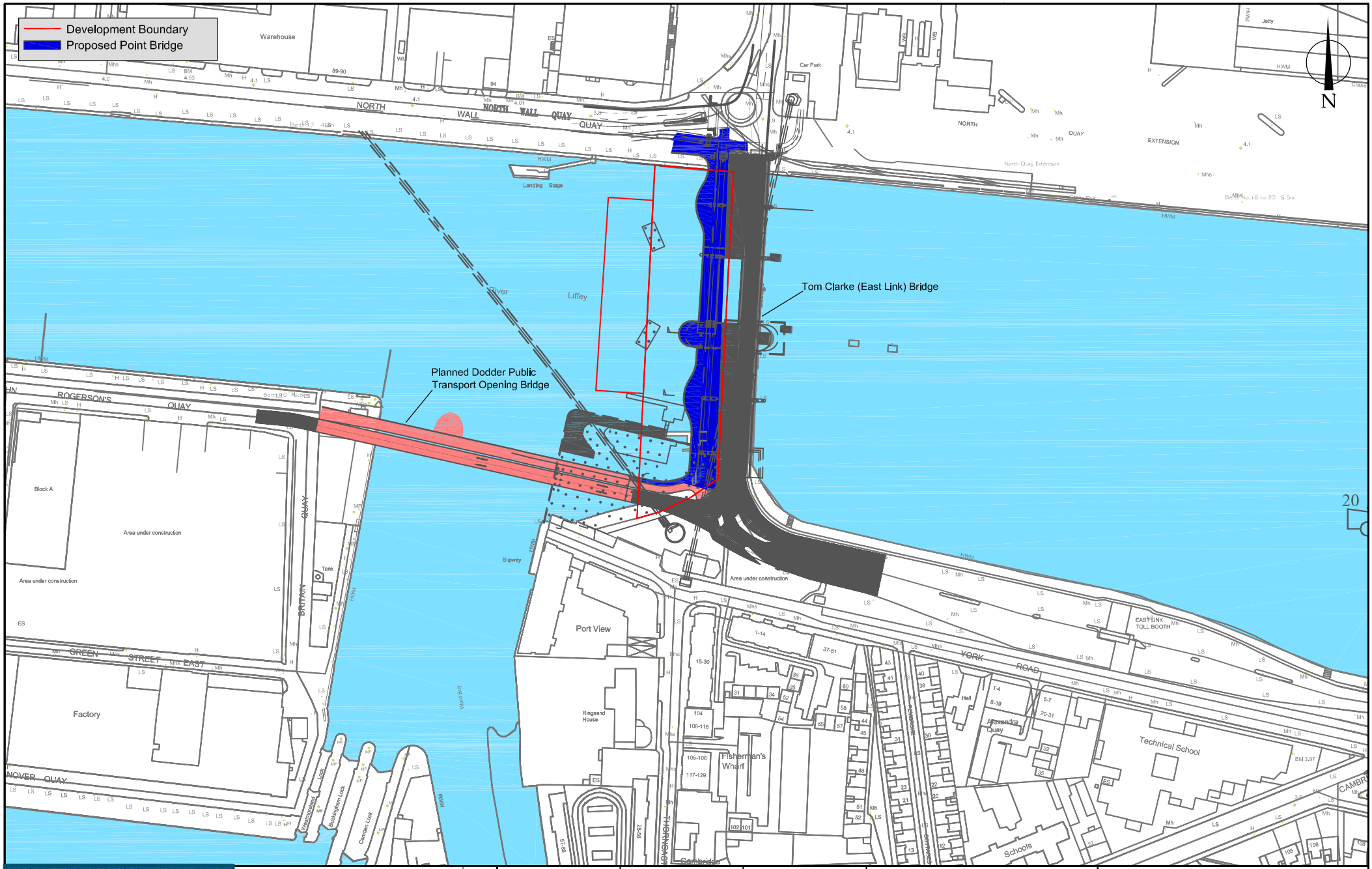
Entry Number	Location	National Grid Reference	Licence Number	Summary Description
2000:0245	River Liffey, Blackhall Place	31413E, 23429N	00E0733	Riverbed with Medieval and later artefacts. Site of eighteenth-century slipway.
2001:365	River Liffey, Blackhall Place	31413E, 23429N	01E0246	Post-medieval/early modern quays
2002:0518	River Liffey, Blackhall Place	31413E, 23429N	01E0246ext.	Post-medieval/early modern quays
2002:0543	River Liffey, Guild Street/Macken Street	------	02E1811	No archaeological significance
2003:509	River Liffey, City Quay/Custom House Quay	31665E, 23440N	03E1060	No archaeological significance
2003:520	River Liffey, Custom House Quay/City Quay	------	03D0363	Riverbed deposits and associated quayside features/walls
2003:527	7–8 Eden Quay, Dublin	31603E, 23447N	SMR 18:20 02E1713	Human skull and 13th–18th-century finds in river gravels.
2002:0516	14–18 Aston Quay	311580E,233435N	02E1621	Urban, eighteenth-century
2003:495	14–18 Aston	31489E, 23336N	02E1621	Urban post-medieval

Entry Number	Location	National Grid Reference	Licence Number	Summary Description
	Quay, Dublin			
2003:509	River Liffey, City Quay/Custom House Quay	31665E, 23440N	03E1060	No archaeological significance
2003:520	River Liffey, Custom House Quay/City Quay	------	03D0363; 03R107	Riverbed deposits and associated quayside features/walls
2003:0576	Spencer Dock, Sheriff Street	317169E, 234711N	03E0654	Post-medieval industrial
2004:0565	Building C, Spencer Dock, North Wall	317169E, 234711N	03E0654	Late Mesolithic fish traps and post-medieval structures
1995:080	8 Ormond Quay Lower, Dublin	31550E, 23430N	95E063	Mid to late seventeenth-century reclamation, eighteenth-century houses
1996:106	22—23 Ormonde Quay, Dublin	31530E, 23420N	96E272	River shoreline up to the seventeenth century when land was reclaimed. Houses are eighteenth century
1997:155	40 Ormond Quay, Dublin	315550E, 234250N	97E013	Urban, eighteenth century
1997:156	15 Ormond Quay Lower, Dublin	315550E, 234250N	97E265	Urban, post-medieval reclamation
1999:222	31A-36 Ormond Quay Ormond Upper/Charles Street West, Dublin	315250E, 234200N	99E0126	Urban post-medieval
2000:280	24–27 Ormond Quay Lower, Dublin	315600E, 234208N	00E0162	Urban post-medieval
2003:520	River Liffey, Custom House Quay/City Quay, Dublin	316650E, 234400N	03D063; 03R107	Riverbed deposits and associated quayside features/walls
2003:527	7–8 Eden Quay, Dublin	316030E, 234470N	02E1713	Human skull in river gravels
2003:562	14 Ormond Quay/11–14 Strand Street, Dublin	315500E, 234300N	03E0964	Urban post medieval
2003:563	14 Ormond Quay/11–14 Strand Street, Dublin	31550E, 23430N	03E0964 ext.	Urban post-medieval
2004:0569	31-36 Ormond Quay Upper/Ormond Place/Charles Street West/Ormond Square, Dublin	31540E, 234230N	04E1206	Urban post-medieval



ADCO	**Notes** Source: Main- OSi Discovery Series (1:50,000) mapping Inset- Satellite Image (image gathered 20.04.2020)	A4	**Job/Exc No.** 22D0070, 22R0234	**Compiled by** R.Bangerter	**CAD reference** Point_Bridge	**Client** Roughan & O'Donovan/ Dublin City Council
			Date 10.10.22	**Scale** 1: 25,000/ 1:5000	**Drawing No.** Figure 1	**Project** UAIA, River Liffey, Point Bridge Project

Title
Figure 1- Extract from OS Discovery Series Map showing location of proposed bridge development on the upstream side of the Tom Clarke (East-link) Bridge.



ADCO

Notes
Source: Project drawing PTCB-ROD-GEN-AE-M2-2m-200002 Project Extent superimposed on OS Background Mapping.

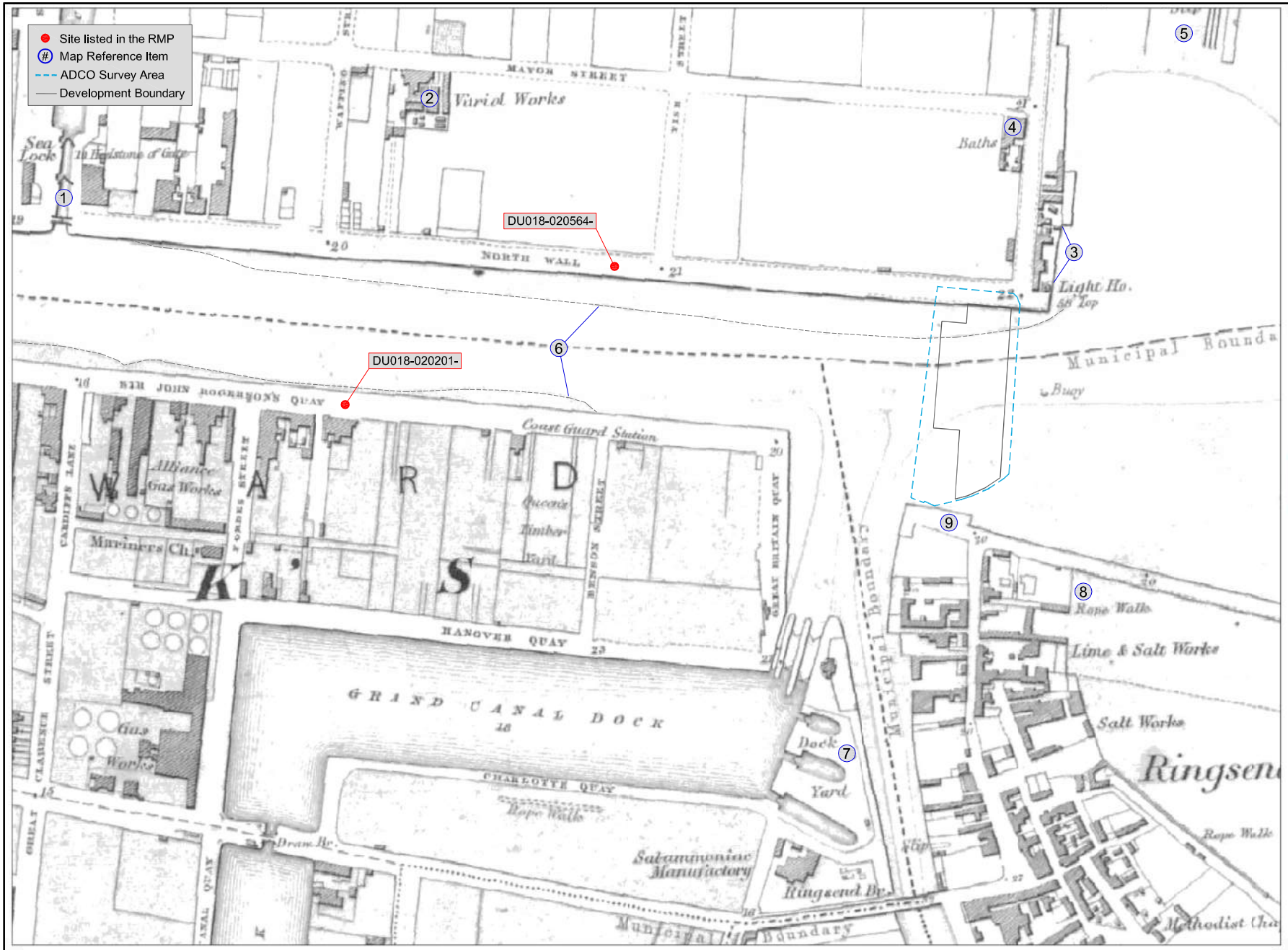
A4

Job/Exc No. 22D0070, 22R0234	**Compiled by** R.Bangerter	**CAD reference** Point_Bridge	**Client** Roughan & O'Donovan/ Dublin City Council
Date 10.10.22	**Scale** 1:2500	**Drawing No.** Figure 2	**Project** UAIA, River Liffey, Point Bridge Project

Title
Figure 2- Extent of proposed bridge development superimposed on OS Background Mapping.

Notes Source: biliotecdigitalhispanica.bne.es	A4	**Job/Exc No.** 22D0070, 22R0234	**Compiled by** R.Bangerter	**CAD reference** Point_Bridge	**Client** Roughan & O'Donovan/ Dublin City Council
		Date 10.10.22	**Scale** 1:10,000	**Drawing No.** Figure 3	**Project** UAIA, River Liffey, Point Bridge Project

Title
Figure 3- Extract from John Roque's map of 1756, *'A Survey of the City, Harbour, and Environs of Dublin'*, with approximate location of Development Boundary & ADCO Survey Area superimposed.



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Notes
Source: OSi Historic Map Archive.

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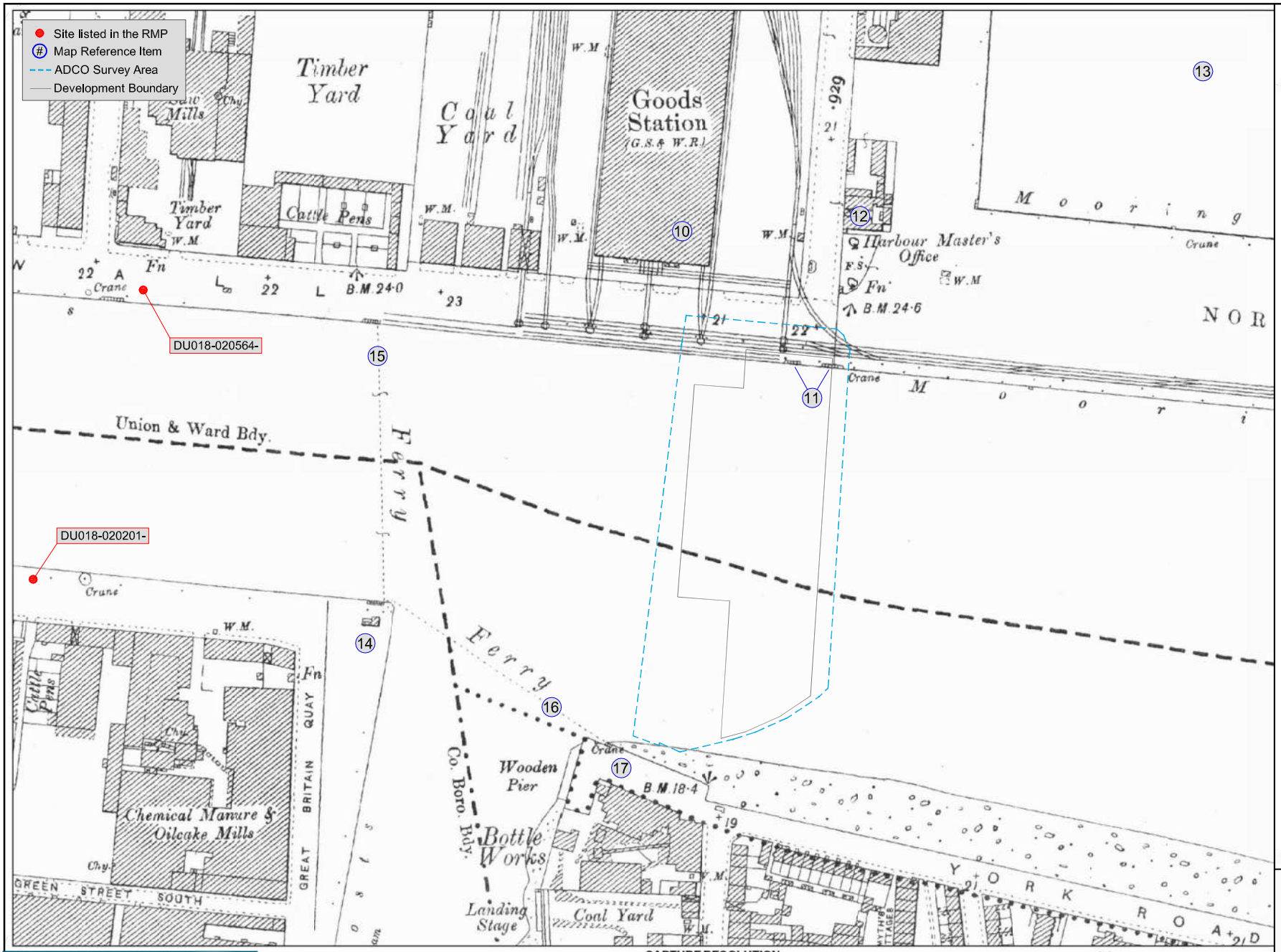
Job/Exc No. 22D0070, 22R0234	**Compiled by** R.Bangerter	**CAD reference** Point_Bridge	**Client** Roughan & O'Donovan/ Dublin City Council	**Title** Figure 4- Extract from OS First Edition (1837) map with Development Boundary, ADCO Survey Area, and Map Reference Items superimposed.
Date 10.10.22	**Scale** 1:5000	**Drawing No.** Figure 4	**Project** UAIA, River Liffey, Point Bridge Project	



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Notes
Source: OSi Historic Map Archive.

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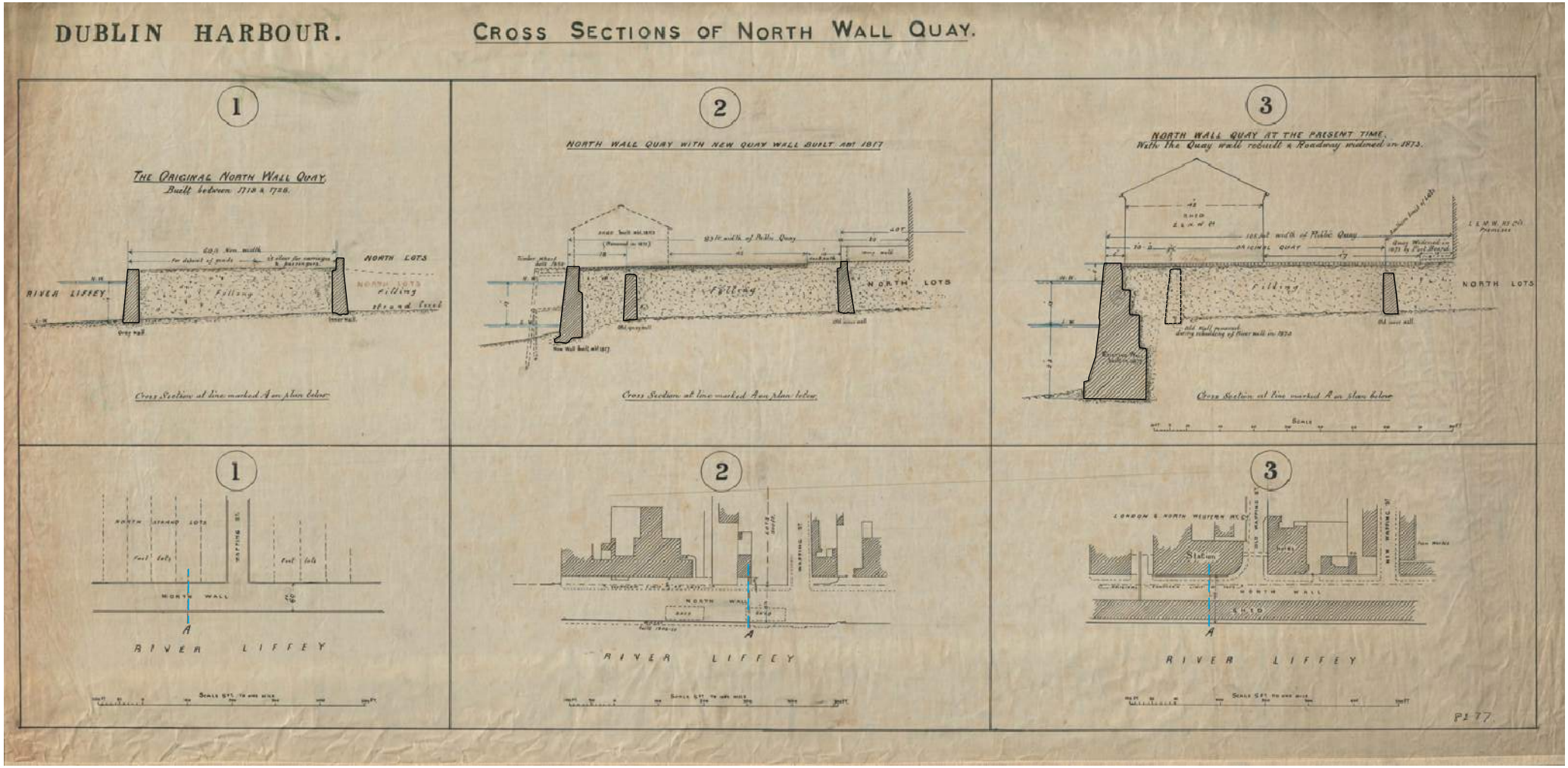
Date 10.10.22	**Scale** 1:2500	**Drawing No.** Figure 5	**Project** UAIA, River Liffey, Point Bridge Project

Title
Figure 5- Extract from OS 25-inch Edition (1906-09) map with Development Boundary, ADCO Survey Area, and Map Reference Items superimposed.

DPC Archive Drawing No. 8277



1 — *The Original North Wall Quay, built between 1718 and 1826*

2 — *North Wall Quay with New Quay built about 1817*

3 — *North Wall Quay at the Present Time, with the Quay Wall and Roadway Rebuilt and Widened in 1873*

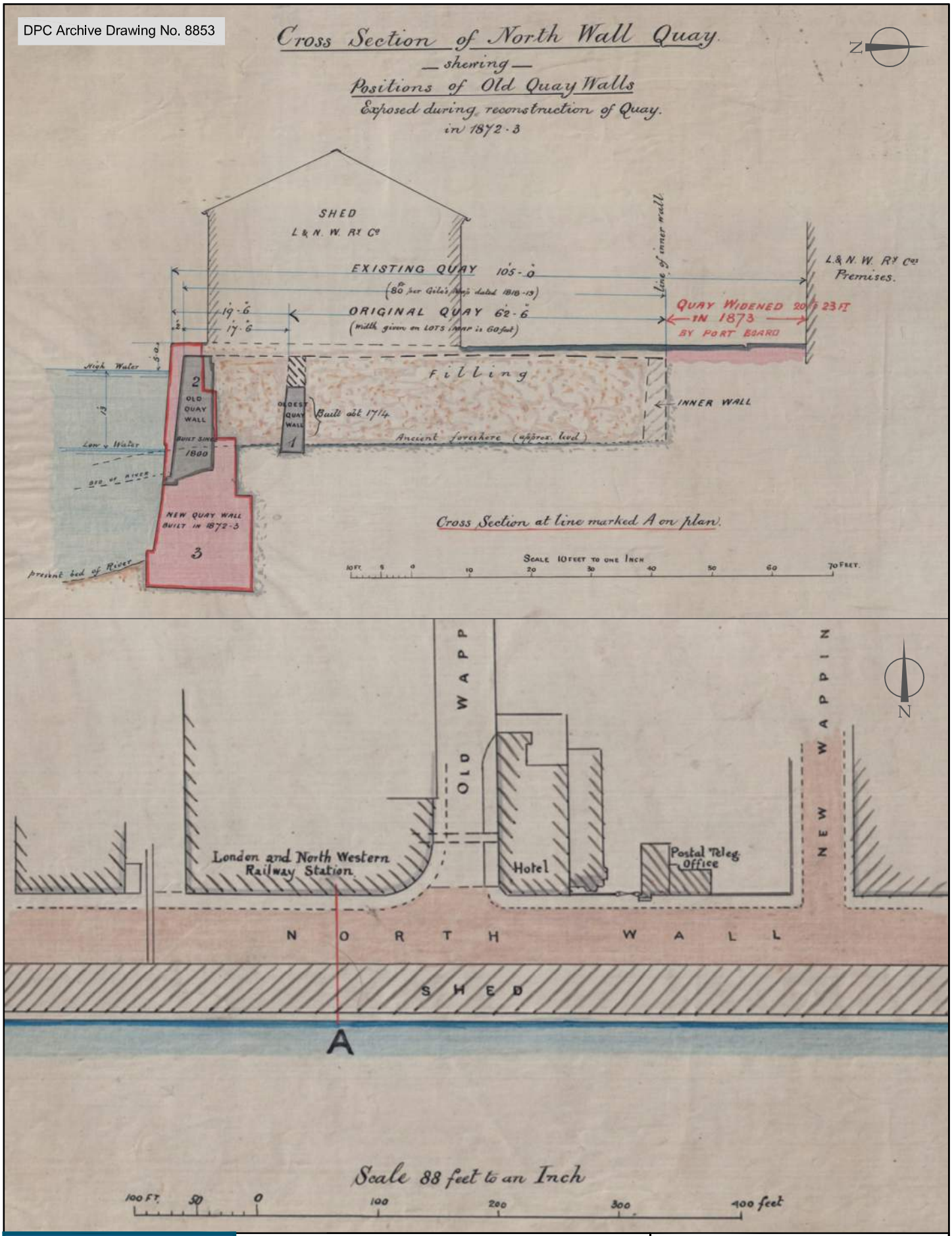
ADCO	**Notes** Source: Dublin Port Company (DPC), Dublin Port Archive- Drawing No. 8277. [drawing adapted by ADCO to enhance a number of drawing details].	A4	**Job/Exc No.** 22D0070, 22R0234	**Compiled by** R.Bangerter	**CAD reference** Point_Bridge
			Date 10.10.22	**Scale** 1:500/ as shown	**Drawing No.** Figure 6

Client Roughan & O'Donovan/ Dublin City Council

Project UAIA, River Liffey, Point Bridge Project

Title Figure 6- Engineer's Drawing (early 1900s) showing construction phases along the North Wall Quay.

DPC Archive Drawing No. 8853



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Client
Roughan & O'Donovan/ Dublin City Council

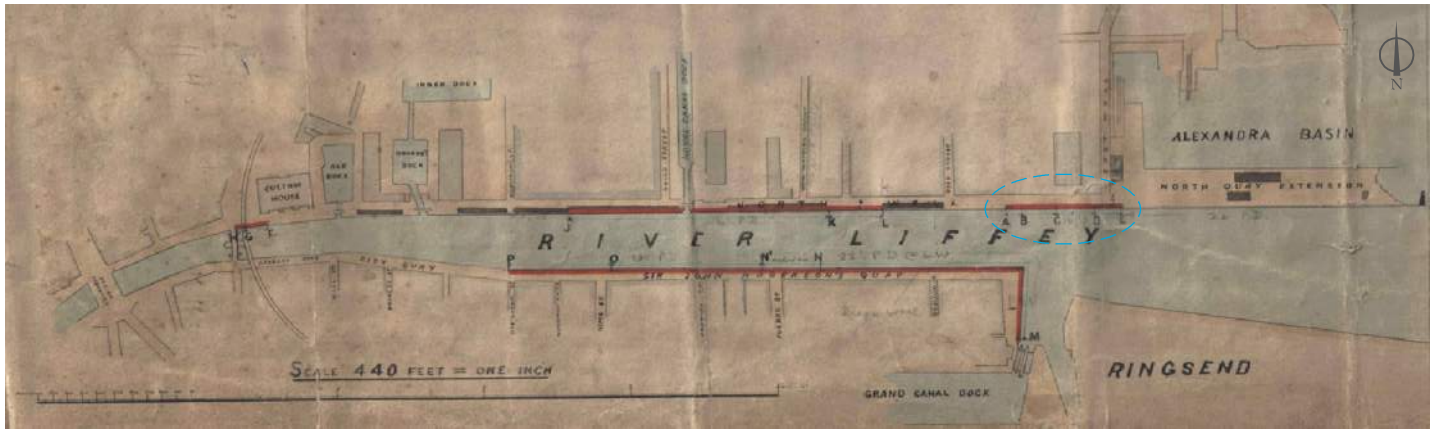
Notes
Source: Dublin Port Company (DPC), Dublin Port Archive- Drawing No. 8853.

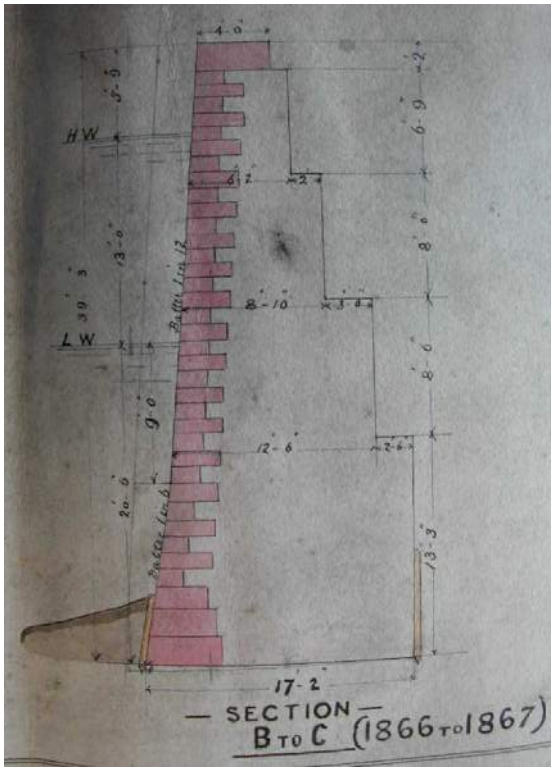
A4

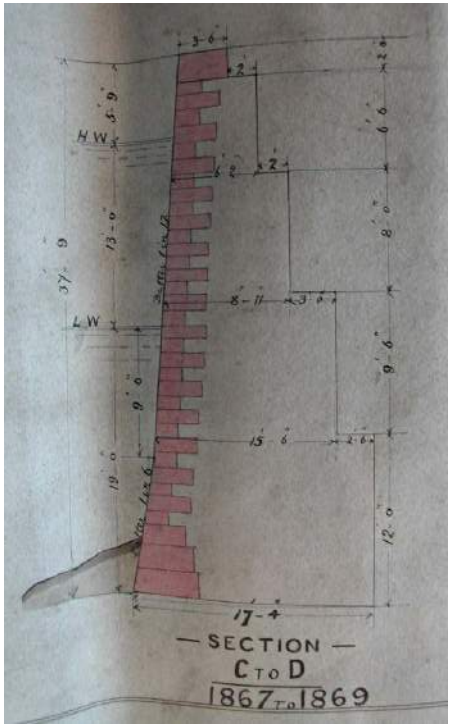
Title
Figure 7- Extract from Engineer's Drawing entitled *'Cross Section of North Wall Quay showing Positions of Old Quay Walls, exposed during reconstruction of Quay in 1872-3'*.

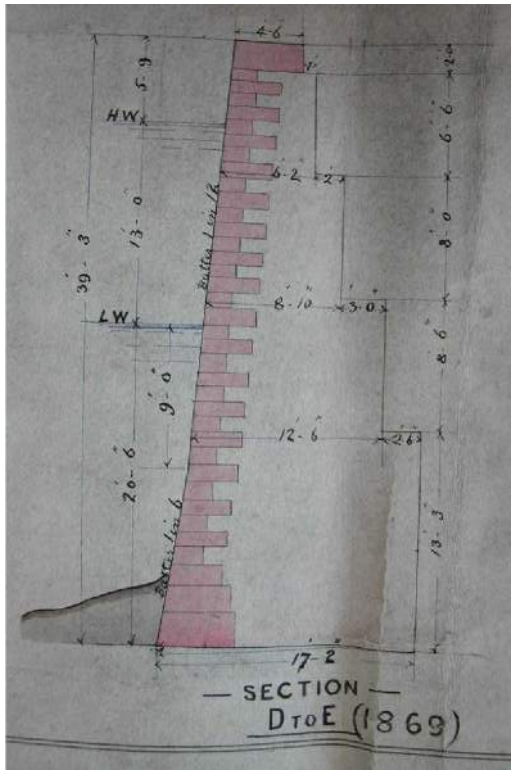
Project	Job/Exc No.	Compiled by	CAD reference	Date	Scale	Drawing No.
UAIA, River Liffey, Point Bridge Project	22D0070, 22R0234	R.Bangerter	Point_Bridge	10.10.22	Top- 1:220 Bottom- 1:1000	Figure 7

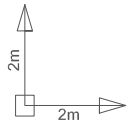
DPC Archive Drawing No. 7199











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Notes
Source: Dublin Port Company (DPC), Dublin Port Archive- Drawing No. 7199. [drawing adapted by ADCO].

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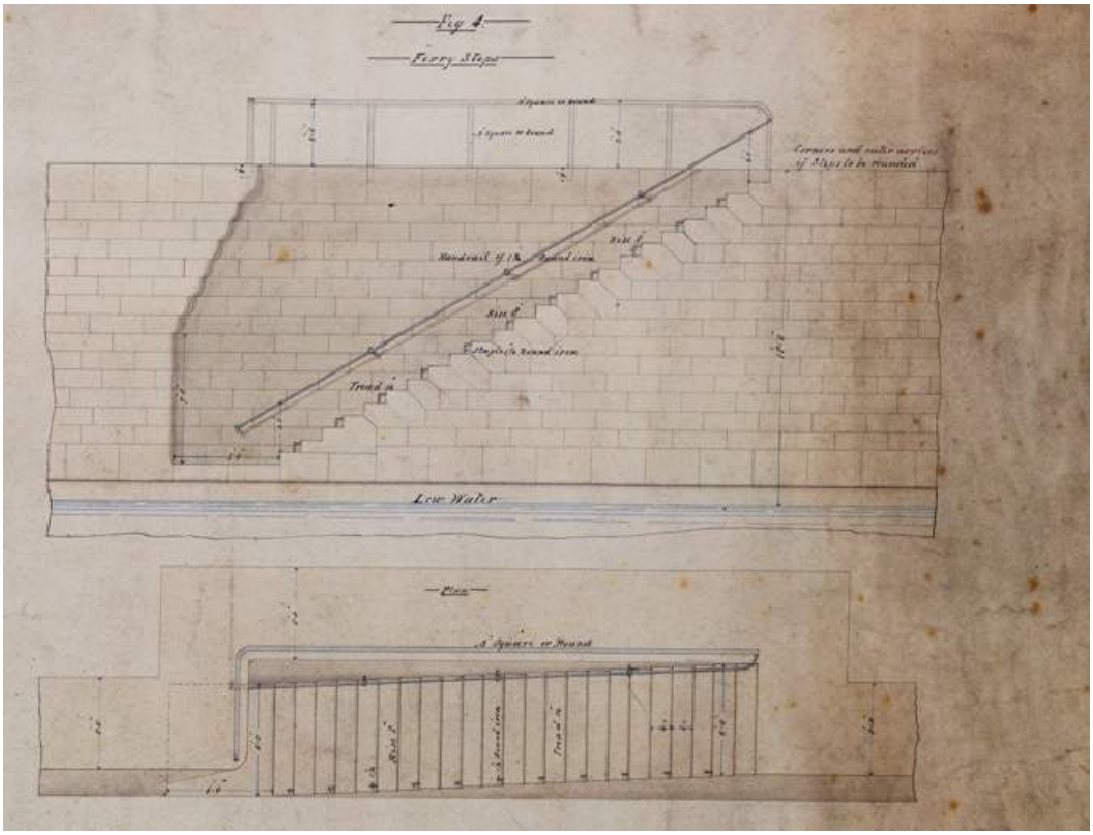
Job/Exc No. 22D0070, 22R0234	**Compiled by** R.Bangerter	**CAD reference** Point_Bridge	**Client** Roughan & O'Donovan/ Dublin City Council	**Title** Figure 8- Extracts from nineteenth-century Engineer's Drawing showing a series of cross-sections through the downstream terminus of North Wall Quay (1865-1869).
Date 10.10.2022	**Scale** 1:150/ 1:1250	**Drawing No.** Figure 8	**Project** UAIA, River Liffey, Point Bridge Project	

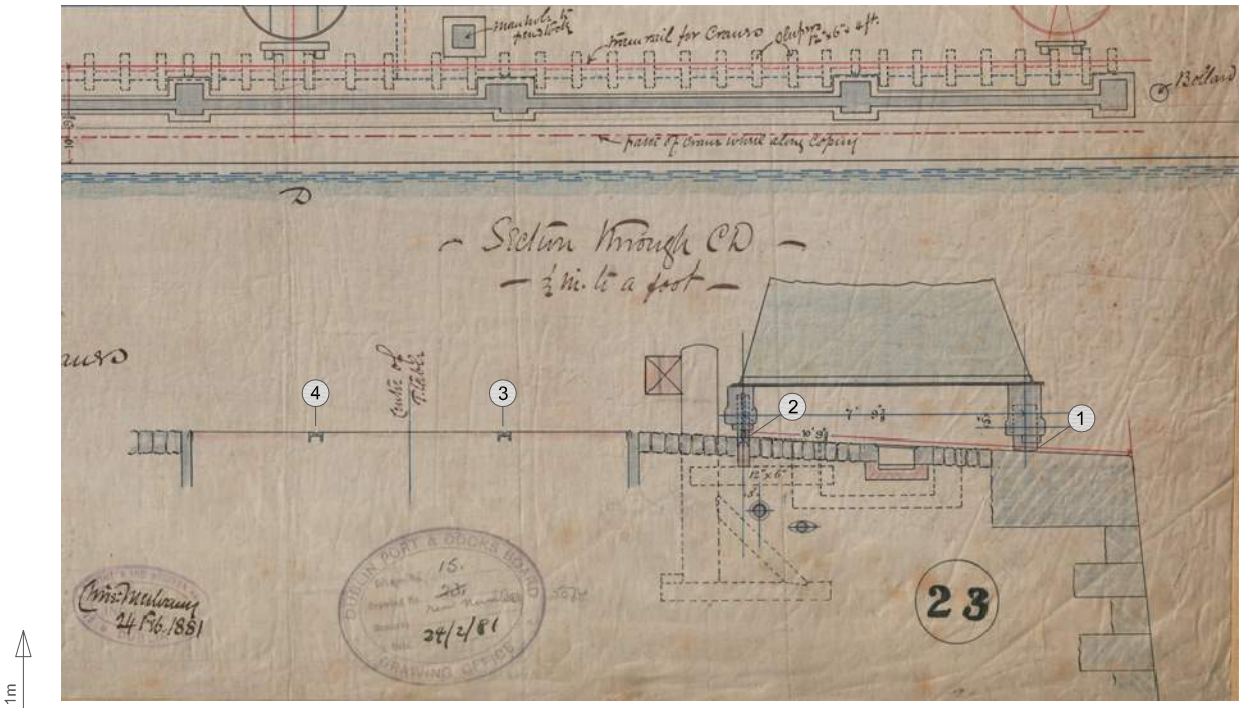
A

DPC Archive Drawing No. 5F.BBS



B

DPC Archive Drawing No. 5074



ADCO

Client
Roughan & O'Donovan/ Dublin City Council

Notes
Source:
[A] Dublin Port Company (DPC), Dublin Port Archive- Drawing No. 5F.BBS
[extract from '*North Quay Deepening Steam Berths, B.B. Stoney, 1870*']

[B] Dublin Port Company (DPC), Dublin Port Archive- Drawing No. 5074
[extract from '*North Wall Goods Terminus: Dublin, Arrangement of Rail in Connexion with Traveling Cranes, Chris Mulrany, 1881*']

A4

Title
Figure 9- Extracts from Engineer's Drawing showing:

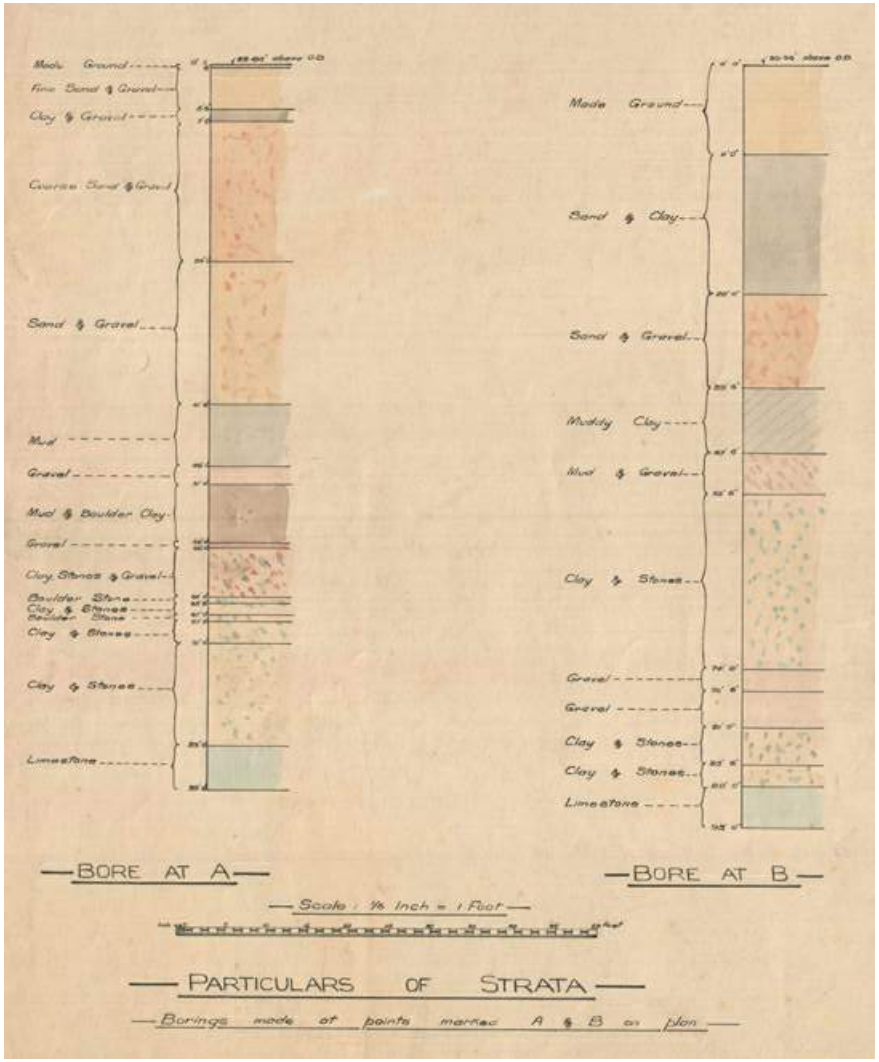
A- Design of River Access Steps (annotated '*Ferry Steps*') placed along the North Wall Quay.

B- Track arrangement for Traveling Cranes placed along downstream section of North Wall Quay.

Project	**Job/Exc No.**	**Compiled by**	**CAD reference**	**Date**	**Scale**	**Drawing No.**
UAIA, River Liffey, Point Bridge Project	22D0070, 22R0234	R.Bangerter	Point_Bridge	11.10.22	Top- 1:125 Bottom- 1:65	Figure 9

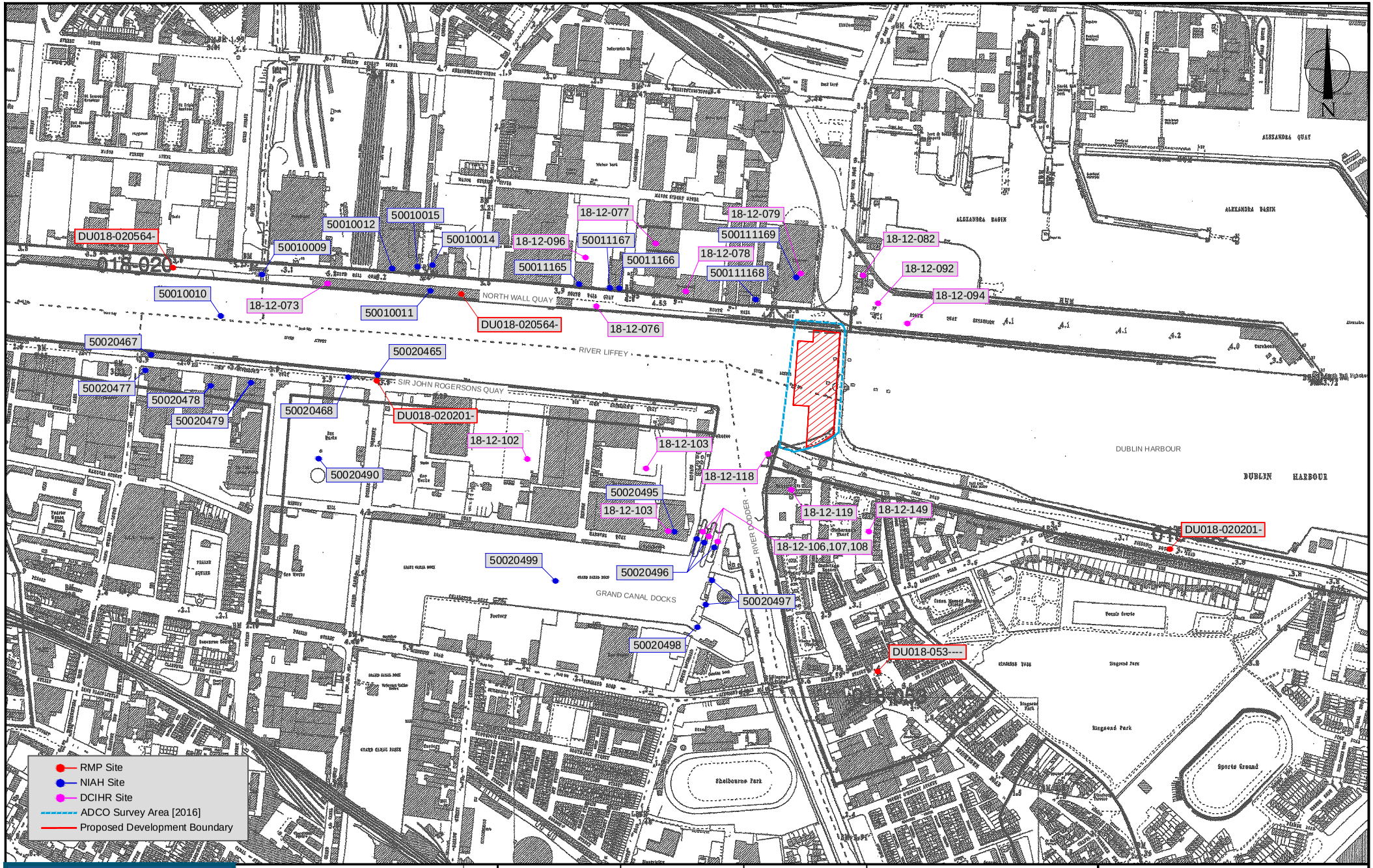
DPC Archive Drawing No. 1014a

Location Plan



Borehole Data

ADCO	**Notes** Source: Dublin Port Company (DPC), Dublin Port Archive- Drawing No. 1014 (Sheet 1). [Drawing adapted from '*Dublin Port and Docks Board, Proposed Subway Under River Liffey*', J. Mallagh, 1925].	A4	**Job/Exc No.** 22D0070, 22R0234	**Compiled by** R.Bangerter	**CAD reference** Point_Bridge	**Client** Roughan & O'Donovan/ Dublin City Council	**Title** Figure 10- Engineer's Drawing (1925) showing proposed subway under the River Liffey.
			Date 11.10.22	**Scale** 1:1000/ 1:250	**Drawing No.** Figure10	**Project** UAIA, River Liffey, Point Bridge Project	



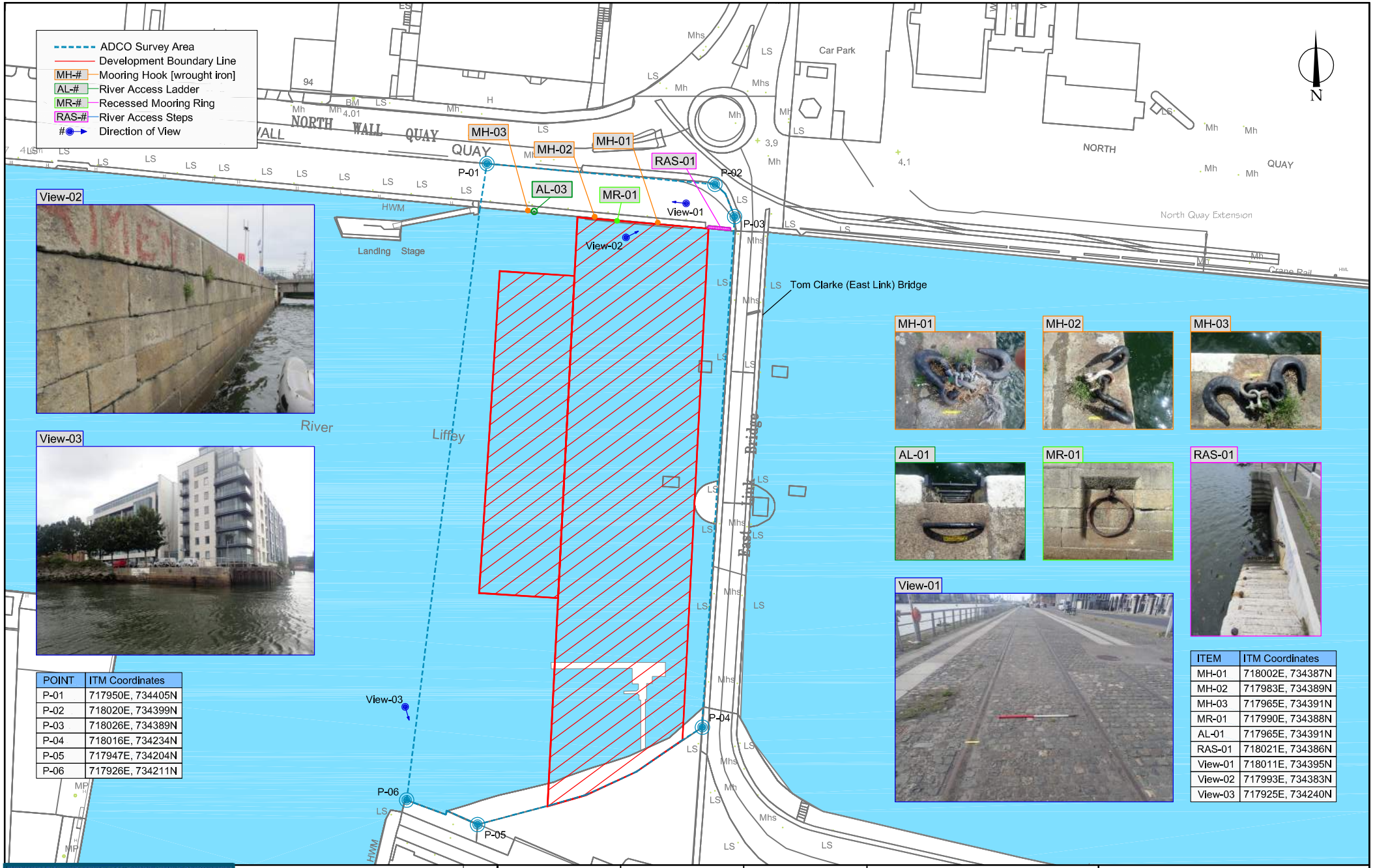
ADCO

Notes
Source: Archaeological Survey of Ireland (1998), Dublin Sheet 3264 [Ordnance Survey, 1:5000, Composite Series map].

A4

Job/Exc No. 22D0070, 22R0234	**Compiled by** R.Bangerter	**CAD reference** Point_Bridge	**Client** Roughan & O'Donovan/ Dublin City Council
Date 11.10.22	**Scale** 1:7500	**Drawing No.** Figure 11	**Project** UAIA, River Liffey, Point Bridge Project

Title
Figure 11- RMP Map extract with Development Boundary and surrounding Cultural Heritage Assets superimposed.



View-02

View-03

MH-01

MH-02

MH-03

AL-01

MR-01

RAS-01

View-01

POINT	ITM Coordinates
P-01	717950E, 734405N
P-02	718020E, 734399N
P-03	718026E, 734389N
P-04	718016E, 734234N
P-05	717947E, 734204N
P-06	717926E, 734211N

ITEM	ITM Coordinates
MH-01	718002E, 734387N
MH-02	717983E, 734389N
MH-03	717965E, 734391N
MR-01	717990E, 734388N
AL-01	717965E, 734391N
RAS-01	718021E, 734386N
View-01	718011E, 734395N
View-02	717993E, 734383N
View-03	717925E, 734240N

ADCO

Notes
Source: survey information superimposed on OS Background Mapping.

[see Figures 13-16 for quay wall elevations]

A4

Job/Exc No. ADCO022/031

Compiled by R.Bangerter

CAD reference Point_Bridge

Client ROD Consulting Engineers/ Dublin City Council

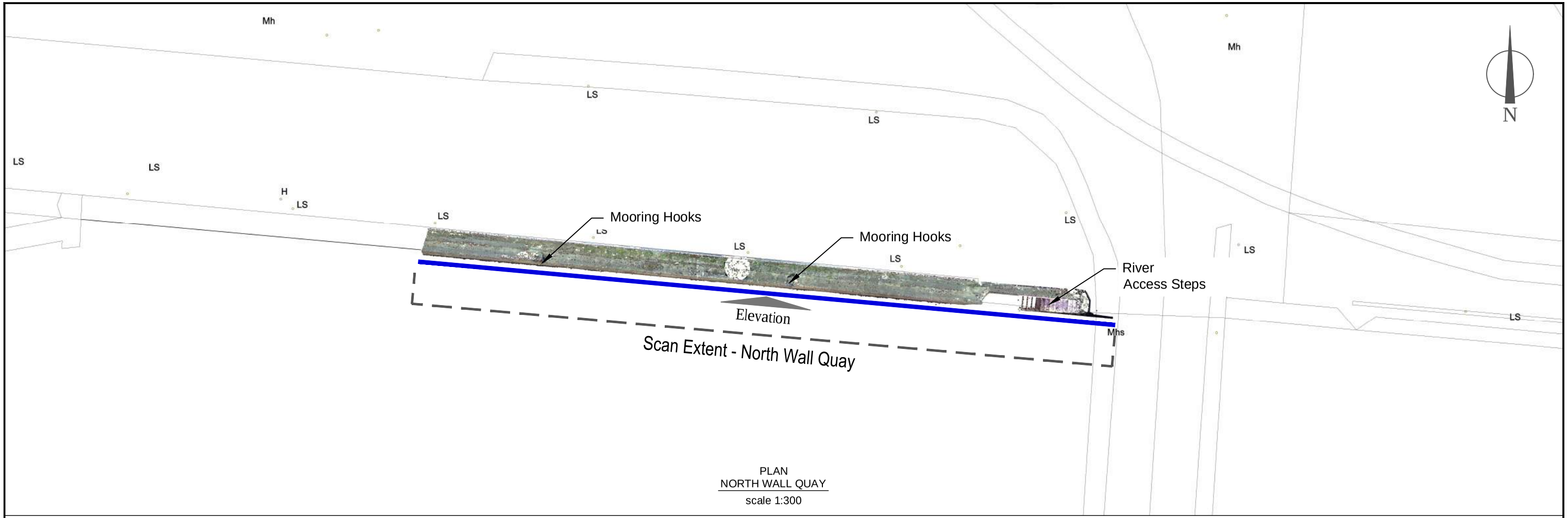
Date 11.10.2022

Scale 1:2500

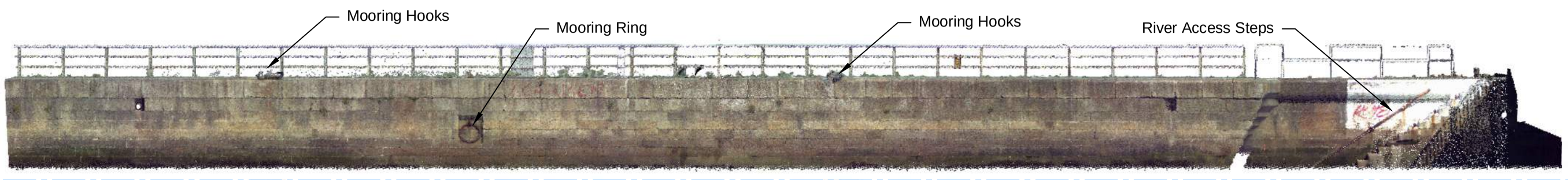
Drawing No. Figure 12

Project UAIA, Point Bridge Project

Title
Figure 12- OS Background Mapping with Development Boundary, ADCO Survey Area, and location of selected quayside features superimposed.



PLAN
NORTH WALL QUAY
scale 1:300



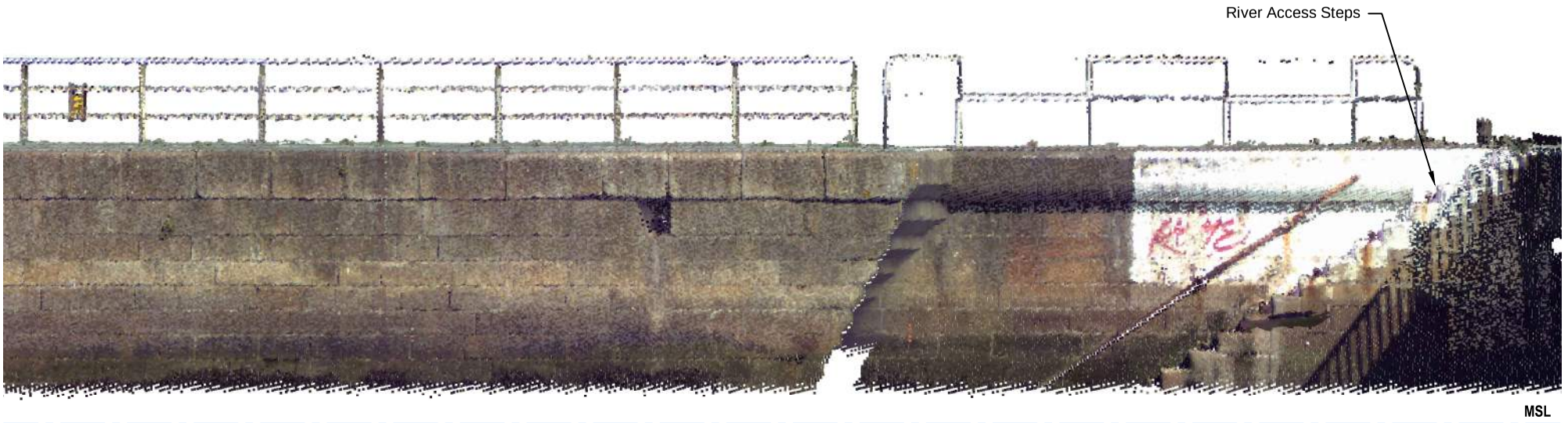
ELEVATION
NORTH WALL QUAY
scale 1:150

ADCO

Notes
Survey Performed using RTK GNSS, Scanning Total Station and handheld Laser Scanner
(Not to be used for engineering measurements)

A3

Job/Exc No. 22D0070/ 22R0234	**Produceded by** D. Copeland	**CAD reference** Point_Bridge	**Client** Roughan & O'Donovan / Dublin City Council	**Title** Figure 13 - Point Cloud Plan and Elevation, North Wall Quay
Date 13.10.22	**Scale** Varies	**Drawing No.** Figure 13	**Project** UAIA, River Liffey, Point Bridge Project.	



ELEVATION
NORTH WALL QUAY IMPACT AREA
scale 1:75

Notes Survey performed using RTK GNSS and Scanning Total Station and Handheld Laser Scanner	A4	**Job/Exc No.** 22D0070 / 22R0234	**Produced by** D. Copeland	**CAD reference** Point_Bridge	**Client** Roughan & O'Donovan / Dublin City Council
		Date 14.10.22	**Scale** 1:75	**Drawing No.** Figure 14	**Project** UAIA, River Liffey, Point Bridge Project.

Title Figure 14 - Point Cloud Elevation of North Wall quay, centred on proposed bridge impact location.

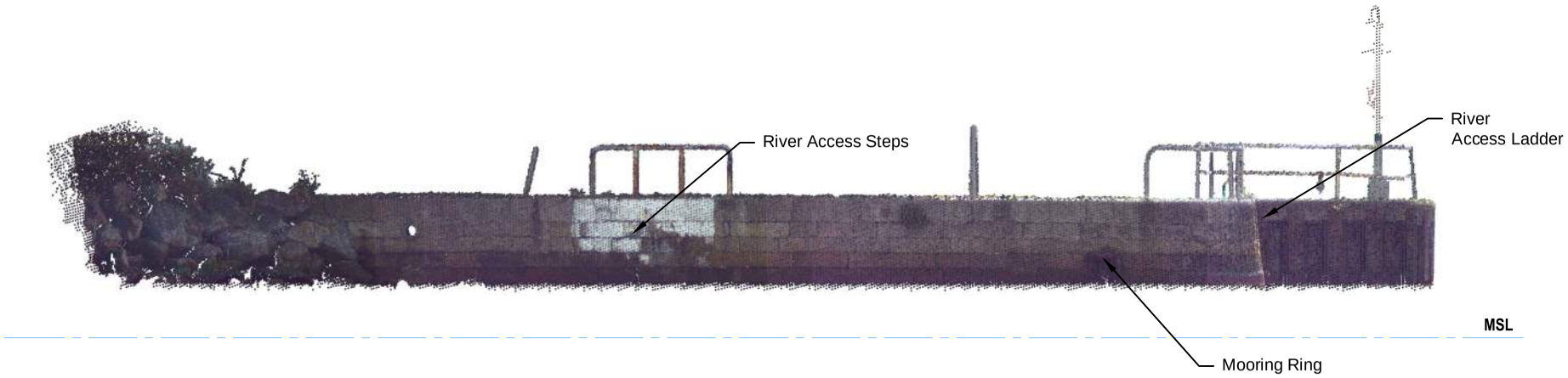
ORIGINAL SIZE – A4 50mm 20mm

SW PERSPECTIVE VIEW
RIVER ACCESS STEPS

NTS

ADCO	**Notes** Survey performed using RTK GNSS and Scanning Total Station and Handheld Laser Scanner	A4	**Job/Exc No.** 22D0070 / 22R0234	**Produceded by** D. Copeland	**CAD reference** Point_Bridge	**Client** Roughan & O'Donovan / Dublin City Council	**Title** Figure 15 - Point Cloud perspective view of River Access Steps located at the downstream terminus of North Wall Quay.
			Date 13.10.22	**Scale** NTS	**Drawing No.** Figure 15	**Project** UAIA, River Liffey, Point Bridge Project.	

ORIGINAL SIZE – A4 | 50mm | 20mm



ELEVATION
UNNAMED QUAY
NTS

ADCO	**Notes** Survey performed using RTK GNSS and Scanning Total Station and Handheld Laser Scanner	A4	**Job/Exc No.** 22D0070 / 22R0234	**Produced by** D. Copeland	**CAD reference** Point_Bridge	**Client** Roughan & O'Donovan / Dublin City Council
			Date 13.10.22	**Scale** NTS	**Drawing No.** Figure 16	**Project** UAIA, River Liffey, Point Bridge Project.

Title Figure 16 - Point Cloud view of Unnamed Quay, located on the south side of the river assessment area.

ORIGINAL SIZE – A4 50mm 20mm

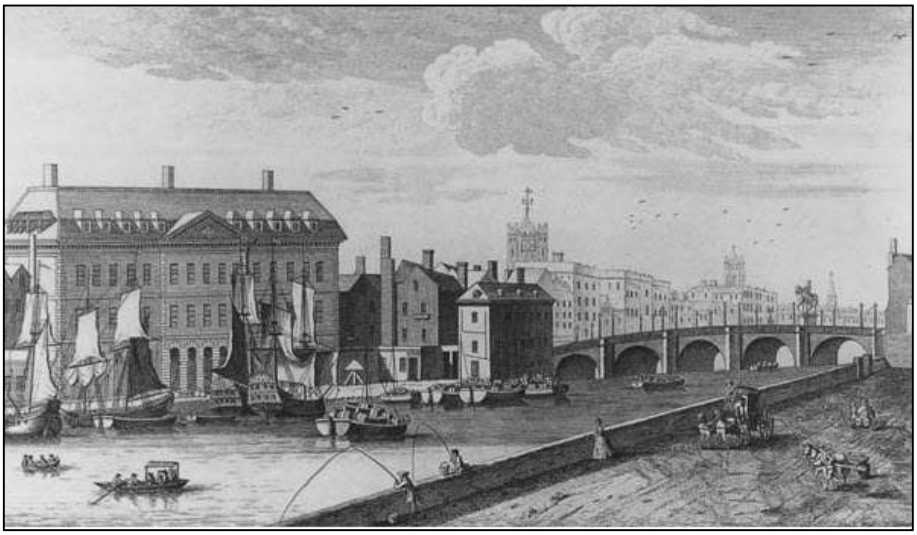


Plate 1: Extract from a print by Joseph Tudor (*c.* 1750) entitled *'A Prospect of Custom House quay and Essex Bridge, Dublin.'*

Plate 2: Extract from Rocque's map an '*Exact Survey of the City and Suburbs of Dublin*', dated 1760.

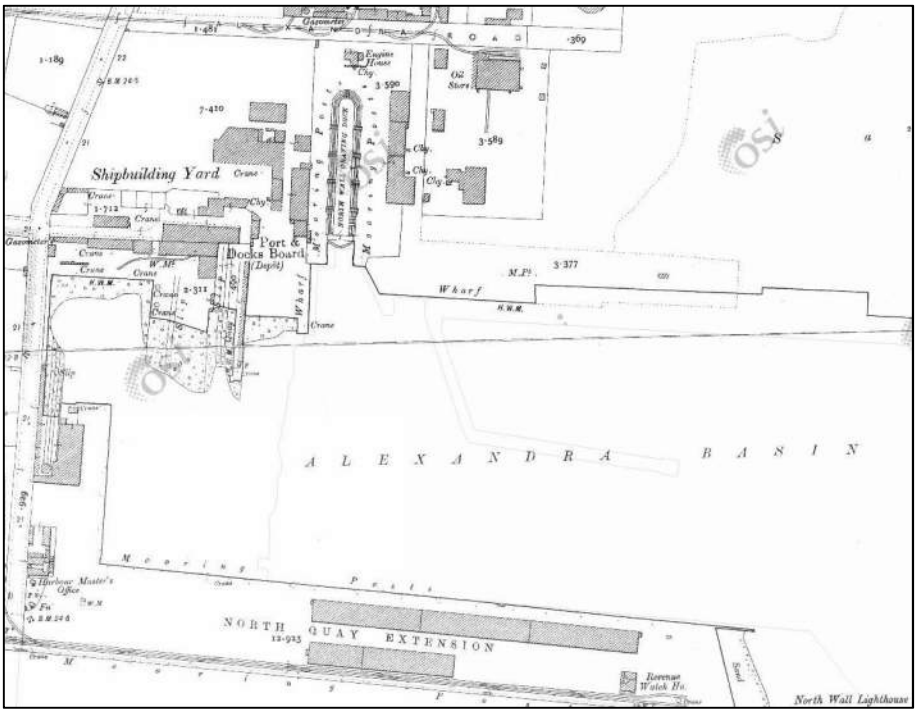


Plate 3: Extract from OS-25-inch map showing Alexandra Basin.

Plate 4: Working shot of diver undergoing dive-checks prior to entering the water.

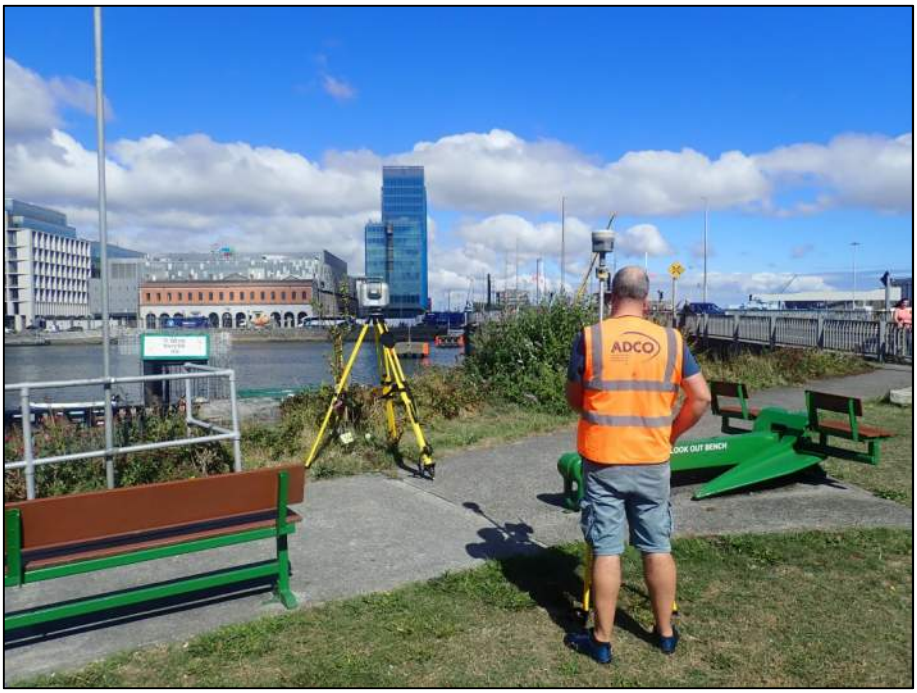


Plate 5: North-facing working shot of Laser-scan and GNSS survey in progress.

Plate 6: North-northeast facing view of the downstream terminus of the North Wall Quay.

Plate 7: West-facing view along top of the North Wall Quay, showing large granite capping stones and section of crane-rail located behind (1m scale).

Plate 8: East-facing view of masonry forming the quay wall (North Wall Quay), shot taken from a point *c.* 33m upstream of Tom Clarke Bridge.

Plate 9: Mooring hook (MH01), located at ITM 718002E, 734387N (150mm scale).

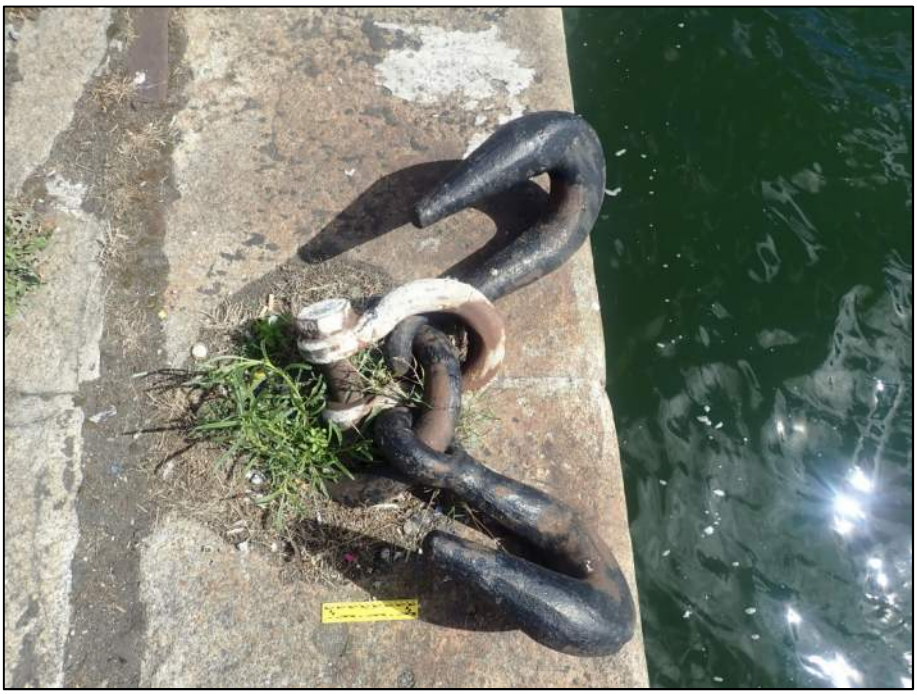


Plate 10: Mooring hook (MH02), located at ITM 717983E, 734389N (150mm scale).

Plate 11: Mooring hook (MH03), located at ITM 717965E, 734391N (150mm scale).

Plate 12: Recessed river access ladder (AL01), located at ITM 717965E, 734391N (150mm scale).

Plate 13: Recessed mooring ring (MR01), located at ITM 717990E, 734388N.

Plate 14: North-west facing view of recessed mooring ring (MR01).

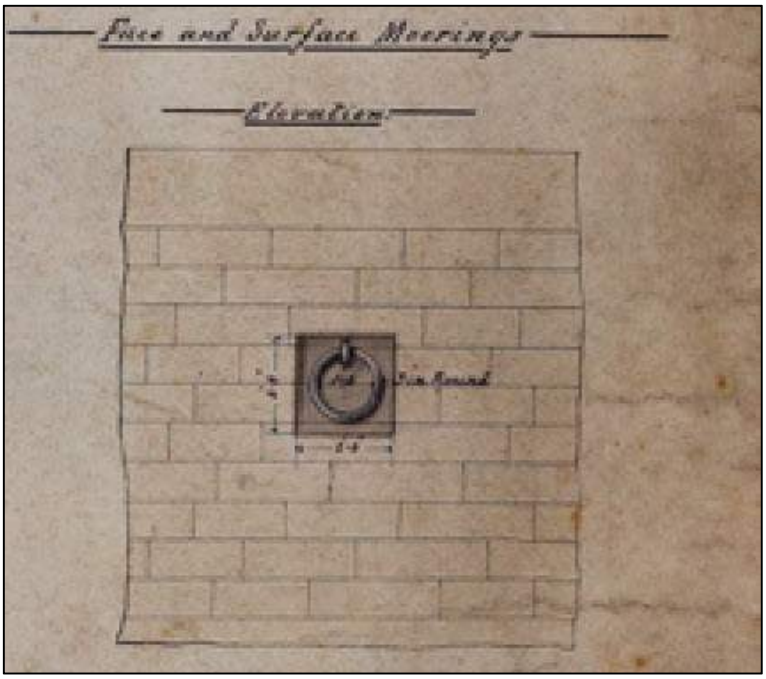


Plate 15: Extract from nineteenth-century drawing showing design of recessed mooring rings along the North Wall Quay (DPC, Dublin Port Archive, Drawing No. 7199, '*Cross Sections of River Quay Walls*').

Plate 16: West-facing view of river access steps (RAS01), located immediately upstream of Tom Clarke Bridge.

Plate 17: Detail shot showing example of boat tie-off fitting, inset into every second step (150mm scale).

Plate 18: West-facing view of bullnose terminus to cascading masonry on the upstream side of river access steps (RAS01).

Plate 19: West-facing view along *campshire* at North Wall Quay, note iron-rails associated with goods carriages (1m scale).

Plate 20: South-facing view of the visible remains of nineteenth-century quay located on south side of the River Liffey, adjacent to Thorncastle Court.

Plate 21: East-facing view along rock-armour that delineates the southern shoreline on the upstream side of Tom Clarke Bridge (1m scale).

Plate 22: East-facing view at point where the unnamed quay becomes buried within area of reclamation (1m scale).

Plate 23: South-facing view of masonry quay wall and associated mooring ring, located at ITM 717924E, 734211N.

Plate 24: Southeast-facing view of a flight of river assess steps located at ITM 717932E, 734208N.

Plate 25: Mooring bollard located at ITM 717928E, 734209N (150mm scale).

Plate 26: Partial remains of a derrick or similar lifting structure, inset into capstone area of quay wall (1m scale).

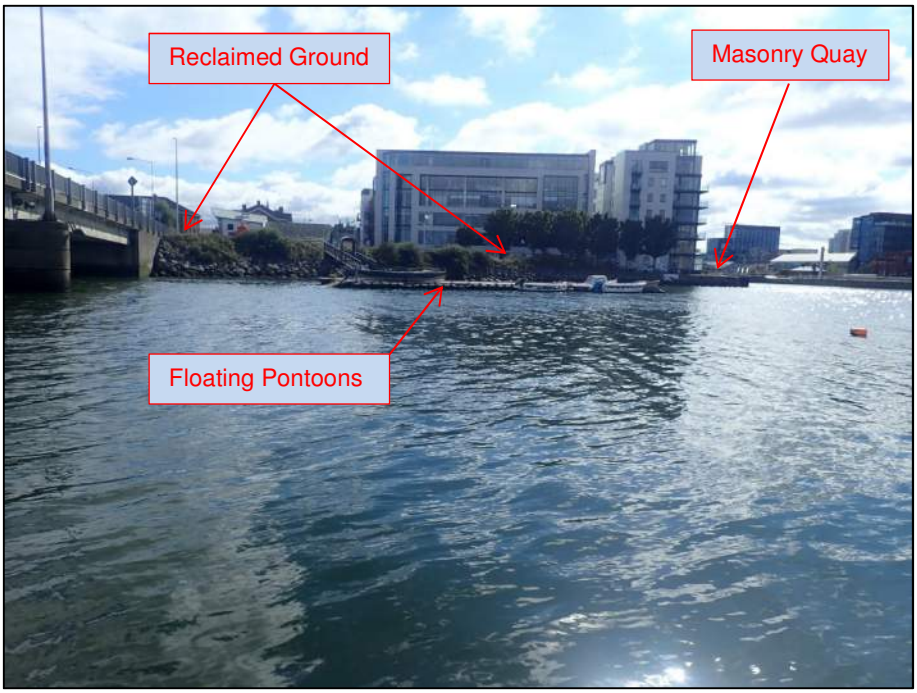


Plate 27: South-facing view of southern side of river, taken from a point 10m upstream of the bascule pier at Tom Clarke Bridge.

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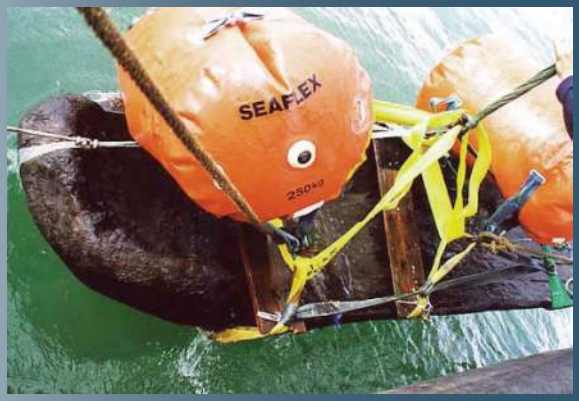

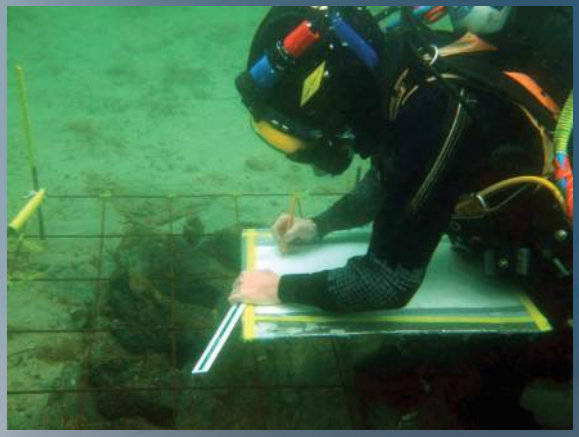

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ADCO Ltd.
Church Terrace, Bray
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www.adco-ie.com
info@adco-ie.com
+353 (0) 1 908 1541