Grand Canal Storm Water Outfall Extension - Natura Impact Statement

Technical Report (FINAL)

May 2022

Project number: 2020s1036

Comhairle Cathrach Bhaile Átha Cliath
Dublin City Council

UISCE ÉIREANN : IRISH WATER

JBA Project Manager

Bernadette O'Connell
Block 660, Unit 8
Greenogue Business Plaza
Greenogue Business Park
Rathcoole
DUBLIN

Revision History

Revision Ref / Date Issued	Amendments	Issued to
S3-P01 / 26-02-2021	Draft Report	JB Barry and Partners Ltd
S3-P01 / 10-12-2021	2nd Draft	JB Barry and Partners Ltd
S3-PO2/ 24/05/2022	3rd Draft	JB Barry and Partners Ltd

Contract

This report was commissioned by J. B. Barry and Partners Ltd, on behalf of Dublin City Council and Irish Water, by a letter dated 28-07-2020. Malin Lundberg of JBA Consulting carried out this work.

Prepared by ..... Malin Lundberg BSc MSc
Ecologist

Reviewed by ..... Patricia Byrne BSc (Hons) PhD CIEEM
Senior Ecologist

Purpose

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Executive Summary

JBA Consulting Ireland Ltd. was commissioned by Dublin City Council and Irish Water to carry out a Natura Impact Statement in relation to the proposed Grand Canal Storm Water Outfall Extension at Grand Canal Docks, Dublin, Ireland. The Grand Canal Tunnel in Dublin City Centre was constructed in the early 1970's in order to convey foul sewerage to Ringsend Wastewater Treatment Plant and provide a conduit for the overflows from the existing combined foul and storm sewers. It also conveys storm relief flows from the Poddle and Swan Rivers thereby reducing the risk of flooding in those areas. The tunnel is partitioned into two separate sections. The smaller compartment caters for foul wastewater and the larger compartment caters for stormwater. The stormwater component is being conveyed to the Grand Canal Basin via a 3.2m diameter pipe. The Grand Canal Docks consists of an enclosed harbour where the Grand Canal terminates before it meets the River Liffey in Dublin. During heavy rainfall events the flow in the foul element will exceed its capacity and will overflow to the storm compartment and discharge at the southern end of the Grand Canal Basin. Bacteriological contamination of the water in the Basin (in excess of the bathing water standards) after heavy rainfall events has been identified by Waterways Ireland from water quality testing and they have urged Irish Water/ Dublin City Council to extend the outfall to the River Liffey as proposed.

The proposed works involves the construction of a 550m pipeline. The pipeline will be laid on the silt bed of the Grand Canal Basin covering a length of 450m. It will then go along Hanover Quay, along existing road and pedestrian infrastructure, for 100m and connect to the existing culvert extension at Asgard Road. A new outfall structure will be constructed at Sir John Rogerson's Quay on the River Liffey. The installation of the pipeline on the silt bed will involve dredging, lowering of the pipes and pouring of concrete below water.

The Appropriate Assessment Screening report (J. B. Barry & Partners, 2020) had identified the presence of surface water pathway between the proposed project site and South Dublin and River Tolka Estuary SPA (004024), North Bull Island SPA (004006) and North Dublin Bay SAC (000206), with the potential for significant impact on these Natura 2000 sites. The Natura Impact Statement assesses the screened-in Natura 2000 sites in more detail and examines where potentially adverse impacts may arise from the sources of impact identified. Where potentially adverse impacts are identified, avoidance and mitigation measures are proposed.

The potential impact from the proposed project is posed during construction and relates to resuspension of sediment within the Grand Canal Basin when installing the new 450m pipeline and potential for surface water runoff from the construction works. This, along with the accidental spill of concrete and runoff of pollutants, such as hydrocarbons from machinery, has the potential to impair the water quality of the SPAs and SAC, which may cause effects such as eutrophication, increased algal and macrophyte growth, increased turbidity and increased sedimentation of the estuarine substrate. This may in turn adversely impact saltmarsh vegetation and macroinvertebrate communities and birds. However, any impact would be short in duration during the construction phase.

During the operation of the project, untreated water from the stormwater, with intermittent overflow from combined sewer, will discharge to River Liffey at Sir John Rogerson's Quay during periods of heavy rainfall. The discharge may sometimes contain concentrations of faecal coliforms, BOD, nutrients and suspended solids. The discharge is likely to be relatively small and intermittent when compared to the volume of the receiving waters, with further dilution effects when reaching Dublin Bay and the Irish Sea. Therefore, no significant impact is anticipated during the operation phase of the project.

Mitigation measures proposed include water quality and silt controls with installation of a silt curtain around the area of works within the basin and the use of bunding around the works along Hanover Quay. Wet concrete leachate control measures will be in place, including appropriate bunded platforms to capture any spilled substances and the concrete used will be a concrete mix for aquatic/marine environment, e.g. fast curing and good anti-washout properties. Concrete wash out areas will be sited on an impermeable designated area. Pollution control and spill prevention methods are also provided, detailing suitable spill kit equipment and management on site.

It is concluded that provided that the mitigation measures outlined are strictly adhered to, adverse effects are not likely to occur from the works involved with the proposed Grand Canal Storm Water

Outfall Extension at Grand Canal Docks, Dublin, either alone or in-combination with other projects and plans on any of the Natura 2000 sites.

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Abbreviations

AA	Appropriate Assessment
BOD	Biological Oxygen Demand
DoEHLG	Department of the Environment, Heritage and Local Government
EC	European Community
ECoW	Ecological Clerk of Works
EPA	Environmental Protection Agency
GDSDS	Greater Dublin Strategic Drainage Strategy
KDA	Key Developing Area
LAP	Local Area Plan
NBDC	National Biodiversity Data Centre
NIS	Natura Impact Statement
NPWS	National Parks and Wildlife Services
PE	Population Equivalent
QI	Qualifying interests
RBMP	River Basin Management Plan
SAC	Special Area of Conservation
SDRA	Strategic Development Regeneration Area
SDZ	Strategic Development Zone
SPA	Special Protection Area
WFD	Water Framework Directive
ZOI	Zone of Influence

1 Introduction

1.1 Background

JBA Consulting Ireland Ltd. has been commissioned by Dublin City Council and Irish Water to undertake a Natura Impact Statement in relation to the proposed Grand Canal Storm Water Outfall Extension at Grand Canal Docks, Dublin, Ireland.

1.2 Summary of the Screening Assessment

An Appropriate Assessment (AA) Screening Report (Appendix A) was carried out by J. B. Barry & Partners (2020) on the proposed project. The AA Screening Report identified three European designated sites (Natura 2000 sites) to be within the zone of influence of the proposed project, namely: South Dublin and River Tolka Estuary SPA (004024), North Bull Island SPA (004006) and North Dublin Bay SAC (000206) due to the presence of surface water pathway and their close distance in relation to the proposed project site.

The following sources of potential impact were identified:

- Sedimentation and run-off of pollutants during the construction phase entering the Grand Canal Docks/ River Liffey and Dublin Bay which may act as a hydrological pathway to relevant European sites.
- Intermittent discharge (rainfall related) consisting of polluted stormwater resulting from emergency overflow events from combined sewers within the catchment during the operational phase. The discharge may contain high concentrations of faecal coliforms, BOD, nutrients and suspended solids.

The report concluded that potential significant impact on the Natura 2000 sites cannot be ruled out at this stage and as such, an Appropriate Assessment Stage 2 needs to be carried out and a Natura Impact Statement (NIS) should accompany the planning application.

1.3 Legislative Context

Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Fauna and Flora, known as the 'Habitats Directive' - provides legal protection for habitats and species of European importance. Article 2 of the Directive requires the maintenance or restoration of habitats and species of European Community interest, at a favourable conservation status. Articles 3 - 9 provide the legislative means to protect habitats and species of Community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000 sites. Natura 2000 sites are Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Conservation of Wild Birds Directive (79 / 409 / EEC).

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

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

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

Article 6(4) states:

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

compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.

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

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

1.4 Appropriate Assessment Process

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

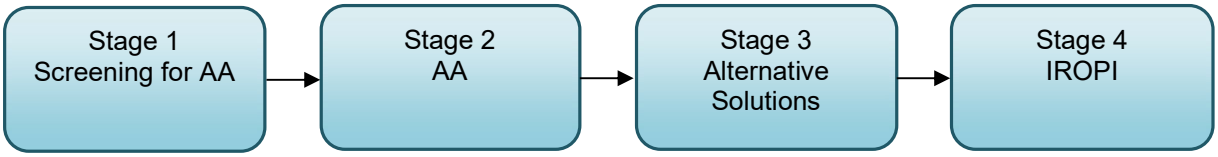

Figure 1-1: The Appropriate Assessment Process (from: Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities, DEHLG, 2009).

1.4.1 Stage 1 - Screening for AA

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

whether the proposed plan or project is directly connected with or necessary for the management of the European designated site for nature conservation

if it is likely to have a significant adverse effect on the European designated site, either individually or in combination with other plans or projects

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

1.4.2 Stage 2 - AA

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

The competent authority can only agree to the plan or project after having ascertained that it will not adversely affect the integrity of the site(s) concerned. If this cannot be determined, and where mitigation cannot be achieved, then alternative solutions will need to be considered (i.e. the process proceeds to Stage 3).

1.4.3 Stage 3 - Alternative Solutions

Where adverse impacts on the integrity of Natura 2000 sites are identified, and mitigation cannot be satisfactorily implemented, alternative ways of achieving the objectives of the plan or project that avoid adverse impacts need to be considered. If none can be found, the process proceeds to Stage 4.

1.4.4 Stage 4 - IROPI

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

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

This report is in support of a Stage 2 Appropriate Assessment.

1.5 Methodology

The Natura Impact Statement has been carried out with reference to the following documents:

- DoEHLG (2009 rev 2010) Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities. Department of the Environment, Heritage and Local Government (DoEHLG 2009).
- Office of the Planning Regulator (2021) OPR Practice Note PN01 - Appropriate Assessment Screening for Development Management (OPR 2021).
- European Communities (EC) (2000) Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg. European Commission (European Commission 2000).
- EC (2002) Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg. European Commission (European Commission et al. 2002).
- EC (2007) Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission. European Commission (European Commission 2007).
- CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland - Terrestrial, Freshwater, Coastal and Marine. (Chartered Institute of Ecology and Environmental Management, 2018)
- EC (2021) Assessment of plans and projects in relation to Natura 2000 sites - Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC. (European Commission 2021)
- Fossitt, J. (2000). A Guide to Habitats in Ireland. The Heritage Council, Kilkenny (Fossitt 2000).

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

- NPWS website (www.npws.ie)
- River Basin Management Plans (RBMP) (www.wfdireland.ie).
- National Biodiversity Data Centre (NBDC) Biodiversity Maps.
- (http://maps.biodiversityireland.ie/#/Map).
- Catchments (www.catchments.ie).

1.6 Desktop Survey

A desktop survey was conducted of available published and unpublished information, along with a review of data available on the NPWS and National Biodiversity Data Centre web-based databases, in order to identify key habitats and species that may be present within relevant 2km grid squares,

in particular those protected by European and national legislation. The data sources for this assessment have been collected in a range of formats, from a range of sources, including:

- NPWS website (NPWS, 2020a) where site synopses, Natura 2000 data forms and conservation objectives were obtained.
- National Biodiversity Data Centre (NBDC, 2020).
- Environmental Protection Agency (EPA, 2020).
- River Basin Management Plans (RBMP) (www.wfdireland.ie).
- The National Planning website (DoHPLG, 2020).

This report has been produced on currently available information, with the most up-to-date versions used, available at the time of issue.

1.7 Competent Persons

The chapter was completed by Malin Lundberg (BSc, MSc), an experienced field Ecologist with JBA. Malin has five years' experience of which three are within consultancy. She has extensive experience of preparing Ecological Impact Assessments (EcIA) and biodiversity chapters for EIAR for private developers and local authorities, including residential developments, quarry rehabilitation and a proposed greenway route.

The assessment has been reviewed by Patricia Byrne (BSc (Hons), PhD, MCIEEM). Patricia is a Senior Ecologist with 20 years' experience of environmental and ecological work, with the last five years as an Ecologist with JBA. She has authored and reviewed numerous ecological assessments under the Habitats Directive; and prepared numerous EcIAs for residential developments, biodiversity chapters for EIARs including King's Island Flood Relief Scheme for Limerick County Council.

1.7.1 Limitations and Constraints

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

- Information on the works and conditions on site are based on current knowledge at the time of writing. Changes to the site since surveys were undertaken cannot be accounted for.
- This assessment is based on the methodology for proposed works as described in this report. Where changes to methodology occur, an ecologist will need to be consulted to determine if the changes need reassessment.
- Adverse weather can cause delays to the schedule and alter the timing of works. This has been accounted for using a worst-case scenario where necessary.
- The NIS addresses issues around designated sites and does not exempt works from responsibilities related to habitats and species covered under separate national legislation.

2 Project Description

2.1 The 'Project'

The proposed development is not directly connected with or necessary to the management of any Natura 2000 site and has been determined to potentially have adverse impacts upon the following Natura 2000 sites: South Dublin Bay and River Tolka Estuary SPA, North Bull Island SPA and North Dublin Bay SAC. Therefore, the proposed project is subject to the requirements of the AA process.

2.2 Site location

The development is located in the Grand Canal Docks, Dublin, Ireland (Figure 2-1). This area is a hub of modern apartment buildings and office and retail spaces which has been zoned as a Strategic Development Regeneration Area (SDRA) in the Dublin City Council Development Plan, 2016 – 2022. The area is also known as a Key Developing Area (KDA) within the Development Plan and also a Strategic Development Zone (SDZ) within the North Lotts and Grand Canal Planning Scheme, 2013.

The project will begin at its most southern point in the Grand Canal Basin at the Grand Canal Tunnel Outfall. The works will involve constructing a pipeline from the Grand Canal Tunnel Outfall, near the Grand Canal Dock Dart Station, north through the Basin where it will pass through a section of Hanover Quay. It will then link up with an existing culvert on Asgard Road, built in 2002 as phase 1 of this project. At the northern end of this existing culvert, a pipeline will be constructed underneath Sir John Rogerson's Quay together with an outfall to the River Liffey. The storm water will therefore have bypassed its previous outfall within the Basin and will discharge into the River Liffey/ Lower Liffey Estuary.

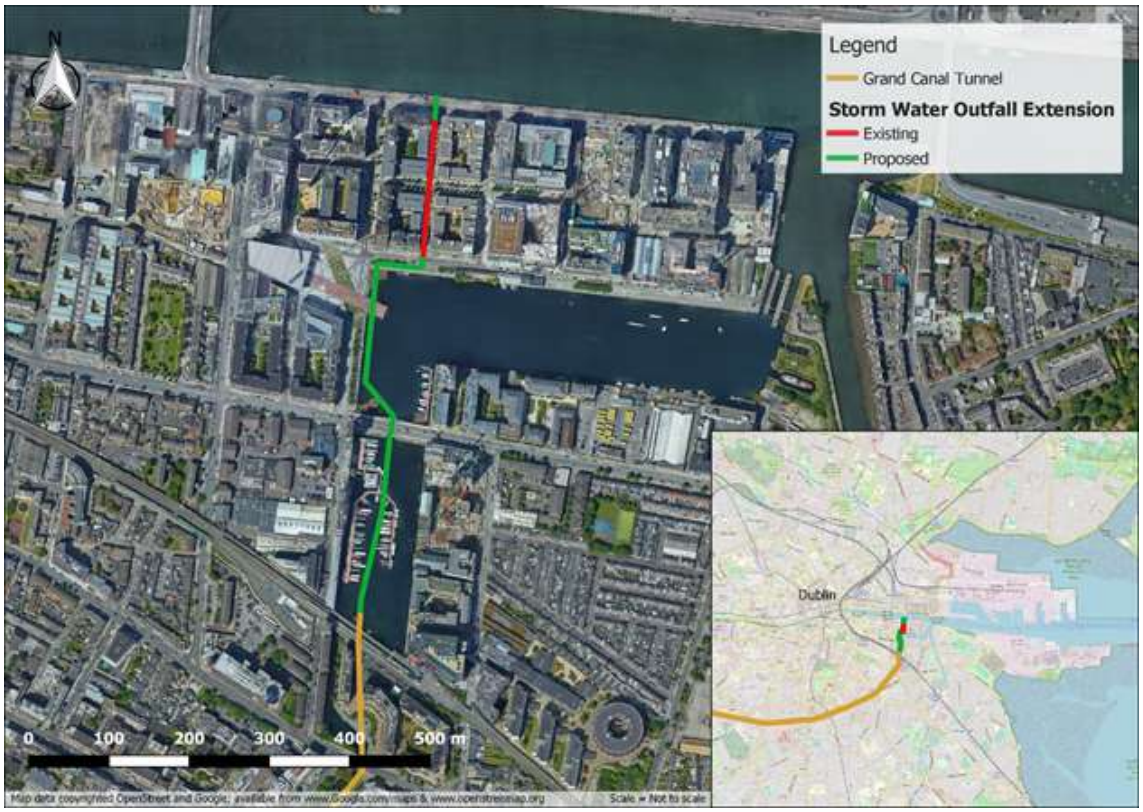

Figure 2-1: Site location

2.3 Background to the project

The Grand Canal Tunnel in Dublin City Centre was constructed in the early 1970's (Figure 2-1) in order to:

- Convey foul sewerage from the newly expanding suburbs in the west of the city to Ringsend Wastewater Treatment Plant.
- Provide a conduit for the overflows from the existing combined foul and storm sewers.
- To convey storm relief flows from the Poddle and Swan Rivers thereby reducing the risk of flooding in those areas.

The existing tunnel is 4.8km in length and has a diameter of 3.6m. The tunnel is partitioned into two separate sections. The smaller compartment caters for foul wastewater and the larger compartment caters for stormwater. At Estate Cottages, Northumberland Road (Manhole 1) the tunnel splits, with the foul component being conveyed to Ringsend Wastewater Treatment Plant (WWTP) and the stormwater component being conveyed to the Grand Canal Basin via a 3.2m diameter pipe.

The Grand Canal Docks consists of an enclosed harbour where the Grand Canal terminates before it meets the River Liffey in Dublin, Ireland. This area is a hub of modern apartment buildings and office spaces which has been zoned as a Strategic Development Regeneration Area in the Dublin City Council Development Plan, 2016 – 2022. The area is also important for entertainment, cultural, and recreational activities, with a number of restaurants and bars, as well as the Bord Gáis Energy Theatre. The development of water-based recreational activity within the Basin is part of the rejuvenation programme in the area. After heavy rainfall, combined sewer overflows (CSO) in the catchment spill into the stormwater component of the Tunnel and discharges sewage contaminated flows into the Grand Canal Basin. Periodic bacteriological contamination of the water in the Basin (in excess of the bathing water standards) after heavy rainfall events has been identified by Waterways Ireland from water quality testing and they have urged Irish Water and DCC to extend the outfall to the River Liffey as proposed.

Irish Water, Dublin City Council, and Waterways Ireland agreed in 2017 to establish a Joint Working Group to examine the issue of bacteriological contamination in the Basin. Extensive water quality analysis and monitoring of the impact of the surface water overflows into the Basin from the Irish Water combined sewer network for a period of one year has been undertaken. This has demonstrated, to the satisfaction of the Working Group, that the primary source of pollution of the waters in the Basin is the discharge from the surface water section of the Grand Canal Tunnel.

Since the discharge cannot be closed off, a possible solution is to relocate the discharge point to a location outside the Basin. The most preferred location for the discharge point is the River Liffey.

Dublin City Council and Irish Water have agreed to jointly complete the Planning and Statutory Approvals for the extension of the Grand Canal Tunnel outfall pipe. Dublin City Council will be making the application. Irish Water have procured J. B. Barry and Partners as the consultant and Dublin City Council have provided a Project Manager.

2.4 Proposed project

The proposed works for the scheme consists of the following:

- Construction of Transition Chamber 1 at chainage Ch.+0m (Starting at southernmost point of development at existing storm water outfall.
- Construction of 5 no. 1.5m diameter pipes from chainage Ch.+7.26 – Ch.+310.00m.
- Construction of Transition Chamber 2 at chainage Ch.+310.00 – Ch.+320.00m.
- Construction of Twin 2.4m dimeter pipes from chainage Ch.+320.00 – Ch.+490.00m.
- Construction of Transition Chamber 3 at chainage Ch.+490.00m.
- Construction of 4m wide 2.7m high (internal diameter) pipe on Hanover Quay.
- Construction of new outfall structure at Sir John Rogerson's Quay on the River Liffey.
- Construction of permanent floating platform along Grand Canal Quay.

The total length of the pipeline to be constructed is 550m. The proposed works involve 450m of development on the silt bed of the Basin within the Grand Canal Docks, and 100m along existing road and pedestrian infrastructure (Figure 2-2). The bed of the Basin is largely flat and gently

undulating; a maximum depth of 3.9m was observed by the Archaeological Diving Company (ADCO) during a dive survey completed in 2008.

Three temporary cofferdams will be built at each of the transition chambers including;

- Transition Chamber 1 at the existing Grand Canal Tunnel Outfall;
- Transition Chamber 2 at the transition point from the 5 no. 1.5m diameter pipeline to 2 no. 2.4m diameter pipeline; and
- Transition Chamber 3 at Hanover Quay.

The route is proposed to traverse underwater through the centre of the southern portion of the Basin, pass underneath the MacMahon Bridge, then bear close to the western wall of the Basin. The pipeline will enter Transition Chamber 3 at Hanover Quay and will run underground along the quay before adjoining with the existing pipeline on Asgard Road, see drawings Appendix B.

Waterway Ireland floating moorings will be removed from the inner dock during the construction phase.

Approximately 7,500m^3 of material will be moved within the basin. This involves dredging and pushing aside silt from the bed of the basin, which will be relocated next to the pipeline. A 200mm gravel bed will be laid down on the footprint of the pipeline, with deeper areas on soft spots where required. As much material as possible will be left in the basin around the pipeline. It may be necessary to remove some material from dredging, and any removed material will be treated as contaminated and transported to a suitably licensed facility.

The finished structure will be lowered into place, which includes the concrete U-shaped housing and pipeline directly down onto the silt bed of the basin. Concrete will be poured below water level to fill up the U-shaped housing between the individual pipelines.

The development will entail works that has the potential to impact on ecological receptors in the vicinity of the site.

Culvert/Pipeline Within the Basin

During the construction phase, bed material will be moved/displaced within the basin. This involves dredging and pushing aside silt from the bed of the basin. A 200mm gravel bed will be laid down on the footprint of the pipeline, with deeper areas on soft spots where required. As much of the material as possible will be left within the basin and placed around the pipeline. Material that will be removed will be treated as contaminated material and transported to a suitably licensed facility.

The pipeline will be lowered into place within the basin. Lengths of the pre-cast concrete U-shaped housing and pipeline sections will be lowered directly onto the silt bed. Concrete will be poured below the water level to fill up the U-shaped housing between the individual pipelines.

Transition Chamber 1 (3m), Transition Chamber 2 (3m)

The cofferdams for these chambers 1 and 2 within the basin will be constructed using conventional sheet piling.

Transition Chamber 3 (7.4m) and Culvert beneath Hanover Quay.

Excavations along Hanover Quay to allow for the new pipeline will be at a depth of 6.55m.

Sheet piles will not be permitted along the back of Hanover Quay wall i.e. in the campshire itself. It is anticipated that Transition Chamber 3 and the Hanover Quay culvert will be constructed within a secant piled wall. This secant piled wall will be required to minimise working width, to contain the existing contaminated material and to limit any water ingress from the dock and surrounding ground. This will tie into the cofferdam or other temporary works provided by the Contractor in the dock to ensure a watertight seal.

Outfall Works and Tie-in at Sir John Rogerson’s Quay.

The Contractor must provide a cofferdam or other temporary works to ensure a watertight seal around the excavation/works in Sir John Rogerson's Quay and the River Liffey.

For the works in Sir John Rogerson's Quay, low vibration, Continuous Flight Auger (CFA) piles are required, as a condition specified by the Bord Gáis Transmission Main Department.

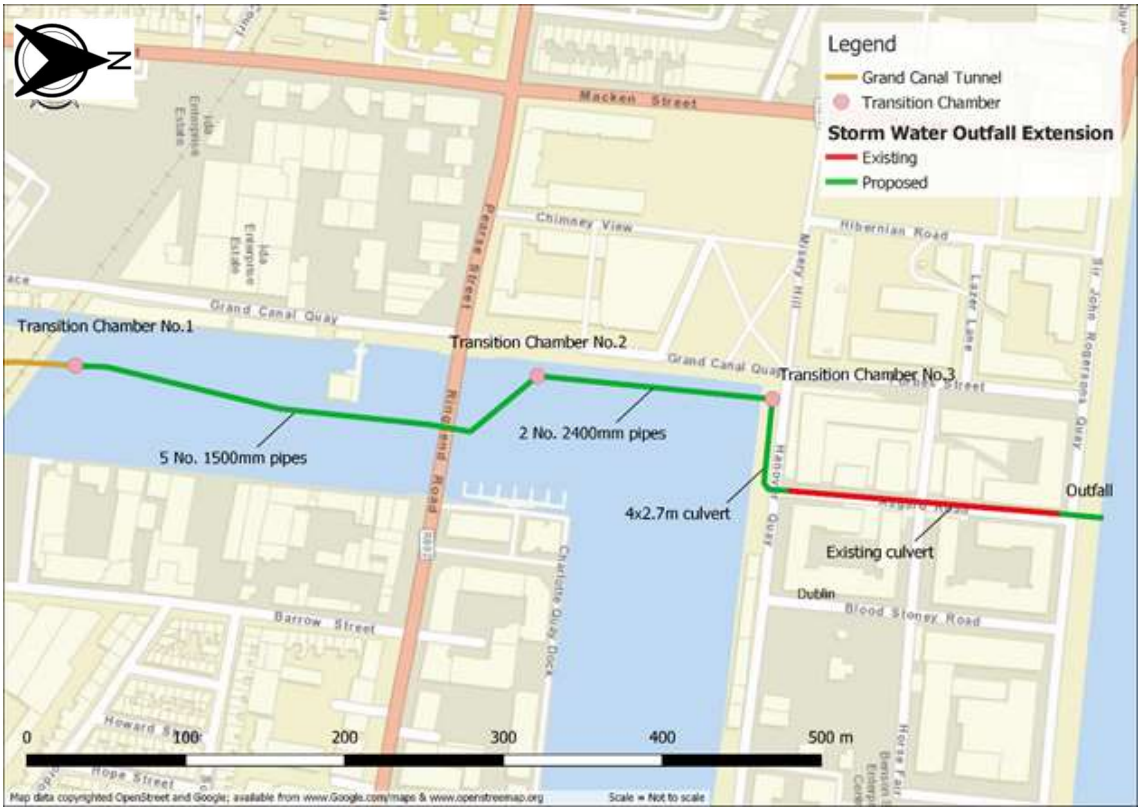

Figure 2-2: Grand Canal Storm Water Outfall pipeline within the Grand Canal Docks

The proposed development will result in the intermittent discharge (rainfall related) of polluted stormwater with an intermittent overflow from combined sewer from the south Dublin Sewer system to the River Liffey. These discharges may contain concentrations of Faecal Coliform, BOD, Nutrients and Suspended Solids. The current outfall discharges indirectly to the River Liffey flowing through the Grand Canal Basin through the lock gates. The potential pollutants have a greater retention within the basin.

The capacity of the proposed culverts was checked using the outputs from the Greater Dublin Strategic Drainage Study (GDSDS) and modelled using InfoWorks.

- 1 in 1 year storm (9.7m3/s flow) with the modified 100 year tide (i.e. estimated future 100 year tide (3.4mOD Malin Head) and;
- 1 in 20 year storm (18.6m3/s flow) and a MHWS tide (2.25mOD Malin Head).

The construction phase is scheduled for 2023 to 2025.

2.4.1 Project Zone of Influence

The Zone of Influence (ZoI) has been identified to include South Dublin and River Tolka Estuary SPA, North Bull Island SPA and North Dublin Bay SAC which are located 3.5km, 5.9km and 5.1km respectively downstream of the site.

2.5 Project Summary

Table 2-1 presents a summary of the elements of the Project that are relevant for ecology derived from the Grand Canal Storm Water Outfall Extension AA Screening Report (J. B. Barry & Partners, 2020).

Table 2-1: Summary of project elements relevant to ecology of the Natura 2000 sites within the ZoI.

Project Elements	Comment
Land-take	There will be no land-take from any of the Natura 2000 sites.
Distance from Natura 2000 site or key features of the site	South Dublin Bay and River Tolka Estuary SPA: 2km north, 3.5km hydrological pathway North Bull Island SPA: 4km north east, 5.9km hydrological pathway North Dublin Bay SAC: 4km north east, 5.1km hydrological pathway
Resource requirements (water abstraction etc.)	There will be no water abstraction requirements.
Emissions (disposal to land, water or air)	Sedimentation and run-off of pollutants during the construction phase entering the Grand Canal Basin/ River Liffey and Dublin Bay which may act as a hydrological pathway to relevant European sites. Intermittent discharge (rainfall related) consisting of polluted stormwater with an intermittent overflow from combined sewer from the South Dublin sewer during the operational phase. The discharge will contain high concentrations of faecal coliforms, BOD, nutrients and suspended solids.
Excavation requirements	Excavation depths are given below. Transition Chamber 1 = 3m (taken from existing bed level). Transition Chamber 2 = 3m (taken from existing bed level). Transition Chamber 3 = 7.4m. Pipeline along Hanover Quay = 6.55m. Stormwater culvert at Sir Rogerson's Quay = 9m. Excavations at Transition Chambers 1 and 2 are within the Basin and all others are terrestrial.
Duration of construction, operation, decommissioning etc.	The construction phase is scheduled for 2023-2025. Operation is permanent and no decommissioning is anticipated.

3 Screening Assessment

3.1 Natura 2000 Sites

This section provides baseline information on the Natura 2000 sites within the ZoI of the proposed works. A short description of the Natura 2000 site is provided, along with details of the qualifying interests/ special conservation interests, conservation objectives, the attributes used to define favourable conservation status and site vulnerabilities.

The Natura 2000 sites identified as occurring within the ZoI (Figure 3-1) of the proposed development are:

- South Dublin Bay and River Tolka Estuary SPA (004024).
- North Bull Island SPA (004006).
- North Dublin Bay SAC (000206).

South Dublin Bay SAC (000210) was screened out due to being significantly remote via hydrological pathway from the proposed project. Given the presence of the south wall the hydrological pathway is 7km.

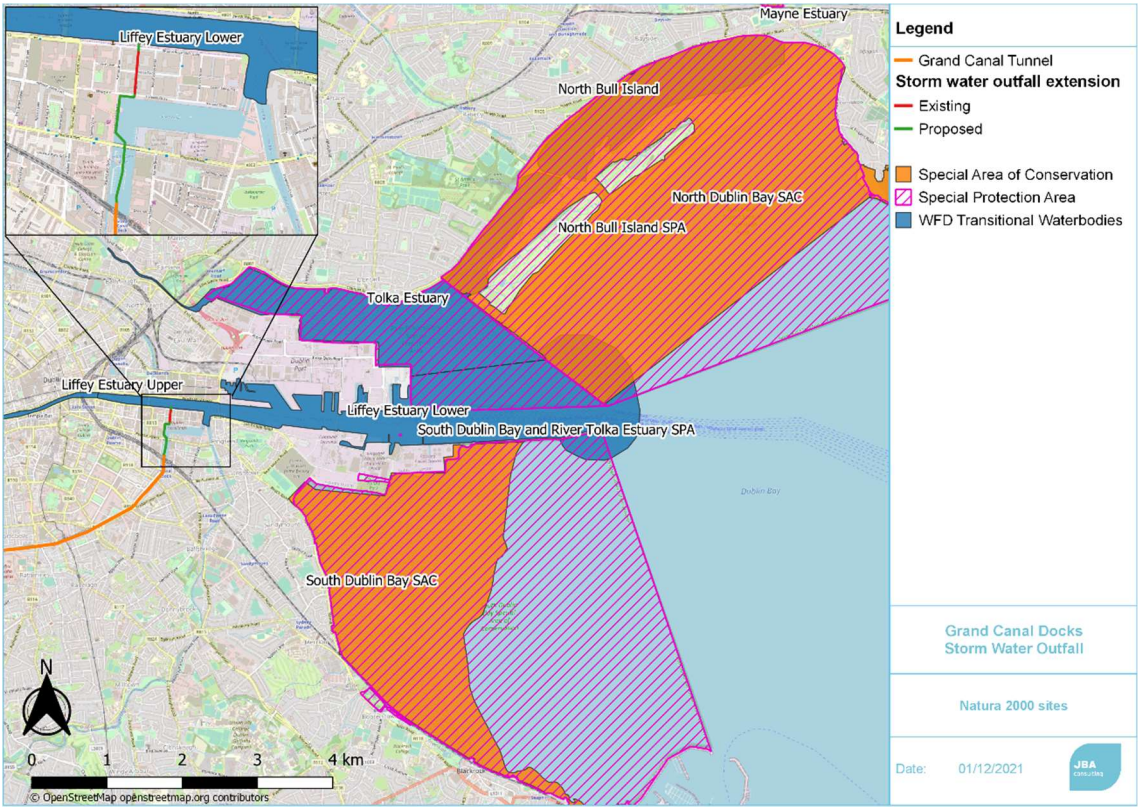

Figure 3-1: Natura 2000 sites within the ZoI. Note that South Dublin Bay SAC has been screened out in the AA Screening report. (Source: NPWS, 2020b)

Screened-in Qualifying Interests

Qualifying interests (QI) screened-in to the project's ZoI include the following QIs:

- South Dublin Bay and River Tolka Estuary SPA (004024)
- Light bellied Brent Goose (*Branta benicla hrota*)
- Oystercatcher (*Haematopodidae*)

- Ringed Plover (*Charadrius hiaticula*)
- Grey Plover (*Pluvialis squatarola*)
- Knot (*Calidris canutus*)
- Sanderling (*Calidris alba*)
- Dunlin (*Calidris alpina*)
- Bar-tailed Godwit (*Limosa lapponica*)
- Redshank (*Tringa tetanus*)
- Black-headed Gull (*Chroicocephalus ridibundus*)
- Roseate tern (*Sterna dougallii*)
- Common Tern (*Sterna hirundo*)
- Arctic Tern (*Sterna paradisaea*)
- North Bull Island SPA (004006)
- Light-bellied Brent Goose (*Branta benicla hrota*)
- Shelduck (*Tadorna tadorna*)
- Teal (*Anas crecca*)
- Pintail (*Anas acuta*)
- Shoveler (*Anas clypeata*)
- Oystercatcher (*Haematopodidae*)
- Golden Plover (*Pluvialis apricaria*)
- Grey Plover (*Pluvialis squatarola*)
- Knot (*Calidris canutus*)
- Sanderling (*Calidris alba*)
- Dunlin (*Calidris alpina*)
- Black-tailed Godwit (*Limosa limosa*)
- Bar-tailed Godwit (*Limosa lapponica*)
- Curlew (*Numenius arquata*)
- Redshank (*Tringa tetanus*)
- Turnstone (*Arenaria intepres*)
- Black-headed Gull (*Chroicocephalus ridibundus*)
- North Dublin Bay SAC (000206)
- Tidal Mudflats and Sandflats
- Annual Vegetation of Drift Lines
- Salicornia Mud
- Atlantic Salt Meadows
- Mediterranean Salt Meadows
- Embryonic Shifting Dunes
- Marram Dunes (White Dunes)
- Fixed Dunes (Grey Dunes)
- Humid Dune Slacks
- Petalwort (*Petalophyllum ralfsii*)

While the sand dune habitats, including Annual vegetation of drift lines, Embryonic shifting dunes, Marram dunes (white dunes), Fixed dunes (grey dunes) and Humid dune slacks, are terrestrial habitats, the Annual vegetation of drift lines is found along the high tidal mark where tidal litter accumulates, containing remains of marine algal and faunal material (NPWS, 2013). This habitat is

therefore considered to have surface water connectivity with the proposed development site. All sand dune habitats are linked in terms of their ecological functioning and should be considered together (NPWS, 2013). Therefore, they are all carried forward in the assessment. The Annex II species Petalwort is dependent on the sand dune habitats (NPWS, 2013) and is therefore also carried forward in the assessment.

Site descriptions of Natura 2000 sites within the ZoI are provided in Table 3-1. Screened in QIs of these Natura 2000 sites and their respective conservation objectives are provided in Table 3-2 and their threats and pressures related the proposed project are detailed in Table 3-3.

Table 3-1: Natura 2000 sites within the ZoI and their respective site briefs.

Natura 2000 Site	Site Brief
South Dublin Bay and River Tolka Estuary SPA [004024]	This site comprises a substantial part of Dublin Bay. It includes virtually all of the intertidal area in the south bay, as well as much of the Tolka Estuary to the north of the River Liffey. A portion of the shallow bay waters is also included. The site possesses extensive intertidal flats which support wintering waterfowl which are part of the overall Dublin Bay population. It regularly has an internationally important population of *Branta bernicla hrota*, which feeds on *Zostera noltii* in the autumn. It has nationally important numbers of a further 6 species: *Haematopus ostralegus, Charadrius hiaticula, Calidris canutus, Calidris alba, Calidris alpina* and *Limosa lapponica*. It is an important site for wintering gulls, especially *Larus ridibundus* and *Larus canus*. South Dublin Bay is the premier site in Ireland for *Larus melanocephalus*, with up to 20 birds present at times. It is a regular autumn roosting ground for significant numbers of terns, including *Sterna dougallii, S. hirundo* and *S. paradisaea* (NPWS, 2018).
North Bull Island SPA [004006]	The site is among the top ten sites for wintering waterfowl in the country. It supports internationally important populations of *Branta bernicila hrota* and *Limosa lapponica* and is the top site in the country for both of these species. A further 14 species have populations of national importance, with particulary notable numbers of *Tadorna tadorna* (8.5% of national total), *Anas acuta* (11.6% of national total), *Pluvialis squatarola* (6.9% of national total), *Calidris canutus* (10.5% of national total). North Bull Island SPA is a regular site for passage waders such as *Philomachus pugnax*, *Calidris ferruginea* and *Tringa erythropus*. The site supports *Asio flammeus* in winter. Formerly the site had an important colony of *Sterna albifrons* but breeding has not occurred in recent years. The site provides both feeding and roosting areas for the waterfowl species (NPWS, 2017).
North Dublin Bay SAC [000206]	The North Bull Island sand spit is a relatively recent depositional feature, formed as a result of improvements to Dublin Port during the 18th and 19th centuries. It is almost 5km long and 1km wide and runs parallel to the coast between Clontarf and Sutton. The North Bull Island dune system is one of the most important systems on the east coast and is one of the few in Ireland that is actively accreting. It possesses extensive and mostly good quality examples of embryonic, shifting marram and fixed dunes, as well as excellent examples of humid dune slacks. Both Atlantic and Mediterranean salt marshes are well represented, and a particularly good marsh zonation is shown. The salt marshes grade into mudflats and sandflats, some of which are dominated by annual Salicornia species. Petalwort *Petalophyllum ralfsii* occurs at its only known station away from the western seaboard (NPWS, 2017b).

Table 3-2: Natura 2000 sites within the ZoI and their respective qualifying interests and conservation objectives.

Natura 2000 Site	Qualifying Interest	Attribute	Measure	Target
South Dublin Bay and River Tolka Estuary SPA [004024]	Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] *Conservation Objectives:*	Population trend	Percentage change	Long term population trend stable or increasing.
		Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by Light-bellied Brent Goose, other than that occurring from natural

Natura 2000 Site	Qualifying Interest	Attribute	Measure	Target
	To maintain favourable conditions (NPWS, 2015)			patterns of variation.
	Oystercatcher (*Haematopus ostralegus*) [A130] *Conservation Objectives: To maintain favourable conditions* (NPWS, 2015)	Population trend	Percentage change	Long term population trend stable or increasing.
		Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by Oystercatcher, other than that occurring from natural patterns of variation.
	Ringed Plover (*Charadrius hiaticula*) [A137] *Conservation Objectives: To maintain favourable conditions* (NPWS, 2015)	Population trend	Percentage change	Long term population trend stable or increasing.
		Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by Ringed Plover, other than that occurring from natural patterns of variation.
	Grey Plover (*Pluvialis squatarola*) [A141][1]	Population trend	Percentage change	Long term population trend stable or increasing.
		Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by Ringed Plover, other than that occurring from natural patterns of variation.
	Knot (*Calidris canutus*) [A143] *Conservation Objectives: To maintain favourable conditions* (NPWS, 2015)	Population trend	Percentage change	Long term population trend stable or increasing.
		Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by Knot, other than that occurring from natural patterns of variation.

Natura 2000 Site	Qualifying Interest	Attribute	Measure	Target
	Sanderling (*Calidris alba*) [A144] *Conservation Objectives: To maintain favourable conditions* (NPWS, 2015)	Population trend	Percentage change	Long term population trend stable or increasing.
		Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by Sanderling, other than that occurring from natural patterns of variation.
	Dunlin (*Calidris alpina*) [A149] *Conservation Objectives: To maintain favourable conditions* (NPWS, 2015)	Population trend	Percentage change	Long term population trend stable or increasing.
		Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by Dunlin, other than that occurring from natural patterns of variation.
	Bar-tailed Godwit (*Limosa lapponica*) [A157] *Conservation Objectives: To maintain favourable conditions* (NPWS, 2015)	Population trend	Percentage change	Long term population trend stable or increasing.
		Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by Bar-tailed Godwit, other than that occurring from natural patterns of variation.
	Redshank *(Tringa totanus*) [A162] *Conservation Objectives: To maintain favourable conditions* (NPWS, 2015)	Population trend	Percentage change	Long term population trend stable or increasing.
		Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by Redshank, other than that occurring from natural patterns of variation.
	Black-headed Gull (*Chroicocephalus ridibundus*) [A179]	Population trend	Percentage change	Long term population trend stable or increasing.
		Distribution	Range, timing and	No significant decrease in the range, timing or

Natura 2000 Site	Qualifying Interest	Attribute	Measure	Target
	Conservation Objectives: To maintain favourable conditions (NPWS, 2015)		intensity of use of areas	intensity of use of areas by Black-headed Gull, other than that occurring from natural patterns of variation.
	Roseate Tern (*Sterna dougallii*) [A192] *Conservation Objectives: To maintain favourable conditions* (NPWS, 2015)	Passage population: individuals	Number	No significant decline.
		Distribution: roosting areas	Number; location; area (hectares)	No significant decline.
		Prey biomass available	Kilogrammes	No significant decline.
		Barriers to connectivity	Number; location; shape; area (hectares)	No significant increase.
		Disturbance at roosting site	Level of impact	Human activities should occur at levels that do not adversely affect the numbers of roseate tern among the post-breeding aggregation of terns.
	Common Tern (*Sterna hirundo*) [A193] *Conservation Objectives: To maintain favourable conditions* (NPWS, 2015)	Breeding population abundance: apparently occupied nests (AONs)	Number	No significant decline.
		Productivity rate: fledged young per breeding pair	Mean number	No significant decline.
		Passage population: individuals	Number	No significant decline.
		Distribution: breeding colonies	Number; location; shape; area (hectares)	No significant decline.
		Distribution: roosting areas	Number; location; shape; area (hectares)	No significant decline.
	Arctic Tern (*Sterna paradisaea*) [A194]	Passage population: individuals	Number	No significant decline.
		Distribution: roosting areas	Number; location; area	No significant decline.

Natura 2000 Site	Qualifying Interest	Attribute	Measure	Target
	Conservation Objectives: To maintain favourable conditions (NPWS, 2015)		(hectares)	
		Prey biomass available	Kilogrammes	No significant decline.
		Barriers to connectivity	Number; location; shape; area (hectares)	No significant increase.
		Disturbance at roosting site	Level of impact	Human activities should occur at levels that do not adversely affect the numbers of Arctic tern among the post-breeding aggregation of terns.
	Wetland and Waterbirds [A999] *Conservation Objectives: To maintain favourable conditions* (NPWS, 2015)	Habitat area	Hectares	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 2,192 hectares, other than that occurring from natural patterns of variation.
North Bull Island SPA [004006]	Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] *Conservation Objectives: To maintain favourable conditions* (NPWS, 2015b)	Population trend	Percentage change	Long term population trend stable or increasing.
		Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by Light-bellied Brent goose, other than that occurring from natural patterns of variation.
	Shelduck (*Tadorna tadorna*) [A048] *Conservation Objectives: To maintain favourable conditions* (NPWS, 2015b)	Population trend	Percentage change	Long term population trend stable or increasing.
		Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by Shelduck, other than that occurring from natural patterns of variation.
	Teal (*Anas crecca*) [A052]	Population trend	Percentage change	Long term population trend stable or

Natura 2000 Site	Qualifying Interest	Attribute	Measure	Target
				increasing.
	Conservation Objectives: To maintain favourable conditions (NPWS, 2015b)	Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by Teal, other than that occurring from natural patterns of variation.
	Pintail (*Anas acuta*) [A054]	Population trend	Percentage change	Long term population trend stable or increasing.
	Conservation Objectives: To maintain favourable conditions (NPWS, 2015b)	Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by Pintail, other than that occurring from natural patterns of variation.
	Shoveler (*Anas clypeata*) [A056]	Population trend	Percentage change	Long term population trend stable or increasing.
	Conservation Objectives: To maintain favourable conditions (NPWS, 2015b)	Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by Shoveler, other than that occurring from natural patterns of variation.
	Oystercatcher (*Haematopus ostralegus*) [A130]	Population trend	Percentage change	Long term population trend stable or increasing.
	Conservation Objectives: To maintain favourable conditions (NPWS, 2015b)	Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by Oystercatcher, other than that occurring from natural patterns of variation.
	Golden Plover (*Pluvialis apricaria*) [A140]	Population trend	Percentage change	Long term population trend stable or increasing.
	Conservation Objectives: To maintain favourable conditions	Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by Golden Plover, other than that occurring from natural patterns of variation.

Natura 2000 Site	Qualifying Interest	Attribute	Measure	Target
	(NPWS, 2015b)			
	Grey Plover (*Pluvialis squatarola*) [A141] *Conservation Objectives: To maintain favourable conditions* (NPWS, 2015b)	Population trend	Percentage change	Long term population trend stable or increasing.
		Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by Grey Plover, other than that occurring from natural patterns of variation.
	Knot (*Calidris canutus*) [A143] *Conservation Objectives: To maintain favourable conditions* (NPWS, 2015b)	Population trend	Percentage change	Long term population trend stable or increasing.
		Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by Knot, other than that occurring from natural patterns of variation.
	Sanderling (*Calidris alba*) [A144] *Conservation Objectives: To maintain favourable conditions* (NPWS, 2015b)	Population trend	Percentage change	Long term population trend stable or increasing.
		Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by Sanderling, other than that occurring from natural patterns of variation.
	Dunlin (*Calidris alpina*) [A149] *Conservation Objectives: To maintain favourable conditions* (NPWS, 2015b)	Population trend	Percentage change	Long term population trend stable or increasing.
		Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by Dunlin, other than that occurring from natural patterns of variation.
	Black-tailed Godwit (*Limosa limosa*) [A156]	Population trend	Percentage change	Long term population trend stable or increasing.

Natura 2000 Site	Qualifying Interest	Attribute	Measure	Target
	Conservation Objectives: To maintain favourable conditions (NPWS, 2015b)	Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by Black-tailed Godwit, other than that occurring from natural patterns of variation.
	Bar-tailed Godwit (*Limosa lapponica*) [A157]	Population trend	Percentage change	Long term population trend stable or increasing.
	Conservation Objectives: To maintain favourable conditions (NPWS, 2015b)	Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by Bar-tailed Godwit, other than that occurring from natural patterns of variation.
	Curlew (*Numenius arquata*) [A160]	Population trend	Percentage change	Long term population trend stable or increasing.
	Conservation Objectives: To maintain favourable conditions (NPWS, 2015b)	Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by Curlew, other than that occurring from natural patterns of variation.
	Redshank *(Tringa totanus*) [A162]	Population trend	Percentage change	Long term population trend stable or increasing.
	Conservation Objectives: To maintain favourable conditions (NPWS, 2015b)	Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by Redshank, other than that occurring from natural patterns of variation.
	Turnstone (*Arenaria interpres*) [A169]	Population trend	Percentage change	Long term population trend stable or increasing.
	Conservation Objectives: To maintain favourable conditions	Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by Turnstone, other than that occurring from natural patterns of variation.

Natura 2000 Site	Qualifying Interest	Attribute	Measure	Target
	(NPWS, 2015b)			
	Black-headed Gull (*Chroicocephalus ridibundus*) [A179] *Conservation Objectives: To maintain favourable conditions* (NPWS, 2015b)	Population trend	Percentage change	Long term population trend stable or increasing.
		Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by Curlew, other than that occurring from natural patterns of variation.
	Wetland and Waterbirds [A999] *Conservation Objectives: To maintain favourable conditions* (NPWS, 2015b)	Habitat area	Hectares	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 1,713 hectares, other than that occurring from natural patterns of variation.
North Dublin Bay SAC [000206]	Mudflats and sandflats not covered by seawater at low tide [1140] *Conservation Objectives: To maintain favourable conditions* (NPWS, 2013b)	Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes.
		Community extent	Hectares	Maintain the extent of the *Mytilus edulis*-dominated community, subject to natural processes.
		Community structure: *Mytilus edulis* density	Individuals/m²	Conserve the high quality of the *Mytilus edulis*-dominated community, subject to natural processes.
		Community distribution	Hectares	Conserve the following community types in a natural condition: Fine sand to sandy mud with *Pygospio elegans* and *Crangon crangon* community complex; Fine sand with *Spio martinensis* community complex
	Annual vegetation of drift	Habitat area	Hectares	Area increasing, subject to natural processes,

Natura 2000 Site	Qualifying Interest	Attribute	Measure	Target
	lines [1210] *Conservation Objectives: To restore favourable conditions* (NPWS, 2013b)			including erosion and succession. Total area mapped: South Bull - 0.11ha.
		Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes.
		Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions.
		Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.
		Vegetation composition: typical species and subcommunities	Percentage cover at a representative number of monitoring stops	Maintain the presence of species-poor communities with typical species: sea rocket (*Cakile maritima*), sea sandwort (*Honckenya peploides*), prickly saltwort (*Salsola kali*) and oraches (*Atriplex* spp.)
	Salicornia and other annuals colonising mud and sand [1310] *Conservation Objectives: To restore favourable conditions* (NPWS, 2013b)	Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-site mapped: North Bull Island - 29.10ha.
		Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes.
		Physical structure: sediment supply	Presence/ absence of physical barriers	Maintain, or where necessary restore, natural circulation of sediments and organic matter, without any physical obstructions.
		Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession.
		Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime.
		Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.

Natura 2000 Site	Qualifying Interest	Attribute	Measure	Target
		Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward.
		Vegetation structure: vegetation cover	Percentage cover at a representative number of monitoring stops	Maintain more than 90% of area outside creeks vegetated.
		Vegetation composition: typical species and subcommunities	Percentage cover	Maintain the presence of species-poor communities listed in SMP.
		Vegetation structure: negative indicator species - *Spartina anglica*	Hectares	No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%.
	Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] *Conservation Objectives: To maintain favourable conditions* (NPWS, 2013b)	Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-site mapped: North Bull Island - 81.84ha.
		Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes.
		Physical structure: sediment supply	Presence/ absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions.
		Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession.
		Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime.
		Vegetation structure: zonation	Occurrence	Maintain range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.
		Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward.
		Vegetation structure:	Percentage cover at a	Maintain more than 90% area outside creeks

Natura 2000 Site	Qualifying Interest	Attribute	Measure	Target
		vegetation cover	representative number of monitoring stops	vegetated.
		Vegetation composition: typical species and subcommunities	Percentage cover	Maintain range of subcommunities with typical species listed in SMP.
		Vegetation structure: negative indicator species - *Spartina anglica*	Hectares	No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%
	Mediterranean salt meadows (Juncetalia maritimi) [1410] *Conservation Objectives: To maintain favourable conditions* (NPWS, 2013b)	Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-site mapped: North Bull Island - 7.98ha.
		Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes.
		Physical structure: sediment supply	Presence/ absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions.
		Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession.
		Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime.
		Vegetation structure: zonation	Occurrence	Maintain range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.
		Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward.
		Vegetation structure: vegetation cover	Percentage cover at a representative number of monitoring stops	Maintain more than 90% area outside creeks vegetated.
		Vegetation composition:	Percentage cover	Maintain range of subcommunities with typical

Natura 2000 Site	Qualifying Interest	Attribute	Measure	Target
		typical species and subcommunities		species listed in SMP.
		Vegetation structure: negative indicator species - *Spartina anglica*	Hectares	No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%
	Embryonic shifting dunes [2110] *Conservation Objectives: To restore favourable conditions* (NPWS, 2013b)	Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: North Bull - 2.64ha; South Bull - 3.43ha.
		Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes.
		Physical structure: functionality and sediment supply	Presence/absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions.
		Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.
		Vegetation composition: plant health of foredune grasses	Percentage cover	More than 95% of sand couch (*Elytrigia juncea*) and/or lyme-grass (*Leymus arenarius*) should be healthy (i.e. green plant parts above ground and flowering heads present).
		Vegetation composition: typical species and subcommunities	Percentage cover at a representative number of monitoring stops	Maintain the presence of species-poor communities with typical species: sand couch (*Elytrigia juncea*) and/or lyme-grass (*Leymus arenarius*)
		Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-native species) to represent less than 5% cover.
	Shifting dunes along the shoreline with Ammophila arenaria (white dunes) [2120]	Habitat area	Hectares	Area stable or increasing, subject to natural processes including erosion and succession. North Bull - 2.20ha; South Bull - 0.97ha.
		Habitat distribution	Occurrence	No decline, or change in habitat distribution,

Natura 2000 Site	Qualifying Interest	Attribute	Measure	Target
				subject to natural processes.
	Conservation Objectives: To restore favourable conditions (NPWS, 2013b)	Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions.
		Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.
		Vegetation composition: plant health of dune grasses	Percentage cover	95% of marram grass (*Ammophila arenaria*) and/or lyme-grass (*Leymus arenarius*) should be healthy (i.e. green plant parts above ground and flowering heads present).
		Vegetation composition: typical species and subcommunities	Percentage cover at a representative number of monitoring stops	Maintain the presence of species-poor communities dominated by marram grass (*Ammophila arenaria*) and/or lymegrass (*Leymus arenarius*).
		Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover.
	Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] *Conservation Objectives: To restore favourable conditions* (NPWS, 2013b)	Habitat area	Hectares	Area stable or increasing, subject to natural processes including erosion and succession. For subsites mapped: North Bull - 40.29ha; South Bull - 64.56ha.
		Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes.
		Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions.
		Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.
		Vegetation structure: bare ground	Percentage cover	Bare ground should not exceed 10% of fixed dune habitat, subject to natural processes.

Natura 2000 Site	Qualifying Interest	Attribute	Measure	Target
		Vegetation structure: sward height	Centimetres	Maintain structural variation within sward.
		Vegetation composition: typical species and subcommunities	Percentage cover at a representative number of monitoring stops	Maintain range of subcommunities with typical species listed in Delaney et al. (2013).
		Vegetation composition: negative indicator species (including *Hippophae rhamnoides*)	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover.
		Vegetation composition: scrub/trees	Percentage cover	No more than 5% cover or under control.
	Humid dune slacks [2190] *Conservation Objectives: To restore favourable conditions* (NPWS, 2013b)	Habitat area	Hectares	Area increasing, subject to natural processes including erosion and succession. For sub-sites mapped: North Bull - 2.96ha; South Bull - 9.15ha.
		Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes.
		Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions
		Physical structure: hydrological and flooding regime	Water table levels; Groundwater fluctuations (metres)	Maintain natural hydrological regime
		Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession
		Vegetation structure: bare ground	Percentage cover	Bare ground should not exceed 5% of dune slack habitat, with the exception of pioneer slacks which can have up to 20% bare ground
		Vegetation structure:	Centimetres	Maintain structural variation within sward

Natura 2000 Site	Qualifying Interest	Attribute	Measure	Target
		vegetation height		
		Vegetation composition: typical species and subcommunities	Percentage cover at a representative number of monitoring stops	Maintain range of subcommunities with typical species listed in Delaney et al. (2013)
		Vegetation composition: cover of *Salix repens*	Percentage cover; centimetres	Maintain less than 40% cover of creeping willow (*Salix repens*)
		Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover
		Vegetation composition: scrub/trees	Percentage cover	No more than 5% cover or under control
	Petalophyllum ralfsii (Petalwort) [1395] *Conservation Objective: To maintain the favourable conservation condition* (NPWS, 2013b)	Distribution of populations	Number and geographical spread of populations	No decline.
		Population size	Number of individuals	No decline. Population at Bull Island estimated at a maximum of 5,824 thalli. Actual population is more likely to be 5% of this, or c. 300 thalli
		Area of suitable habitat	Hectares	No decline. Area of suitable habitat at Bull Island is estimated at c. 0.04ha.
		Hydrological conditions: soil moisture	Occurrence	Maintain hydrological conditions so that substrate is kept moist and damp throughout the year, but not subject to prolonged inundation by flooding in winter
		Vegetation structure: height and cover	Centimetres and percentage	Maintain open, low vegetation with a high percentage of bryophytes (small acrocarps and liverwort turf) and bare ground

[1]Grey Plover is proposed for removal from the list of Special Conservation Interests for South Dublin Bay and River Tolka Estuary SPA. As a result, a site-specific conservation objective has not been set for this species. For the current assessment, generic conservation objective has been used for the species.

Table 3-3: Natura 2000 sites within the ZoI with their respective site threats and pressures of relevance to the proposed development's construction and operation.

Natura 2000 Site	Development relevant Threats and Pressures (NPWS 2017a, 2017b, 2018)	Impact Rank: High (H) Moderate(M) Low (L)	Impact Source: Inside (i) Outside (o) Both (b)
South Dublin Bay and River Tolka Estuary SPA [004024]	Industrial or commercial areas	H	o
	Discharges	H	i
	Eutrophication (natural)	M	i
North Bull Island SPA [004006]	Discharges	M	b
	Industrial or commercial areas	M	o
North Dublin Bay SAC [000206]	Diffuse pollution to surface waters due to other sources not listed	M	i
	Discharges	H	i
	Industrial or commercial areas	H	o
	Other point source pollution to surface water	M	i
	Invasive non-native species	M	i

3.2 Screening Conclusion

The Screening Assessment (J. B. Barry & Partners, 2020) has determined the works are likely to have significant effects, either alone or in-combination with other plans/ projects on the following European sites:

- South Dublin Bay and River Tolka Estuary SPA (004024).
- North Bull Island SPA (004006).
- North Dublin Bay SAC (000206).

The following sources of potential impact has been identified:

- Sedimentation and run-off of pollutants during the construction phase entering the Grand Canal Basin/ River Liffey and Dublin Bay which may act as a hydrological pathway to relevant European sites.
- Intermittent discharge (rainfall related) consisting of polluted stormwater resulting from emergency overflow events from combined sewers within the catchment during the operational phase. The discharge may contain high concentrations of faecal coliforms, BOD, nutrients and suspended solids.

Therefore, an Appropriate Assessment is required to assess in more detail the likely nature of the effects on the integrity of these sites. This is given in the section below.

4 Environmental Baseline

4.1 Site Description

The Grand Canal Basin is a freshwater body of water located at the eastern end of the Grand Canal, where the canal can be accessed from the River Liffey. The main water source for the Grand Canal is the Milltown Feeder, which flows from Pollardstown Fen, Co. Kildare, supplying the canal with high quality water. The water level of the Grand Canal Basin is maintained at 3.4mOD, and it is regulated through a set of weirs located in the north-eastern part of the Basin, that discharge any excess water from the basin into the mouth of the River Dodder and onwards into the River Liffey.

4.2 Site Survey

An aquatic ecological survey of the Grand Canal Dock and River Liffey Estuary was carried out by BEC Consultants Ltd on the 28-29th July 2020 (BEC Consultants Ltd, 2020). The benthic habitat was investigated by means of a grab sample survey with six samples undertaken within Grand Canal Basin and four samples within the Liffey Estuary.

Macroinvertebrates were identified using stereoscopic and compound microscopes and standard freshwater keys.

Additional data collected include water depth, salinity and temperature.

The intertidal zone of the study area comprised the quay walls of the River Liffey along Sir John Rogerson's Quay. Species present were recorded.

Habitat classification followed the Marine Habitat Classification for Britain and Ireland (JNCC, 2015).

A terrestrial alien invasive species survey was carried out along the pipe route. The focus of this survey was species listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations (S.I. 477/2011) (as amended). These are species for which there is a legal imperative to prevent their spread.

The results have been compiled into a report (Grand Canal Dock Storm Water Outfall Project: aquatic ecology and alien invasive species survey) which can be found in Appendix C.

4.3 Summary of Results

4.3.1 Aquatic Habitats

The benthic grab survey of the Grand Canal Basin returned a total of 22 species or higher taxa, comprising 361 individuals. All these species were freshwater species with the dominant species being the water slater *Asellus aquaticus* and the snail *Bithynia tentaculate*. Submerged aquatic plants recorded within the basin include Nuttall's Waterweed *Elodea nuttallii*, Rigid Hornwort *Ceratophyllum demersum* and Spiked Water-milfoil *Myriophyllum spicatum*, with filamentous algae and the stonewort *Nitella flexilis* agg. also present. The leech *Erpobdella octoculata* and oligochaete worms of the family Naididae were most common in the upper Grand Canal Basin, where the existing outfall is located. These species are tolerant of organic pollution and give an indication that the water from the stormwater outfall is high in organic pollution. This indication is further supported by the presence of filamentous algae. The water slater *Asellus aquaticus* is also tolerant of organic pollution.

The estuarine habitat of Lower River Liffey in the area of Sir John Rogerson's Quay is defined as SS.SMu.SMuVS Sublittoral mud in variable salinity (estuaries). This habitat is defined by the fine, anoxic mud with some leaf detritus recovered by the benthic grab samples, and the varying salinity of the water. No fauna was recorded in the grab samples taken in this location. The lack of fauna in this area is likely to be the result of the challenging estuarine habitat, with its varying salinity, along with historic pollution of the fine sediment, resulting in anoxic conditions.

The intertidal habitat on the quay wall in the same area is defined as LR.LLR.FVS.Fcer *Fucus ceranoides* on reduced salinity eulittoral rock. This habitat is defined by the dominating species found on the wall, Horned Wrack *Fucus ceranoides* together with green algae *Ulva* spp. Fauna found on the wall include the barnacle *Austrominius modestus* and the sea slater *Ligia oceanica*. The species richness on the quay wall is low, which is expected from the estuarine location. This type of habitat is common within the River Liffey Estuary and other estuaries around Ireland with similar conditions.

The survey did not identify any protected species or habitats within the sites.

4.3.2 Alien Invasive Species

No terrestrial invasive species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations (S.I. 477/2011) (as amended) were recorded in the course of the survey undertaken by BEC Consultants Ltd. However, the invasive non-native species Butterfly-bush *Buddleja davidii* was recorded along the quay wall at Sir John Rogerson's Quay. This is not a Third Schedule species but it has the ability to outcompete native species, therefore its eradication is recommended.

Within the Grand Canal Basin, two aquatic invasive species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations (S.I. 477/2011) (as amended) were recorded, namely the Zebra Mussel *Dreissena polymorpha* and Nuttall's Waterweed *Elodea nuttallii*.

4.4 Common Tern

There is a known nesting location for Common Tern on the Camden Lock structure at the outer end of the Grand Canal Basin (Figure 4-1). This nest site is known to regularly support a single pair of Common Tern during the breeding season. Common Tern is listed on Annex I of the EU Birds Directive, and breeding populations are confined to a small number of suitable locations on the Irish coast. Common Tern is a Qualifying Interest of South Dublin Bay and River Tolka Estuary SPA. It is considered that birds using this nest site may be associated with the population within the designated area of the SPA.

Therefore, disturbance as potential impact to Common Tern will be assessed further.

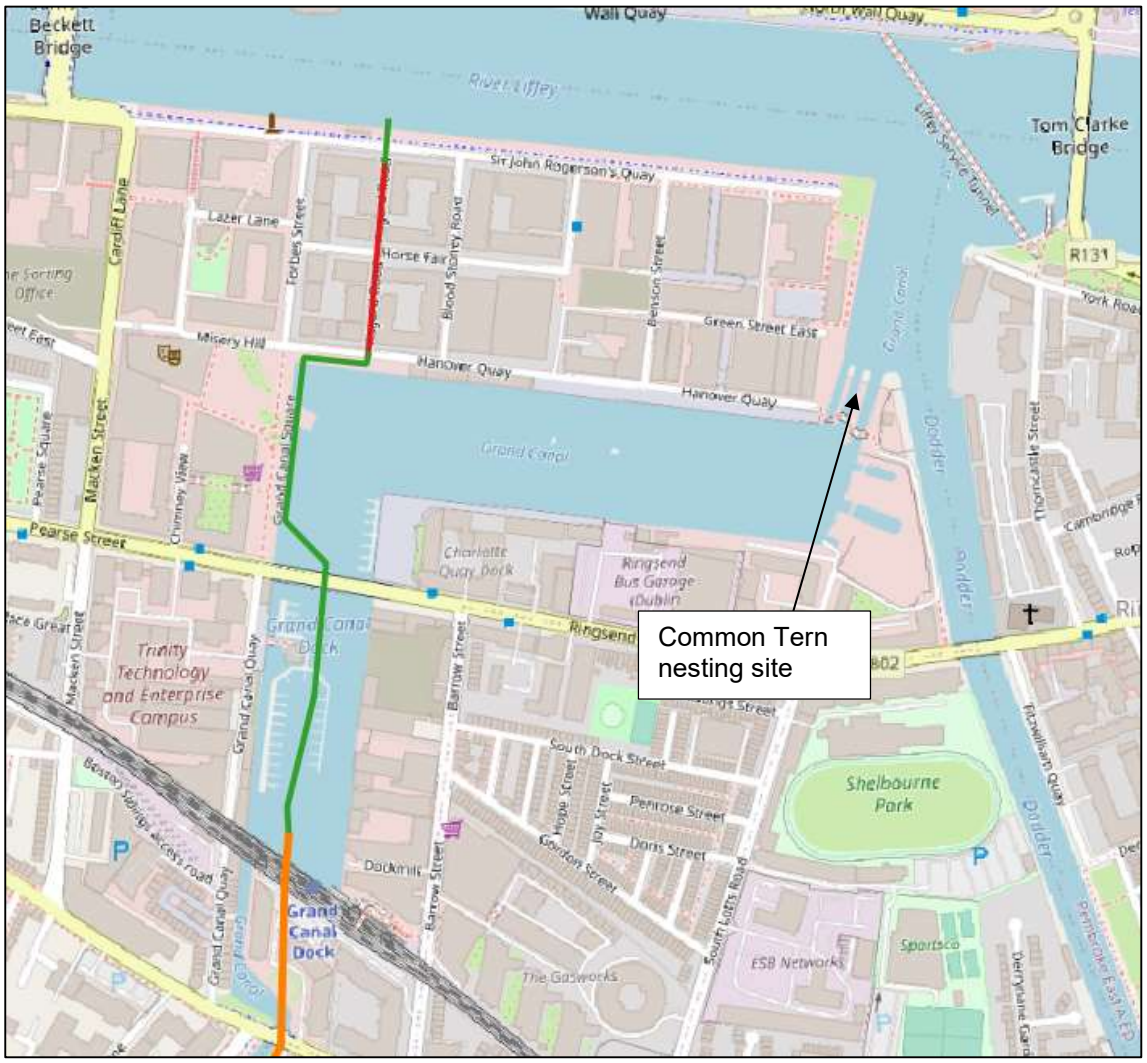

Figure 4-1: Location of Common Tern nest on Camden Lock structure.

4.5 Waterbodies in the Vicinity of the Proposed Site

The site lies within the Water Framework Directive (WFD) sub-catchment of Dodder_SC_010 (EPA, 2020). The Grand Canal connects to the Grand Canal Basin from the south, which has its outlet to the River Liffey in the North (Figure 4-2). The River Dodder is located east of the Grand Canal Basin and has its outfall to the River Liffey at the same location as the Grand Canal Basin. The River Liffey connects to the Irish Sea via Dublin Bay.

4.5.1 The Grand Canal Tunnel

The Grand Canal Tunnel is partitioned into two separate sections; a foul wastewater element and a stormwater element. The foul wastewater is conveyed to Ringsend WWTP and the stormwater discharges into the southern area of the Grand Canal Basin. The stormwater outfall conveys overflows from the River Poddle, storm water drainage (from Drimnagh/ Crumlin Area) and overflows from storm water overflows in Rathmines & Pembroke catchment into the Grand Canal Basin. During heavy rainfall events the flow in the foul element will exceed its capacity and will overflow into the stormwater compartment.

4.5.2 Water Quality

The Grand Canal Basin currently has the WFD status 'Moderate' (2013-2018) which is a downgrade from the previous period ('Good' (2010-2015)). This waterbody is 'At risk' of not meeting the WFD objectives (EPA, 2020).

The Liffey Estuary Lower currently has the WFD status 'Good' (2013-2018) which is an upgrade from previous period ('Moderate' (2010-2015)). This waterbody is 'At risk' of not meeting the WFD objectives with the main pressure being urban wastewater (EPA Catchments Unit, 2018).

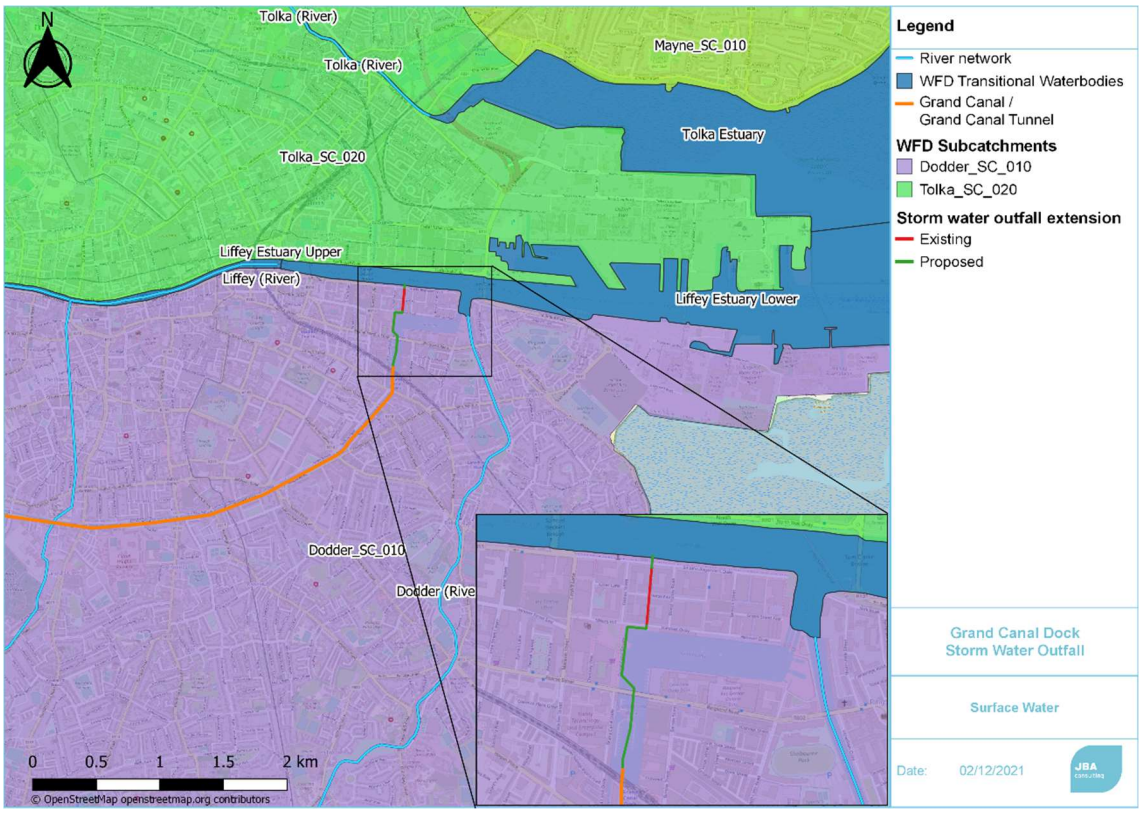

Figure 4-2: Surface water bodies in the vicinity of the proposed site. (Source EPA, 2020)

5 Other Relevant Plans and Projects

5.1 Cumulative Effects

As part of the Screening for an Appropriate Assessment, in addition to the proposed works, other relevant projects and plans in the region that may induce cumulative impacts must also be considered at this stage.

The following projects or plans were identified as potential sources of cumulative impacts:

- Dublin City Council Development Plan 2016 - 2022.
- Poolbeg West SDZ Planning Scheme.
- Greater Dublin Drainage Strategy.
- River Basin Management Plan for Ireland 2018-2021.
- Dublin Port Masterplan 2040.
- Alexandra Basin Redevelopment.
- MP2 Project.
- Bus Connect Ringsend to City Centre.
- Dodder Public Transportation Opening Bridge
- Pedestrian Bridge across River Liffey.
- Dart+ Underground.
- The Dublin Eastern Bypass.
- Dodder Greenway.
- Dublin District Heating.
- Grand Canal Greenway- Grand Canal Dock Section;
- Grand Canal Quay East development works;
- Maintenance dredging in Dublin Port;
- Luas Red Line Poolbeg Extension.
- Greater Dublin Area Cycle Network Plan.
- Metrolink
- Ringsend Waste Water Treatment Plant Upgrade
- South Campshire Flood Defence Wall Project
- Treasury Building; and
- Planning Applications on Myplan.ie.

5.2 Plans

5.2.1 Dublin City Development Plan 2016-2022

Dublin City Development Plan 2016-2022 sets out aims policies and objectives for the proper planning and sustainable development in the city. The Plan seeks to develop and improve, in a sustainable manner, the social, economic, cultural and environmental assets of the city (Dublin City Council, 2016).

All Natura 2000 sites within the considered zone of influence of the Plan, must be assessed for potential to be impacted by the Plan and for there to potentially be in-combination impacts as a result of the Plan. The City Development Plan is designed to be taken in conjunction with other similar plans and programmes, to have the overall effect of strengthening the management of and enhancing the protection and conservation of Natura 2000 sites. Specific statements, policies and objectives are formulated within the Plan to allow the Council to take appropriate steps to avoid the deterioration of Natura 2000 sites.

Prior to any works commencing on a project that may impact the Natura 2000 network, the project shall be subject to a full Natura Impact Assessment in accordance with the requirements of Article 6(3) of the EU Habitats Directive (Directive 92/43/EEC). This requirement is made explicit in the Plan.

An Appropriate Assessment Stage 2 Natura Impact Statement was completed in 2016 and published as part of the Dublin City Development Plan (volume 6). The zone of influence for this Plan was identified as 15km. The concluding statement in this appropriate assessment stage 2 report ruled out the potential for significant effects on European sites as a result of the Plan. The potential likely significant impacts from core strategies, and their related mitigation measures are outlined as follows:

- The housing strategy will result in an increase of 29,500 housing units. This has the potential to cause a change of water quality due to developments, and the potential to disturb species and European sites. Relevant mitigation measures include:
- Promoting the development of vacant or under-utilised sites in line with environmental surveys including flora and fauna.
- Protecting flora, fauna, and habitats by conserving NHAs, SPAs, and SACs.
- Promoting the progressive reduction of pollution of groundwater and preventing its further pollution.
- Ensuring development is permitted in tandem with available water supply and wastewater treatment and to manage development.
- Promoting sustainable design and construction to help reduce emissions from the demolition and construction of buildings.
- The employment, enterprise, and retail strategies will support the consolidation of the city centre and development of the regeneration areas will encourage movement of people, which has the potential to impact European sites. Relevant mitigation measures include:
- Promoting sustainable development by balancing complex sets of economic, environmental or social goals in planning decisions.
- Developing a sustainable network of safe, clean, attractive pedestrian routes, lanes, and cycleways in order to make the city more coherent and navigable.
- Improving pedestrian and cycle access routes to strategic level amenities while ensuring that ecosystem functions are not compromised, and biodiversity is conserved.
- Ensuring development is permitted in tandem with available water supply and wastewater treatment services.
- Promoting sustainable design and construction to help reduce emissions from the demolition and construction of buildings.
- The sustainable infrastructure strategy has the potential to significantly impact European sites. Relevant mitigation measures include:
- Protecting flora, fauna, and habitats which have been identified by Articles 10 and 12 of the Habitats Directive.
- Promoting and maintaining the achievement of at least ‘good’ status in all waterbodies in the city.
- Promoting the progressive reduction of pollution of groundwater and preventing further pollution.
- Supporting initiatives to reduce marine pollution in Dublin Bay.
- The public transport strategy has the potential to significantly impact European sites by way of disturbance, change in water quality, and noise pollution. Relevant mitigation measures include:
- Carrying out road capacity improvements subject to environmental and conservation considerations.
- Maintaining air and noise quality in accordance with good practice and relevant legislation.
- Improving pedestrian and cycle access routes to strategic level amenities while ensuring that ecosystem functions are not compromised, and biodiversity is conserved.

A number of mitigation measures have been prepared and applied to the policies and objectives that have been screened in for Appropriate Assessment as follows:

- SI1: to support Irish Water in provision of high-quality drinking water, water conservation, and in the development of water and wastewater systems to meet public demands in the city and wider region, in accordance with the Greater Dublin Water Supply Strategic Study, and the Greater Dublin Strategic Drainage Study.

- SI2: to support Irish Water to ensure the upgrade of wastewater infrastructure, in particular Ringsend wastewater treatment plant, marine outfall, and orbital sewer.
- SI3: to ensure that development is permitted in tandem with available water and wastewater treatment. Also, to manage development whereby there is adequate capacity.
- SI4: to promote and maintain good status in all waterbodies in the city.
- SI5: to promote the enhancement of aquatic ecosystems and wetlands.
- SI6: to promote the protection and improvement of the aquatic environment through reduction of discharges and emissions.
- SI7: to promote the reduction of groundwater pollution.
- SI8: to mitigate the effects of floods and droughts.
- GI20: to seek the improvement of water quality, bathing facilities, and other recreational opportunities in the coastal, estuarine and surface water environments in the city. Also, to protect ecology and wildlife of Dublin Bay.
- GI21: to support initiatives to reduce marine pollution in Dublin Bay in with other organisations, to raise awareness, and to have regard to the Marine Strategy Framework Directive (2008/56/EC).
- GI23: to protect flora, fauna and habitats, which have been identified by Articles 10 and 12 of the Habitats Directive, Birds Directive, Wildlife Acts 1976-2012, the Flora (Protection) Order 2015 S.I. No. 356 of 2015, European Communities (Birds and Natural Habitats) Regulations 2011 to 2015.
- GI24: to conserve and manage all natural heritage areas, SACs and SPAs designated, or proposed to be designated, by the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.
- GI25: to make provisions for habitat creation/ maintenance and facilitate biodiversity by encouraging the development of linear parks, nature trails, wildlife corridors, urban meadows and urban woodlands.
- GI26: to have regard to the conservation and enhancement of significant non-designated areas of ecological importance in accordance with development standards set out in this plan.

The revised policies and objectives following relevant mitigation measures are outlined below.

- Policy SC3: to develop a sustainable network of safe, clean, attractive pedestrian routes, lanes and cycleways in order to make the city more coherent and navigable. The mitigation measures applied include GI23, GI24, GI25, and GI26.
- Policy GH8: to promote the sustainable development of vacant or under-utilised infill sties and to favourably consider higher-density proposals which respect the design of the surrounding development and the character of the area. The mitigation measures applied include GI23, GI24, GI25, and GI26.
- Policy RD2: to require that proposed retail developments for large-scale or sensitive sites in line with environmental requirements, are accompanied by a retail design brief guided by the key principles contained in the “Retail Design Manual – DECLG, 2012”, www.environ.ie. The mitigation measures applied include GI23, GI24, GI25, and GI26.
- Policy MT7: to improve the city’s environment for walking and cycling through the implementation of improvements to thoroughfares and junctions and also through the development of new and safe routes, including the provision of foot and cycle bridges. Routes within the network will be planned in conjunction with Green Infrastructure Objectives and on foot of (inter alia) the NTA’s cycle network plan for the Greater Dublin Area and the National Cycle Manual having regard to policies GI5 and GI018. The mitigation measures applied include GI23, GI24, GI25, and GI26. A clause was inserted in the Transport and Movement chapter that stated, “all development proposals shall be subject to Article 6 EU Habitats Directive Appropriate Assessment”.
- Policy MT12: to improve the pedestrian environment and promote the development of a network of pedestrian routes which link residential areas with recreational, educational and employment destinations to create a pedestrian environment that is safe and accessible to all. The mitigation measures applied include GI23, GI24, GI25, and GI26. A clause was inserted in the Transport

and Movement chapter that stated, “all development proposals shall be subject to Article 6 EU Habitats Directive Appropriate Assessment”.

- Policy SI8: to mitigate the effects of floods and droughts subject to environmental assessment. The mitigation measures applied include GI15, HI16, GI17, and GI016.
- Objective MT01: to encourage intensification and mixed-use development along public transport corridors and at transport nodes where sufficient public transport capacity and accessibility exists to meet the sustainable transport requirements of the development, having regard to conservation policies set out elsewhere in this plan and the need to make best use of urban land. Dublin City Council will seek to prepare SDZ’s, LAP’s, or other plans for areas surrounding key transport nodes where appropriate, in order to guide future sustainable development. The mitigation measures applied include GI23, GI24, GI25, and GI26. A clause was inserted in the Transport and Movement chapter that stated, “all development proposals shall be subject to Article 6 EU Habitats Directive Appropriate Assessment”.
- Objective MT09: to develop, within the lifetime of this plan, the Strategic Cycle Network for Dublin city – connecting key city centre destinations to the wider city and the national cycle network, and to implement the NTA’s Greater Dublin Area Cycle Network Plan, to bring forward planning and design of the Santry River Greenway, incorporating strongly integrative social and community development initiatives. The mitigation measures applied include GI23, GI24, GI25, and GI26. A clause was inserted in the Transport and Movement chapter that stated, “all development proposals shall be subject to Article 6 EU Habitats Directive Appropriate Assessment”.
- Objective MT031: to initiate and/ or implement the following road improvement schemes and bridges within the six-year period of the development plan, subject to the availability of funding and environmental requirements and compliance with the “Principles of Road Development” set out in the NTA transport strategy:
- River Road.
- Richmond Road.
- Malahide Road/ R107 (including North Fringe improvements).
- Blackhorse Avenue.
- Clonshaugh Road Industrial Estate.
- Ballymun (improved town centre linkage).
- Kilmainham/ South Circular Road.
- Link from Military Road to Conyngham Road.
- East Wall Road/ Sheriff Street to North Quays.
- Cappagh Road.
- Dodder Bridge.
- Liffey Valley Park pedestrian/ cycle bridge.
- Cycle/ pedestrian bridges that emerge as part of the evolving Strategic Cycle Network and Strategic Green Infrastructure Network.
- Newcomen Bridge (upgrading for pedestrian and cyclist use).
- Three new bridges proposed as part of the North Lotts and Grand Canal Dock SDZ.

The mitigation measures applied include GI23, GI24, GI25, and GI26. A clause was inserted in the Transport and Movement chapter that stated, “all development proposals shall be subject to Article 6 EU Habitats Directive Appropriate Assessment”.

- GIO19: to maintain beaches at Dollymount, Sandymount, Merrion, and Poolbeg/ Shell Banks to a high standard, and to develop their recreational potential as a seaside amenity, in order to bring them to “Blue Flag” standard subject to Article 6 Assessment of the Habitats Directive. The mitigation measures applied include GI23, GI24, GI25, and GI26. A clause was inserted in the Green Infrastructure and Open Space chapter that stated, “all development proposals shall be subject to Article 6 EU Habitats Directive Appropriate Assessment”.

The proposed development has the potential to contravene a number of mitigatory policies set out in the Plan including GI20, GI21, GI23, GI24, and GI26. Therefore, there may be cumulative effects on European sites from the proposed development in combination with the Dublin City

Development Plan 2016 – 2022. The Dublin City Development Plan is therefore considered further in the cumulative assessment.

5.2.2 Poolbeg West SDZ Planning Scheme April 2019

Poolbeg West is located circa 1.2 km directly east of Grand Canal Dock (Figure 5-1). The vision for the Poolbeg Peninsula seeks to connect with the transport infrastructure and social and economic fabric of the city, to create a new high quality 'place' that is unique, and to protect the surrounding environment and ongoing functions of the port and municipal facilities (Dublin City Council, 2019). Poolbeg West has the opportunity to provide a significant level of new uses and services that support and benefit the existing urban neighbourhoods of Ringsend, Irishtown, and Sandymount.

The Appropriate Assessment carried out on the plan identified no significant effect via surface water pathway on South Dublin Bay and River Tolka Estuary SPA, North Bull Island SPA and North Dublin Bay SAC. However, mitigation measures have been put in place to minimise vibration and control of sediment. The Appropriate Assessment concludes that, by incorporating avoidance and mitigation measures, the Poolbeg West SDZ Planning Scheme is not anticipated to have any significant effects on the ecological integrity of any European Sites. Further, lower level plans and projects will be subject to separate Appropriate Assessments.

Therefore, it is not anticipated that the Poolbeg West SDZ Planning Scheme will contribute to cumulative or in-combination effects.

Figure 5-1: Location of Poolbeg West SDZ (Dublin City Council, 2019).

5.2.3 Greater Dublin Drainage Strategy

The Greater Dublin Drainage Strategy sets out the strategic planning for the development of waste water treatment in the Greater Dublin area in relation to the Ringsend WWTP Upgrade, Greater Dublin Drainage Project and associated wastewater network drainage projects (Irish Water, 2018). The Ringsend WWTP Upgrade includes plans to expand the WWTP to its ultimate capacity, together with associated network upgrades required. The Greater Dublin Drainage Project is planned to relieve both the Ringsend WWTP and network loading by construction of a new WWTP at Clonshaugh, an orbital sewer and provision of an outfall pipe discharging 1km north east of Ireland's Eye.

The Ringsend WWTP upgrade is in progress and carried out in stages, with an increased capacity of 400,000 PE by the first half of 2021 and the ultimate capacity of 2.4 million PE to be in operation by 2025.

The Appropriate Assessment Stage 2, Natura Impact Statement for the proposed Ringsend Wastewater Treatment Plant (WWTP) Upgrade concluded that the upgrade of the treatment process at Ringsend would not have any significant effects on the integrity of any European site.

Mitigation measures were implemented here to include:

- Construction within the boundaries of the South Dublin Bay and River Tolka Estuary SPA to take place when Brent Geese are absent from the area, i.e. works must take place between 1st May and 31st August.
- Reinstatement of the works area within the SPA in time for the return of Brent Geese in September/ October.
- Provision of screening to prevent visual disturbance to bird species.
- Implementation of invasive species management Plan.
- Implementation of Construction and Environmental Management Plan.
- Implementation of Dust Management Plan.
- Implementation of Construction Noise and Vibration Management Plan.

Monitoring measures were also implemented to include:

- Monitoring for disturbance to waterbirds including monthly surveys on nearby grassland areas in Winter during construction and for one year thereafter.
- Monitoring for potential changes in waterbird population related to effluent discharge.
- Monitoring for invasive plant species in the immediate vicinity of the development.

The Greater Dublin Drainage Strategy is not anticipated to contribute to cumulative or in-combination effects.

5.2.4 River Basin Management Plan for Ireland 2018-2021

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

The first cycle of River Basin Management Plans included the Eastern River Basin District - River Basin Management Plan (ERBDMP) 2009 – 2015 (WFD (2010). The plans summarised the waterbodies that may not meet the environmental objectives of the WFD by 2015 and identified which pressures are contributing to the environmental objectives not being achieved. The plans described the classification results and identified measures that can be introduced in order to safeguard waters and meet the environmental objectives of the WFD;

- Prevent deterioration of water body status.
- Restore good status to water bodies.
- Achieve protected areas objectives.
- Reduce chemical pollution of water bodies

The ERBD Management Plan (2009-2015) and the River Basin Management Plan for Ireland (2018-2021) aim to improve the management and water quality of the Eastern RBD, and hence the River Liffey and Dublin Bay.

The River Basin Management Plan is not anticipated to contribute to cumulative or on-combination effects.

5.2.5 Dublin Port Masterplan 2040

The Masterplan sets out options for the infrastructural development of Dublin Port between 2012 and 2040 (Dublin Port Company, 2018). The presented options for development are depending on demand and capacity and are subject to securing the planning and other necessary consent. The Port should provide a capacity based on an increased average annual growth rate of 3.3% which the handling of 77 million gross tonnes by 2040. The second objective of the Masterplan is to re-integrate Dublin Port with Dublin City and Dublin Bay. This will involve a range of projects and initiatives based on the Port's heritage and on the natural environment.

The review carried out of the Masterplan in 2018 includes assessment of the likely environmental impacts arising from the set out development path was undertaken including the potential impact on Natura 2000 sites. A specific set of measures have been identified to mitigate the environmental impacts of future development. These measures will be developed in detail at the study stage and at the detailed design stage of future projects.

Mitigation measures detailed in the NIS (RPS Group Ireland, 2018) are outlined as follows:

- Water Quality and Habitat Deterioration - individual projects will require Construction stage Environmental Management Plans (CEMPs); Erosion and Sediment Control Plans; Invasive Species Management Plans; Emergency Response Plans; Dust and Noise Minimisation Plans or Dredging Mitigation Plans as applicable to ensure marine water quality is maintained and the favourable conservation condition of marine, coastal and wetland habitats does not deteriorate. Modelling to predict the extent, duration and concentration of plumes of suspended sediments associated with marine construction activities and modelling of waste water and storm water discharges. Drainage systems shall be designed to maintain a separation between the clean storm water and potentially contaminated runoff to ensure that water is treated onsite before discharge.
- An Emergency Response Plan and an Accident Prevention Procedure are being implemented at Dublin Port to reduce the potential for accidental spillages and the severity of actual spillages.
- Underwater noise and disturbance - dredging will be confined to periods between September and March inclusive to avoid impacting on harbour porpoises during the breeding and calving season. Marine Mammal Observers shall be stationed on survey vessels prior to and during any activities producing significant underwater noise emissions. These will have the authority to stop activities when marine mammals are close enough to be at risk.
- Aerial Noise and Visual Disturbance - individual projects will include proposals for any activities producing significant aerial noise emissions (e.g. rock-breaking, demolition, piling) stimuli to be restricted to daylight hours and subject to ornithological monitoring of responses of waterbirds to noise. Construction phase and regular operational phase activities during the overwintering season adjacent to SPAs will be screened to prevent waders and waterbirds being disturbed by the presence of people in close proximity to intertidal areas.
- Habitat Loss - modelling will be undertaken to predict the magnitude and extent of changes to the sedimentation and scouring patterns in the South Dublin Bay and River Tolka Estuary SPA as a result of construction of a new jetty requiring land reclamation or creation of a 400m manoeuvring area at the eastern edge of the port.

The NIS also outlines compensation measures where mitigation measures are not possible. The development of Dublin Port will result in the loss of marine structures (dolphins) used by breeding terns. The compensation measures will provide a new, larger breeding area and monitoring of the tern colony.

The proposed development could have an in-combination effect with the Dublin Port Masterplan on the Dublin Bay Natura 2000 sites. Two of the projects outlined in the Dublin Port 2040 Masterplan, Alexandra Basin Redevelopment and MP2, have been granted permission and construction phase is underway. These projects have been considered in-combination with the proposed project (Figure 5-1).

5.2.6 Irish Water's Biodiversity Action Plan

Irish Water are committed to ensure that they build and manage their infrastructure responsibly to protect ecosystems. The Biodiversity Action Plan (BAP) has been developed to help in the conservation and enhancement of the natural environment. The overall aim of the Biodiversity Policy is "In association with the provision of water and wastewater services, biodiversity and the natural environment are conserved, protected and where practical enhanced, through our responsible stewardship, sustainable water services and strong partnerships."

The overarching objectives of the BAP are:

- Ensure no net loss of biodiversity as a result of Irish Water activities, projects or plans. Follow the mitigation hierarchy by avoiding impacts in the first instance, before seeking to reduce, improve or compensate. Actively seek opportunities for biodiversity net gain by identifying opportunities for biodiversity enhancement at both existing and proposed Irish Water sites.

- Develop a community of staff/personnel who are informed and can easily access the appropriate information in relation to biodiversity and the expertise they require to support them.
- Collaborate with external stakeholders to deliver biodiversity benefits at local, regional and national scales. Work collaboratively with relevant public/private organisations and local communities to support healthy ecosystems that can deliver ecosystem services.

In addition to the overarching objectives, seven key objectives have been identified which align with Irish Water policy-level strategic objectives. These are:

- Issue all Irish Water sites with a clear set of measures that will enhance and protect biodiversity.
- Raise awareness and provide educational supports on biodiversity to Irish Water staff and its partners.
- Ensure 'no net loss' of biodiversity when carrying out activities, or delivering plans or projects.
- Implement actions arising from the All-Ireland Pollinator Plan across all Irish Water sites, to support and increase our pollinator population.
- Promote the use of nature-based solutions for water protection and wastewater treatment.
- Manage invasive alien species at Irish Water sites.
- Collaborate and work with key internal and external stakeholders, and the wider community, to protect and enhance biodiversity.

The Irish Water's BAP has set out objectives to preserve and where possible enhance the natural environment and its ecosystems. The proposed GCSWOE project is not considered to interfere with the objectives of the BAP. It is however, anticipated that the stormwater outfall extension will have a long-term positive effect on the environment in the Grand Canal Basin as the reduction of pollutants entering the basin will improve the water quality and the benthic habitat. This is in line with two of the key objectives of the BAP, namely "issue all Irish Water sites with a clear set of measures that will enhance and protect biodiversity" and "ensure 'no net loss' of biodiversity when carrying out activities, or delivering plans or projects". The discharge from the combined stormwater overflow outfall into the River Liffey will cause a very slight change in water quality and there will be no discernible change in the ability to meet the surface water environmental quality standards (EQS). The WFD status for the Lower Liffey Estuary and Dublin Bay will remain good. The slight reduction in quay wall habitat is negligible in the context of the total area of quay wall habitat along the Lower River Liffey. Therefore, the operation of the new stormwater outfall is not anticipated to have a significant in-combination impact on the ecological features together with the Irish Water's BAP as the new stormwater outfall is in line with objective of the BAP and will not contravene the aims and objectives of the BAP.

5.3 Other Projects

Other larger development projects and schemes, some of which are under construction and others are still at early planning stage, are listed in Table 5-1.

Since September 2018, the projects listed in Table 5-2, which are not retention applications, home extensions and/or internal alterations, have applied for planning permission in the locality of the proposed site.

Table 5-1: Larger development projects and schemes in the vicinity of the proposed Grand Canal Stormwater Outfall Extension project.

Project	Description	Considered cumulatively (yes/no)	Reasoning
Alexandra Basin Redevelopment	The works involve: Works at Alexandra Basin West including construction of new quays and jetties, remediation of contamination on the bed of the basin, capital dredging to deepen the basin and to achieve the specified depths of -10m Chart Datum (CD) at the new berths. Infilling of the Basin at Berths 52 & 53 and construction of a new river berth with a double tiered Ro-Ro ramp. Deepening of the fairway and approach to Dublin Port to increase the ruling depth from -7.8m CD to -10.0m CD.	Yes	Works are being carried out and are likely to coincide with timing of construction phase of the Grand Canal Stormwater Outfall Extension.
MP2 Project	Works involve: • Construction of a new Ro-Ro jetty (Berth 53) for ferries up to 240m in length. • A reorientation of the already consented Berth 52 (ABP Ref. 29N.PA0034) and modification to Berth 49. • A lengthening of an existing river berth (50A). • The redevelopment of Oil Berth 3, and infill of Oil berth 4, as a future deep-water container berth for the Container Freight Terminal. • The dredging of berthing pockets and channel widening. • Consolidation of passenger terminal buildings, demolition of redundant structures and buildings, and removal of connecting roads to increase the area of land for the transit storage of Ro-Ro freight units as a Unified Ferry Terminal (UFT); a heritage zone adjacent to Berth 53 and the Unified Ferry Terminal set down area.	Yes	Planning permission has been granted and works are underway. They are likely to coincide with timing of construction phase of the Grand Canal Stormwater Outfall Extension.
Bus Connect Ringsend to City Centre	The preferred route on the south side of River Liffey is along City Quay, Sir John Rogerson's Quay and crossing Grand Canal outlet to the river. Construction will take place during a 2-year period between 2022 and 2027.	Yes	Due to timing and location, it may act in-combination with proposed project.
Dodder Public Transportation	The scheme comprises a new public transportation opening bridge over the River Dodder at its confluence with the River Liffey along with the construction of approach roads associated with the bridge.	Yes	The project is in early planning stage. It is likely to coincide with timing of construction phase of the

Opening Bridge	The purpose of the proposed bridge is to improve the pedestrian, cyclist and public transportation accessibility between the Poolbeg Peninsula and the rest of the city and to allow the development of the proposed Poolbeg West Strategic Development Zone (SDZ).		Grand Canal Stormwater Outfall Extension.
Pedestrian Bridge across River Liffey	Amendments are proposed to the North Lotts and Grand Canal Dock SDZ Planning Scheme in relation to pedestrian bridge relocation across the River Liffey. It is proposed for a new pedestrian/cycle bridge to the west of Tom Clarke (East Link) Bridge.	Yes	No details of timeline are provided. However, should the application be approved by An bord Pleanàla there is the potential for works to overlap with the proposed project.
Dart+ Underground	The current programme timeline for Dart+ (coastal south) is: 2022 Design Development and Public Consultation on Emerging Preferred route will be carried out. In 2023, public consultation on preferred route, railway order application and detailed design will be carried out.	No	No overlap on timing of works with proposed project.
Dublin Eastern Bypass	The Dublin Eastern Bypass is proposed to be located approx. 630m east of the proposed outfall at Sir John Rogerson's Quay. The bypass route proposes to travel across the Dublin Port area by underground tunnel or at-grade road and bridge. The route is proposed to travel along south of the East Wall Road, along the alignment of the Tom Clarke Bridge (East Link Toll Bridge) and the R131.	No	This project is not intended to progress as part of the Transport Strategy 2022-2042.
Dodder Greenway	Along Dodder and through parks and existing roads. The project is carried out in phases.	No	Planning application has not yet been submitted.
Dublin District Heating	The Dublin District Heating System (DDHS) will be a thermal energy network that uses energy from waste heat and distributes it as hot water through insulated dual (supply and return) pipelines to homes and business for space heating, hot water and industrial purposes. The initial project phase is focused on the, Poolbeg West, North Lotts and Grand Canal Dock SDZ's. The Project is expected to take up to five years (between 2021 and 2026) to install and commission the initial network, with customer connection and realisation of the benefits being delivered on a phased basis, over the next ten years in line with development within the catchment areas.	Yes	This project has the potential to partly overlap with the construction phase of the proposed project.
Grand Canal Greenway- Grand Canal Dock Section	The proposed works involve the installation of a smoother cycle friendly lane within the existing Grand Canal Quay cobbled roads. This is part of the Grand Canal Greenway as described in the GDA Cycle Network Plan.	Yes	The project is in early planning stage. It is likely to coincide with timing of construction phase of the Grand Canal Stormwater Outfall Extension.
Grand Canal Quay East development works	The development will consist of demolition of existing vacant warehouse structure (2,241sqm) on-site, construction of part 8 to part 15 storey (proposed 8-storey element facing west and proposed 15-storey element facing Grand Canal Quay to the east),	Yes	The project is in early planning stage. It is likely to coincide with timing of construction phase of the Grand Canal Stormwater Outfall

	over basement level, contemporary glazed office building incorporating a ground floor cafe and reception area.		Extension.
Maintenance dredging in Dublin Port	Maintenance of dredging activity in the basin will involve dredging and relocation of sediment with potential impact on benthic communities in the bay.	Yes	Involve dredging and relocation of sediment with potential impact on benthic communities in the bay.
Luas Red Line Poolbeg Extension	The Transport Strategy 2022-2042 outlines that the extension may be considered during the later periods of the Transport Strategy or after 2042.	No	No overlap with the construction phase of the proposed project.
Greater Dublin Area Cycle Network Plan	Sets out proposals for new cycle routes, including Dodder Greenway, but no detailed planning.	No	Each individual project will have to be assessed at the planning stage.
Metrolink	Transport Infrastructure Ireland (TII) will apply for a Railway Order for the project in Q2, 2022. The planning process with An Bord Pleanála is likely to take 12-18 months to complete. Once a Railway Order has been granted, work can commence on site. It is anticipated that the construction work will take between 6-8 years to complete.	No	Works are not likely to overlap with the proposed project, therefore no cumulative impacts anticipated.
Ringsend Waste Water Treatment Plant Upgrade	The Greater Dublin Drainage Strategy includes the upgrade of Ringsend WWTP. In June 2018 Irish Water applied for (and subsequently received) planning permission for upgrade works to the Ringsend WWTP facility. These are currently on-going and will increase the capacity of the facility from 1.6 million PE to 2.4 million PE. This plant upgrade will result in an overall reduction in the final effluent discharge of several parameters from the facility including BOD, suspended soils, ammonia, DIN and MRP. An EIAR was submitted by Irish Water as part of this application.	Yes	The works are currently on-going at the Ringsend WWTP.
South Campshire Flood Defence Wall Project	The South Campshires Flood Defence Scheme, consists of approximately 1.0 km of flood wall situated on the quayside, extending from Butt Bridge on George's Quay to approximately 50m east of the Samuel Beckett Bridge on Sir John Rogerson's Quay.	Yes	The project is in early planning stage. It is likely to coincide with timing of construction phase of the Grand Canal Stormwater Outfall Extension.
Treasury Building	Google Ireland Limited have been granted planning permission for development comprising the refurbishment and extension of the existing 'Treasury Building' to provide c. 7,802sqm of additional office floor space on the c. 0.40ha site at Grand Canal Street Lower, Dublin 2	Yes	The project is in early planning stage. It is likely to coincide with timing of construction phase of the Grand Canal Stormwater Outfall Extension.

Table 5-2: Projects granted planning permission since September 2018 in vicinity of proposed site.

Planning Reference	Address	Application Status	Decision date	Summary of development
DSDZ3780/20	The Former Boland's Mill incorporating 33 & 34 Barrow Street together with 35A Barrow Street & 35 Barrow Street at Ringsend Road and Barrow Street, Dublin 4	Granted permission	26 Jan 2021	Planning permission for development at a site of 1.098 ha known as The former Boland's Mill incorporating 33 & 34 Barrow Street together with 35A Barrow Street & 35 Barrow Street at Ringsend Road and Barrow Street, Dublin 4, bounded to the north by Ringsend Road, to the south by adjacent office development (Mason Hayes Curran ("South Bank House") and the Warehouse), to the east by Barrow Street and to the west by Grand Canal Dock. The application relates to a proposed development within a Strategic Development Zone Planning Scheme area. The site accommodates 4 protected structures including: Block B referred to as 1 Ringsend Road (RPS 7377); Block D comprising nos. 33 and 34 Barrow Street (RPS 483, 484): two-storey brick gables of warehouses to south of Boland's Mill (the 'factory' building) (RPS 485). The proposed development seeks amendments to the previously permitted development DSDZ3796/14 and as amended by DSDZ3264/17, DSDZ4111/17, DSDZ2986/18, DSDZ4618/18, DSDZ2623/19, DSDZ2679/19, DSDZ4835/19, DSDZ4334/19. The proposed amendments comprise of internal and external alterations to the existing buildings on the site, change of use of part of Building A and B to provide for retail / café/ restaurant and marketplace use (“Marketplace” use incorporates retail / café/ restaurant uses including hot food for consumption off the premises), change of use of ground floor of Tower 1 and 2 to provide for retail / café/ restaurant use and alterations to the permitted hard and soft landscaping throughout the development.
DSDZ4423/18	The Marker Hotel, Grand Canal Square, Misery Hill, Dublin 2	Granted permission	11-Mar-2019	Permission for development at a site of 0.17 ha at The Marker Hotel, Grand Canal Square, Misery Hill, Dublin 2. The site is bound by Misery Hill to the South, Hibernian Road to the West, Chimney Park to the North and Forbes St. to the East. The development consists of the following: 1. Additional level of bedroom accommodation between permitted 7th floor and 8th floor rooftop restaurant (as previously permitted by Planning Reg. Ref. DSDZ2505/17) which will increase the overall permitted building height by 2.215m; 2. Alteration to the permitted rooftop restaurant to comply with Part L, including solar screening, and minor additional plant; 3. Proposed new glazed entrance at ground floor southern elevation. The proposed

Planning Reference	Address	Application Status	Decision date	Summary of development
				amendments result in an overall increase in floor area of 1,475.93 sq.m. This application relates to a proposed development within the North Lotts & Grand Canal Dock SDZ Planning Scheme Area.
DSDZ2708/20	The Marker Hotel, Grand Canal Square, Misery Hill, Dublin 2	Granted permission	17-Jul-2020	Permission for development of a site of 0.17ha at the Marker Hotel - the site is bounded by Misery Hill to the South, Hibernian Road to the West, Chimney Park to the North and Forbes St. to the East. The development consists of the following: removal of the existing main hotel entrance doors and stone surround, construction of new front entrance doors, entrance canopy with signage, and an adjacent free standing totem sign and logo at street level and all associated site works. The proposed amendments result in an overall increase in floor area of 27sq.m.
DSDZ2657/18	Thorncastle Street, Dublin 4, D04 P4F3	Granted permission	04-Dec-2018	Temporary Planning Permission for 5 years for a development consisting of the erection of a new single storey prefabricated modular unit of 360m2 to replace the existing 4 single storey cabins and two 40ft double stacked containers at the rear of this site, totalling 228m2, currently used for community activities in order to replace and improve these existing community facilities. This application relates to a proposed development within the North Lotts & Grand Canal Dock SDZ Planning Scheme area.
DSDZ2145/18	Sir John Rogerson's Quay, Britain Quay, Green Street East and Benson Street, Dublin 2	Granted permission	15-Jun-2018	KW Real Estate ICAV acting for and on behalf of KW Irish Real Estate Fund VIII intends to apply for permission for development at a site of c.1.93 ha, known as Capital Dock, at Sir John Rogerson's Quay, Britain Quay, Green Street East and Benson Street, Dublin 2. The site adjoins the State Street Bank building to the west. The proposed development comprises changes to the two basement levels and changes at surface level, previously permitted under DSDZ2546/15 (the parent permission) as amended by permission references DSDZ4345/15, DSDZ2663/16, DSDZ4102/16, DSDZ3796/16, DSDZ3572/17 and DSDZ4135/17. The basement levels are now described as follows: A two level basement (c.23,781 sq.m gross floor area as previously permitted), accessed via existing entrance on Green Street East (shared with State Street Bank building), to serve the mixed-use development permitted under DSDZ2546/15 (as amended by subsequent related permissions), to accommodate: a total

Planning Reference	Address	Application Status	Decision date	Summary of development
				of 339 no. car parking spaces (a decrease of 33 no. spaces from the permitted), of which 94 no. car parking spaces to serve the permitted commercial (office) floor area (c.40,075 sq.m gfa), a total of 674 no. bicycle parking spaces (an increase of 24 no. spaces from the permitted), and the reconfiguration of other associated and ancillary facilities including: plant, utility and attenuation areas, refuse storage, employee welfare facilities, remote residential storage, remote non-residential storage, stair and lift cores, and circulation areas. Proposed reconfiguration of site development and landscape works at surface level to include: Re-positioning of permitted car-parking/set down spaces at the entrance to Block A & B (no change in number of spaces); 1 no. new set down space adjoining Block G. The removal of 2 no. ventilation funnels and relocation of 1 no. ventilation funnel along the roadway between Block B and Blocks F & E. The removal and relocation of 1 no. permitted set down space from Green Street East to the space between Block D and the existing State Street Bank. All associated with and ancillary to the development otherwise permitted under parent permission DSDZ2546/15 (as amended). This application relates to proposed development within the North Lotts & Grand Canal Dock Strategic Development Zone Planning Scheme area.
DSDZ2459/19	Block G, Capital Dock, Britain Quay, Dublin, 2	Granted permission	24-Jun-2019	Permission for development at a site (c.0.09ha), at Block G, Capital Dock, Britain Quay, Dublin 2. Bounded generally by Sir John Rogerson's Quay to the north, Britain Quay to the east, Green Street East and Hanover Quay to the south, and surrounding development permitted under Reg. Ref. DSDZ2546/15 (as amended) to the west. Permission is sought for an in house micro-brewing facility (c. 50 sqm) and external ground floor seating areas (c. 182 sqm. on east, south and west elevations), ancillary to the 'public house, with ancillary restaurant' use for Block G sought under concurrent planning application reference DSDZ4740/18.
DSDZ4502/18	Block C, 77, Sir John Rogerson's Quay, Dublin 2	Granted permission	01-Feb-2019	Planning Permission for development at Block C, 77 Sir John Rogerson's Quay, Dublin 2. The development will consist of (1) the erection of 1 no. fascia sign with halo effect illumination to the east elevation and (2) all associated works.

Planning Reference	Address	Application Status	Decision date	Summary of development
2089/20	The Watermarque Building, South Lotts Road, Ringsend, Dublin 4	Granted permission	12-Mar-2020	Planning Permission for development at the Watermarque Building, Ringsend Road, Dublin 4, D04K7N3. The site is bound by Ringsend Road to the north, Shelbourne Park Stadium to the south, the River Dodder to the east and South Lotts Road to the west. The proposed development seeks amendments to the existing building to provide for the following: - Provision of additional plant machinery and ancillaries at roof level comprising of c. 115 sq.m; - Relocation and replacement of existing safety barrier at roof level to accommodate new plant machinery; - Provision of 2 no. supply and exhaust ventilation louvers to the southern elevation; - Existing entrance door at ground floor level on the north west corner at the junction of Ringsend Road and South Lotts Road to be removed and replaced with new glazing; - All other ancillary site development work necessary to facilitate the development.
4470/18	1 Grand Canal Quay, Dublin 2, D02 FF61	Granted permission	25-Jan-2019	The development will consist of modifications to existing glass Balustrade at Level 4 on Front/East Elevation to raise the height of the glass along the entire front with the addition of glass balustrades to top of Level 4 parapet walls to North and South elevations to match height of Front/East balustrade ; along with works to rear courtyard area to include glass and steel smoking shelter and additional height glass barrier to courtyard perimeter walls for additional security.
4582/18	1, Grand Canal Quay, Dublin 2	Granted permission	05-Apr-2019	Planning permission is sought at No. 1 Grand Canal Quay, Dublin 2 (D02 FF61). The development will consist of: Extensions at sixth floor level and seventh floor level to existing office building extensions (previously approved under Reg. Ref. 2263/15). The proposed works comprise the following: (i) provision of a new front (east facing) and side (south-west facing) office extension (356sq.m) at sixth floor level; (ii) provision of a new front (east facing) and rear (west-facing) office extension (761 sq.m) at seventh floor level both finished in dark-coloured metal cladding and glazing to match the existing office building, (iii) relocation of existing roof plant to a new set back and screened plant enclosure area above new seventh floor level extension; and, (iv) all ancillary site works, green roof and drainage infrastructure to facilitate the development. The proposed development also provides for the relocation of plant approved under Reg. Ref. 4028/18 to the proposed plant enclosure area.

Planning Reference	Address	Application Status	Decision date	Summary of development
3395/19	1, Grand Canal Quay, Dublin 2	Granted permission	10-Dec-2019	The proposed development will consist of: (i) the strip-out of existing sixth floor level including exterior walls and glazing, the removal of existing roof finishes and rooflights, and relocation of existing plant enclosure; (ii) the demolition of existing seventh floor level; (iii) the construction of 4 no. additional floors of office accommodation with a rooftop plant enclosure in a new contemporary glazed extension. The development will result in an eleven-storey office building. The proposed works also include internal and external alterations as follows: (a) existing lifts and stair core extended to serve areas to each floor level; (b) existing set-back of the atrium facade on the south elevation will be maintained on the proposed upper floor levels forming a balcony at each floor level from sixth to tenth floors; (c) drainage and all associated site development and ancillary works necessary to facilitate the proposed development.
2608/20	1, Grand Canal Quay, Dublin 2	Granted permission	10-Jul-2020	Planning Permission is sought at No. 1 Grand Canal Quay, Dublin 2 (D02 FF61) for alterations to previously approved development (Reg. Ref. 3395/19) including internal and external alterations as follows: (i) minor increase in floor to ceiling heights of the previously approved 4 no. additional floor levels, resulting in an increase in overall building height of 0.85 metres; (ii) reconfiguration of the approved 2 no. lift cores and lobby in core 2 on the north side of the building to comply with fire safety requirements and ensure safe evacuation; (iii) the infilling of the approved terrace on the eastern elevation at tenth floor level to provide additional office space; (iv) amendments to the approved elevation treatment at sixth floor level to retain the existing glazing; (v) minor internal layout changes to toilets, risers and fire lobbies and the widening of the existing stairs to comply with fire safety requirements; and (vi) all associated site development and ancillary works necessary to facilitate the proposed development.
4074/18	Block A/B, Grand Canal Plaza, Dublin 2	Granted permission	26-Nov-2018	Planning permission for development at a 0.31 hectare site located immediately north of Block A/B at Grand Canal Plaza, Dublin 2. The proposed development will consist of the construction of a new 2 no. storey Tenant Amenities Building to accommodate 153 no. secure and covered bicycle parking spaces at ground floor level alongside 1 no. disabled access shower and changing cubicle, with 11 no. shower cubicles and associated lockers located at first

Planning Reference	Address	Application Status	Decision date	Summary of development
				floor level. Ancillary facilities are provided within the building, with areas of plant at ground floor, first floor and enclosed roof level. All associated site and drainage works are included in the red line site boundary. The gross floor area of the building extends to 103 sqm. The subject site is currently occupied by a service building (which is to be retained) and surface car parking. Proposals also include the relocation of 8 no. car parking spaces through a reconfigured car parking layout.
3233/20	Gordon House, Barrow Street, Dublin 4	Granted permission	11-Jan-2021	Planning permission for development at a site of c.0.3861ha at Gordon House, Barrow Street, Dublin 4, D04 E5W5. The site is bound to the north by residential properties along Gordon Street to the south by an office development known as the "Gasworks House" and "The Hibernian" to the east by residential apartments known as the "Gasworks" and to the west by Barrow Street. The proposed development comprises of the following: • Provision of new entrance to Barrow Street in the south west corner of the site and upgrade of existing entrance to Barrow Street; • Internal modifications to the existing building to provide for a revised office layout; • New façade treatment at ground and first floor level; • Removal of part of the existing plant screen at 2nd floor level to extend the plant screen and provide for additional plant equipment to the east (c.112sqm); • Provision of 2 no. new entrance signs comprising individually mounted, PPC aluminium letters with translucent acrylic front face and internal illumination, 1 no. "The Foundry" sign above the existing entrance on the north end of Barrow Street and 1 no. "Gordon House" entrance sign above the new entrance to the south end of Barrow Street; • All other associated site development works necessary to facilitate the development.
3752/21	No. 2 Grand Canal Quay, Dublin 2 and No. 1 Grand Canal Quay, Dublin 2	Not decision made	-	The development will consist of: i) demolition of existing vacant warehouse structure (2,241sqm) on-site; ii) construction of part 8 to part 15 storey (proposed 8-storey element facing west and proposed 15-storey element facing Grand Canal Quay to the east), over basement level, contemporary glazed office building incorporating a ground floor cafe and reception area. The building will comprise: a) 15 no. car parking spaces (including 1 no. limited mobility parking space), 160 no. bicycle parking spaces, staff facilities including changing rooms and

Planning Reference	Address	Application Status	Decision date	Summary of development
				showers, bin-storage, set-down area and plant equipment all at basement level; b) vehicular access to the proposed basement level will be via the existing ramp to the basement level of the adjacent No. 1 Grand Canal Quay building; c) a publicly accessible cafe, reception area, staff and customer facilities, office space, ESB sub-station and plant rooms at ground floor level; d) office space on upper floor levels, including staff facilities from first to fourteenth floor levels; and e) lift cores and stairwells to serve each floor level. The proposed development will also include: iii) alterations to the basement layout of No. 1 Grand Canal Quay as approved under Reg. Ref. 3395/19 and 2608/20; iv) provision of roof terrace at eighth floor level on western facade of the development; v) provision of landscaped walkway along northern boundary of site comprising planting, landscaping, lighting and visitor bicycle parking; vi) drainage, landscaping, boundary treatments and all associated site development and ancillary works necessary to facilitate the development including lighting, signage and roof top plant enclosure.
3220/21	Dublin Port, Alexandra Road, Dublin 1	No decision made	-	Permission for development at this site which extends from North Wall Quay Extension to the Tolka Estuary, to include the western boundary to Dublin Port and pavements along East Wall Road, across the Alexandra Road junction with East Wall Road, across the Tolka Quay Road junction with East Wall Road, Bond Road, across the Promenade Road junction with Bond Road and to end of Bond Road, Dublin Port, Dublin 1 & 3 and permission to amend development permitted under Reg. Ref. 3084/16. The ESB substation (Record of Protected Structures No. 8771) is located within the subject site. The proposed development will consist of construction of a new 1.4km pedestrian walkway and a 2-way cycle lane along East Wall Road and Bond Road from the River Liffey to the Tolka Estuary.
DSDZ3021/21	The Malt House North (Eircode D02R239), The Malt House South (Eircode D02PW24) and No.s 1-4 Malt House Apartments (Eircode D02A252, D02XF63, D02WF83 and D02E803), Grand Canal Quay, Dublin 2	Grant Permission	17 Aug 2021	The proposed development consists of demolition of the existing 4th floor penthouse, including external walls, pitched roof and concrete floor slab; and the removal of the existing concrete floor slabs at 1st, 2nd and 3rd floors. The proposed development will comprise the construction of replacement composite deck concrete floor slabs at 1st, 2nd, 3rd and 4th floor levels, and the provision of an additional 3 no. floors of office accommodation (5th, 6th

Planning Reference	Address	Application Status	Decision date	Summary of development
				and 7th floor levels) supported on a new steel frame in a new contemporary glazed extension. The development results in a 8-storey office building with rooftop plant enclosures. Permission is also sought for a change of use of No. 1-4 Malt House Apartments from residential use to office use and integration with adjacent office floorspace (permission was previously granted for change of use of No.s 1-4 Malt House Apartments under Reg. Ref. DSDZ4441/16 and DSDZ2355/19).
2860/21	The Treasury Building, Grand Canal Street Lower, Dublin 2 D02XN96	Additional information requested	26 Jul 2021	Planning permission for development comprising the refurbishment and extension of the existing 'Treasury Building' to provide c. 7,802sqm of additional office floor space [resulting in a total of 20,933sqm GFA] on the c. 0.40ha site at Grand Canal Street Lower, Dublin 2 D02XN96.
3768/20	No. 4, Grand Canal Quay, Dublin 2, D02 HR22	Grant permission	22 Jan 2021	The development will consist of demolition of existing boundary walls/ gates along the eastern boundary of the site facing onto Grand Canal Quay and two storey flat roofed annex to warehouse at No. 4 Grand Canal Quay. Proposed relocation of vehicular access to existing alternative entrances onto Pearse Street/ Macken Street. Proposed raising of roof to warehouse at no. 4 Grand Canal Quay and all roof coverings replaced, the introduction of roof glazing to the north and south facing slopes and local roof additions for access to topmost floors of annex. Pitched roof coverings to adjacent annexes to be repaired and existing roof vents converted to roof glazing. Re-organisation of all internal spaces within the warehouse/ annexes including insertion of additional mezzanine floor spaces all for use as innovation/ office space. Existing external walls to warehouse and annexes to be repaired and repointed, all existing window openings to be re-opened and re-glazed and localised new fenestration introduced facing onto Grand Canal Quay and new pedestrian court. The development will provide a new external terrace in front of warehouse onto Grand Canal Quay. Refurbishment of ground floor only of adjacent 8 storey tower - a protected structure - into innovation/ office space, including relocation of main entrance from the east to the south facade at ground floor. Existing car parking yard between warehouse and 8-storey tower to be replaced by two pedestrian courts separated by an

Planning Reference	Address	Application Status	Decision date	Summary of development
				external covered walkway including steps and ramps linking the warehouse and tower. The (eastern) court adjacent to Grand Canal Quay to be hard paved and provide an external terrace for the new cafe and events. The (western) rear court to be soft landscaped and act as a garden and gathering space for the innovation hub. 2 no. accessible car parking spaces to be located off Grand Canal Quay and 33 no. cycle parking spaces to be located in the front courtyards.

5.4 Summary

The plans and projects near the proposed project are considered in combination with the currently proposed project in the Assessment section below.

6 Appropriate Assessment

6.1 Introduction

This section presents a detailed assessment of the potential impact of the proposed project on the QIs of the Dublin Bay Natura 2000 sites: South Dublin Bay and River Tolka Estuary SPA, North Bull Island SPA and North Dublin Bay SAC. The screening report identified surface water pollution as the potential impacts on QIs of the Natura 2000 sites. There is also potential for disturbance impact on Common Tern (QI of South Dublin Bay and River Tolka Estuary SPA) due to the presence of a nesting site at the Camden Lock structure at the outer end of Grand Canal Basin.

Section 6.2 assesses the screened-in Natura 2000 sites in more detail and examines where potentially adverse impacts may arise from the sources of impact identified (i.e. surface water, land and air, or groundwater pathways). Where potentially adverse impacts are identified, avoidance and mitigation measures are proposed. These are discussed in Section 6.3.

6.2 Potential Sources of Impact via Surface Water Pathways

The AA screening determined that pathway of impact existed between the proposed site and the relevant Natura 2000 sites. This section further examines the source > pathway > receptor chains that could potentially result in adverse impacts arising within the Dublin Bay Natura 2000 sites.

Habitats and species, and their attributes, likely to be impacted by surface water pollution are listed in Table 6-1.

6.2.1 Construction Phase - Direct impacts

Sedimentation and run-off of pollutants entering the Grand Canal Basin/ River Liffey and South Dublin Bay and River Tolka Estuary SPA, North Bull Island SPA and North Dublin Bay SAC

There is potential for impacts on water dependent QIs to occur during the construction phase of the proposed project.

The proposed works entails the construction of a 450m pipeline on the silt bed within the Grand Canal Basin, undergrounding 100m pipeline along existing road and pedestrian walkway, and a new outfall structure at Sir John Rogerson's Quay at River Liffey. The works will involve dredging and relocation of silt within the basin and pouring of concrete below the water surface. There will be resuspension of sediment within the Grand Canal Basin when installing the new 450m pipeline and potential for surface water runoff from the construction works. This will cause an increased delivery of silt to enter River Liffey and potentially the South Dublin Bay and River Tolka Estuary SPA, North Bull Island SPA and North Dublin Bay SAC located downstream.

This, along with the accidental spill of concrete and runoff of pollutants, such as hydrocarbons from machinery, has the potential to impair the water quality of the SPAs and SAC, which may cause effects such as eutrophication, increased algal and macrophyte growth, increased turbidity and increased sedimentation of the estuarine substrate. This may in turn adversely impact saltmarsh vegetation and macroinvertebrate communities and birds.

The pollutants could directly impact the bird QI species of the SPAs through contact with the feathers, which will ultimately degrade the physical condition of these biological features. Furthermore, these pollutants may be ingested through the grooming of the affected feathers, or while feeding within the aquatic environment.

The 3.5km to 5.9km hydrological distance between the proposed development site and Natura 2000 sites will contribute to settling some of sediment out of the water before it reaches estuarine habitats within the South Dublin Bay and River Tolka Estuary SPA, North Bull Island SPA and North Dublin Bay SAC.

The potential direct impacts on QIs of the South Dublin Bay and River Tolka Estuary SPA, North Bull Island SPA and North Dublin Bay SAC from the construction phase are outlined in Table 6-1, Table 6-2, and Table 6-3.

Accidental spread of alien invasive species

The only invasive species identified in the areas of proposed works are Nuttall's Waterweed, Zebra Mussel and Butterfly-bush. Nuttall's Waterweed and Zebra Mussel are found in freshwater habitats and

therefore, there will be no spread of these species to any of the Natura 2000 sites located in Dublin Bay: South Dublin Bay and River Tolka Estuary SPA, North Bull Island SPA and North Dublin Bay SAC. Butterfly-bush is a terrestrial species and its distribution within the proposed works area is restricted to Sir John Rogerson's Quay. As the Annex I habitats of the Natura 2000 sites are coastal/marine and given the distance, it is not anticipated that Butterfly-bush will spread to these sites. Therefore, no impacts are anticipated from spread of invasive species to these Natura 2000 sites due to the proposed development.

Table 6-1: Potential direct impacts on the attributes of the designated features of the South Dublin Bay and River Tolka Estuary SPA within the ZoI of the proposed project.

Qualifying Interest	Attribute	Measure	Potential Impacts
Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] Oystercatcher (*Haematopus ostralegus*) [A130] Ringed Plover (*Charadrius hiaticula*) [A137] Grey Plover (*Pluvialis squatarola*) [A141] Knot (*Calidris canutus*) [A143] Sanderling (*Calidris alba*) [A144] Dunlin (*Calidris alpina*) [A149] Bar-tailed Godwit (*Limosa lapponica*) [A157] Redshank *(Tringa totanus*) [A162] Black-headed Gull (*Chroicocephalus ridibundus*) [A179]	Population trend	Percentage change	Potential pollutants may negatively impact on the overall health of the population resulting in decreased fecundity, ultimately leading to a decrease in population for the following QI bird species: Light-bellied Brent Goose Oystercatcher Ringed Plover Grey Plover Knot Sanderling Dunlin Bar-tailed Godwit Redshank Black-headed Gull
	Distribution	Range, timing and intensity of use of areas	Potential pollutants may negatively impact on the range, timing and intensity of use of areas within the SPA by the following QI bird species: Light-bellied Brent Goose Oystercatcher Ringed Plover Grey Plover Knot Sanderling Dunlin Bar-tailed Godwit Redshank Black-headed Gull
Roseate Tern (*Sterna dougallii*) [A192]	Passage population: individuals	Number	Potential pollutants may negatively impact on the overall health of individuals within the passage population, resulting in potential population decline.
	Distribution: roosting areas	Number; location; area	N/A

Qualifying Interest	Attribute	Measure	Potential Impacts
		(hectares)	
	Prey biomass available	Kilogrammes	Potential pollutants may negatively impact on prey biomass as prey species may reduce in quantity / quality, which in turn reduces prey biomass available for the Roseate Tern population.
	Barriers to connectivity	Number; location; shape; area (hectares)	N/A
	Disturbance at roosting site	Level of impact	N/A
Common Tern (*Sterna hirundo*) [A193]	Breeding population abundance: apparently occupied nests (AONs)	Number	Potential pollutants may negatively impact on the overall health of individuals within the breeding population, resulting in potential population / occupied nest decline.
	Productivity rate: fledged young per breeding pair	Mean number	Potential pollutants may negatively impact on the overall health of individuals within the breeding population, resulting in reduced fecundity and a decrease in fledged young per breeding pair.
	Passage population: individuals	Number	Potential pollutants may negatively impact on the overall health of individuals within the passage population, resulting in potential population decline.
	Distribution: breeding colonies	Number; location; shape; area (hectares)	N/A
	Distribution: roosting areas	Number; location; shape; area (hectares)	N/A
	Prey biomass available	Kilogrammes	Potential pollutants may negatively impact on prey biomass as prey species may reduce in quantity / quality, which in turn reduces prey biomass available for the Common Tern population.
	Barriers to connectivity	Number; location; shape; area (hectares)	N/A
	Disturbance at breeding site	Level of impact	N/A
	Disturbance at roosting site	Level of impact	N/A
Arctic Tern (*Sterna paradisaea*) [A194]	Passage population: individuals	Number	Potential pollutants may negatively impact on the overall health of individuals within the passage population, resulting in potential population decline.

Qualifying Interest	Attribute	Measure	Potential Impacts
	Distribution: roosting areas	Number; location; area (hectares)	N/A
	Prey biomass available	Kilogrammes	Potential pollutants may negatively impact on prey biomass as prey species may reduce in quantity / quality, which in turn reduces prey biomass available for the Artic Tern population.
	Barriers to connectivity	Number; location; shape; area (hectares)	N/A
	Disturbance at roosting site	Level of impact	N/A
Wetland and Waterbirds [A999]	Habitat area	Hectares	Potential pollutants may negatively impact on the wetland vegetation, resulting in a decrease of total wetland habitat.

Table 6-2: Potential direct impacts on the attributes of the designated features of the North Bull Island SPA within the ZoI of the proposed project.

Qualifying Interest	Attribute	Measure	Potential Impacts
Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] Shelduck (*Tadorna tadorna*) [A048] Teal (*Anas crecca*) [A052] Pintail (*Anas acuta*) [A054] Shoveler (*Anas clypeata*) [A056] Oystercatcher (*Haematopus ostralegus*) [A130] Golden Plover (*Pluvialis apricaria*) [A140] Grey Plover (*Pluvialis squatarola*) [A141]	Population trend	Percentage change	Potential pollutants may negatively impact on the overall health of the population resulting in decreased fecundity, ultimately leading to a decrease in population for the following QI bird species: Light-bellied Brent Goose Shelduck Teal Pintail Shoveler Oystercatcher Golden Plover Grey Plover Knot Sanderling Dunlin Black-tailed Godwit Bar-tailed Godwit Curlew Redshank

Qualifying Interest	Attribute	Measure	Potential Impacts
Knot (*Calidris canutus*) [A143]			Turnstone Black-headed Gull
Sanderling (*Calidris alba*) [A144] Dunlin (*Calidris alpina*) [A149] Black-tailed Godwit (*Limosa limosa*) [A156] Bar-tailed Godwit (*Limosa lapponica*) [A157] Curlew (*Numenius arquata*) [A160] Redshank *(Tringa totanus*) [A162] Turnstone (*Arenaria interpres*) [A169] Black-headed Gull (*Chroicocephalus ridibundus*) [A179]	Distribution	Range, timing and intensity of use of areas	Potential pollutants may negatively impact on the range, timing and intensity of use of areas within the SPA by the following QI bird species: Light-bellied Brent Goose Shelduck Teal Pintail Shoveler Oystercatcher Golden Plover Grey Plover Knot Sanderling Dunlin Black-tailed Godwit Bar-tailed Godwit Curlew Redshank Turnstone Black-headed Gull
Wetland and Waterbirds [A999]	Habitat area	Hectares	Potential pollutants may negatively impact on the wetland vegetation, resulting in a decrease of total wetland habitat.

Table 6-3: Potential direct impacts on the attributes of the designated features of the North Dublin Bay SAC within the ZoI of the proposed project.

Qualifying Interest	Attribute	Measure	Potential Impacts
Mudflats and sandflats not covered by seawater at low tide [1140]	Habitat area	Hectares	N/A
	Community extent	Hectares	Potential pollutants may negatively impact on the *Mytilus edulis*-dominated community and its extent. Increased sedimentation could alter sediment composition and typical species change.

Qualifying Interest	Attribute	Measure	Potential Impacts
	Community structure: *Mytilus edulis* density	Individuals/m²	Potential pollutants may negatively impact on the *Mytilus edulis density.* Increased sedimentation could alter sediment composition and typical species change.
	Community distribution	Hectares	Potential pollutants may negatively impact on the *Pygospio elegans, Crangon crangon* and *Spio martinensis* community complexes. Increased sedimentation could alter sediment composition and typical species change.
Annual vegetation of drift lines [1210]	Habitat area	Hectares	Potential pollutants may negatively impact on the total habitat area of annual drift line vegetation.
	Habitat distribution	Occurrence	Potential pollutants may negatively impact on the overall distribution of annual drift line vegetation.
	Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	N/A
	Vegetation structure: zonation	Occurrence	Potential pollutants and sediment could alter structural variation within sward.
	Vegetation composition: typical species and subcommunities	Percentage cover at a representative number of monitoring stops	Potential pollutants and sediment may negatively impact on the species-poor communities with typical species: sea rocket (*Cakile maritima*), sea sandwort (*Honckenya peploides*), prickly saltwort (*Salsola kali*) and oraches (*Atriplex* spp.).
	Vegetation composition: negative indicator species	Percentage cover	Potential pollutants and sediment may negatively impact on the positive indicator species, reducing their density and subsequently allowing the establishment of non-native invasive species.
Salicornia and other annuals colonising mud and sand [1310]	Habitat area	Hectares	Potential pollutants and sediment may negatively impact on the total habitat area of Salicornia and other colonising annual vegetation.
	Habitat distribution	Occurrence	Potential pollutants and sediment may negatively impact on the overall distribution of Salicornia and other colonising annual vegetation.
	Physical structure: sediment	Presence/ absence of	N/A

Qualifying Interest	Attribute	Measure	Potential Impacts
	supply	physical barriers	
	Physical structure: creeks and pans	Occurrence	N/A
	Physical structure: flooding regime	Hectares flooded; frequency	N/A
	Vegetation structure: zonation	Occurrence	Potential pollutants and sediment could alter structural variation within sward.
	Vegetation structure: vegetation height	Centimetres	Potential pollutants and sediment may negatively impact and alter the sward heights of the Salicornia and other colonising annual vegetation.
	Vegetation structure: vegetation cover	Percentage cover at a representative number of monitoring stops	Potential pollutants and sediment may negatively impact and subsequently reduce the total vegetation cover (outside of creeks).
	Vegetation composition: typical species and subcommunities	Percentage cover	Potential pollutants and sediment may negatively impact on the typical species and subcommunities.
	Vegetation structure: negative indicator species - *Spartina anglica*	Hectares	Potential pollutants and sediment may negatively impact on the positive indicator species, reducing their density and subsequently allowing the establishment of non-native invasive species, such as *Spartina anglica*.
Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]	Habitat area	Hectares	Potential pollutants and sediment may negatively impact on the total habitat area of Atlantic salt meadows.
	Habitat distribution	Occurrence	Potential pollutants and sediment may negatively impact on the overall distribution of Atlantic salt meadows.
	Physical structure: sediment supply	Presence/ absence of physical barriers	N/A
	Physical structure: creeks and pans	Occurrence	N/A
	Physical structure: flooding regime	Hectares flooded; frequency	N/A
	Vegetation structure: zonation	Occurrence	Potential pollutants and sediment could alter structural variation within sward.
	Vegetation structure: vegetation height	Centimetres	Potential pollutants and sediment may negatively impact and alter the sward heights of the Atlantic salt meadow

Qualifying Interest	Attribute	Measure	Potential Impacts
			vegetation.
	Vegetation structure: vegetation cover	Percentage cover at a representative number of monitoring stops	Potential pollutants and sediment may negatively impact and subsequently reduce the total vegetation cover (outside of creeks).
	Vegetation composition: typical species and subcommunities	Percentage cover	Potential pollutants and sediment may negatively impact on the typical species and subcommunities of Atlantic salt meadows.
	Vegetation structure: negative indicator species - *Spartina anglica*	Hectares	Potential pollutants and sediment may negatively impact on the positive indicator species, reducing their density and subsequently allowing the establishment of non-native invasive species, such as *Spartina anglica*.
Mediterranean salt meadows (Juncetalia maritimi) [1410]	Habitat area	Hectares	Potential pollutants and sediment may negatively impact on the total habitat area of Mediterranean salt meadows.
	Habitat distribution	Occurrence	Potential pollutants and sediment may negatively impact on the overall distribution of Mediterranean salt meadows.
	Physical structure: sediment supply	Presence/ absence of physical barriers	N/A
	Physical structure: creeks and pans	Occurrence	N/A
	Physical structure: flooding regime	Hectares flooded; frequency	N/A
	Vegetation structure: zonation	Occurrence	Potential pollutants and sediment could alter structural variation within sward.
	Vegetation structure: vegetation height	Centimetres	Potential pollutants and sediment may negatively impact and alter the sward heights of the Mediterranean salt meadow vegetation.
	Vegetation structure: vegetation cover	Percentage cover at a representative number of monitoring stops	Potential pollutants and sediment may negatively impact and subsequently reduce the total vegetation cover (outside of creeks).
	Vegetation composition: typical species and subcommunities	Percentage cover	Potential pollutants and sediment may negatively impact on the typical species and subcommunities of Mediterranean salt meadows.
	Vegetation structure: negative indicator species - *Spartina anglica*	Hectares	Potential pollutants and sediment may negatively impact on the positive indicator species, reducing their density and subsequently allowing the establishment of non-native

Qualifying Interest	Attribute	Measure	Potential Impacts
			invasive species, such as *Spartina anglica*.
Embryonic shifting dunes [2110]	Habitat area	Hectares	Potential pollutants may negatively impact on the total habitat area of Embryonic shifting dune vegetation.
	Habitat distribution	Occurrence	Potential pollutants may negatively impact on the overall distribution of Embryonic shifting dune vegetation.
	Physical structure: functionality and sediment supply	Presence/absence of physical barriers	N/A
	Vegetation structure: zonation	Occurrence	Potential pollutants and sediment could alter structural variation within sward.
	Vegetation composition: plant health of foredune grasses	Percentage cover	Potential pollutants may negatively impact on the health of foredune grass vegetation.
	Vegetation composition: typical species and subcommunities	Percentage cover at a representative number of monitoring stops	Potential pollutants and sediment may negatively impact on the typical species and subcommunities of Embryonic shifting dunes.
	Vegetation composition: negative indicator species	Percentage cover	Potential pollutants and sediment may negatively impact on the positive indicator species, reducing their density and subsequently allowing the establishment of non-native invasive species.
Shifting dunes along the shoreline with Ammophila arenaria (white dunes) [2120]	Habitat area	Hectares	Potential pollutants may negatively impact on the total habitat area of shifting dunes with *Ammophila arenaria*.
	Habitat distribution	Occurrence	Potential pollutants may negatively impact on the overall distribution of shifting dunes with *Ammophila arenaria*.
	Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	N/A
	Vegetation structure: zonation	Occurrence	Potential pollutants and sediment could alter structural variation within sward.
	Vegetation composition: plant health of dune grasses	Percentage cover	Potential pollutants may negatively impact on the health of dune grass vegetation.
	Vegetation composition: typical species and	Percentage cover at a representative number of	Potential pollutants and sediment may negatively impact on the typical species and subcommunities of shifting

Qualifying Interest	Attribute	Measure	Potential Impacts
	subcommunities	monitoring stops	dunes with *Ammophila arenaria*.
	Vegetation composition: negative indicator species	Percentage cover	Potential pollutants and sediment may negatively impact on the positive indicator species, reducing their density and subsequently allowing the establishment of non-native invasive species.
Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	Habitat area	Hectares	Potential pollutants may negatively impact on the total habitat area of Fixed coastal dunes with herbaceous vegetation.
	Habitat distribution	Occurrence	Potential pollutants may negatively impact on the overall distribution of Fixed coastal dunes with herbaceous vegetation.
	Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	N/A
	Vegetation structure: zonation	Occurrence	Potential pollutants and sediment could alter structural variation within sward.
	Vegetation structure: bare ground	Percentage cover	Potential pollutants and sediment may negatively impact on the herbaceous vegetation reducing total cover, and thus increasing total bare ground cover.
	Vegetation structure: sward height	Centimetres	Potential pollutants and sediment may negatively impact and alter the sward heights of the Fixed coastal dunes with herbaceous vegetation.
	Vegetation composition: typical species and subcommunities	Percentage cover at a representative number of monitoring stops	Potential pollutants and sediment may negatively impact on the typical species and subcommunities of Fixed coastal dunes with herbaceous vegetation.
	Vegetation composition: negative indicator species (including *Hippophae rhamnoides*)	Percentage cover	Potential pollutants and sediment may negatively impact on the positive indicator species, reducing their density and subsequently allowing the establishment of non-native invasive species.
	Vegetation composition: scrub/trees	Percentage cover	N/A
Humid dune slacks [2190]	Habitat area	Hectares	Potential pollutants may negatively impact on the total habitat area of Humid dune slacks dunes with herbaceous vegetation.

Qualifying Interest	Attribute	Measure	Potential Impacts
	Habitat distribution	Occurrence	Potential pollutants may negatively impact on the overall distribution of Fixed coastal dunes with herbaceous vegetation.
	Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	N/A
	Physical structure: hydrological and flooding regime	Water table levels; Groundwater fluctuations (metres)	N/A
	Vegetation structure: zonation	Occurrence	Potential pollutants and sediment could alter structural variation within sward.
	Vegetation structure: bare ground	Percentage cover	Potential pollutants and sediment may negatively impact on the herbaceous vegetation reducing total cover, and thus increasing total bare ground cover.
	Vegetation structure: vegetation height	Centimetres	Potential pollutants and sediment may negatively impact and alter the sward heights of the Humid dune slacks with herbaceous vegetation.
	Vegetation composition: typical species and subcommunities	Percentage cover at a representative number of monitoring stops	Potential pollutants and sediment may negatively impact on the typical species and subcommunities of Humid dune slacks with herbaceous vegetation.
	Vegetation composition: cover of *Salix repens*	Percentage cover; centimetres	N/A
	Vegetation composition: negative indicator species	Percentage cover	Potential pollutants and sediment may negatively impact on the positive indicator species, reducing their density and subsequently allowing the establishment of non-native invasive species.
	Vegetation composition: scrub/trees	Percentage cover	N/A

6.2.2 Construction Phase – Indirect impacts

Impacts to the Natura 2000 sites could impact the food chain for QI bird species, i.e. fish, macro-invertebrates and flora species (also within the supporting habitats of the Natura 2000 sites), which the faunal QI species of South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA depend upon.

Impacts on the sand dune habitats could indirectly impact on the distribution of the QI species Petalwort, for which North Dublin Bay SAC is designated.

The potential indirect impacts on QIs from the construction phase are outlined in Table 6-4, Table 6-5 and Table 6-6 (i.e. South Dublin Bay and River Tolka Estuary SPA, North Bull Islands SPA and North Dublin Bay SAC respectively).

Disturbance to Common Tern

There will be an increase in noise and visual intrusion due to construction activity, including dredging, construction of pipeline and transition chambers. The main site compound will be located on Hanover Quay, next to the lock and the presence of site personnel may also cause disturbance to the nesting Common Tern pair. These activities will be short-term during the construction phase of the project. As the construction works are carried out at the inner basin, >450m distance form nesting site, it is not anticipated the works will cause significant disturbance to the nesting tern pair as there is already background disturbance from human presence and commercial activity in the area to which nesting birds are likely to be habituated, and therefore less prone to disturbance. However, should the Camden Lock structure be accessed by site personnel it is likely that nesting terns will be disturbed, potentially leading to less time spent on the nest and reduced fitness of chicks. Given that there is only one pair nesting at the site, the impact on the conservation objective to Common Tern within South Dublin Bay and River Tolka Estuary will be minor.

The potential indirect impact to Common Tern of South Dublin Bay and River Tolka Estuary SPA due to disturbance is outlined in Table 6-4.

Table 6-4: Potential indirect impacts on the attributes of the designated features of South Dublin Bay and River Tolka Estuary SPA within the ZoI of the proposed project.

Qualifying Interest	Attribute	Measure	Potential Impacts
Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] Oystercatcher (*Haematopus ostralegus*) [A130] Ringed Plover (*Charadrius hiaticula*) [A137] Grey Plover (*Pluvialis squatarola*) [A141] Knot (*Calidris canutus*) [A143]	Population trend	Percentage change	Potential pollutants may indirectly impact on QI bird species through reduction in food availability and quality (contaminated), which may negatively affect the overall health of the population resulting in decreased fecundity, ultimately leading to a decrease in population for the following QI bird species: Light-bellied Brent Goose Oystercatcher Ringed Plover Grey Plover Knot Sanderling Dunlin Bar-tailed Godwit

Qualifying Interest	Attribute	Measure	Potential Impacts
Sanderling (*Calidris alba*) [A144] Dunlin (*Calidris alpina*) [A149] Bar-tailed Godwit (*Limosa lapponica*) [A157] Redshank *(Tringa totanus*) [A162] Black-headed Gull (*Chroicocephalus ridibundus*) [A179]			Redshank Black-headed Gull
	Distribution	Range, timing and intensity of use of areas	Potential pollutants may indirectly impact on QI bird species through reduction in food availability and quality (contaminated), which may negatively impact on the range, timing and intensity of use of areas within the SPA by the following QI bird species: Light-bellied Brent Goose Oystercatcher Ringed Plover Grey Plover Knot Sanderling Dunlin Bar-tailed Godwit Redshank Black-headed Gull
Roseate Tern (*Sterna dougallii*) [A192]	Passage population: individuals	Number	Potential pollutants may indirectly impact on QI bird species through reduction in food availability and quality (contaminated), which may negatively impact on the overall health of individuals within the passage population, resulting in potential population decline.
	Distribution: roosting areas	Number; location; area (hectares)	N/A
	Prey biomass available	Kilogrammes	Potential pollutants may indirectly impact on QI bird species through reduction in food availability and quality (contaminated), which may negatively impact on prey biomass as prey species may reduce in quantity / quality, which in turn reduces prey biomass available for the Roseate Tern population.
	Barriers to connectivity	Number; location; shape; area (hectares)	N/A
	Disturbance at roosting site	Level of impact	N/A

Qualifying Interest	Attribute	Measure	Potential Impacts
Common Tern (*Sterna hirundo*) [A193]	Breeding population abundance: apparently occupied nests (AONs)	Number	Potential pollutants may indirectly impact on QI bird species through reduction in food availability and quality (contaminated), which may negatively impact on the overall health of individuals within the breeding population, resulting in potential population / occupied nest decline.
	Productivity rate: fledged young per breeding pair	Mean number	Potential pollutants may indirectly impact on QI bird species through reduction in food availability and quality (contaminated), which may negatively impact on the overall health of individuals within the breeding population, resulting in reducing fecundity and a decrease in fledged young per breeding pair.
	Passage population: individuals	Number	Potential pollutants may indirectly impact on QI bird species through reduction in food availability and quality (contaminated), which may negatively impact on the overall health of individuals within the passage population, resulting in potential population decline.
	Distribution: breeding colonies	Number; location; shape; area (hectares)	N/A
	Distribution: roosting areas	Number; location; shape; area (hectares)	N/A
	Prey biomass available	Kilogrammes	Potential pollutants may indirectly impact on QI bird species through reduction in food availability and quality (contaminated), thus negatively impact on prey biomass as prey species may reduce in quantity / quality, which in turn reduces prey biomass available for the Common Tern population.
	Barriers to connectivity	Number; location; shape; area (hectares)	N/A
	Disturbance at breeding site	Level of impact	Potential disturbance due to construction activities and presence of site personnel may negatively impact on the breeding pair at the Camden Lock structure.
	Disturbance at roosting site	Level of impact	N/A
Arctic Tern (*Sterna paradisaea*) [A194]	Passage population: individuals	Number	Potential pollutants may indirectly impact on QI bird species through reduction in food availability and quality (contaminated), which may negatively impact on the overall health of individuals within the passage population,

Qualifying Interest	Attribute	Measure	Potential Impacts
			resulting in potential population decline.
	Distribution: roosting areas	Number; location; area (hectares)	N/A
	Prey biomass available	Kilogrammes	Potential pollutants may indirectly impact on QI bird species through reduction in food availability and quality (contaminated), thus negatively impact on prey biomass as prey species may reduce in quantity / quality, which in turn reduces prey biomass available for the Artic Tern population.
	Barriers to connectivity	Number; location; shape; area (hectares)	N/A
	Disturbance at roosting site	Level of impact	N/A
Wetland and Waterbirds [A999]	Habitat area	Hectares	N/A

Table 6-5: Potential indirect impacts on the attributes of the designated features of North Bull Islands SPA within the ZoI of the proposed project.

Qualifying Interest	Attribute	Measure	Potential Impacts
Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] Shelduck (Tadorna tadorna) [A048] Teal (*Anas crecca*) [A052] Pintail (*Anas acuta*) [A054] Shoveler (*Anas clypeata*) [A056] Oystercatcher (*Haematopus ostralegus*) [A130] Golden Plover (*Pluvialis*	Population trend	Percentage change	Potential pollutants may indirectly impact on QI bird species through reduction in food availability and quality (contaminated), which may negatively affect the overall health of the population resulting in decreased fecundity, ultimately leading to a decrease in population for the following QI bird species: Light-bellied Brent Goose Shelduck Teal Pintail Shoveler Oystercatcher Golden Plover Grey Plover Knot Sanderling

apricaria) [A140] Grey Plover (*Pluvialis squatarola*) [A141] Knot (*Calidris canutus*) [A143] Sanderling (*Calidris alba*) [A144]			Dunlin Black-tailed Godwit Bar-tailed Godwit Curlew Redshank Turnstone Black-headed Gull
Dunlin (*Calidris alpina*) [A149] Black-tailed Godwit (*Limosa limosa*) [A156] Bar-tailed Godwit (*Limosa lapponica*) [A157] Curlew (*Numenius arquata*) [A160] Redshank *(Tringa totanus*) [A162] Turnstone (*Arenaria interpres*) [A169] Black-headed Gull (*Chroicocephalus ridibundus*) [A179]	Distribution	Range, timing and intensity of use of areas	Potential pollutants may indirectly impact on QI bird species through reduction in food availability and quality (contaminated), which may negatively impact on the range, timing and intensity of use of areas within the SPA by the following QI bird species: Light-bellied Brent Goose Shelduck Teal Pintail Shoveler Oystercatcher Golden Plover Grey Plover Knot Sanderling Dunlin Black-tailed Godwit Bar-tailed Godwit Curlew Redshank Turnstone Black-headed Gull
Wetland and Waterbirds [A999]	Habitat area	Hectares	N/A

Table 6-6: Potential indirect impacts on the attributes of the designated features of North Dublin Bay SAC within the ZoI of the proposed project.

Qualifying Interest	Attribute	Measure	Potential Impacts
Petalophyllum ralfsii (Petalwort) [1395]	Distribution of populations	Number and geographical spread of populations	Potential pollutants and sediment may indirectly impact on the distribution of Petalwort through reduction of sand dune habitats.
	Population size	Number of individuals	Potential pollutants and sediment may indirectly impact on the population size of Petalwort through reduction of sand dune habitats.
	Area of suitable habitat	Hectares	Potential pollutants and sediment may impact on the area of suitable habitat through reduction of sand dune habitats.
	Hydrological conditions: soil moisture	Occurrence	N/A
	Vegetation structure: height and cover	Centimetres and percentage	N/A

6.2.3 Operational Impacts

During the operation of the project, untreated water from the stormwater with an intermittent overflow from combined sewer will discharge to River Liffey at Sir John Rogerson Quay during periods of heavy rainfall. The discharge may contain high concentrations of faecal coliforms, BOD, nutrients and suspended solids. The discharge is likely to be relatively small and intermittent when compared to the volume of the receiving waters, with further dilution effects when reaching Dublin Bay and the Irish Sea.

A water quality model of the receiving waters of the Liffey estuary has been developed to suitably resolve the controlling hydrodynamic processes (DHI Water Environments (UK) LTD, 2021). The presence of a salt-wedge has been previously confirmed through detailed survey data collection. The focus of the model development was to create a one-year representation of the system that could then be used to understand the fate of pollutants from a proposed outfall from the Grand Canal Tunnel, running under Sir John Rogerson's Quay.

The water quality model was developed using measured and modelled data as boundary conditions for the hydrodynamics and was seen to re-create the key hydrodynamic processes known to control this part of the estuary.

The Water Quality Modelling (WQM) report assessed the change in water quality in River Liffey based on four parameters: Molybdate Reactive Phosphate (MRP), Dissolved Inorganic Nitrogen (DIN), Biological Oxygen Demand (BOD) and E. coli. There was no discernible change in the achievement of the Environmental Quality Standard (EQS) compared to the baseline in regards to MRP and DIN with the % difference in concentration in much of the Lower Liffey being less than 1%. BOD showed no discernible change in the achievement of the EQS compared to the baseline. It was noted that this parameter showed the greatest increases compared to the baseline, however, the resultant values were still well below the EQS thresholds. For E. coli the increases due to the GCSWOE were seen to be less than 2% in the time varying scenario reducing rapidly away from the outfall and between 2 and 5% for the storm-based scenarios. Importantly, at the downstream boundary these both reduced to less than a 1% increase compared to the baseline.

E. coli relates to bathing waters and is not considered to be directly relevant to WFD parameters for this stretch of the River Liffey.

Therefore, it is considered that the proposed Grand Canal Stormwater Outfall Extension will have an imperceptible change on water quality and no significant impacts to any of the Natura 2000 sites are anticipated during the operation phase of the project.

6.2.4 Do Nothing Impact

If the 'do-nothing' approach is adopted and the extended pipeline is not constructed, there will be no impact from construction or operation on the QIs of South Dublin Bay and River Tolka Estuary SPA, North Bull Island SPA and North Dublin Bay SAC. As the current stormwater with an intermittent overflow from combined sewer discharges to the Grand Canal Basin, it is likely that some of the pollutants settle within the sediment of the basin due to the slower flow of water within the basin before water discharge to River Liffey and Dublin Bay. Based on the water quality modelling on the discharge from the proposed stormwater outfall extension (DHI Water Environments (UK) LTD, 2021), it is not anticipated that the current discharges from the Grand Canal Basin will have a higher concentration of pollutants. Therefore, no significant impact is anticipated on the Dublin Bay Natura 2000 sites under the 'do-nothing' scenario.

6.3 Mitigation Measures for Construction Phase

6.3.1 Adherence to Best Practice Guidance

The activities of the project for the construction phase shall remain within the boundary of the proposed site. Within this area, the mitigation measures outlined below shall be implemented.

- A Construction and Environment Management Plan (CEMP) will be submitted for agreement prior to site works commencing. This CEMP will incorporate the mitigation measures listed here.
- The CEMP will also strictly adhere to best practice environmental guidance including but not limited to the following:

- CIRIA Guidance C532 Control of water pollution from construction sites. Guidance for consultants and contractors. (CIRIA, 2019 - www.ciria.org).
- CIRIA Guidance C741: Environmental good practice on site guide (Charles & Edwards, 2015; CIRIA, 2019 - www.ciria.org).
- CIRIA Guidance C750D: Groundwater control: design and practice (Preene et al., 2016; CIRIA, 2019 - www.ciria.org).
- Inland Fisheries Ireland 2016 Guidance on Protection of Fisheries During Construction Works In and Adjacent to Waters.
- Construction method statements will be submitted to Dublin City Council and Irish Water for agreement prior to site works commencing.

6.3.2 Site Compound

The following measures shall be implemented for the site compound layout:

- The site compound shall be located within the site boundary.
- A plastic membrane will be put up with berms around the edge of the site compound to prevent any contaminants leaking through to the Grand Canal Basin and River Liffey.
- Only plant and materials necessary for the construction of the works will be permitted to be stored at the compound location.
- Site establishment by the Contractor will include the following:
- Site offices.
- Site facilities (canteen, toilets, drying rooms, etc.).
- Office for construction management team.
- Secure compound for the storage of all on-site machinery and materials.
- Temporary car parking facilities.
- Temporary fencing.
- Site Security to restrict unauthorized entry.
- Bunded storage of fuels and refuelling area. Bunds shall be 110% capacity of the largest vessel contained within the bunded area.
- A separate container will be located in the Contractors compound to store absorbents used to contain spillages of hazardous materials. The container will be clearly labelled and the contents of the container will be disposed of by a licenced waste contractor at a licenced site. Records will be maintained of material taken off site for disposal.
- A maintenance programme for the bunded areas will be managed by the site environmental manager. The removal of rainwater from the bunded areas will be their responsibility. Records will be maintained of materials taken off site for disposal.
- The site environmental manger will be responsible for maintaining all training records.
- The contents of any tank will be clearly marked on the tank, and a notice displayed requiring that valves and trigger guns be locked when not in use.
- Drainage collection system for washing area to prevent run-off into surface water system.
- All refuelling of vehicles will be carried out at the fuel stores within the main site compound and only ADR trained personnel will be permitted to operate fuel bowsers.

6.3.3 Water Quality

Relevant legislation and best practice guidance that have been considered includes but not limited to the following:

- CIRIA C532 Control of water pollution from construction sites. Guidance for consultants and contractors (CIRIA, 2019 - www.ciria.org)
- CIRIA C515 Groundwater control – design and practice, 2nd ed. (CIRIA, 2019 - www.ciria.org)
- CIRIA Guidance C741: Environmental good practice on site guide (Charles & Edwards, 2015; CIRIA, 2019 - www.ciria.org)

- Inland Fisheries Ireland 2016 Guidance on Protection of Fisheries During Construction Works In and Adjacent to Waters
- Adoption of a surface water plan including appropriate barrier controls to prevent potentially polluted surface water from the site reaching Garand Canal Basin or the River Liffey.
- Oil booms and oil soakage pads should be maintained on-site to enable a rapid and effective response to any accidental spillage or discharge. These shall be disposed of correctly and records will be maintained by the environmental manager of the used booms and pads taken off site for disposal.
- Fail-safe site drainage and bunding through drip trays on plant and machinery will be provided to prevent discharge of chemical spillage from the sites to surface water.

6.3.4 Pollution Control and Spill Prevention

Prevention measures:

- Daily inspections and maintenance of plant and machinery checking for leaks, damage or vandalism will be made on all plant and equipment. The inspections will be recorded on a sign-off sheet on site.
- The site compound storage areas and cleaning areas will be rendered impervious and will be constructed to ensure no discharges will cause pollution to surface waters.
- Designated locations for refuelling land-based plant and machinery off site, >100m from waterbody.
- Potentially contaminated run off from plant and machinery maintenance areas will be managed within the site compound surface water collection system.
- Damaged or leaking containers will be removed from use and replaced immediately.
- Refuelling Protocol to include:
    a. Refuelling of barge/vessels to take place at designated area at/adjacent to site compound at Hanover Quay;
    b. Vessels to be securely docked before attempting to refuel;
    c. Clear and easy access for personnel to get from tank on quay to refuelling point on boat/barge;
    d. Refuelling to be carried out under strict supervision of Environmental Officer;
    e. Refuelling to be carried out in a controlled manner by trained, authorised and named personnel only.
    f. Refuelling pipe to be supervised at all times;
    g. Refuelling from temporary storage tank by pump only, with automatic cut-off, and automatic retraction of hose pipe. Adequate length of hose required, to enable full and easy access to fuelling point on vessel;
    h. No fuel to be stored at site compound;.
    i. Spill kits, drip trays and booms to be available in case of accidental spillage.

Control measures

In the event of a spill the Contractor will ensure that the following procedures are in place:

- Emergency response awareness training for all Project personnel on-site works.
- Appropriate and sufficient spill control materials will be installed at strategic locations within the site. Spills kits for immediate use will be kept in the cab of mobile equipment.
- Spill kits will be stored in the site compound with easy access for delivery to site in the case of an emergency. A minimum stock of spill kits will be maintained at all times and site vehicles will carry spill kits at all times. Spill kits must include suitable spill control materials to deal with the type of spillage that may occur and where it may occur. Typical contents of an on-site spill kit will include the following as a minimum:
- Absorbent granules.
- Absorbent mats/cushions.

- Absorbent booms.
- Spill kits will contain gloves to handle contaminated materials and sealable disposal sacks.
- Track-mats, geotextile material and drain covers.
- Absorbent material will be used with pumps and generators at all times.
- All potentially polluting substances such as oils and chemicals used during construction will be stored in containers clearly labelled and stored with suitable precautionary measures such as bunding within the site compound.
- All used spill materials e.g. absorbent pads will be placed in a bunded container in the contractor's compound. The material will be disposed of by a licenced waste contractor at a licenced facility. Records will be maintained by the environmental site manager.
- All tank and drum storage areas on the site will, as a minimum, be bunded to a volume not less than the following;
- 110% of the capacity of the largest tank or drum within the bunded area; or
- 25% of the total volume of substances which could be stored within the bunded area.
- , whichever is great.

6.3.5 Silt Control

Silt control measures will incorporate the following:

- A silt curtain will be installed around the area of works within the Grand Canal Basin. The works within the basin will be carried out in two phases, the inner and outer basin. The silt curtain will be installed to screen the inner basin, i.e. south of MacMahon Bridge. Before works commence in the outer basin, i.e. north of MacMahon Bridge, a silt curtain will be installed to screen the area off. The silt curtain is secured to an anchoring system and hangs within the waterbody. The curtain will be in place during the entire phase of the construction.
- The silt curtain shall be inspected regularly and maintained to prevent failure during the work. Accumulated material upstream of the silt curtain should be carefully removed and properly disposed of. Any accumulated material should be removed before removing the silt curtain.
- Any silt to be removed will be inspected for protected species by an ECoW and any protected species found will be returned to the Basin;
- The silt to be disposed of will be moved to a suitable licensed facility off-site;
- Bunding shall be installed along Hanover Quay, between the area of works along the quay and the Grand Canal Basin prior to works commencing in this area. All surface water run-off from the construction site shall be directed to a temporary facility, where the flow will be attenuated and sediment allowed to settle, before passing through a hydrocarbon interceptor prior to discharge. Bunding should only be removed when sediment movement is no longer a risk.
- Silt-traps should be maintained and cleaned regularly during the course of site works.
- Lock gates will be kept closed during the construction works within the basin. Only necessary controls of water levels within the basin will be permitted.

6.3.6 Wet Concrete Leachate Control

The measures prescribed with regard to sedimentation and surface water run-off will also minimise the risk of input of cementitious material during construction. However, the following measures shall also apply:

- In order to prevent input of cementitious materials into the Grand Canal Basin from the below water elements of the construction, concrete structural elements shall be precast, wherever possible.
- Concrete to be used below water shall be a concrete mix for aquatic/marine environment, e.g. fast curing and good anti-washout properties.
- Where concrete or other wet materials are to be used over/below water, appropriate bunded platforms shall be in place to capture any spilled concrete, sealants or other materials.
- A geotextile screen and boom with oil barrier will be required around such aquatic works to prevent runoff, silt or oil from polluting the water.

- Batching of concrete will be done off site and delivered to site as required by Readymix truck.
- Only designated and trained operators experienced in working with concrete will be employed during the concrete pouring phase.
- Raw, uncured or waste concrete will be collected and stored appropriately for disposal by a licensed contractor in accordance with the Waste Management Plan.
- A designated concrete washout area should be contained and impermeable and located off site, a minimum of 50m away from the Grand Canal Basin and River Liffey.
- Large volumes of water with dissolved concrete can be pumped into a skip to settle out; settled solids will need to be appropriately disposed of off site.
- Waters from wash facility should be recycled to the greatest extent feasible and should not be discharged directly to surface water drains, watercourses or soakaways. Waters that cannot be recycled should discharge through silt and full retention oil/petrol interceptor prior to discharge. A regular maintenance programme should be put in place to ensure that the silt and hydrocarbon interceptors remain effective.

6.3.7 Monitoring Programme

The Grand Canal Basin will be monitored during the construction phase of the project. The monitoring will measure the level of suspended solids in the water at different locations within the basin while works are taking place within the Grand Canal Basin. Should a significant increase of suspended solids be recorded, the works must temporarily stop and be re-assessed, and further mitigation measures be put in place before works can continue.

An Ecological Clerk of Works (ECoW)will prior to construction works commencing visually check the Camden Lock structure for the Common Tern nest. If deemed necessary, a barrier will be put in place to prevent access to the nest and ensure there is no risk of disturbance during the construction period.

A long-term water quality monitoring program will be in place during the operation of the project. The monitoring will measure the levels of BOD, MRP, DIN and bacteria (faecal coliforms) in the water entering River Liffey via the new stormwater outfall. The water monitoring will be compared against the results of the modelling of the predicted water quality to ensure there will be no negative impact on River Liffey and downstream Natura 2000 sites. Adequate measures will be taken if the monitoring finds the discharge to have a negative impact on water quality and such measures should take the Water Framework Directive into account.

6.4 Residual Impacts

Table 6-7 summaries the potential impacts on the attributes of the designated QIs of the Dublin Bay Natura 2000 sites along with the mitigation measures and residual impacts.

Residual Impacts are those that occur after mitigation measure have taken place. It is considered that if the proposed mitigation measures are employed during the proposed works, then no residual impacts of adverse effect are foreseen on the habitats and species of South Dublin Bay and River Tolka Estuary SPA, North Bull Island SPA and North Dublin Bay SAC.

Table 6-7: Pathways of impact on the attributes of the designated QIs of the Dublin Bay Natura 2000 sites.

Natura 2000 sites	Qualifying Interest	Attribute	Measure	Potential Impacts	Mitigation Measures	Residual Impact
South Dublin Bay and River Tolka Estuary SPA [004024]	Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] Oystercatcher (*Haematopus ostralegus*) [A130] Ringed Plover (*Charadrius hiaticula*) [A137] Grey Plover (*Pluvialis squatarola*) [A141] Knot (*Calidris canutus*) [A143] Sanderling (*Calidris alba*) [A144] Dunlin (*Calidris alpina*) [A149] Bar-tailed Godwit (*Limosa lapponica*) [A157] Redshank *(Tringa totanus*) [A162] Black-headed Gull (*Chroicocephalus ridibundus*) [A179]	Population trend	Percentage change	Potential pollutants may: - negatively impact on the overall health of the population resulting in decreased fecundity; - indirectly impact on QI bird species through reduction in food availability and quality (contaminated), which may negatively affect the overall health of the population resulting in decreased fecundity ultimately leading to a decrease in population for the following QI bird species: Light-bellied Brent Goose Oystercatcher Ringed Plover Grey Plover Knot Sanderling Dunlin Bar-tailed Godwit Redshank Black-headed Gull	Strict adherence to: - The CEMP and all the best practice guidance therewith. - Site compound layout instructions, ensuring that potential sources of pollution (chemical storage and machinery) are kept at an impermeable area within the site compound. - Water quality controls. - Pollution control and spill prevention methods, detailing suitable spill kit equipment and management on site. - Silt control, including installation of silt curtain and silt fence. - Wet concrete leachate control, including the use of fast curing concrete mix for aquatic environment and appropriate measures in place to capture any spilled concrete,	No adverse effects

Natura 2000 sites	Qualifying Interest	Attribute	Measure	Potential Impacts	Mitigation Measures	Residual Impact
					sealants or other materials	
		Distribution	Range, timing and intensity of use of areas	Potential pollutants may: - negatively impact on the overall health of the population resulting in decreased fecundity; - indirectly impact on QI bird species through reduction in food availability and quality (contaminated), which may negatively affect the overall health of the population resulting in decreased fecundity, which may in turn negatively impact on the range, timing and intensity of use of areas within the SPA by the following QI bird species: Light-bellied Brent Goose Oystercatcher Ringed Plover Grey Plover Knot Sanderling Dunlin Bar-tailed Godwit Redshank Black-headed Gull	Strict adherence to: - The CEMP and all the best practice guidance therewith. - Site compound layout instructions, ensuring that potential sources of pollution (chemical storage and machinery) are kept at an impermeable area within the site compound. - Water quality controls. - Pollution control and spill prevention methods, detailing suitable spill kit equipment and management on site. - Silt control, including installation of silt curtain and silt fence. - Wet concrete leachate control, including the use of fast curing concrete mix for aquatic environment and appropriate measures in place to capture any spilled concrete,	No adverse effects

Natura 2000 sites	Qualifying Interest	Attribute	Measure	Potential Impacts	Mitigation Measures	Residual Impact
					sealants or other materials	
	Roseate Tern (*Sterna dougallii*) [A192]	Passage population: individuals	Number	Potential pollutants may: - negatively impact on the overall health of individuals within the passage population, resulting in potential population decline. - indirectly impact on QI bird species through reduction in food availability and quality (contaminated), which may negatively impact on the overall health of individuals within the passage population, resulting in potential population decline.	Strict adherence to: - The CEMP and all the best practice guidance therewith. - Site compound layout instructions, ensuring that potential sources of pollution (chemical storage and machinery) are kept at an impermeable area within the site compound. - Water quality controls. - Pollution control and spill prevention methods, detailing suitable spill kit equipment and management on site. - Silt control, including installation of silt curtain and silt fence. - Wet concrete leachate control, including the use of fast curing	No adverse effects
		Prey biomass available	Kilogrammes	Potential pollutants may: - negatively impact on prey biomass as prey species may reduce in quantity / quality, which in turn reduces prey biomass available for the Roseate Tern population. - indirectly impact on QI bird species through reduction in food availability and quality (contaminated), which may negatively impact on prey biomass as prey species may reduce in quantity / quality, which in turn reduces prey biomass available for the Roseate Tern population.		No adverse effects

Natura 2000 sites	Qualifying Interest	Attribute	Measure	Potential Impacts	Mitigation Measures	Residual Impact
					concrete mix for aquatic environment and appropriate measures in place to capture any spilled concrete, sealants or other materials	
	Common Tern (*Sterna hirundo*) [A193]	Breeding population abundance: apparently occupied nests (AONs)	Number	Potential pollutants may: - negatively impact on the overall health of individuals within the breeding population, resulting in potential population / occupied nest decline; - indirectly impact on QI bird species through reduction in food availability and quality (contaminated), which may negatively impact on the overall health of individuals within the breeding population, resulting in potential population / occupied nest decline.	Strict adherence to: - The CEMP and all the best practice guidance therewith. - Site compound layout instructions, ensuring that potential sources of pollution (chemical storage and machinery) are kept at an impermeable area within the site compound.	No adverse effects
		Productivity rate: fledged young per breeding pair	Mean number	Potential pollutants may: - negatively impact on the overall health of individuals within the breeding population, resulting in reducing fecundity and a decrease in fledged young per breeding pair; - indirectly impact on QI bird species through reduction in food availability and quality (contaminated), which may negatively impact on the overall health of individuals within the breeding population, resulting in reducing fecundity and a decrease in fledged young per breeding pair.	- Water quality controls. - Pollution control and spill prevention methods, detailing suitable spill kit equipment and management on site. - Silt control, including installation of silt curtain and silt fence. - Wet concrete leachate	No adverse effects

Natura 2000 sites	Qualifying Interest	Attribute	Measure	Potential Impacts	Mitigation Measures	Residual Impact
		Passage population: individuals	Number	Potential pollutants may: - negatively impact on the overall health of individuals within the passage population, resulting in potential population decline; - indirectly impact on QI bird species through reduction in food availability and quality (contaminated), which may negatively impact on the overall health of individuals within the passage population, resulting in potential population decline.	control, including the use of fast curing concrete mix for aquatic environment and appropriate measures in place to capture any spilled concrete, sealants or other materials	No adverse effects
		Prey biomass available	Kilogrammes	Potential pollutants may: - negatively impact on prey biomass as prey species may reduce in quantity / quality, which in turn reduces prey biomass available for the Common Tern population; - indirectly impact on QI bird species through reduction in food availability and quality (contaminated), which may negatively impact on prey biomass as prey species may reduce in quantity / quality, which in turn reduces prey biomass available for the Common Tern population.		No adverse effects
		Disturbance at breeding site	Level of impact	Potential disturbance due to construction activities and presence of site personnel may negatively impact on the breeding pair at the Camden Lock structure.	An ECoW will visually check the nesting site at the Camden Lock structure prior to construction works commence. If deemed necessary, a barrier will be put in place to prevent access to the nest.	No adverse effects

Natura 2000 sites	Qualifying Interest	Attribute	Measure	Potential Impacts	Mitigation Measures	Residual Impact
	Arctic Tern (*Sterna paradisaea*) [A194]	Passage population: individuals	Number	Potential pollutants may: - negatively impact on the overall health of individuals within the passage population, resulting in potential population decline; - indirectly impact on QI bird species through reduction in food availability and quality (contaminated), which may negatively impact on prey biomass as prey species may reduce in quantity / quality, which in turn reduces prey biomass available for the Artic Tern population.	Strict adherence to: - The CEMP and all the best practice guidance therewith. - Site compound layout instructions, ensuring that potential sources of pollution (chemical storage and machinery) are kept at an impermeable area within the site compound. - Water quality controls. - Pollution control and spill prevention methods, detailing suitable spill kit equipment and management on site. - Silt control, including installation of silt curtain and silt fence. - Wet concrete leachate control, including the use of fast curing concrete mix for aquatic environment and appropriate measures in place to capture any spilled concrete, sealants or other materials	No adverse effects
		Prey biomass available	Kilogrammes	Potential pollutants may: - negatively impact on prey biomass as prey species may reduce in quantity / quality, which in turn reduces prey biomass available for the Artic Tern population; - indirectly impact on QI bird species through reduction in food availability and quality (contaminated), which may negatively impact on prey biomass as prey species may reduce in quantity / quality, which in turn reduces prey biomass available for the Artic Tern population.		No adverse effects

Natura 2000 sites	Qualifying Interest	Attribute	Measure	Potential Impacts	Mitigation Measures	Residual Impact
	Wetland and Waterbirds [A999]	Habitat area	Hectares	Potential pollutants may negatively impact on the wetland vegetation, resulting in a decrease of total wetland habitat.	Strict adherence to: - The CEMP and all the best practice guidance therewith. - Site compound layout instructions, ensuring that potential sources of pollution (chemical storage and machinery) are kept at minimum of at an impermeable area within the site compound. - Water quality controls. - Pollution control and spill prevention methods, detailing suitable spill kit equipment and management on site. - Silt control, including installation of silt curtain and silt fence. - Wet concrete leachate control, including the use of fast curing concrete mix for aquatic environment and appropriate measures in place to capture any spilled concrete, sealants or other	No adverse effects

Natura 2000 sites	Qualifying Interest	Attribute	Measure	Potential Impacts	Mitigation Measures	Residual Impact
					materials	
North Bull Island SPA [004006]	Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] Shelduck (*Tadorna tadorna*) [A048] Teal (*Anas crecca*) [A052] Pintail (*Anas acuta*) [A054] Shoveler (*Anas clypeata*) [A056] Oystercatcher (*Haematopus ostralegus*) [A130] Golden Plover (*Pluvialis apricaria*) [A140] Grey Plover (*Pluvialis squatarola*) [A141] Knot (*Calidris canutus*) [A143] Sanderling (*Calidris alba*) [A144] Dunlin (*Calidris alpina*) [A149] Black-tailed Godwit (*Limosa limosa*) [A156] Bar-tailed Godwit (*Limosa lapponica*)	Population trend	Percentage change	Potential pollutants may: - negatively impact on the overall health of the population resulting in decreased fecundity; - indirectly impact on QI bird species through reduction in food availability and quality (contaminated), which may negatively affect the overall health of the population resulting in decreased fecundity, ultimately leading to a decrease in population for the following QI bird species: Light-bellied Brent Goose Shelduck Teal Pintail Shoveler Oystercatcher Golden Plover Grey Plover Knot Sanderling Dunlin Black-tailed Godwit Bar-tailed Godwit Curlew Redshank Turnstone	Strict adherence to: - The CEMP and all the best practice guidance therewith. - Site compound layout instructions, ensuring that potential sources of pollution (chemical storage and machinery) are kept at an impermeable area within the site compound. - Water quality controls. - Pollution control and spill prevention methods, detailing suitable spill kit equipment and management on site. - Silt control, including installation of silt curtain and silt fence. - Wet concrete leachate control, including the	No adverse effects

Natura 2000 sites	Qualifying Interest	Attribute	Measure	Potential Impacts	Mitigation Measures	Residual Impact
	[A157] Curlew (*Numenius arquata*) [A160] Redshank *(Tringa totanus*) [A162] Turnstone (*Arenaria interpres*) [A169] Black-headed Gull (*Chroicocephalus ridibundus*) [A179]			Black-headed Gull	use of fast curing concrete mix for aquatic environment and appropriate measures in place to capture any spilled concrete, sealants or other materials	
		Distribution	Range, timing and intensity of use of areas	Potential pollutants may: - negatively impact on the overall health of the population resulting in decreased fecundity; - indirectly impact on QI bird species through reduction in food availability and quality (contaminated), which may negatively affect the overall health of the population resulting in decreased fecundity, which may in turn negatively impact on the range, timing and intensity of use of areas within the SPA by the following QI bird species: Light-bellied Brent Goose Shelduck Teal Pintail Shoveler Oystercatcher Golden Plover Grey Plover Knot Sanderling Dunlin Black-tailed Godwit Bar-tailed Godwit Curlew		No adverse effects

Natura 2000 sites	Qualifying Interest	Attribute	Measure	Potential Impacts	Mitigation Measures	Residual Impact
				Redshank Turnstone Black-headed Gull		
	Wetland and Waterbirds [A999]	Habitat area	Hectares	Potential pollutants may negatively impact on the wetland vegetation, resulting in a decrease of total wetland habitat.	Strict adherence to: - The CEMP and all the best practice guidance therewith. - Site compound layout instructions, ensuring that potential sources of pollution (chemical storage and machinery) are kept at an impermeable area within the site compound. - Water quality controls. - Pollution control and spill prevention methods, detailing suitable spill kit equipment and management on site. - Silt control, including installation of silt curtain and silt fence. - Wet concrete leachate control, including the use of fast curing concrete mix for aquatic environment and appropriate measures in	No adverse effects

Natura 2000 sites	Qualifying Interest	Attribute	Measure	Potential Impacts	Mitigation Measures	Residual Impact
					place to capture any spilled concrete, sealants or other materials	
North Dublin Bay SAC [000206]	Mudflats and sandflats not covered by seawater at low tide [1140]	Community extent	Hectares	Potential pollutants may negatively impact on the *Mytilus edulis*-dominated community and its extent. Increased sedimentation could alter sediment composition and typical species change.	Strict adherence to: - The CEMP and all the best practice guidance therewith. - Site compound layout instructions, ensuring that potential sources of pollution (chemical storage and machinery) are kept at an impermeable area within the site compound. - Water quality controls. - Pollution control and spill prevention methods, detailing suitable spill kit equipment and management on site. - Silt control, including installation of silt curtain and silt fence. - Wet concrete leachate	No adverse effects
		Community structure: *Mytilus edulis* density	Individuals/m²	Potential pollutants may negatively impact on the *Mytilus edulis density*. Increased sedimentation could alter sediment composition and typical species change.		No adverse effects
		Community distribution	Hectares	Potential pollutants may negatively impact on the *Pygospio elegans, Crangon crangon* and *Spio martinensis* community complexes. Increased sedimentation could alter sediment composition and typical species change.		No adverse effects

Natura 2000 sites	Qualifying Interest	Attribute	Measure	Potential Impacts	Mitigation Measures	Residual Impact
					control, including the use of fast curing concrete mix for aquatic environment and appropriate measures in place to capture any spilled concrete, sealants or other materials	
	Annual vegetation of drift lines [1210]	Habitat area	Hectares	Potential pollutants may negatively impact on the total habitat area of annual drift line vegetation.	Strict adherence to: - The CEMP and all the best practice guidance therewith. - Site compound layout instructions, ensuring that potential sources of pollution (chemical storage and machinery) are kept at an impermeable area within the site compound. - Water quality controls. - Pollution control and spill prevention methods, detailing suitable spill kit equipment and management on site. - Silt control, including installation of silt curtain and silt fence. - Wet concrete leachate	No adverse effects
		Habitat distribution	Occurrence	Potential pollutants may negatively impact on the overall distribution of annual drift line vegetation.		No adverse effects
		Vegetation structure: zonation	Occurrence	Potential pollutants and sediment could alter structural variation within sward.		No adverse effects
		Vegetation composition: typical species and subcommunities	Percentage cover at a representative number of monitoring stops	Potential pollutants and sediment may negatively impact on the species-poor communities with typical species: sea rocket (*Cakile maritima*), sea sandwort (*Honckenya peploides*), prickly saltwort (*Salsola kali*) and oraches (*Atriplex* spp.).		No adverse effects
		Vegetation composition: negative indicator species	Percentage cover	Potential pollutants and sediment may negatively impact on the positive indicator species, reducing their density and subsequently allowing the establishment of non-native invasive species.		No adverse effects

Natura 2000 sites	Qualifying Interest	Attribute	Measure	Potential Impacts	Mitigation Measures	Residual Impact
					control, including the use of fast curing concrete mix for aquatic environment and appropriate measures in place to capture any spilled concrete, sealants or other materials	
	Salicornia and other annuals colonising mud and sand [1310]	Habitat area	Hectares	Potential pollutants and sediment may negatively impact on the total habitat area of Salicornia and other colonising annual vegetation.	Strict adherence to: - The CEMP and all the best practice guidance therewith. - Site compound layout instructions, ensuring that potential sources of pollution (chemical storage and machinery) are kept at an impermeable area within the site compound. - Water quality controls. - Pollution control and spill prevention methods, detailing suitable spill kit equipment and management on site. - Silt control, including installation of silt curtain and silt fence. - Wet concrete leachate	No adverse effects
		Habitat distribution	Occurrence	Potential pollutants and sediment may negatively impact on the overall distribution of Salicornia and other colonising annual vegetation.		No adverse effects
		Vegetation structure: zonation	Occurrence	Potential pollutants and sediment could alter structural variation within sward.		
		Vegetation structure: vegetation height	Centimetres	Potential pollutants and sediment may negatively impact and alter the sward heights of the Salicornia and other colonising annual vegetation.		No adverse effects
		Vegetation structure: vegetation cover	Percentage cover at a representative number of monitoring stops	Potential pollutants and sediment may negatively impact and subsequently reduce the total vegetation cover (outside of creeks).		No adverse effects
		Vegetation composition: typical species and subcommunities	Percentage cover	Potential pollutants and sediment may negatively impact on the typical species and subcommunities.		No adverse effects
		Vegetation structure: negative indicator species - *Spartina anglica*	Hectares	Potential pollutants and sediment may negatively impact on the positive indicator species, reducing their density and subsequently		No adverse effects

Natura 2000 sites	Qualifying Interest	Attribute	Measure	Potential Impacts	Mitigation Measures	Residual Impact
				allowing the establishment of non-native invasive species, such as *Spartina anglica*.	control, including the use of fast curing concrete mix for aquatic environment and appropriate measures in place to capture any spilled concrete, sealants or other materials	
	Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330	Habitat area	Hectares	Potential pollutants and sediment may negatively impact on the total habitat area of Atlantic salt meadows.	Strict adherence to: - The CEMP and all the best practice guidance therewith. - Site compound layout instructions, ensuring that potential sources of pollution (chemical storage and machinery) are kept at an impermeable area within the site compound. - Water quality controls. - Pollution control and spill prevention methods, detailing suitable spill kit equipment and management on site. - Silt control, including installation of silt curtain and silt fence. - Wet concrete leachate	No adverse effects
		Habitat distribution	Occurrence	Potential pollutants and sediment may negatively impact on the overall distribution of Atlantic salt meadows.		No adverse effects
		Vegetation structure: zonation	Occurrence	Potential pollutants and sediment could alter structural variation within sward.		
		Vegetation structure: vegetation height	Centimetres	Potential pollutants and sediment may negatively impact and alter the sward heights of the Atlantic salt meadow vegetation.		No adverse effects
		Vegetation structure: vegetation cover	Percentage cover at a representative number of monitoring stops	Potential pollutants and sediment may negatively impact and subsequently reduce the total vegetation cover (outside of creeks).		No adverse effects
		Vegetation composition: typical species and subcommunities	Percentage cover	Potential pollutants and sediment may negatively impact on the typical species and subcommunities of Atlantic salt meadows.		No adverse effects
		Vegetation structure: negative indicator species - *Spartina anglica*	Hectares	Potential pollutants and sediment may negatively impact on the positive indicator species, reducing their density and subsequently		No adverse effects

Natura 2000 sites	Qualifying Interest	Attribute	Measure	Potential Impacts	Mitigation Measures	Residual Impact
				allowing the establishment of non-native invasive species, such as *Spartina anglica*.	control, including the use of fast curing concrete mix for aquatic environment and appropriate measures in place to capture any spilled concrete, sealants or other materials	
	Mediterranean salt meadows (Juncetalia maritimi) [1410]	Habitat area	Hectares	Potential pollutants and sediment may negatively impact on the total habitat area of Mediterranean salt meadows.	Strict adherence to: - The CEMP and all the best practice guidance therewith. - Site compound layout instructions, ensuring that potential sources of pollution (chemical storage and machinery) are kept at an impermeable area within the site compound. - Water quality controls. - Pollution control and spill prevention methods, detailing suitable spill kit equipment and management on site. - Silt control, including installation of silt curtain and silt fence. - Wet concrete leachate	No adverse effects
		Habitat distribution	Occurrence	Potential pollutants and sediment may negatively impact on the overall distribution of Mediterranean salt meadows.		No adverse effects
		Vegetation structure: zonation	Occurrence	Potential pollutants and sediment could alter structural variation within sward.		No adverse effects
		Vegetation structure: vegetation height	Centimetres	Potential pollutants and sediment may negatively impact and alter the sward heights of the Mediterranean salt meadow vegetation.		No adverse effects
		Vegetation structure: vegetation cover	Percentage cover at a representative number of monitoring stops	Potential pollutants and sediment may negatively impact and subsequently reduce the total vegetation cover (outside of creeks).		No adverse effects
		Vegetation composition: typical species and subcommunities	Percentage cover	Potential pollutants and sediment may negatively impact on the typical species and subcommunities of Mediterranean salt meadows.		No adverse effects
		Vegetation structure: negative indicator species - *Spartina anglica*	Hectares	Potential pollutants and sediment may negatively impact on the positive indicator species, reducing their density and subsequently		No adverse effects

Natura 2000 sites	Qualifying Interest	Attribute	Measure	Potential Impacts	Mitigation Measures	Residual Impact
				allowing the establishment of non-native invasive species, such as *Spartina anglica*.	control, including the use of fast curing concrete mix for aquatic environment and appropriate measures in place to capture any spilled concrete, sealants or other materials	
	Embryonic shifting dunes [2110]	Habitat area	Hectares	Potential pollutants may negatively impact on the total habitat area of Embryonic shifting dune vegetation.	Strict adherence to: - The CEMP and all the best practice guidance therewith. - Site compound layout instructions, ensuring that potential sources of pollution (chemical storage and machinery) are kept at an impermeable area within the site compound. - Water quality controls. - Pollution control and spill prevention methods, detailing suitable spill kit equipment and management on site. - Silt control, including installation of silt curtain and silt fence. - Wet concrete leachate	No adverse effects
		Habitat distribution	Occurrence	Potential pollutants may negatively impact on the overall distribution of Embryonic shifting dune vegetation.		No adverse effects
		Vegetation structure: zonation	Occurrence	Potential pollutants and sediment could alter structural variation within sward.		No adverse effects
		Vegetation composition: plant health of foredune grasses	Percentage cover	Potential pollutants may negatively impact on the health of foredune grass vegetation.		No adverse effects
		Vegetation composition: typical species and subcommunities	Percentage cover at a representative number of monitoring stops	Potential pollutants and sediment may negatively impact on the typical species and subcommunities of Embryonic shifting dunes.		No adverse effects
		Vegetation composition: negative indicator species	Percentage cover	Potential pollutants may negatively impact on the positive indicator species, reducing their density and subsequently allowing the establishment of non-native invasive species.		No adverse effects

Natura 2000 sites	Qualifying Interest	Attribute	Measure	Potential Impacts	Mitigation Measures	Residual Impact
					control, including the use of fast curing concrete mix for aquatic environment and appropriate measures in place to capture any spilled concrete, sealants or other materials	
	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]	Habitat area	Hectares	Potential pollutants may negatively impact on the total habitat area of shifting dunes with *Ammophila arenaria*.	Strict adherence to: - The CEMP and all the best practice guidance therewith. - Site compound layout instructions, ensuring that potential sources of pollution (chemical storage and machinery) are kept at an impermeable area within the site compound. - Water quality controls. - Pollution control and spill prevention methods, detailing suitable spill kit equipment and management on site. - Silt control, including installation of silt curtain and silt fence. - Wet concrete leachate	No adverse effects
		Habitat distribution	Occurrence	Potential pollutants may negatively impact on the overall distribution of shifting dunes with *Ammophila arenaria*.		No adverse effects
		Vegetation structure: zonation	Occurrence	Potential pollutants and sediment could alter structural variation within sward.		No adverse effects
		Vegetation composition: plant health of dune grasses	Percentage cover	Potential pollutants may negatively impact on the health of dune grass vegetation.		No adverse effects
		Vegetation composition: typical species and subcommunities	Percentage cover at a representative number of monitoring stops	Potential pollutants and sediment may negatively impact on the typical species and subcommunities of shifting dunes with *Ammophila arenaria*.		No adverse effects
		Vegetation composition: negative indicator species	Percentage cover	Potential pollutants and sediment may negatively impact on the positive indicator species, reducing their density and subsequently allowing the establishment of non-native invasive species.		No adverse effects

Natura 2000 sites	Qualifying Interest	Attribute	Measure	Potential Impacts	Mitigation Measures	Residual Impact
					control, including the use of fast curing concrete mix for aquatic environment and appropriate measures in place to capture any spilled concrete, sealants or other materials	
	Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	Habitat area	Hectares	Potential pollutants may negatively impact on the total habitat area of Fixed coastal dunes with herbaceous vegetation.	Strict adherence to: - The CEMP and all the best practice guidance therewith. - Site compound layout instructions, ensuring that potential sources of pollution (chemical storage and machinery) are kept at an impermeable area within the site compound. - Water quality controls. - Pollution control and spill prevention methods, detailing suitable spill kit equipment and management on site. - Silt control, including installation of silt curtain and silt fence. - Wet concrete leachate	No adverse effects
		Habitat distribution	Occurrence	Potential pollutants may negatively impact on the overall distribution of Fixed coastal dunes with herbaceous vegetation.		No adverse effects
		Vegetation structure: zonation	Occurrence	Potential pollutants and sediment could alter structural variation within sward.		No adverse effects
		Vegetation structure: bare ground	Percentage cover	Potential pollutants and sediment may negatively impact on the herbaceous vegetation reducing total cover, and thus increasing total bare ground cover.		No adverse effects
		Vegetation structure: sward height	Centimetres	Potential pollutants and sediment may negatively impact and alter the sward heights of the Fixed coastal dunes with herbaceous vegetation.		No adverse effects
		Vegetation composition: typical species and subcommunities	Percentage cover at a representative number of monitoring stops	Potential pollutants and sediment may negatively impact on the typical species and subcommunities of Fixed coastal dunes with herbaceous vegetation.		No adverse effects
		Vegetation composition: negative indicator	Percentage cover	Potential pollutants and sediment may negatively impact on the positive indicator species, reducing		No adverse effects

Natura 2000 sites	Qualifying Interest	Attribute	Measure	Potential Impacts	Mitigation Measures	Residual Impact
		species (including *Hippophae rhamnoides*)		their density and subsequently allowing the establishment of non-native invasive species.	control, including the use of fast curing concrete mix for aquatic environment and appropriate measures in place to capture any spilled concrete, sealants or other materials	
	Humid dune slacks [2190]	Habitat area	Hectares	Potential pollutants may negatively impact on the total habitat area of Humid dune slacks dunes with herbaceous vegetation.	Strict adherence to: - The CEMP and all the best practice guidance therewith. - Site compound layout instructions, ensuring that potential sources of pollution (chemical storage and machinery) are kept at an impermeable area within the site compound. - Water quality controls. - Pollution control and spill prevention methods, detailing suitable spill kit equipment and management on site. - Silt control, including installation of silt curtain and silt fence. - Wet concrete leachate	No adverse effects
		Habitat distribution	Occurrence	Potential pollutants may negatively impact on the overall distribution of Fixed coastal dunes with herbaceous vegetation.		No adverse effects
		Vegetation structure: zonation	Occurrence	Potential pollutants and sediment could alter structural variation within sward.		No adverse effects
		Vegetation structure: bare ground	Percentage cover	Potential pollutants and sediment may negatively impact on the herbaceous vegetation reducing total cover, and thus increasing total bare ground cover.		No adverse effects
		Vegetation structure: vegetation height	Centimetres	Potential pollutants and sediment may negatively impact and alter the sward heights of the Humid dune slacks with herbaceous vegetation.		No adverse effects
		Vegetation composition: typical species and subcommunities	Percentage cover at a representative number of monitoring stops	Potential pollutants and sediment may negatively impact on the typical species and subcommunities of Humid dune slacks with herbaceous vegetation.		No adverse effects
		Vegetation composition: negative indicator	Percentage cover	Potential pollutants and sediment may negatively impact on the positive indicator species, reducing		No adverse effects

Natura 2000 sites	Qualifying Interest	Attribute	Measure	Potential Impacts	Mitigation Measures	Residual Impact
		species		their density and subsequently allowing the establishment of non-native invasive species.	control, including the use of fast curing concrete mix for aquatic environment and appropriate measures in place to capture any spilled concrete, sealants or other materials	
	Petalophyllum ralfsii (Petalwort) [1395]	Distribution of populations	Number and geographical spread of populations	Potential pollutants and sediment may indirectly impact on the distribution of Petalwort through reduction of sand dune habitats.	Strict adherence to: - The CEMP and all the best practice guidance therewith. - Site compound layout instructions, ensuring that potential sources of pollution (chemical storage and machinery) are kept at an impermeable area within the site compound. - Water quality controls. - Pollution control and spill prevention methods, detailing suitable spill kit equipment and management on site. - Silt control, including installation of silt curtain and silt fence. - Wet concrete leachate	No adverse effects
		Population size	Number of individuals	Potential pollutants and sediment may indirectly impact on the population size of Petalwort through reduction of sand dune habitats.		No adverse effects
		Area of suitable habitat	Hectares	Potential pollutants and sediment may impact on the area of suitable habitat through reduction of sand dune habitats.		No adverse effects

Natura 2000 sites	Qualifying Interest	Attribute	Measure	Potential Impacts	Mitigation Measures	Residual Impact
					control, including the use of fast curing concrete mix for aquatic environment and appropriate measures in place to capture any spilled concrete, sealants or other materials	

6.5 Significance of Cumulative and In-combination Impacts

The residual impact from the proposed development following appropriate mitigation will be negligible. Further, the projects in the Grand Canal Dock area (Section 5.3) have been screened for Appropriate Assessment and have been screened out with the conclusion that they will not have a significant impact, alone or in combination with other projects, on any of the Natura 2000 sites. Therefore, no adverse cumulative or in combination impacts will occur.

The Alexandra Basin redevelopment, MP2 Project and maintenance of dredging activity in the basin will involve dredging and relocation of sediment with potential impact on benthic communities in the bay. The biological communities are adapted to disturbance due to water and sediment movement in the tidal area. Mitigation measures include Water Quality Management Plan, Pollution Incident Response Plan, Dredging Management Plan, Suspended Sediment and Sedimentation Measures, Concrete and Cement Pollution Measures. Temporary negative impacts are anticipated on the benthic fauna, but recovery is expected to take <1 year and no residual impact is anticipated. No cumulative impacts with the proposed project are anticipated.

A preliminary assessment of the Bus Connect Ringsend to City Centre identified potential impact to surface water. There is the potential for reduction in surface water quality in the receiving environment as a result of surface water runoff and discharge into any surface water feature. This in turn could result in the degradation of aquatic/wetland habitats and indirect impacts on the aquatic species that these habitats may support, such as otters, amphibians and fish (if present). The project would require a Stage 1 AA Screening and potentially a Stage 2 AA to be carried out prior to commencement. Such an assessment will identify potential impacts and outline any mitigation measures required. No cumulative impacts with the proposed project are anticipated.

The following projects are still at early planning stages; Dodder Public Transportation Opening Bridge, Dublin District Heating System, Grand Canal Greenway- Grand Canal Dock Section, Grand Canal Quay East development works, South Campshire Flood Defence Wall Project and Treasury Building. Their construction phases may overlap with the proposed project. These projects will be subject to a separate Stage 1 AA Screening and potentially a Stage 2 AA prior to commencement. Such an assessment will identify potential impacts and outline any mitigation measures required. Provided mitigation measures are in place, no cumulative impacts with the proposed project are anticipated.

Of the projects listed in Table 5-2, all but one has been screened out for appropriate assessment with the conclusion that they will have no significant impact, alone or in combination with other projects, on any Natura 2000 sites. Planning application 3220/21 which involves construction of a new 1.4km pedestrian walkway and a 2-way cycle lane along East Wall Road and Bond Road had an NIS prepared. The NIS identified potential for pollution via hydrological pathway. Mitigation measures are incorporated, including pollution prevention (including concrete) and suspended sedimentation. Having applied the mitigation measures to manage and reduce the risk of pollution, there will be no adverse upon the integrity of the European sites concerned and no scientific doubt remains as to the absence of such effects. Therefore, no cumulative impacts with the proposed project are anticipated.

Operation

The Dublin City Development Plan has a range of policies and objectives outlining mitigation measures to offset any potential impact on the Dublin Bay Natura 2000 sites. These relate particularly to water quality and enhancement of aquatic ecosystems. The potential for the proposed project to contravene these mitigations by extending the combined stormwater outfall to the quay of River Liffey could result in a significant in-combination impact on the Natura 2000 sites by impairing water quality. However, the discharge from the new stormwater outfall is expected to be intermittent.

The Water Quality Modelling (WQM) report assessed the change in water quality in River Liffey based on four parameters: Molybdate Reactive Phosphate (MRP), Dissolved Inorganic Nitrogen (DIN), Biological Oxygen Demand (BOD) and E. coli. There was no discernible change in the achievement of the Environmental Quality Standard (EQS) compared to the baseline in regards to MRP and DIN with the % difference in concentration in much of the Lower Liffey being less than 1%. BOD showed no discernible change in the achievement of the EQS

compared to the baseline. It was noted that this parameter showed the greatest increases compared to the baseline, however, the resultant values were still well below the EQS thresholds. For E. coli the increases due to the GCSWOE were seen to be less than 2% in the time varying scenario reducing rapidly away from the outfall and between 2 and 5% for the storm-based scenarios. Importantly, at the downstream boundary these both reduced to less than a 1% increase compared to the baseline.

Therefore, the operation of the new outfall is not anticipated to have a significant in-combination impact on the Dublin Bay Natura 2000 sites together with the Dublin City Development Plan.

The Greater Dublin Drainage Strategy includes the upgrade of Ringsend WWTP. In June 2018 Irish Water applied for (and subsequently received) planning permission for upgrade works to the Ringsend WWTP facility. These are currently on-going and will increase the capacity of the facility from 1.6 million PE to 2.4 million PE. This plant upgrade will result in an overall reduction in the final effluent discharge of several parameters from the facility including BOD, suspended soils, ammonia, DIN and MRP. An EIAR was submitted by Irish Water as part of this application. The EIAR contains sections relating to Marine Biodiversity and Terrestrial Biodiversity, and each contains a section on the 'do-nothing scenario'. These review the effects of the WWTP on biodiversity in Dublin Bay in the absence of the upgrade works.

The EIAR report acknowledges that under the do-nothing scenario "the areas in the Tolka Estuary and North Bull Island channel will continue to be affected by the cumulative nutrient loads from the river Liffey and Tolka and the effluent from the Ringsend WWTP", which could result in a decline in biodiversity and the deterioration of the biological status of Dublin Bay (Irish Water, 2018b). Nevertheless, these negative impacts of nutrient over-enrichment are considered "unlikely" (Irish Water, 2018b). This is because historical data suggests that pollution in Dublin Bay has had little or no effect on the composition and richness of the benthic macroinvertebrate fauna. The EIAR notes that "although a localised decline could occur, it is not envisaged to be to a scale that could pose a threat to the shellfish, fish, bird or marine mammal populations that occur in the area." Furthermore, the EIAR notes that significant impacts on waterbird populations foraging on invertebrates in Dublin Bay due to nutrient over-enrichment are "unlikely" to occur (Irish Water, 2018b). What is important in the context of this Biodiversity Chapter is that the do-nothing scenario predicts that nutrient and suspended solid loads from the WWTP will "continue at the same levels and the impact of these loadings should maintain the same level of effects on marine biodiversity" and that "if the status quo is maintained there will be little or no change in the majority of the intertidal faunal assemblages found in Dublin Bay which would likely continue to be relatively diverse and rich across the bay."

Therefore, given that no impacts are anticipated from the new stormwater outfall and that the current discharges from the Ringsend WWTP pose no threat to biodiversity in Dublin Bay, there will be no cumulative impacts.

7 Conclusions

JBA Consulting Ireland Ltd. was commissioned by Dublin City Council and Irish Water to undertake a Natura Impact Statement in relation to the proposed Grand Canal Storm Water Outfall Extension at Grand Canal Docks, Dublin, Ireland.

The proposed project is identified as occurring within the Zone of Influence of the following Natura 2000 sites:

- South Dublin and River Tolka Estuary SPA
- North Bull Island SPA
- North Dublin Bay SAC

The proposed site is connected to the Natura 2000 sites via the surface water pathway, from Grand Canal Basin and River Liffey to Dublin Bay.

The qualifying interests within the Zone of Influence are:

- Light bellied Brent Goose (*Branta benicla hrota*) [A046]
- Oystercatcher (*Haematopodidae*) [A130]
- Ringed Plover (*Charadrius hiaticula*) [A137]
- Grey Plover (*Pluvialis squatarola*) [A141]
- Knot (*Calidris canutus*) [A143]
- Sanderling (*Calidris alba*) [A144]
- Dunlin (*Calidris alpina*) [A149]
- Bar-tailed Godwit (*Limosa lapponica*) [A157]
- Redshank (*Tringa tetanus*) [A162]
- Black-headed Gull (*Chroicocephalus ridibundus*) [A179]
- Roseate tern (*Sterna dougallii*) [A192]
- Common Tern (*Sterna hirundo*) [A193]
- Arctic Tern (*Sterna paradisaea*) [A194]
- Shelduck (*Tadorna tadorna*) [A048]
- Teal (*Anas crecca*) [A052]
- Pintail (*Anas acuta*) [A054]
- Shoveler (*Anas clypeata*) [A056]
- Golden Plover (*Pluvialis apricaria*) [A140]
- Black-tailed Godwit (*Limosa limosa*) [A156]
- Curlew (*Numenius arquata*) [A160]
- Turnstone (*Arenaria intepres*) [A169]
- Wetlands and Waterbirds [A999]
- Tidal Mudflats and Sandflats [1140]
- Annual Vegetation of Drift Lines [1210]
- Salicornia Mud [1310]
- Atlantic Salt Meadows [1330]
- Mediterranean Salt Meadows [1410]
- Embryonic Shifting Dunes [2110]
- Marram Dunes (White Dunes) [2120]
- Fixed Dunes (Grey Dunes) [2130]
- Humid Dune Slacks [2190]
- Petalwort (*Petalophyllum ralfsii*) [1395]

The potential impact from the proposed project is posed during construction and relates to potential pollution of surface waters caused by accidental spillage of construction pollutants,

e.g. concrete mix, diesel and oil, and resuspension of sediment within the basin and runoff from excavated soil via surface water which has the potential to significantly impact on the qualifying interests of the Natura 2000 sites.

The construction works and increased human activity also has the potential to cause disturbance to the nesting Common Tern pair at Camden Lock at the outer end of the Grand Canal Basin.

Mitigation measures have been proposed for the area of the proposed site for inclusion of pollution control measures to water, including specific controls to prevent concrete leachate and spill, ensuring that no adverse effects in relation to surface water pollution occur. The presence of an ECoWon site will ensure no disturbance to the nesting Common Tern pair at the Camden Lock.

It is concluded that **provided that the mitigation measures outlined are strictly adhered to, adverse effects are not likely to occur** from the works involved with the proposed storm water outfall extension; in-combination with other projects and plans on the following Natura 2000 sites:

- South Dublin and River Tolka Estuary SPA
- North Bull Island SPA
- North Dublin Bay SAC

To confirm this conclusion, a checklist from (DoEHLG, 2009) has been completed in Table 7-1.

Table 7-1: Integrity of Natura 2000 site checklist (DoEHLG, 2009).

Conservation objectives: does the project or plan have the potential to:	Y/N
Cause delays in progress towards achieving the conservation objectives of the sites?	N - Following mitigation, no significant adverse residual impacts have been identified that will prevent achievement of the conservation objectives of the assessed sites.
Interrupt progress towards achieving the conservation objectives of the sites?	N - Following mitigation, no significant adverse residual impacts have been identified that will prevent achievement of the conservation objectives of the assessed site.
Disrupt those factors that help to maintain the favourable conditions of the site?	N - Potential adverse impacts via surface water; land and air; and groundwater pathways identified during the screening process can be mitigated against.
Interfere with the balance, distribution and density of key species that are the indicators of the favourable condition of the site?	N - Potential adverse impacts on the habitats and species of the SACs are not expected as impacts can be avoided by implementing the mitigation and avoidance measures detailed.
Other objectives: does the project or plan have the potential to:	
Cause changes to the vital defining aspects (e.g. nutrient balance) that determine how the site functions as a habitat or ecosystem?	N - Potential adverse impacts from suspended solid and nutrient release are not expected as measures can be included within working protocols to ensure potential impacts are effectively mitigated.
Change the dynamics of the relationships (between, for example, soil and water or plants and animals) that define the structure and/or function of the site?	N - Potential adverse impacts relating to hydrological status and water quality have been identified which could impact on the functioning and dynamics of the site, however, these are not expected to be significant given the mitigation measures detailed to ensure potential impacts are effectively mitigated.
Interfere with predicted or expected natural changes to the site (such as water dynamics or chemical composition)?	N - Potential adverse impacts from changes to the hydrological regime and suspended solid/nutrient/pollutant release are not expected as measures are included within

Conservation objectives: does the project or plan have the potential to:	Y/N
	working protocols to ensure potential impacts are effectively mitigated.
Reduce the area of key habitats?	N - Potential adverse impacts on the habitats of the SAC and SPAs are not expected given the mitigation measures that have been detailed.
Reduce the population of key species?	N - Potential impacts to key species of the SAC and SPAs, are not expected as impacts can be avoided by implementing the mitigation measures detailed.
Change the balance between key species?	N - Potential impacts to key species for which the SAC and SPAs are designated, are not expected as impacts can be avoided by implementing the mitigation measures detailed.
Reduce diversity of the site?	N - The identified mitigation measures to protect designated habitats and species will ensure that the current diversity of the sites is maintained.
Result in disturbance that could affect population size or density or the balance between key species?	N - Potential impacts to the population size, density or balance of key species are not expected as impacts can be avoided by implementing the mitigation measures detailed.
Result in fragmentation	N – Potential impacts resulting in fragmentation of species or habitats are not expected as impacts can be avoided by implementing the mitigation measures detailed.
Result in loss or reduction of key features (e.g. tree cover, tidal exposure, annual flooding etc.)?	N - Potential adverse impacts on SAC and SPA habitats are not expected as impacts can be avoided by implementing the mitigation measures detailed so there will be no loss of, or reduction of, key features.

Appendices

A Appropriate Assessment (AA) Screening Report - J. B. Barry & Partners (2020)

Client:

Dublin City Council and Irish Water

Applicant:

Dublin City Council

Project:

Grand Canal Storm Water Outfall Extension

Report:

AA Screening Report

Table of Contents

SECTION 1: Introduction

The Grand Canal Tunnel was constructed in the early 1970's (Figure 1.1) in order to:

- Convey foul sewerage from the newly expanding suburbs in the west of the city to the Ringsend Wastewater Treatment Plant in Ringsend.
- Provide a conduit for the overflows from the existing combined foul and storm sewers.
- To convey storm relief flows from the Poddle and Swan Rivers thereby reducing the risk of flooding in those areas.

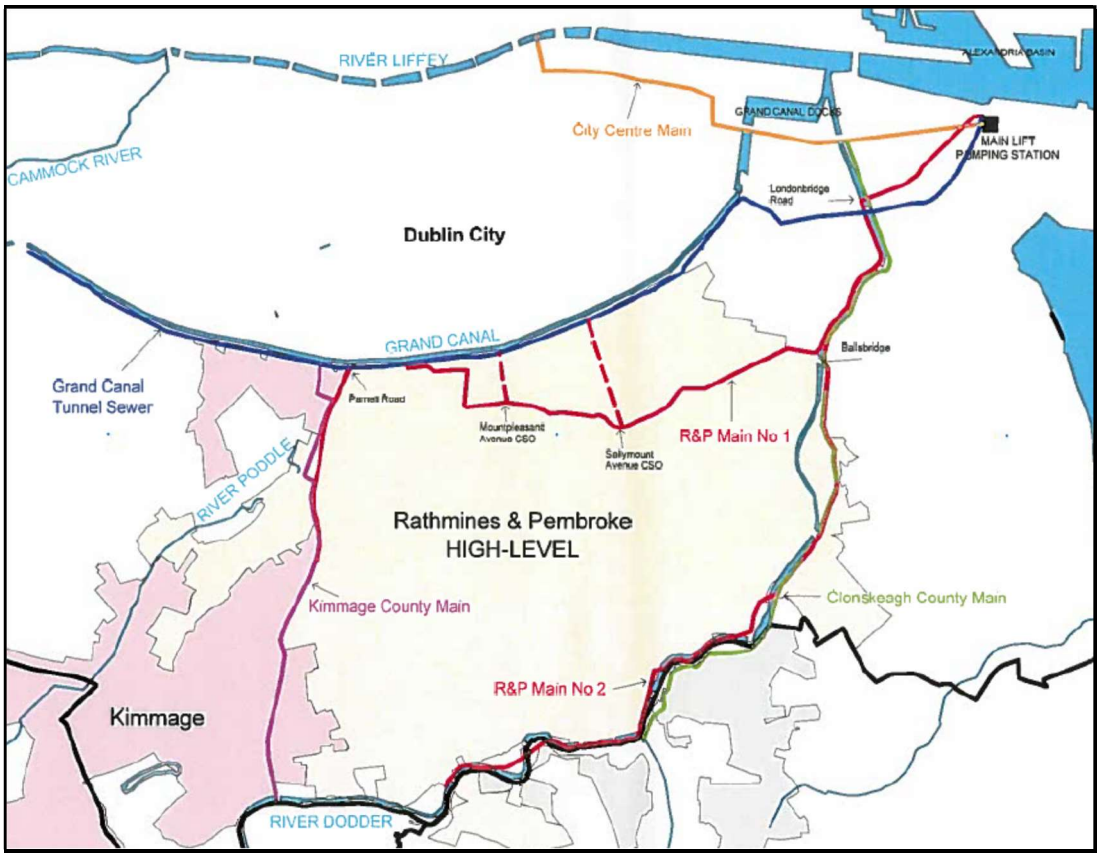

Figure 1.1 Grand Canal Tunnel

The tunnel is 4.8 km in length and has a diameter of 3.6 metres in diameter. The tunnel is partitioned off into two separate sections. The smaller compartment of the cross section caters for the foul and with remaining larger section catering for storm water. At Northumberland Road (Manhole 1) the tunnel splits with the foul component being conveyed to Ringsend while the stormwater component is piped to the Grand Canal Basin in a 3.2 metre diameter pipe. During heavy rainfall events the flow in the foul element will exceed its capacity and will overflow to the storm compartment and discharge at the southern end of the Grand Canal Basin. Bacteriological contamination of the Basin (in excess of the bathing water standards) after heavy rainfall events has been observed by Waterways Ireland and they have urged Irish Water/ DCC to extend the outfall to the River Liffey as has been proposed.

The intention to move the outfall to the Liffey has been proposed since the 1990s (requested by OPW). In 2001 a solution was designed to be completed in 2 phases.

Phase 1 of the scheme was completed in 2002 with the construction of a 170m long 4m wide x 2.7m high culvert through the Dublin Docklands Development Authority (DDDA) site between Hanover Quay and Sir John Rogerson Quay and connecting into the secant piled wall constructed as part of the remediation of the site. Provision was made in the secant wall for the future connection of the Phase 2 culverts on either side.

Phase 2 comprises the culverting of the discharge from the existing outfall through the Grand Canal Basin to connect with the Phase 1 Culvert and to construct an outfall structure at Sir John Rogerson's Quay on the River Liffey.

A Section 25 certificate (Planning Approval) was granted by DDDA to proceed.

The Phase 2 design proceeded to tender documents, but the project was put on hold in 2012.

The extension of the outfall to the River Liffey was contained within the Water Services Investment Plan (WSIP) 2007-2009 and was entitled Relocation of Grand Canal Surface Water Outfall. The scheme was programmed to start in 2008. The project was also listed in the 2010-2012 WSIP. However, the project was not progressed further, primarily due to the economic downturn.

One of the objectives of the North Lotts and Grand Canal Dock Planning Scheme was outlined as W3, *To provide adequate wastewater treatment, water distribution networks and drawing networks,* and specifically *to complete the relocation of the Grand Canal Surface Water Outfall from the Grand Canal Dock Basin to the River Liffey*. The relocation of the Grand Canal Surface Water Outfall from the Basin to the River Liffey has been targeted as a priority environmental objective within the Planning Scheme.

In 2015 the DDDA was dissolved rendering the Section 25 certificate void.

Irish Water, Dublin City Council and Waterways Ireland agreed, in 2017, to establish a Joint Working Group to examine the issue. Extensive water quality analysis and monitoring of the impact of the surface water overflows into the Basin from the Irish Water combined sewer network for a period of one year has demonstrated, to the satisfaction of the Working Group, that the primary source of pollution of the waters in the GCB is the discharge from the surface water section of the GCT.

It was concluded that if the GCB is to be usefully developed as an Amenity in accordance with current policy, the existing discharge point of the GCT surface water outfall into the GCB must be removed. Since the discharge cannot be closed off, the only feasible solution involved intercepting the storm water discharge where it enters the dock, installing a new culvert within the dock itself north to the River Liffey via Asgard Road together with the construction of an outfall structure to the River Liffey at Sir John Rogerson's Quay where the impact would be reduced.

A design review concluded that Phase 2 design as approved in 2007 was still the preferred option As the DDDA has since been dissolved, a new planning submission will be required.

DCC and IW have agreed to jointly complete the Planning and Statutory Approvals for the extension of the outfall pipe. DCC will be making the application. IW have procured J. B. Barry and Partners Ltd as the consultant and DCC will provide a Project Manager

A number of designated European sites (Natura 2000 sites) are located within the zone of influence of the project. These sites are their relevant distances to the project are listed below.

- South Dublin Bay and River Tolka Estuary SPA: 2km.
- North Bull Island SPA: 4km.
- South Dublin Bay SAC: 2km.
- North Dublin Bay SAC: 4km.
- Howth Head SAC: 9.6km.
- Rockabill to Dalkey Island SAC: 9.7km.
- Howth Head Coast SPA: 12.5km.
- Dalkey Islands SPA: 12km.
- Baldoyle Bay SPA: 9.3km.
- Baldoyle Bay SAC: 9.3km.
- Ireland's Eye SPA: 12.7km.
- Ireland's Eye SAC: 12.9km.
- Malahide Estuary SAC: 12.3km.

- Malahide Estuary SPA: 13km.
- Glenasmole Valley SAC: 12.5km.
- Wicklow Mountains SAC: 11.7km.
- Wicklow Mountains SPA: 12.6km.

1.1 Legislative Context

Natura 2000 sites (referred to as 'European sites' in national legislation) are areas designated for protection at European level under the E.U. Habitats Directive (92/43/EEC) and the E.U. Birds Directive (79/409/EEC) amended in 2009 (Directive 2009/147/EC). These Directives have been transposed into Irish law by the European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No 477 of 2011).

Under these Directives and Regulations, European sites provide legal protection to faunal and floral species and important/ vulnerable habitats. There are two categories of designation as follows:

- Special Areas of Conservation (SAC) are designated under the E.U. Habitats Directive (92/43/EEC).
- Special Protection Areas (SPAs) are designated under the E.U. Birds Directive (Directive 2009/147/EC).

Designated SACs and SPAs are considered to be of international importance.

Under Article 3 of the E.U. Habitats Directive "*a coherent European network of special areas of conservation shall be set up under the title Natura 2000" and "the Natura 2000 network shall include special protection areas classified by the Member States pursuant to Directive 79/409/EEC*". In an Irish context, these Natura 2000 sites include only SACs and SPAs.

Article 6(3), paragraph 3 of the Habitats Directive states that:

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

The main conservation objective of all the Special Areas of Conservation is "*to maintain or restore the favourable conservation condition of the Annex I habitat(s) and /or the Annex II species for which the SAC has been selected"*. The integrity of a site can be regarded as the coherence of ecological structure and function, across the entirety of a site, which enables it to sustain all the ecological resources for which it has been valued.

The main conservation objective of the Special Protection Areas is "*to maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for the SPA*".

The favourable conservation status of a habitat is achieved when:

- Its natural range, and area it covers within that range, are stable or increasing.
- The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future.
- The conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats.
- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future.
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Additionally, Article 10 of the Habitats Directive (92/43/EEC) states: "*Member States shall endeavour, where they consider it necessary, in their land-use planning and development policies and, in particular, with a view to improving the ecological coherence of the Natura network, to encourage the management of features of the landscape which are of major importance for wild fauna and flora.*

Such features are those which, by virtue of their linear and continuous structure (such as rivers with their banks or the traditional systems for marking field boundaries) or their function as stepping stones (such as ponds or small woods), are essential for the migration, dispersal and genetic exchange of wild species."

The need for supporting ecological coherence is further supported by Article 3(3) of the Habitats Directive:

"*Where they consider it necessary, Member States shall endeavour to improve the ecological coherence of Natura 2000 by maintaining, and where appropriate developing, features of the landscape which are of major importance for wild fauna and flora, as referred to in Article 10*".

In addition to SAC's and SPA's, The Wildlife (Amendment) Act 2000 makes legal provision for the designation and protection of areas known as Natural Heritage Areas (NHA). These are areas considered to be important for the habitats present or which holds species of plants and animals whose habitat needs protection. Natural Heritage Areas (NHAs), proposed Natural Heritage Areas (pNHAs) along with other sites such as Nature Reserves, Wildfowl Sanctuaries, and Ramsar sites do not form part of the Natura 2000 network, however they can provide an important supporting role to the network, particularly when it comes to mobile faunal species that do not necessarily confine to site boundaries.

The statutory agency responsible for European sites in Ireland is the National Parks and Wildlife Service (NPWS) of the Department of Culture, Heritage and the Gaeltacht. Guidelines on AA for Planning Authorities were issued by the NPWS in 2009 and revised in 2010 (NPWS, 2010).

1.2 The Stages in the Appropriate Assessment Process

Article 6(3) defines a *step-wise* procedure for considering plans and projects. There are four stages in the Appropriate Assessment process as outlined in the document *Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities* (NPWS, 2010). The following is a summary of the first step in the AA process;

Stage 1 – Screening for Appropriate Assessment:

The first part of this procedure consists of a pre-assessment stage ('screening') to determine whether, firstly, the plan or project is directly connected with or necessary to the management of a European site, and secondly, whether it is likely to have a significant effect on the site; it is governed by Article 6(3), first sentence.

1) Whether a project is directly connected to or necessary for the management of the European site.
2) Whether a project, alone or in combination with other plans and projects is likely to have significant effects on a European site in view of its conservation objectives.

In an Irish context, under Part XAB of the Planning and Development Act 2000 – 2019, screening for appropriate assessment must be carried out by the Competent Authority to assess, in view of best

scientific knowledge, if a land-use plan or proposed development, individually or in combination with another plan or project, is likely to have a significant effect on a European site. The Competent Authority's determination as to whether an Appropriate Assessment is required must be made on the basis of objective information and should be recorded. Consultants or project proponents may undertake a form of screening to establish if an Appropriate Assessment is required and provide advice/ submit the necessary information to allow the Competent Authority to conduct a screening exercise.

Where it is likely that a plan or project will have significant effects on a site, or where it is uncertain whether there will be significant effects, then a stage 2 Appropriate Assessment is required.

Stage 2 - Appropriate Assessment:

The second part of the procedure, governed by Article 6(3), second sentence, relates to the appropriate assessment and the decision of the competent national authorities. This stage considers whether the project, alone or in combination with other projects or plans, including mitigation measures will have adverse effects on the integrity of a European site, and includes mitigation measures.

The proponent of a project that is progressed to Stage 2 is required to submit a Natura Impact Statement to identify and characterise any possible implications for a European site in view of the site's Conservation Objectives, taking account of in-combination effects. To grant planning permission, the Competent Authority must have determined that the proposed development would not adversely affect the integrity of the European site if carried out with the consent and the modifications or conditions attaching thereto.

A third part of the procedure (governed by Article 6(4) comes into play if, despite a negative assessment, it is proposed not to reject a plan or project but to give it further consideration. In these scenarios, Article 6(4) allows for derogations from Article 6(3) under certain conditions.

1.3 Guidance

This Appropriate Assessment Screening Report has been prepared in accordance with the following guidance documents where relevant:

- National Parks and Wildlife Service (NPWS), Department of the Environment, Heritage & Local Government (DoEHLG). (2009 with revision notes published in February 2010). Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities.
- European Commission. (2001). Assessment of Plans and Projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC.
- European Commission. (2018). Managing Natura 2000 Sites: The Provisions of Article 6 of the 'Habitats Directive' 92/43/EEC.
- European Commission. (2000). Communication from the Commission on the precautionary principle.
- European Commission. (2007). Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC: Clarification of the concepts of alternative solutions and imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the Commission.

1.4 Authors' Qualifications and Expertise

Harry Jones is an Environmental Engineer with J. B. Barry & Partners Limited. He holds a Bachelor Degree (BA) in Mathematics and a Master Degree (MAI) with distinction in Civil, Structural and Environmental Engineering from Trinity College Dublin. He also has Diplomas in Water Resources Management and Policy, and Introduction to Environmental Law and Policy, and has formal training in Environmental Impact Assessment and Appropriate Assessment. He is currently studying for a Post Graduate Certificate (PGCert) in Ecological Surveying techniques part-time with the University of Oxford. Harry is a full Member of Engineers Ireland (MIEI) and has been working professionally in the field of Environmental Engineering for more than three years following the completion of his studies.

Ben Huskinson is a Senior Environmental Consultant with J. B. Barry & Partners Limited. He holds a Bachelor (Hons.) Degree in Environmental Science from University College Cork and a Diploma in Planning and Environmental Law from the Law Society of Ireland. He is also a Chartered Environmentalist (CEnv) with the Society for the Environment (Soc. Env.) and a full Member of the Institute of Environmental Sciences (MIEnvSc). He has worked in environmental consultancy for over eleven years and is a highly experienced consultant, specialising in Environmental Assessments of medium to large scale infrastructural projects and in the coordination and management of Appropriate Assessment and Environmental Impact Assessment processes.

SECTION 2: Adopted Methodology and Information Collected

2.1 Introduction

This section provides detail on the adopted methodology and the information gathered to inform the overall assessment process.

2.2 Methodology

This Appropriate Assessment Screening Report (Stage 1) has been prepared in accordance with relevant guidance document listed in Section 1.3, above.

Screening for Appropriate Assessment

Screening for Appropriate Assessment involves the following:

- Determining whether a project or plan is directly connected with or necessary to the conservation management of any European site.
- Description of plan or project and determination of the spatial extent of the impacts that may be associated with project ('zone of influence').
- Identification of relevant European sites, and compilation of information on their qualifying interests and conservation objectives.
- Assessment of the potential of likely effects of the proposed project on relevant European sites.

The assessment includes direct, indirect and in-combination effects – which is based on available information such as a desk studies, consultation with statutory and non-statutory authorities, field surveys, and other primary research as necessary. Screening is undertaken without the consideration of mitigation measures, unless potential impacts can clearly be avoided through modification or redesign of the project.

If, on the basis of objective information provided at Stage 1, the Competent Authority cannot exclude that the proposed development will have a significant effect on a European site then it must determine that a Stage 2 Appropriate Assessment be undertaken for the proposed scheme.

2.3 Information Collected

The information gathered for the purposes of this report was based on a desktop study, field surveys, and consultation with statutory and non-statutory organisations.

A desktop study was carried out to collate available information on the proposed scheme and the existing ecological environment. Of relevance to this assessment are the following:

- Environmental Impact Assessment Screening Report (J. B. Barry and Partners, 2020).
- Underwater Archaeological Assessment Report (The Archaeological Diving Company, 2008).
- Archaeological Appraisal Report (Margaret Gowen & Co, 2006).
- Freshwater and Estuarine Ecological Study (Ecological Consultancy Services, EcoServe, 2001).

The following sources of information were also accessed:

- Birdwatch Ireland I-WeBS Site data (www.bwi.maps.arcgis.com).
- The National Parks and Wildlife Service (NPWS) database (www.npws.ie/protected-sites); European sites, National sites and their Conservation Objectives and supporting documents were identified.

A site walkover was carried out on the 16th of January which involved a walkover of the entire proposed scheme and the Grand Canal Docks environs. The study area was assessed in terms of ecological value, potential pathways to European sites, and potential effects on the receiving environment from the proposed scheme.

2.4 Relationship between the Proposed Works and Other Plans and Projects.

Article 6 (3) of the Habitats Directive requires that in-combination effects of the project with other plans or projects are considered in an Appropriate Assessment. As the underlying intention of the in-combination provision is to take account of cumulative effects, and as these effects often only occur over time, plans or projects that are completed, approved but uncompleted, or proposed (but not yet approved) should be considered in this context (Department of Environment, Heritage and Local Government, 2010).

The works associated with the proposed development are within and under other strategic plans that influence development in the local and wider area and therefore will be developed alongside other policies and objectives contained therein. The following resources were examined to identify potential plans or projects with the potential to give rise to cumulative impacts:

- Dublin City Development Plan (DCC, 2016).
- The National Planning Application database (www.myplan.ie - accessed January 2020).
- An Board Pleanála database (www.pleanala.ie - accessed January 2020).
- EPA Appropriate Assessment Tool Mapping Resource (www.gis.epa.ie/EPAMaps/AAGeoTool - accessed November 2019).
- EIA Portal (www.housinggovie.maps.arcgis.com - accessed January 2020).

The potential for 'in-combination' effects of the proposed works with the plans, projects and studies listed above, on European sites as a result of the implementation of the proposed scheme has been considered in this report.

SECTION 3: Screening for Appropriate Assessment

3.1 Site Location

The development is located in the Grand Canal Docks, Dublin, Ireland. This area is a hub of modern apartment buildings and office spaces which has been zoned as a Strategic Development Regeneration Area in the Dublin City Council Development Plan, 2016 – 2022.

The project will begin at its most southern point in the Grand Canal Docks at the Grand Canal Tunnel Outfall. The works will involve constructing a pipeline from the existing Grand Canal Tunnel Outfall, near the Grand Canal Dock Dart Station, north through the Basin, from where it will pass through a section of Hanover Quay. It will then link up with an existing culvert on Asgard Road, built in 2002 for the purposes of this project. At the end of this existing culvert, pipeline will be constructed underneath Sir John Rogerson's Quay and an outfall at the River Liffey. The storm water will therefore have bypassed it's previous outfall within the Grand Canal Docks and will discharge into the Lower Liffey Estuary.

3.2 Description of the Proposed Works

The proposed works for the scheme consists of the following:

- Construction of Transition Chamber 1 at chainage Ch.+0m (Starting at southernmost point of development at existing storm water outfall.
- Construction of 5 no. 1.5m diameter pipes from chainage Ch.+7.26 – Ch.+310.00m.
- Construction of Transition Chamber 2 at chainage Ch.+310.00 – Ch.+320.00m.
- Construction of Twin 2.4m dimeter pipes from chainage Ch.+320.00 – Ch.+490.00m.
- Construction of Transition Chamber 3 at chainage Ch.+490.00m.
- Construction of 4m wide 2.7m high (internal diameter) pipe on Hanover Quay.
- Construction of new outfall structure at Sir John Rogerson's Quay on the River Liffey.
- Construction of permanent floating platform along Grand Canal Quay.

The total length of the pipeline to be constructed is 550m. The proposed works involve 450m of development within the Grand Canal Docks, and 100m along existing road and pedestrian infrastructure, see Figure 3.1.

Three temporary cofferdams will be built at each of the transition chambers including;

- Transition Chamber 1 at the existing Grand Canal Tunnel Outfall;
- Transition Chamber 2 at the transition point from the 5 No. 1.5m diameter pipeline to 2 No. 2.4m diameter pipeline; and
- Transition Chamber 3 at Hanover Quay.

The route is proposed to traverse underwater through the centre of the southern portion of the Basin, pass underneath the MacMahon Bridge, then bear close to the western wall of the Basin. The pipeline will enter Transition Chamber 3 at Hanover Quay and will run underground along the quay before adjoining with the existing pipeline on Asgard Road, see Figure 3.2.

Particular constraints for the construction phase of the project include:

- Meeting canal draught requirements in terms of navigation; 1.9m minimum clearance.
- Avoiding the existing >100years old 8foot (2.4m) diameter sewer underneath the basin of the Docks.
- Minimising discharge velocities into the River Liffey.
- Minimising risk of damage to the extension pipe which could cause rapid drawdown of the Grand Canal Docks.

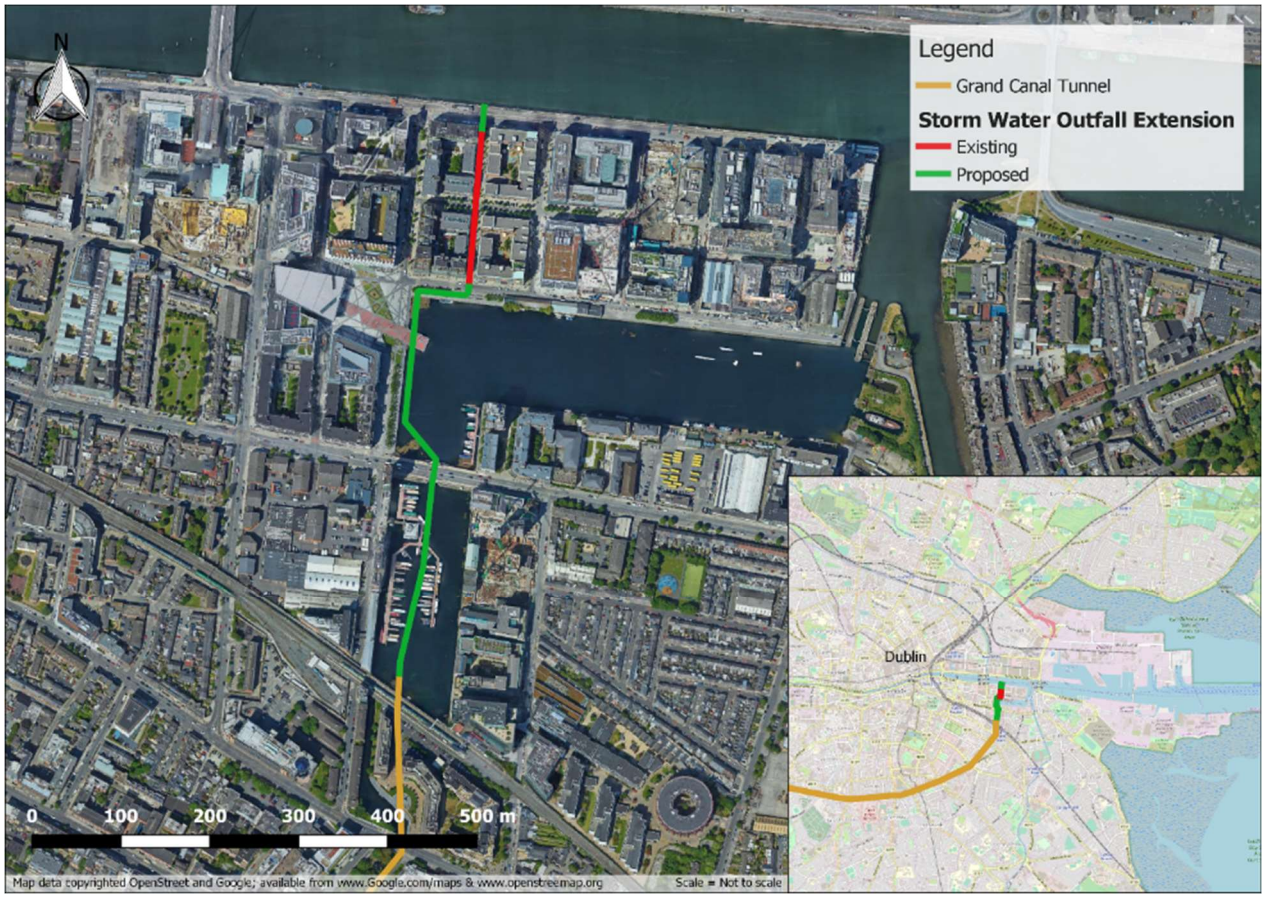

Figure 3.1 Overview of Grand Canal Storm Water Outfall Pipeline

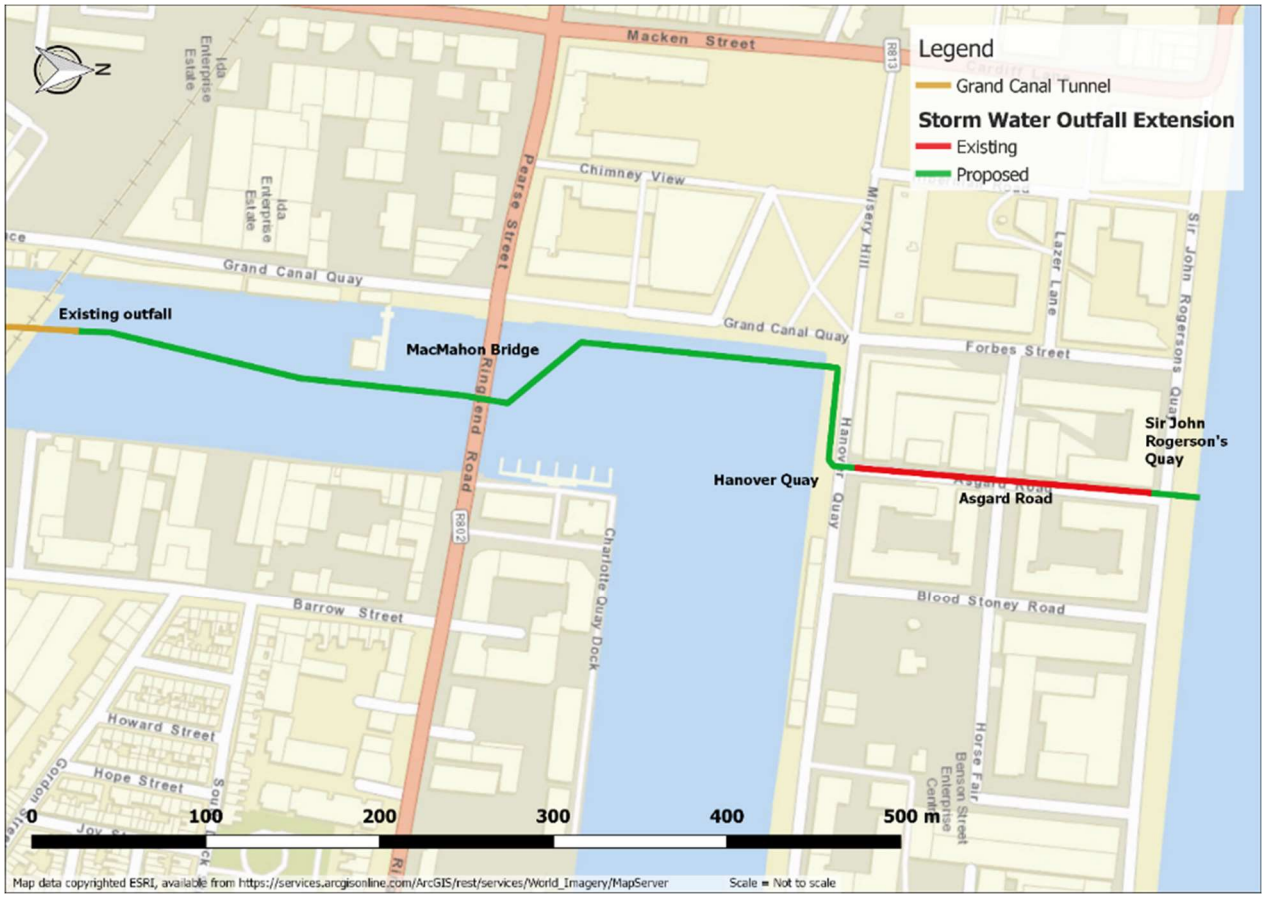

Figure 3.2 Grand Canal Storm Water Outfall pipeline within the Grand Canal Docks

3.3 Determination of zone of influence

There is no set recommended distance from a proposal for which European sites should be considered for inclusion in the assessment. The guidance (NPWS, 2010) recommends that '*the distance should be evaluated on a case-by-case basis with reference to the nature, size and location of the project, and the sensitivities of the ecological receptors, and the potential for in combination effects*'.

A Source-Pathway-Receptor model has been used to determine the spatial extent to which the proposed scheme may result in the rise of significant effects. For screening purposes, the presence of the following are required:

- 'Source' of impact – in this case, activities or emissions that may be associated with the construction and operation of the proposed scheme.
- 'Receptor' - European sites or their qualifying interests.
- A 'Pathway' between the source and the receptor (e.g. waterbodies connecting the proposed scheme to a European site).

The presence of a pathway does not automatically mean that significant effects will arise. The likelihood for significant effects will depend upon the characteristics and relationship between all three elements.

The zone of influence has been informed by the project description including the construction and operation activities, as well as EPA data, NPWS data and maps of European sites. Objective information has been used where available. Where there is a degree of uncertainty regarding the extent of a potential impact (for example construction noise), then a conservative or precautionary estimate or buffer has been applied.

The NPWS recommends a 15km buffer be undertaken in the case of plans. For the purposes of this assessment, a conservative 15km zone of influence has been employed under the precautionary approach to cater for the potential impacts of the proposed development.

3.4 Identification of European sites

There are 17 European sites are located within 15km (Figure 3.3) of the proposed development as shown in Table 1, below.

Table 1 Distance to European sites

Site Name	Site Code	Distance to site
South Dublin Bay and River Tolka Estuary SPA	004024	2km
North Bull Island SPA	004006	4km
North Dublin Bay SAC	000206	4km
South Dublin Bay SAC	000210	2km
Howth Head SAC	000202	9.6km
Rockabill to Dalkey Island SAC	003000	9.7km
Howth Head Coast SPA	004113	12.5km
Dalkey Islands SPA	004172	12km
Baldoyle Bay SPA	004016	9.3km
Baldoyle Bay SAC	000199	9.3km
Ireland's Eye SPA	004117	12.7km
Ireland's Eye SAC	002193	12.9km
Malahide Estuary SAC	00205	12.3km
Malahide Estuary SPA	004025	13km
Glenasmole Valley SAC	001209	12.5km
Wicklow Mountains SAC	002122	11.7km
Wicklow Mountains SPA	004040	12.6km

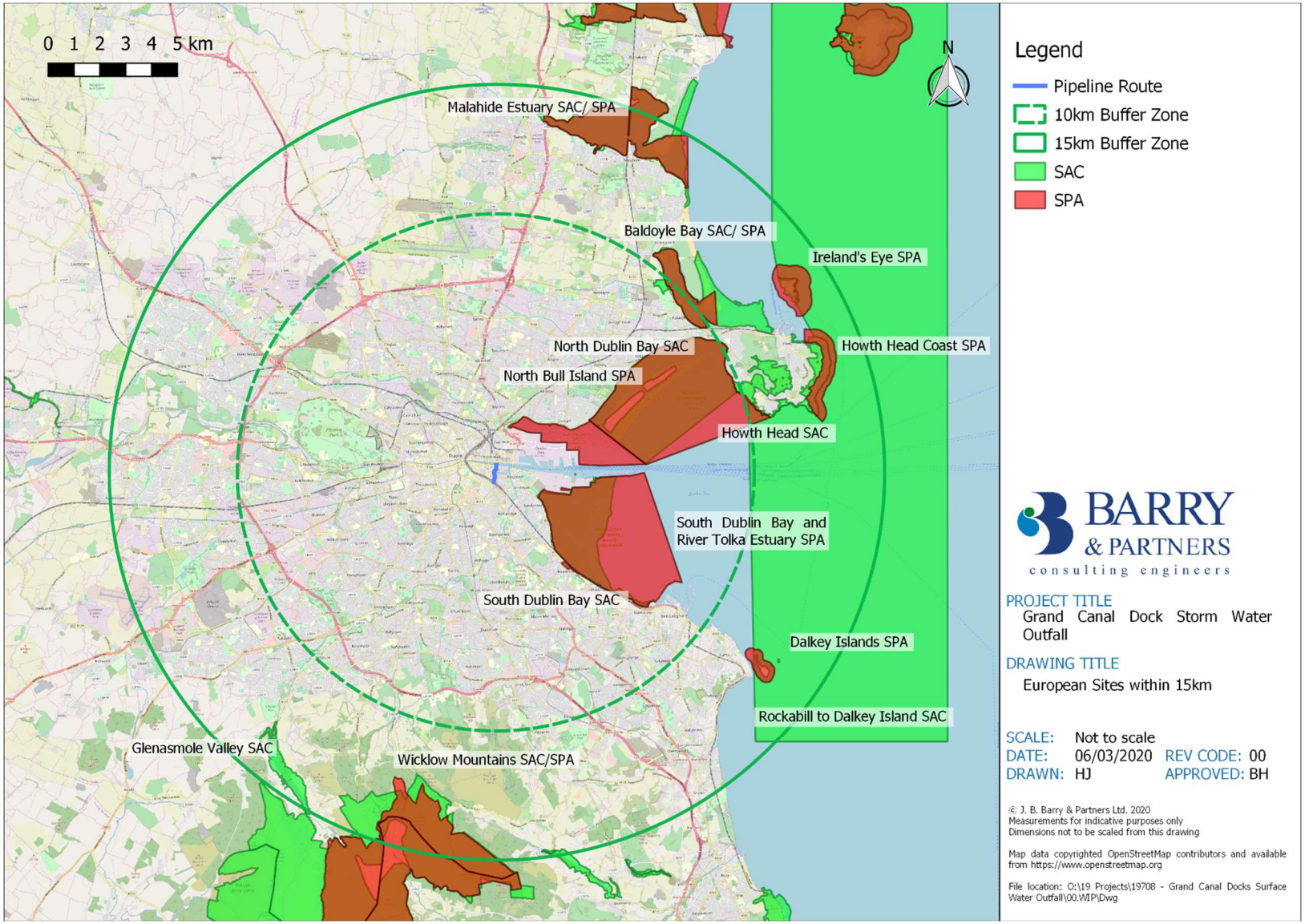

Figure 3.3 European sites within 10km

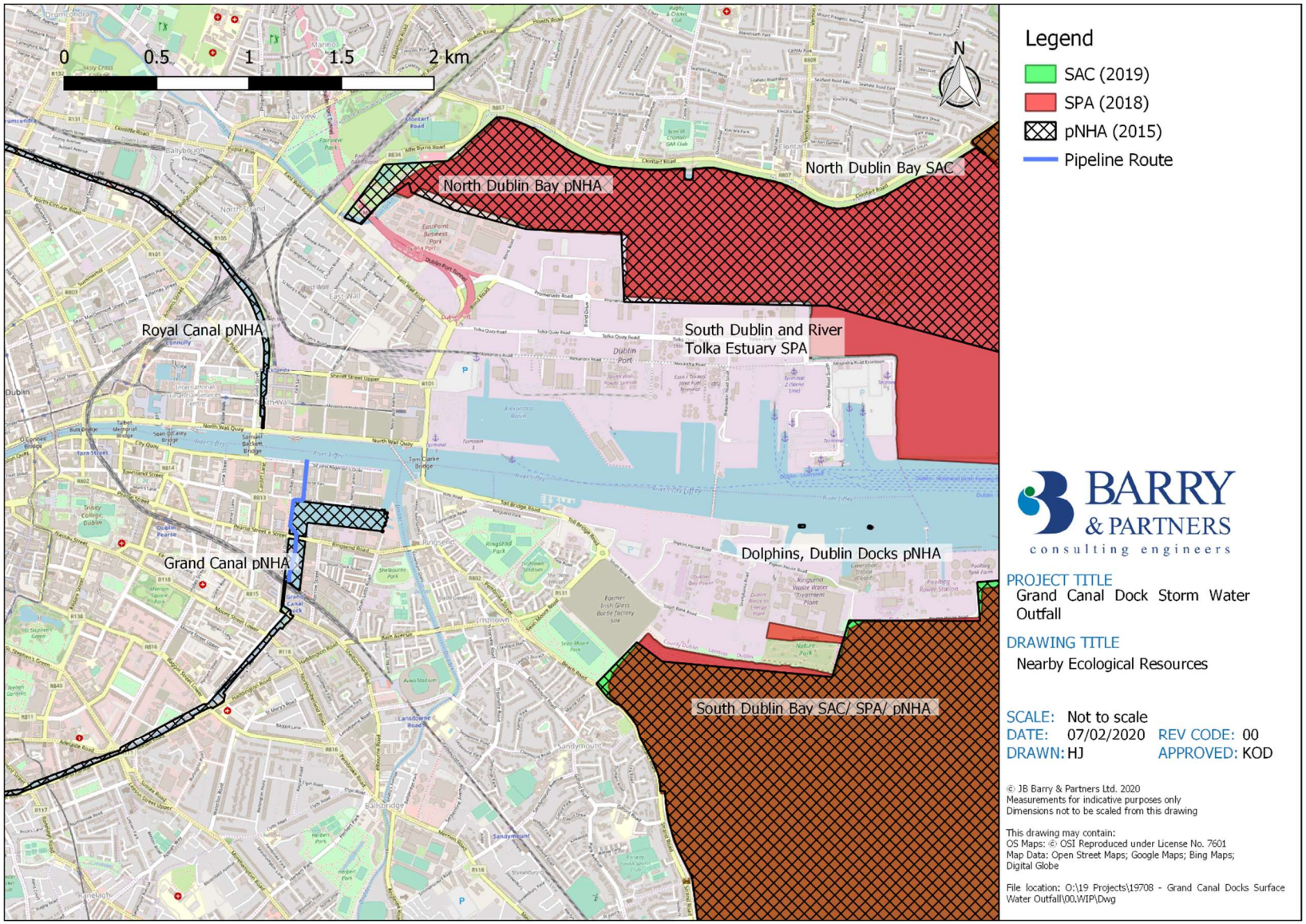

Figure 3.4 Nearby Ecological Resources

South Dublin Bay and River Tolka Estuary SPA (Site Code 004024)

South Dublin Bay and River Tolka Estuary SPA makes up a large portion of Dublin Bay. It includes the intertidal area between the River Liffey and Dun Laoghaire, the estuary of the River Tolka to the north of the River Liffey, and Booterstown Marsh. In the southern extent of the bay, the intertidal flats extend for nearly 3km, and are made up of well-aerated sands. The land boundary is almost entirely artificially embanked. There is a bed of Dwarf Eelgrass (*Zostera noltii)* below Merrion Gates which is the largest stand on the east coast. Green algae (*Ulva spp.)* are distributed throughout the area at low density. The macro-invertebrate fauna is well-developed and is characterised by annelids such as Lugworm (*Arenicola marina*), *Nephthys spp.* and Sand Mason (*Lanice conchilega*), and bivalves, especially Cockle (*Cerastoderma edule)* and Baltic Tellin (*Macoma balthica)*. The small gastropod Spire Shell (*Hydrobia ulvae)* occurs on the muddy sands of Merrion Gates, along with the crustacean, *Corophium volutator.* The site includes Booterstown Marsh which is an enclosed area of saltmarsh and muds that is cut off from the sea by the Dublin/ Wexford railway line, being linked only by the Nutley stream to the east. An area of grassland at Poolbeg, to the north of Irishtown Nature Park is also included in the site.

This site is designated as a SPA under the E. U. Birds Directive, of special conservation interest for the following species:

- Light bellied Brent Goose (*Branta benicla hrota*).
- Oystercatcher (*Haematopodidae*).
- Ringed Plover (*Charadrius hiaticula*).
- Grey Plover (Pluvialis squatarola).
- Knot (*Calidris canutus*).
- Sanderling (*Calidris alba*).
- Dunlin (*Calidris alpina*).
- Bar-tailed Godwit (*Limosa lapponica*).
- Redshank (*Tringa tetanus).*
- Black-headed Gull (Chroicocephalus ridibundus).
- Roseate tern (*Sterna dougallii*).
- Common Tern (*Sterna hirundo*).
- Arctic Tern (Sterna paradisaea).

The site is an important site for wintering waterfowl, being part of the internationally important Dublin Bay complex. Many species commute between the south bay and the north bay; however, most birds remain solely in either one. South Dublin Bay is also a significant site for wintering gulls, with nationally important numbers of Black-headed Gull, Common Gull and Herring Gull. Mediterranean Gull has also been recorded here occurring throughout the year. The Common Tern and Arctic Tern have been known to breed in the Dublin Docks. It should be noted that four of the conservation interests are listed on Annex I of the E.U. Birds Directive; Bar-tailed Godwit, Common Tern, Arctic Tern, and Roseate Tern. Sandymount Strand/ Tolka Estuary is also a Ramsar Convention site.

South Dublin Bay and River Tolka SPA is located approx. 2km east of the proposed development. The River Liffey acts as a hydrological pathway to the SPA, which is 3.5km downstream.

North Bull Island SPA (Site Code 004006)

North Bull Island SPA covers the inner part of north Dublin Bay along with the seaward boundary from Bull wall lighthouse across to Drumleck Point at Howth Head and is an excellent example of an estuarine complex. North bull island is a sandy spit formed as a result of improvements to the Dublin Port and is a relatively recent depositional feature. It is 5 km in length and 1km in width and runs parallel to the coast of Clontarf and Sutton. Saltmarshes are present along the landward side of the island and serve as the main roost for wintering birds in Dublin Bay. Two intertidal lagoons are also found on the island which provide the main feeding grounds for wintering waterfowl.

This site is designated as a Special Protection Area under the E.U. Birds Directive, of special conservation interest for the following species:

- Light-bellied Brent Goose (*Branta benicla hrota).*
- Shelduck (*Tadorna tadorna*).
- Teal (*Anas crecca*).
- Pintail (*Anas acuta*).
- Shoveler (*Anas clypeata*).
- Oystercatcher (*Haematopodidae).*
- Golden Plover (*Pluvialis apricaria*).
- Grey Plover (*Pluvialis squatarola*).
- Knot (*Calidris canutus*).
- Sanderling (*Calidris alba*).
- Dunlin (*Calidris alpina*).
- Black-tailed Godwit (*Limosa limosa*).
- Bar-tailed Godwit (*Limosa lapponica*).
- Curlew (*Numenius arquata*).
- Redshank (*Tringa tetanus*).
- Turnstone (*Arenaria intepres*).
- Black-headed Gull (*Chroicocephalus ridibundus*).

Other species that occur regularly in winter include Grey Heron, Little Egret, Cormorant, Wigeon, Goldeneye, Red-breasted Merganser, Ringed Plover, Greenshank, Common Gull, and Herring Gull. The SPA is a regular site for passage waders like Ruff, Curlew, Sandpiper, and Spotted Redshank. Breeding passerines found here include Skylark, Meadow Pipit, Stonechat and Reed Bunting. The island is also a wintering site for Short-eared Owl, and is one of the top sites in Ireland for wintering waterfowl. North Bull Island is a Ramsar Convention site and part of the SPA is a Statutory Nature Reserve and a Wildfowl Sanctuary.

North Bull Island SPA is located 4km north east of the proposed development. The River Liffey and Dublin Bay act as a hydrological pathway to the SPA, which is 5.9km downstream and out into Dublin Bay.

North Dublin Bay SAC (Site Code 000206)

North Dublin Bay SAC covers the inner part of north Dublin Bay, the seaward boundary extending from Bull Wall Lighthouse across to the Martello Tower at Howth Head.

The site is a SAC for the following habitats and/or species listed on Annex I/ II of the E. U. Habitats Directive:

- Tidal Mudflats and Sandflats.
- Annual Vegetation and Drift Lines.
- *Salicornia* Mud.
- Atlantic Salt Meadows.
- Mediterranean Salt Meadows.
- Embryonic Shifting Dunes.
- Marram Dunes (White Dunes).
- Fixed Dunes (Grey Dunes).
- Humid Dune Slacks.
- Petalwort (*Petalophyllum ralfsii*).

The North Bull Island is the prime focus of this site, which is a sandy spit formed after the building of the South Wall and Bull Wall. It is 5 km long and up to 1 km wide. It hosts a well-developed dune system along the seaward side. Species found in the area include Marram Grass (*Ammophila arenaria*), Lyme-grass *(Leymus arenarius*) and Sand Couch (*Elymus farctus*). Diverse plant species such as Wild Pansy (*Viola tricolor*), Kidney Vetch (*Anthyllis vulneraria*), Common Bird's-foot-trefoil (*Lotus corniculatus*), Common Restharrow (*Ononis repens*), Yellow-rattle (*Rhinanthus minor*) and Pyramidal Orchid (*Anacamptis pyramidalis*) are found. The scarce Bee Orchid (*Ophrys apifera*) occurs in these grassy areas and slacks. A large dune slack with rich flora, called the 'Alder Marsh' due to the presence of Alder trees (*Alnus glutinosa*), occurs about 1 km from the tip of the island. The species found in the area include

Saltmarsh Rush (*Juncus maritimus*), Meadowsweet (*Filipendula ulmaria*) and Devil's-bit Scabious (*Succisa pratensis*). Orchid flora in the area includes Marsh Helleborine (*Epipactis palustris*), Twayblade (*Listera ovata*), Autumn Lady's-tresses (*Spiranthes spiralis*) and Marsh Orchids (*Dactylorhiza* spp.).

Two intertidal lagoons are found on the island. The sediments of the lagoons are majorly sands with a small and varying mixture of silt and clay. The species occurring in this area includes *Salicornia dolichostachya*, a pioneer glasswort species, Beaked Tasselweed (*Ruppia maritima*), Narrow-leaved

There is also a rich macrofauna in the sediments including Lugworm (*Arenicola marina*), Mussel (*Mytilus edulis*), and bivalves such as *Cerastoderma edule*, *Macoma balthica* and *Scrobicularia plana*. The small gastropod *Hydrobia ulvae* occurs in high densities in places, while the crustaceans, *Corophium volutator* and *Carcinus maenas* are common.

The saltmarsh extending along the landward side of the island is zoned into different levels according to the vegetation types, and includes species such as Glasswort (*Salicornia europaea*), Common Saltmarsh-grass (*Puccinellia maritima*), Annual Sea-blite (*Suaeda maritima*) and Greater Sea-spurrey (*Spergularia media*), Sea Plantain (*Plantago maritima*), Sea Aster (*Aster tripolium*), Sea Arrowgrass (*Triglochin maritima*), Thrift (*Armeria maritima*), Common Scurvygrass (*Cochlearia officinalis*), Sea Milkwort (*Glaux maritima*), and rushes such as *Juncus maritimus* and *J. gerardi.*

Three rare plant species which are also legally protected under the Flora (Protection) Order, 1999 have been recorded on the North Bull Island: Lesser Centaury (*Centaurium pulchellum*), Red Hemp-nettle (*Galeopsis angustifolia*) and Meadow Saxifrage (*Saxifraga granulata*).

North Bull Bay is of international importance for waterfowl. Other species noted in the area previously include Brent Goose, Knot, bar-tailed godwit, Shelduck, Wigeon, Teal, Pintail, Shoveler, Oystercatcher, Ringed plover, Grey Plover, Sanderling, Dunlin, Black-tailed Godwit, Curlew, Turnstone, Redshank. The tip of the North Bull Island is a traditional nesting site for Little Tern. Irish Hare is also found on the island. The island also hosts invertebrates of regional and national importance from the Orders Diptera, Hymenoptera and Hemiptera. North Bull Island has been designated a Special Protection Area under the E.U. Birds Directive and it is also a statutory Wildfowl Sanctuary, a Ramsar Convention site, a Biogenetic Reserve, a Biosphere Reserve and a Special Area Amenity Order site.

North Dublin Bay SAC is located 4km north east of the proposed development. The River Liffey and Dublin Bay act as a hydrological pathway to the SAC, which is 5.9km downstream and out into Dublin Bay.

South Dublin Bay SAC (Site Code 000210)

South Dublin Bay SAC lies south of the River Liffey in Dublin and runs from South Wall to the west pier at Dun Laoghaire. It is an intertidal site with substantial areas of sand and mudflats.

The site is a SAC for the following habitats and/or species listed on Annex I/ II of the E. U. Habitats Directive:

- Tidal Mudflats and Sandflats.
- Annual vegetation of drift lines.
- Salicornia and other annual colonising mud and sand.
- Embryonic shifting dunes.

Several small, sandy beaches with dune formations occur in the northern and western areas of the site, most notably at Poolbeg, Irishtown and Merrion/ Booterstown. Early stage saltmarsh also occur here, characterised by stands of glassworts (*Salicornia spp.*). Some of the species of vegetation include Dwarf Eelgrass (*Zostera noltii),* Sea Rocket (*Cakile maritima*), Frosted Orache (*Atriplex laciniata*), Brown Algae and Green Algae.

Lugworm (*Arenicola marina*), Cockles (*Cerastoderma edule*), annelids and other bivalves are common throughout the site.

This SAC is an important site for the waterfowl. The principal bird species in the area include Oystercatcher, Ringed Plover, Sanderling, Dunlin, and Redshank. Brent Goose. Bar-tailed Godwit, species listed on Annex I of the E.U. Birds Directive also occurs here. The area also serves as an important roost for Black-headed Gulls, Common Gulls and Roseate Tern, a specie listed on Annex I of the E.U. Birds Directive. South Dublin Bay is also largely protected as a Special Protection Area.

South Dublin Bay SAC is located approx. 2km east of the proposed development. The River Liffey and Dublin Bay act as a hydrological pathway to the SAC, which is 7km downstream.

Howth Head SAC (Site Code 000202)

Howth Head SAC is a rocky headland situated on the northern side of Dublin Bay. The peninsula is made up of Cambrian slates and quartzites and is joined to the mainland by a post-glacial raised beach. The north-west side is composed of limestone while the glacial drift is deposited against the cliffs in places.

The site is designated as a SAC for the following habitats and/or species listed on Annex I/ II of the E. U. Habitats Directive:

- Vegetated Sea Cliffs.
- Dry Heath.

The slopes above the sea cliffs and in the area of the summit have a mosaic of heathland vegetation dominated by Western Gorse (*Ulex gallii*), Heather (*Calluna vulgaris*), Bell Heather (*Erica cinerea*) and localised patches of Bracken (*Pteridium aquilinum*). In the summit area there are a few wet flushes and small bogs, with typical bog species such as Bog Asphodel (*Narthecium ossifragum*) and Sundews (*Drosera* spp.).

The maritime flora in the area supports a number of scarce and local plants such as Golden-samphire (*Inula crithmoides*), Sea Wormwood (*Artemisia maritima*), Grass-leaved Orache (*Atriplex littoralis*), Frosted Orache (*Atriplex laciniata*), Sea Spleenwort (*Asplenium marinum*), Bloody Crane's-bill (*Geranium sanguineum*), Spring Squill (*Scilla verna*), Sea Stork's-bill (*Erodium maritimum*) and three uncommon clover species: Knotted Clover (*Trifolium striatum*), Bird's-foot Clover (*T. ornithopodioides*) and Western Clover (*T. occidentalis*).

Rocky outcrops are widely distributed around Howth Head and support lichens. The area around Balscadden quarries is the richest area for lichens. Also, the Earlscliffe area is of national importance for lichens and is the type locality for black, yellow and grey lichen zonation. A number of Red Data Book plant species, the latter five of which are legally protected under the Flora (Protection) Order 1999 have been recorded at the site and include Green-winged Orchid (*Orchis morio*), Bird's-foot (*Ornithopus perpusillus*), Hairy Violet (*Viola hirta*), Rough Poppy (*Papaver hybridum*), Pennyroyal (*Mentha pulegium*), Heath Cudweed (*Omalotheca sylvatica*) and Betony (*Stachys officinalis*).

The site is of national importance for breeding seabirds such as Fulmar, Shags, Herring Gulls, Kittiwake, Guillemot and Razorbill. The site also hosts a number of rare invertebrates like the fly, *Phaonia exoleta* which occurs in the woods at the back of Deerpark and has not been elsewhere in Ireland, the ground beetle, *Trechus rubens* is found on storm beaches on eastern cliffs and hoverfly, *Sphaerophoria batava* is found in the heathland habitat within the site.

This SAC site displays a fine range of natural habitats including two Annex I habitats. The site is also of scientific importance for the seabird colonies, invertebrates and lichens. It also supports populations of two legally protected plant species and several scarce plants.

Howth Head SAC is located approx. 9.6km north east of the proposed development. The River Liffey and Dublin Bay may act as a hydrological pathway to the SAC, which is 10km out into Dublin Bay.

Rockabill to Dalkey Island SAC (Site Code 003000).

Rockabill to Dalkey Island SAC includes a range of inshore and coastal waters in the western Irish Sea and includes sandy and muddy seabed, reefs, sandbanks and islands. This site encloses Dalkey, Muglins and Rockabill islands. The site extends southwards in a strip which is 7km broad and 40km long from Rockabill Island, running adjacent to Howth Head and crosses Dublin Bay to Frazer Bank in south Co. Dublin.

The site is designated as a SAC for the following habitats and/or species listed on Annex I/ II of the E. U. Habitats Directive:

- Reefs.
- Harbour Porpoise (*Phocoena phocoena*).

Due to the prevailing geology and hydrographical features along the eastern seaboard of Ireland, reef habitat is not very common. The greatest resource of reef habitats within Irish coasts is found along offshore islands which are concentrated in the Dublin area. Various species recorded in the intertidal zone include *Fucus spiralis, Fucus serratus, Pelvetia canaliculata, Ascophyllum nodosum, Semibalanus balanoides* and *Necora puber*. Species in the subtidal area include *Laminaria hyperborea, Flustra folicacea, Alaria esculenta, Halidrys siliquosa, Pomatocereos triqueter, Alcyonium digitatum, Metridium senile, Caryophyllia smithii, Tubularia indivisa, Mytilus edulis, Gibbula umbilcalis, Asterias rubens, and Echinus esculentus.* These reefs support filter feeding fauna such as sponges, anemones and echinoderms as they are subject to strong tidal currents and have an abundant supply of suspended matter.

The area also represents a key habitat for the Annex II species, Harbour Porpoise within the Irish Sea. This site contains a wide array of habitats of importance to Harbour Porpoise such as inshore shallow sand, mudbanks and rocky reefs. The site also supports Common Seal and Grey Seal with occasional records of Bottle-nosed Dolphins. Other marine mammals recorded in the area are Minke, Fin, Killer Whales, Risso's and Common Dolphins.

The site also supports bird populations such as Arctic tern, Common tern, Roseate tern, Kittiwake, Razorbill, Guillemot, Puffin, Fulmar, Shag, Cormorant, Manx Shearwater, Gannet and gulls.

Rockabill to Dalkey Island SAC is located approx. 9.5km east of the proposed development. The River Liffey and Dublin Bay act as a hydrological pathway to the SAC, which is 9.5km out into Dublin Bay.

Howth Head Coast SPA (Site Code 004113)

Howth Head is a rocky headland situated on the northern side of Dublin Bay. The site comprises the sea cliffs extending from just east of the Nose of Howth to the tip of the Bailey Lighthouse peninsula. The marine area to a distance of 500 m from the cliff base is included within the site. Here plants such as Rock Sea-spurrey (*Spergularia rupicola*), Navelwort (*Umbilicus rupestris*), Rock Samphire (*Crithmum maritimum*), English Stonecrop (*Sedum anglicum*) and Biting Stonecrop (*Sedum acre*) are found, along with a good diversity of lichen species.

This site is designated as a SPA under the E. U. Birds Directive (2009/147/EC), of special conservation interest for the Kittiwake *(Rissa tridactyla).*

A range of seabird species breed within the Howth Head Coast SPA, including a nationally important population of Kittiwake. Other species such as Fulmar, Shag, Herring Gull, Great Black-backed Gull, Kittiwake, Guillemot, Razorbill, and Black Guillemot have also been recorded on site. The cliffs also support a breeding pair of Peregrine Falcon, an Annex I species under the Birds Directive. The seabird colony at Howth Head has been monitored at intervals since the Operation Seafarer project in 1969/ 70.

Howth Head Coast SPA is located 12.5km north east of the proposed development. The River Liffey and Dublin Bay act as a hydrological pathway to the SPA, which is 13km downstream and out into Dublin Bay.

Dalkey Islands SPA (Site Code 004172)

Dalkey Islands SPA comprises of Dalkey Island, Lamb Island, Maiden Rock, the intervening rocks and reefs, and the surrounding sea to a distance of 200m. Dalkey Island is the largest in the group and is a low-lying island lying 400m off Sorento Point. A deep channel separates the mainland from Dalkey Island. The soil cover consists of a thin peaty layer with boulder clay deposits in a few places. Vegetation cover is low-growing and dominated by grass with dense patches of Bracken (*Pteridium aquilinum*) and Hogweed (*Heracleum sphondylium*). Lamb Island occurs to the north of Dalkey Island and is connected by a line of rocks at low tide. It has a thin soil cover and some vegetation, mainly grasses such as nettles (*Urtica dioica*) and Hogweed. Maiden Rock lies further north and is a bare angular granite rock up to 5m high and lacks higher plant vegetation.

This site is designated as a SPA under the E.U. Birds Directive, of special conservation interest for the following species:

- Roseate Tern (*Sterna dougallii*).
- Common Tern (*Sterna hirundo*).
- Arctic Tern (*Sterna paradisaea*).

Dalkey Island SPA is both a breeding and staging site for *Sterna* terns. Common Tern is the most common species in the SPA. The site along with other parts of south Dublin Bay is used as a major post-breeding and pre migration Autumn roost area by the three terns. The site is also linked to another important post-breeding/ pre-migration Autumn tern roost area in Dublin Bay. The site also has breeding Great Black-headed Gull, Shelduck and Oystercatcher. Herring Gull bred in large numbers earlier but is now scarce.

Dalkey Island SPA is of particular importance as post-breeding/ pre migration Autumn roost area for Roseate Tern, Common Tern and Arctic Tern. All the three tern species found on site are listed on Annex I of the E.U. Birds Directive.

Dalkey Island SPA is located approx. 12km south east of the proposed development. The River Liffey and Dublin Bay act as a hydrological pathway to the SPA, which is 13km downstream and out into Dublin Bay.

Baldoyle Bay SPA (Site Code 004016)

Baldoyle Bay SPA is located to the north and east of Baldoyle and to the south of Portmarnock, Co. Dublin. It is a relatively small, narrow estuary segregated from the open sea by a large sand dune system and two small rivers, the Mayne River and the Sluice River flow into the inner part of the estuary.

The E.U. Birds Directive lays emphasis on wetlands and as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland and Waterbirds. This site is designated as a SPA under the E.U. Birds Directive, of special conservation interest for the following species:

- Light-bellied Brent Goose (*Branta benicla hrota).*
- Shelduck *(Tadorna tadorna).*
- Ringed Plover (*Charadrius hiaticula*).
- Golden Plover (*Pluvialis apricaria*).
- Grey Plover (*Pluvialis squatarola*).
- Bar-tailed Godwit (*Limosa lapponica*).

Baldoyle Bay SPA is an important site for wintering waterfowl as it provides quality feeding areas and roost sites for these species. Other species found here include:

- Great Crested Grebe (*Podiceps cristatus*).
- Pintail (*Anas acuta*).

- Teal (*Anas crecca*).
- Mallard (*Anas platyrhynchos*)
- Common Scoter (*Melanitta nigra*).
- Oystercatcher (*Haematopodidae).*
- Lapwing (*Vanellus vanellus*).
- Knot (*Calidris canutus*).
- Dunlin (*Calidris alpina*).
- Black-tailed Godwit (*Limosa limosa*).
- Curlew (*Numenius arquata*).
- Redshank (*Tringa tetanus*).
- Greenshank (*Tringa nebularia*).
- Turnstone (*Arenaria interpres*).

Regular breeding birds at the site include Shelduck, Mallard and Ringed Plover along with some autumn passage migrants such as Curlew Sandpiper, Spotted Redshank and Green Sandpiper. A recently colonised species, Little Egret also occurs in the area.

Baldoyle Bay SPA is located approx. 9km north east of the proposed development. The River Liffey and Dublin Bay may act as a hydrological pathway to the SPA. However, via this route the site is located 20km from the proposed development. Subsequently, Baldoyle Bay SPA is considered sufficiently remote to be removed from further consideration of likely significant effects.

Baldoyle Bay SAC (Site Code 000199)

Baldoyle Bay SAC extends from just below Portmarnock village to the west pier at Howth in Co. Dublin. The site is a tidal estuarine bay separated from the open sea by a large sand-dune system. Two small rivers, the Mayne and the Sluice flow into the site

The site is a SAC for the following habitats and/or species listed on Annex I/II of the E.U. Habitats Directive:

- Tidal Mudflats and Sandflats.
- *Salicornia* Mud.
- Atlantic Salt Meadows.
- Mediterranean Salt Meadows.

The site includes Knotted Hedge parsley (*Torilis nodosa*), a scarce plan in eastern Ireland, and Brackish Water-crowfoot (*Ranunculus baudotti*), which is a species of brackish pools and ditches that has declined in most areas due to habitat loss. Two plant species legally protected under the Flora (Protection) Order 1999, occur in the Mayne marsh include Borrer's Saltmarsh-grass (*Puccinellia fasciculata*) and Meadow Barley (*Hordeum secalinum*).

Baldoyle Bay is an important site for wintering waterfowl and the inner part of the estuary is a Special Protection Area under the E.U. Birds Directive and also a Statutory Nature Reserve. Important bird species in the area include Pale-bellied Brent Goose, Bar-tailed Godwit, and Golden Plover, and the site hosts nationally important numbers for Shelduck, Pintail, Grey Plover, and Ringed Plover. Breeding wetland birds include Shelduck, Mallard, and Ringed Plover. Small numbers of Little Tern, on Annex I of the E.U. Birds Directive have also been recorded here, but not since 1991.

Baldoyle Bay is a great example of estuarine system containing four habitats listed on Annex I of the E.U. Habitats Directive and two legally protected plant species. Part of the site is also a Special Protection Area under the E.U. Birds Directive, a Statutory Nature Reserve, and a wetland of international importance under the Ramsar Convention.

Baldoyle Bay SAC is located approx. 9km north east of the proposed development. The River Liffey and Dublin Bay may act as a hydrological pathway to the SPA. However, via this route the site is located

18km from the proposed development. Subsequently, Baldoyle Bay SAC is considered sufficiently remote to be removed from further consideration of likely significant effects.

Ireland's Eye SPA (Site Code 004117)

Ireland's Eye is an uninhabited island located about 1.5km north of Howth in Co. Dublin. A low-lying, sparsely vegetated islet, known as Thulla, occurs adjacent the south of the island. An extensive area of bedrock shore (heavily covered by brown seaweeds) is exposed at low tide between Thulla and the main island. There are no watercourses or springs on the island.

This site is designated as a SPA under the E. U. Birds Directive, of special conservation interest for the following species:

- Cormorant *(Phalacrocorax carbo).*
- Herring Gull *(Larus argentatus).*
- Kittiwake *(Rissa tridactyla).*
- Guillemot *(Uria aalge).*
- Razorbill *(Alca torda).*

Ireland's Eye SPA has important populations of breeding seabirds. Several species including Fulmar, Gannet, Cormorant, Shag, Lesser Black-backed Gull, Great Black-backed Gull, Herring Gull, Kittiwake, Guillemot, Razorbill, and Puffin have been recorded here. Black Guillemot may also breed on this site, with 15 individuals recorded in 1998. The Cormorant, Herring Gull, Kittiwake, Guillemot, and Razorbill populations are of national importance. When considered as part of a larger grouping with the colonies on nearby Lambay and St. Patrick's Island, Cormorant populations nesting on Thulla are of international importance. The Gannet colony is of particular note as it is one of the six in Ireland and one of the two sites on the east coast.

Other species breeding on the site are Shelduck, Oystercatcher, and Ringed Plover. The island is also a traditional site for Peregrine, a species that is listed on Annex I of the E. U. Birds Directive. During winters, small numbers of Greylag Goose and Pale-bellied Brent Goose graze on the island, and it is also used as a roost site by gulls and some waders.

Ireland's Eye SPA is located 12.7km north east of the proposed development. The River Liffey and Dublin Bay act as a hydrological pathway to the SPA. However, via this route the site is located 17km from the proposed development. Subsequently, Ireland's Eye SPA is considered sufficiently remote to be removed from further consideration of likely significant effects.

Ireland's Eye SAC (Site Code 002193)

As mentioned above, Ireland's Eye is an uninhabited island located about 1.5km north of Howth in Co. Dublin. The SAC covers the terrestrial area of Ireland's Eye, and the intertidal area that extends to the south of the island.

The site is a designated SAC for the following habitats listed on Annex I/ II of the E. U. Habitats Directive:

- Perennial Vegetation of Stony Banks.
- Vegetated Sea Cliffs.

The drift soils on Ireland's Eye SAC support a plant community of Bracken (*Pteridium aquilinum*) and various grasses, especially Red Fescue (*Festuca rubra*), along with Bluebells (*Hyacinthoides non-scripta*), Common Dog-violet (*Viola riviniana*) and Navelwort (*Umbilicus rupestris*). The thinner soils have species such as Spring Squill (*Scilla verna*), Knotted Clover (*Trifolium striatum*), Field Mouse-ear (*Cerastium arvense*), and Bloody Cranesbill (*Geranium sanguineum*).

The cliff maritime flora includes Rock Sea-Spurrey (Spergularia rupicola), Sea Stork's-bill (*Erodium martimum*), Rock Samphire (*Cyrithmum martimum*), Golden Samphire (*Inula crithmoides*), Rock Sea-lavender (*Limonium binervousum*), Meadow Rue (*Thalictrum minor*), Portland Spurge (*Euphorbia*

portlandica), and Tree-mallow (Lavatera arborea). A small area of shingle vegetation occurs above the sandy beach at Carrigeen Bay on the western side of the island. Species such as Silverweed (*Potentilla anservina*), and Spear-leaved Orache (*Atriplex prostrata*), the rare Sea-kale (*Crambe maritima*), and Henbane (*Hyoscyamus niger*) occur. Sea-kale and Henbane are listed in the Irish Red Data Book.

Ireland's Eye SAC is located 12.9km north east of the proposed development. The River Liffey and Dublin Bay act as a hydrological pathway to the SAC. However, via this route the site is located 17km from the proposed development. Subsequently, Ireland's Eye SAC is considered sufficiently remote to be removed from further consideration of likely significant effects.

Malahide Estuary SAC (Site Code 00205)

Malahide Estuary SAC is situated immediately north of Malahide in Co. Dublin. It is the estuary of the River Broadmeadow. The site is divided by a railway viaduct built in 1800s. The site is a SAC for the following habitats and/ or species listed on Annex I/ II of the E. U. Habitats Directive:

- Tidal Mudflats and Sandflats.
- *Salicornia* Mud.
- Atlantic Salt Meadows.
- Mediterranean Salt Meadows.
- Marram Dunes (White Dunes).
- Fixed Dunes (Grey Dunes).

A large sand spit, known as 'the island', separates the outer part of the estuary from the sea. The outer estuary drains almost completely at low tide and exposes sand and mud flats. Large bed of Eelgrass (Dwarf Eelgrass, *Zostera noltii,* and Narrow-leaved Eelgrass, *Z. angustifolia*) occurs in the north section of the outer estuary, along with Beaked Tasselweed (*Ruppia maritima*) and extensive mats of green algae (*Enteromorpha* spp., *Ulva lactuca*). Common Cord-grass (*Spartina anglica*) is also widespread in this sheltered part of the estuary.

The dune spit has a well-developed outer dune ridge dominated by Marram Grass (*Ammophila arenaria*). The dry areas of the stabilised dunes have a dense covering of Burnet Rose (*Rosa pimpinellifolia*), Red Fescue (*Festuca rubra*) and species such as Yellow-wort (*Blackstonia perfoliata*), Autumn Gentian (*Gentianella amarella*), Hound's-tongue (*Cynoglossum officinale*), Carline Thistle (*Carlina vulgaris*) and Pyramidal Orchid (*Anacamptis pyramidalis*). The interior of the spit is taken up by a golf course. The inner stony shore hosts frequent Sea-holly (*Eryngium maritimum*). At the tip of the spit well developed saltmarshes occur wherein Atlantic salt meadow is the principle type and is characterised by species such as Sea-purslane (*Halimoine portulacoides*), Sea Aster (*Aster tripolium*), Thrift (*Armeria maritima*), Sea Arrowgrass (*Triglochin maritima*) and Common Saltmarsh-grass (*Puccinellia maritima*). In the outer estuary, a small area of Mediterranean salt meadow occurs which is characterised by the presence of Sea Rush (*Juncus maritimus*). Below the salt marshes there are present pioneering glasswort (*Salicornia* spp.) swards and other annual species, such as *S. dolichostachya* and Annual Sea-blite (*Suaeda maritima*).

The inner estuary hosts patches of saltmarsh and salt meadows, with Sea Aster, Sea Plantain (Plantago maritima) and Sea Club-rush (Scirpus maritimus). Beaked Tasselweed occurs in one of the channels. The SAC includes a fine area of rocky shore south-east of Malahide, extending towards Portmarnock. This represents the only section through fossiliferous Lower Carboniferous rocks in Dublin Basin and is the type locality for several species of fossil coral. The inner part of the estuary is used for water sports while the outer part has been infilled for marina and housing development.

The site is also an important wintering bird site and hosts internationally important numbers of Brent Goose. Previously a large number of counts of Brent Goose, Great Crested Grebe, Mute Swan, Shelduck, Pochard, Goldeneye, Red-breasted Merganser, Oystercatcher, Golden Plover, Grey Plover, Redshank, Wigeon, Teal, Ringed Plover, Knot, Dunlin, Greenshank, Pintail, Black-tailed Godwit, and Bar-tailed Godwit have been observed. Migrant species such as Ruff, Curlew, Sandpiper, Spotted Redshank, and Little Stint have been observed.

Malahide Estuary SAC is located 13km north east of the proposed development. The River Liffey and Dublin Bay act as a hydrological pathway to the SAC. However, via this route the site is located 25km from the proposed development. Subsequently, Malahide Estuary SAC is considered sufficiently remote to be removed from further consideration of likely significant effects.

Malahide Estuary SPA (Site Code 004025)

Malahide Estuary SPA is situated in Co. Dublin between the towns of Malahide and Swords. The site encloses the estuary, saltmarsh habitats and shallow subtidal areas at the mouth of the estuary. The site is divided by a railway viaduct built in the 1800s which has caused the inner estuary to become lagoonal in nature partly tidal. The outer part of the estuary is well-sheltered from the sea by a large sand spit and this has mostly been converted to golf-course. The sheltered parts of the outer estuary hosts eelgrass (both *Zostera noltii* and *Z. angustifolia*) along with Tasselweed (*Ruppia maritima*). Green algae, mostly *Ulva* spp., are also frequent on the sheltered flats. Common Cord-grass (*Spartina anglica*) is well established in the outer estuary and also in the innermost part of the site. The intertidal flats support a typical macro-invertebrate fauna, with polychaete worms (*Arenicola marina* and *Hediste diversicolor*), bivalves such as *Cerastoderma edule*, *Macoma balthica* and *Scrobicularia plana*, the small gastropod *Hydrobia ulvae* and the crustacean *Corophium volutator*. Salt marshes occur in parts of the outer estuary and in the extreme inner part of the inner estuary and are characterised by such species as Sea Purslane (*Halimione portulacoides*), Sea Aster (*Aster tripolium*), Thrift (*Armeria maritima*), Sea Arrowgrass (*Triglochin maritima*), and Common Saltmarsh-grass (*Puccinellia maritima*) and provide important roosts during high tide.

This site is designated as a SPA under the E. U. Birds Directive, of special conservation interest for the following species:

- Great Crested Grebe (*Podiceps cristatus*).
- Light-bellied Brent Goose (*Branta benicla hrota).*
- Shelduck *(Tadorna tadorna).*
- Pintail (*Anas acuta*).
- Goldeneye (*Bucephala clangula*).
- Red-breasted Merganser (*Mergus serrator*).
- Oystercatcher (*Haematopodidae).*
- Golden Plover (*Pluvialis apricaria*).
- Grey Plover (*Pluvialis squatarola*).
- Knot (*Calidris canutus*).
- Dunlin (*Calidris alpina*).
- Black-tailed Godwit (*Limosa limosa*).
- Bar-tailed Godwit (*Limosa lapponica*)
- Redshank (*Tringa tetanus*).

The site is of importance for wintering waterfowl and supports a good diversity of species. A high number of diving ducks reflects the lagoonal nature of inner estuary and this is one of the few sites in eastern Ireland to host substantial numbers of Goldeneye. Other species present in the area include Mute Swan, Pochard, Ringed Plover, Lapwing, Curlew, Greenshank, and Turnstone. The site also attracts other migrant wader species such as Ruff, Curlew Sandpiper, Spotted Redshank, and little Stint. The breeding birds found on site include Ringed Plover, shelduck, and Mallard. Grey Heron breeds in nearby area and feeds regularly within the site.

The site is a fine example of an estuarine system and provides both feeding and roosting areas for wintering waterfowl. Due to the lagoonal nature of inner estuary a wide range of birds occur in the area. Two species, Golden Plover, and Bar-tailed Godwit occur regularly on site are listed on Annex I of the E.U. birds Directive. Malahide Estuary is also a Ramsar Convention Site.

Malahide Estuary SPA is located 13km north east of the proposed development. The River Liffey and Dublin Bay act as a hydrological pathway to the SPA. However, via this route the site is located 25km

from the proposed development. Subsequently, Malahide Estuary SPA is considered sufficiently remote to be removed from further consideration of likely significant effects.

Glenasmole Valley SAC (Site Code 001209)

Glenasmole Valley SAC lies on the edge of the Wicklow uplands, in Co. Dublin. The River Dodder flows through the valley and has been impounded here to form two reservoirs which supply water to south Dublin.

This site is designated as a SAC for the following habitats and/ or species listed on Annex I/ II of the E.U. Habitats Directive:

- Orchid-rich Calcareous Grassland.
- *Molinia* Meadows.
- Petrifying Springs.

In the drier parts of the site, orchid-rich grasslands occur grading into *Molinia* meadow at some places. Orchids recorded in these habitats include Frog Orchid (*Coeloglossum viride*), Northern Marsh-orchid (*Dactylorhiza purpurella*), Fragrant Orchid (*Gymnadenia conopsea*), Marsh Helleborine (*Epipactis palustris*), Early-purple Orchid (*Orchis mascula*) and Greater Butterfly Orchid (*Platanthera chlorantha*). Two Red Data Book-listed orchid species have also been found here, Green-winged Orchid (*Orchis morio*) and Small-white Orchid (*Pseudorchis albida*). The latter is legally protected under the Flora (Protection) Order, 1999. Two other threatened species which are listed in the Irish Red Data Book occur on site, Yellow Archangel (*Lamiastrum galeobdolon*) and Yellow Bird's-nest (*Monotropa hypopitys*).

Common grasses in the sward include Sweet Vernal-grass (*Anthoxanthum odoratum*), Creeping Bent (*Agrostis stolonifera*) and Crested Dog's-tail (*Cynosurus cristatus*). Other commonly occurring species at this site are Common Bird's-foot-trefoil (*Lotus corniculatus*), Kidney Vetch (*Anthyllis vulneraria*), Common Restharrow (*Ononis repens*), Yellow-wort (*Blackstonia perfoliata*) and Autumn Gentian (*Gentianella amarella*).

The areas of *Molinia* meadows at the site occur with the grasslands on the valley sides, and particularly in seepage and flushed areas. Typical and indicative species include Greater Bird's-foot-trefoil (*Lotus uliginosus*), Tormentil (*Potentilla erecta*), Purple Moor-grass (*Molinia caerulea*), Sharp-flowered Rush (*Juncus acutiflorus*), Adder's-tongue (*Ophioglossum vulgatum*), Meadow Thistle (*Cirsium dissectum*) and Fen Bedstraw. As noted above, orchids are frequent in the grasslands at this site.

Woodland occurs in patches around the site. On the east side of the valley, a Hazel (*Corylus avellana*) wood has developed including other species such as Ash (*Fraxinus excelsior*), Downy Birch (*Betula pubescens*), Goat Willow (*Salix caprea*) and (Irish) Whitebeam (*Sorbus hibernica*). Spring Wood-rush (*Luzula pilosa*), Wood Speedwell (*Veronica montana*) and Bramble (*Rubus fruticosus* agg.) are present in the ground flora.

Wet semi-natural broadleaved woodland is also found around the reservoirs and includes Alder (*Alnus glutinosa*) and Willow (*Salix* spp.), with Yellow Iris (*Iris pseudacorus*), Horsetails (*Equisetum* spp.), and Bramble. Localised patches of Japanese Knotweed (*Reynoutria japonica*), an introduced and invasive species, also occur in this area.

At this site, between the two reservoirs, occur examples of calcareous fen and flush where sedges (including *Carex flacca* and *C. panicea*) are joined by species such as Grass-of-parnassus (*Parnassia palustris*), Few-flowered Spike-rush (*Eleocharis quinqueflora*), Zig-zag clover (*Trifolium medium*) and the scarce Fen Bedstraw (*Galium uliginosum*). The site is long known for Tufa depositing springs, along the valley sides, some of which have substantial tufa mounds and banks. Tufa formation is also known from small streams within the woodlands. A distinctive flora with Marsh Hawk's-beard (*Crepis paludosa*) and luxuriant stands of Great Horsetail (*Equisetum telmateia*) has developed within the hazel woods associated with the springs and flushes.

The lake shore vegetation is not well developed, which is typical of a reservoir. There are occasional patches of Reed Canary-grass (*Phalaris arundinacea*), Purple-loosestrife (*Lythrum salicaria*), Common Marsh-bedstraw (*Galium palustre*) and Water Mint (*Mentha aquatica*). Other vegetation includes Shoreweed (*Littorella uniflora*) and the scarce Water Sedge (*Carex aquatilis*).

Glenasmole Valley SAC contains a high diversity of habitats and plant communities, including three habitats listed on Annex I of the E.U. Habitats Directive. Two of these habitats are priority habitats- Orchid-rich Calcareous Grassland and Petrifying Springs. The presence of four Red Data Book plant species further adds to the value of the site. The site provides excellent habitat for bats, with at least four species recorded: Pipistrelle, Leisler's, Daubenton's, and Brown Long-eared. Otters occur along the river and reservoirs. The site also supports Kingfisher, an Annex I species under the E.U. Birds Directive.

Glenasmole Valley SAC is located 12.5km south west of the proposed development. The River Dodder acts as a hydrological pathway to the SAC, which is 17km upstream. Subsequently, Glenasmole Valley SAC is considered sufficiently remote to be removed from further consideration of likely significant effects.

Wicklow Mountains SAC (Site Code 002122)

Wicklow Mountains SAC is a complex of upland areas extending over Co. Wicklow and Co. Dublin. Most of the western part of the site consists of an elevated moorland, covered by peat. The site is drained by several major rivers including the Dargle, Liffey, Dodder, Slaney, and Avonmore. The river water in the mountain areas is often peaty, especially during floods.

This site is designated as a SAC for the following habitats and/ or species listed on Annex I/ II of the E.U. Habitats Directive:

- Oligotrophic Waters containing very few minerals.
- Dystrophic Lakes.
- Wet Heath.
- Dry Heath.
- Alpine and Subalpine Heaths.
- Calaminarian Grassland.
- Species-rich *Nardus* Grassland.
- Blanket Bogs (Active).
- Siliceous Scree.
- Calcareous Rocky Slopes.
- Siliceous Rocky Slopes.
- Old Oak Woodlands
- Otter (*Lutra lutra)*

The two dominant vegetation communities in the area are heath and blanket bog. Heath vegetation with both wet and dry heath, occurs in association with blanket bog, upland acid grassland and rocky habitats. The wet heath is characterised by species such as Heather (*Calluna vulgaris*), Cross-leaved Heath (*Erica tetralix*), Cottongrasses (*Eriophorum* spp.), Tormentil (*Potentilla erecta*), Mat-grass (*Nardus stricta*), Bent grasses (*Agrostis* spp.) and Bog mosses (*Sphagnum* spp.). At some locations the wet heath occurs in conjunction with flush communities and streamside vegetation, with species such as Heath Rush (*Juncus squarrosus*) and Sedges (*Carex* spp.). Dry heath at the site is confined to shallow peaty soils on steep slopes. It is characterised by species such as Heather, Gorse (*Ulex* spp.), Bell Heather (*Erica cinerea*), Bilberry (*Vaccinium myrtillus*), Purple Moor-grass (*Molinia caerulea*) and Lichens (*Cladonia* spp.). Mountain loughs and corrie lakes are scattered throughout the site.

Blanket bog is usually dominated by Cottongrasses, Heather and Bog mosses. On steeper slopes, in flushes, Purple Moor-grass, Heath Rush and certain *Sphagnum* species become more common. The vegetation is largely dominated by Heather and Cross-leaved Heath, with Cottongrasses (*Eriophorum vaginatum* and *E. angustifolium*), Deergrass (*Scirpus cespitosus*) and Bog Asphodel (*Narthecium ossifragum*). In drier areas, Bilberry and Cowberry (*Vaccinium vitis-idaea*) are common, while the scarce

Bog-rosemary (*Andromeda polifolia*) is also found. Blanket bog occurs over extensive areas of deeper peat on the plateau and on gentle slopes at high altitudes.

Due to the underlying rock strata, the water of the rivers and streams is acidic rather than alkaline. The deep lakes on the site are characteristically species-poor, but hold some interesting plants including an unusual form of Quillwort (*Isoetes lacustris* var. *morei*), a stonewort (*Nitella* sp.) and Floating Bur-reed (*Sparganium angustifolium*).

Alpine vegetation occurs on some of the mountain tops represented with heath species such as Crowberry (*Empetrum nigrum*) and Cowberry, and others such as Dwarf Willow (*Salix herbacea*), the grey-green moss *Racomitrium lanuginosum,* and scarce species such as Mountain Clubmoss (*Diphasiastrum alpinum*), Firmoss (*Huperzia selago*), and Starry Saxifrage (*Saxifraga stellaris*). Some rare arctic-alpine species have also been recorded, including Alpine Lady's-mantle (*Alchemilla alpina*) and Alpine Saw-wort (*Saussurea alpina*).

Small areas of old oakwood, with native Sessile Oak (*Quercus petraea*) trees, occur on the slopes. On wetter areas, wet broadleaved semi-natural woodlands occur which are dominated by Downy Birch (*Betula pubescens*). Mixed woodland with non-native tree species are also present on the site.

The site supports a range of rare plant species. Parsley Fern (*Cryptogramma crispa*), Marsh Clubmoss (*Lycopodiella inundata*), Lanceolate Spleenwort (*Asplenium billotii*), Small-white Orchid (*Pseudorchis albida*) and Bog Orchid (*Hammarbya paludosa*) are all legally protected under the Flora (Protection) Order, 2015. Greater Broomrape (*Orobanche rapum-genistae*), Alpine Saw-wort and Alpine Lady's-mantle are listed in the Irish Red Data Book. The rare Myxomycete fungus *Echinostelium colliculosum* has also been recorded.

Mammals and birds which occur are typical of the uplands. Deer are abundant, mainly hybrids between Red and Sika Deer. Other mammals include Hare, Badger, and Otter, the latter being a species listed on Annex II of the E.U. Habitats Directive (92/43/EEC) as amended. Pine Marten has recently been confirmed as occurring within the site. Among the birds, Meadow Pipit, Skylark, Raven and Red Grouse are resident throughout the site. Wheatear, Whinchat and the scarce Ring Ouzel are summer visitors. Wood Warbler and Redstarts are rare breeding species of the woodlands. Dipper and Grey Wagtail are typical riparian species. Merlin and Peregrine, both Annex I species of the E.U. Birds Directive, breed within the site. Recently, Goosander has become established as a breeding species.

Wicklow Mountains SAC is located 12km south of the proposed development. The River Dodder and River Liffey may act as a hydrological pathway to the SAC. The SAC is 23km upstream via the River Dodder. Subsequently, Wicklow Mountains SAC is considered sufficiently remote to be removed from further consideration of likely significant effects.

Wicklow Mountains SPA (Site Code 004040)

Wicklow Mountains SPA is an extensive upland site in Co. Wicklow with a small area extending to Co. Dublin. The site features fine examples of glacial lakes, deep valleys and moraines. The substrate over much of site is peat and the predominant habitats present are blanket bogs, heaths and upland grassland. Exposed rock and scree are features of the site. A part of Wicklow Mountains SPA is a Statutory Nature Reserve.

This site is designated as a SPA under the E. U. Birds Directive, of special conservation interest for the following species:

- Merlin (*Falco columbarius).*
- Peregrine (*Falco peregrinus).*

In the Wicklow Mountains, Merlin are usually found nesting in old crow nests in conifer plantations despite traditionally being a ground-nesting species. The open peatlands provide an excellent foraging habitat for Merlin, with small birds like Meadow Pipit being their main prey. The cliffs and crags on site also

provide ideal breeding locations for Peregrine. Other birds recorded within the site include Ring Ouzel and Red Grouse.

Wicklow Mountains SPA is located 12km south of the proposed development. The River Dodder and River Liffey act as a hydrological pathway to the SPA. The SAC is 23km upstream via the River Dodder. Subsequently, Wicklow Mountains SPA is considered sufficiently remote to be removed from further consideration of likely significant effects.

3.5 Other ecological resources.

This list has been included for completeness (taking into account Article 3(3) and Article 10 of the Habitats Directive.

Article 3(3)

Where they consider it necessary, Member states shall endeavour to improve the ecological coherence of Natura 2000 by maintaining, and where appropriate developing, ***features of the landscape which are of major importance wild fauna and flora, as referred to in***

Article 10*.*

Article 10 Habitats Directive 92/43/EEC & DoEHLG. (2010). Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities:

Member states are required to endeavour, where they consider it necessary, in their land use planning and development policies, and in particular, with a ***view to improving the ecological coherence of the Natura 2000 network****, to encourage the management of* ***features of the landscape which are of major importance for wild fauna and flora.***

Such features are those which, by virtue of their ***linear and continuous structure*** *(as rivers with their banks or the traditional systems for marking field boundaries) or their function as stepping stones (such as ponds or small woods),* ***are essential for the migration, dispersal and genetic exchange of wild species****.*

Proposed Natural Heritage Areas, pNHA

It is noted that five proposed Natural Heritage Areas (pNHA) exist in the near vicinity of the proposed development. These include the Royal Canal pNHA (Site Code 2103), the Grand Canal pNHA (Site Code 2104), North Dublin Bay pNHA (Site Code 206), and South Dublin Bay pNHA Site Code (210), and the Dolphins Dublin Docks pNHA (Site Code 201), see Figure 3.4.

Dublin Bay Unesco Biosphere

The proposed development is located to the east of the Dublin Bay Unesco Biosphere, formerly known as the North Bull Island Biosphere Reserve. This reserve was declared in 1981, renamed in 2015, and comprises Dublin Bay, North Bull Island, and adjacent land, including parts of Dublin. It is recorded as one of the finest examples of a sand dune system in Ireland and is internationally important in terms of its conservation value. The biosphere reserve supports well-developed salt marshes and is important for nesting and wintering waterfowls. The proposed development is located 600m to the east of the Terrestrial Transition Zone and 2km east of the Core Terrestrial Zone. The development is located within the Marine Transition Zone, and 3.2km south west of the Core Marine Zone.

Irishtown Nature Park

Irishtown Nature Park is located approx. 2.6km east of the proposed scheme. The South Dublin Bay and River Tolka Estuary SPA extends onto a portion of this park. In 2009, a biodiversity management plan for Irishtown Nature Park was established. The Park is important for supporting Dublin City's biodiversity including Pyramidal Orchid, Red-tailed Bumblebee, and *Oedemera lurida*.

North Bull Island Nature Reserve

The North Bull Island Nature Reserve is located on Bull Island, approx. 4km north east of the proposed scheme. This site is largely covered by the North Bull Island SPA and North Dublin Bay SAC. The island is covered with dune grassland, with an extensive salt marsh in the northwest. There are extensive mud flats between the island and the mainland, and the site is of international scientific importance for Brent Geese and for botanical, ornithological, zoological and geomorphological purposes (www.npws.ie).

3.6 Assessment of likely effects

This section of the Screening determines whether Appropriate Assessment is necessary. It does this by:

1) Confirming in this instance that the proposed development is not directly connected with or necessary to the conservation management of any European sites.
2) Describing the details of the project/ plan proposals and other plans or projects that may cumulatively affect any European sites.
3) Discussing the likely direct or indirect effects of the project/ plan alone or in combination with other projects/ plans. These details are presented in **Table 2**, below.

Table 2 European sites within the potential zone of influence of the proposed works

European site (site code)	Distance from proposed works	Qualifying Interests	Source – Pathway – Receptor Linkages between the proposed development and the European site, with the potential to result in significant adverse effects.	Further Assessment Required
South Dublin Bay and River Tolka Estuary SPA (004024)	2km north Hydrological pathway; 3.5km via River Liffey and Dublin Bay	Light bellied Brent Goose (*Branta bernicla hrota)* (A046) Oystercatcher (*Haematopus ostralegus)* (A130) Ringed Plover (*Charadrius hiaticula)* (A137) Grey Plover (*Pluvialus squatarola)* (A141) Knot (*Calidris canutus)* (A143) Sanderling (*Calidris alba)* (A144) Dunlin (*Calidris alpina alpina)* (A149) Bar-tailed Godwit (*Limosa lapponica)* (A157) Redshank (*Tringa tetanus)* (A162) Black-headed *Gull* (*Chroicocephalus)* (A179) Roseate tern (*Sterna dougallii)* (A192) Common Tern (*Sterna hirundo)* (A193) Arctic Tern (*Sterna paradisaea)* (A194) Wetlands (A999)	**Construction Phase Effects** ▪ Noise due to construction may disturb the qualifying interests of the SPA which may utilise the local area. However, RPS (2018) have demonstrated that unless construction works contain high level impulses such as those contained in piling or pneumatic breaking, it is unlikely to startle birds. It is outlined that unless sound levels exceed a maximum of 70dB, works are unlikely to illicit a behavioural change in birds. It should also be noted that construction noise will be masked by other urban noise in the area. Noise due to construction can subsequently be removed from further consideration of likely significant effects. ▪ Sedimentation and run-off due to construction may enter the River Liffey and consequently the SPA. Paustenbach D. J. (2002) has demonstrated that siltation and sedimentation may result in the loss of benthic macroinvertebrates, which in turn will reduce the food supply for predators. This could pose a negative effect on the qualifying interests of the SPA. There may also be accidental discharge of hazardous material to the surface water which may impact upon protected habitats and species. However, it is considered that there will be a very low amount of sediments displaced as a result of construction	**Yes**

European site (site code)	Distance from proposed works	Qualifying Interests	Source – Pathway – Receptor Linkages between the proposed development and the European site, with the potential to result in significant adverse effects.	Further Assessment Required
			that may leave the immediate working area. Further assessment is required. **Operational Phase Effects** ▪ A hydrological pathway, the River Liffey, and Dublin Bay, exists linking the proposed development to the SPA. Intermittent storm and foul water discharging from the outfall into the River Liffey may give rise to potential negative effects on the water quality in Dublin Bay. This may negatively impact bird species feeding in the area. Further hydrological assessment is required to quantify the effects upon the receiving waters.	
North Bull Island SPA (004006)	4km north east Hydrological pathway; 5.9km via River Liffey and Dublin Bay	Light-bellied Brent Goose (*Branta benicla hrota)* (A046) Shelduck (*Tadorna tadorna*) (A048) Teal (*Anas crecca*) (A052) Pintail (*Anas acuta*) (A054) Shoveler (*Anas clypeata*) (A056) Oystercatcher (*Haematopodidae)* (A130) Golden Plover (*Pluvialis apricaria*) (A140) Grey Plover (*Pluvialis squatarola*) (A141) Knot (*Calidris canutus*) (A143) Sanderling (*Calidris alba*) (A144) Dunlin (*Calidris alpina*) (A149) Black-tailed Godwit (*Limosa limosa*) (A156) Bar-tailed Godwit (*Limosa lapponica*) (A157) Curlew (*Numenius arquata*) (A160) Redshank (*Tringa tetanus*) (A162) Turnstone (*Arenaria intepres*) (A169)	**Construction Phase Effects** ▪ Noise due to construction is unlikely to disturb the qualifying interests of the SPA which are located 4km north east. As previously mentioned, RPS (2018) have demonstrated that unless construction works contain high level impulses such as those contained in piling or pneumatic breaking, it is unlikely to startle birds. It is outlined that unless sound levels exceed a maximum of 70dB, works are unlikely to illicit a behavioural change in birds. It should also be noted that construction noise will be masked by other urban noise in the area. Noise due to construction can subsequently be removed from further consideration of likely significant effects.	**Yes**

European site (site code)	Distance from proposed works	Qualifying Interests	Source – Pathway – Receptor Linkages between the proposed development and the European site, with the potential to result in significant adverse effects.	Further Assessment Required
		Black-headed Gull (*Chroicocephalus ridibundus*) (A179)	▪ Sedimentation and run-off due to construction may result in negative effects on the qualifying interests of the SAC. However, it is considered that there will be very low amount of sediments displaced as a result of construction that may leave the immediate working area. Furthermore, it is considered that the SAC is significantly remote via hydrological pathway, 5.9km, from the proposed development and can thus be removed from further consideration of likely significant effects. **Operational Phase Effects** ▪ A 5.9km hydrological pathway, the River Liffey and Dublin Bay, exists linking the proposed development to the SPA. Intermittent storm and foul water discharging from the outfall into the River Liffey may give rise to potential negative effects on the water quality in Dublin Bay. This may negatively impact bird species feeding in the area. Further hydrological assessment is required to quantify the impacts upon the receiving waters.	
North Dublin Bay SAC (000206)	4km north east Hydrological pathway; 5.1km via River Liffey	Tidal Mudflats and Sandflats (1140) Annual Vegetation and Drift Lines (1210) *Salicornia* Mud (1310) Atlantic Salt Meadows (1330) Mediterranean Salt Meadows (1410) Embryonic Shifting Dunes (2110) Marram Dunes (White Dunes) (2120) Fixed Dunes (Grey Dunes) (2130)	**Construction Phase Effects** ▪ Sedimentation and run-off due to construction may enter the River Liffey and consequently the SAC. There may also be accidental discharge of hazardous material to the surface water which may impact upon the protected habitats and species which make up the qualifying interests of the SAC. However, it is	**Yes**

European site (site code)	Distance from proposed works	Qualifying Interests	Source – Pathway – Receptor Linkages between the proposed development and the European site, with the potential to result in significant adverse effects.	Further Assessment Required
	and Dublin Bay	Humid Dune Slacks (2190) Petalwort (*Petalophyllum ralfsii*) (1395)	considered that there will be a very low amount of sediments displaced as a result of construction that may leave the immediate working area. Further assessment is required. **Operational Phase Effects** ▪ A 5.1km hydrological pathway, the River Liffey, and Dublin Bay, exists linking the proposed development to the SAC. Intermittent storm and foul water discharging from the outfall into the River Liffey may give rise to potential negative effects on the water quality in Dublin Bay. This may negatively impact the qualifying interests of the SAC. Further hydrological assessment is required to quantify the effects upon the receiving waters.	
South Dublin Bay SAC (000210)	2km south east Hydrological pathway; 7km via River Liffey and Dublin Bay	Tidal Mudflats and Sandflats (1140) Annual vegetation of drift lines (1210) Salicornia and other annual colonising mud and sand (1310) Embryonic shifting dunes (2110)	**Construction Phase Effects** ▪ Sedimentation and run-off due to construction may result in negative effects on the qualifying interests of the SAC. However, it is considered that there will be a very low amount of sediments displaced as a result of construction that may leave the immediate working area. Furthermore, it is considered that the SAC is significantly remote via hydrological pathway, 7km, from the proposed development and can thus be removed from further consideration of likely significant effects. **Operational Phase Effects**	**No**

European site (site code)	Distance from proposed works	Qualifying Interests	Source – Pathway – Receptor Linkages between the proposed development and the European site, with the potential to result in significant adverse effects.	Further Assessment Required
			▪ A 7km hydrological pathway, the River Liffey, and Dublin Bay, exists linking the proposed development to the SAC. However, this is considered significantly remote from the proposed development and can thus be removed from further consideration of likely significant effects.	
Howth Head SAC (000202)	9.6km north east Hydrological pathway; 10km via River Liffey and Dublin Bay	Vegetated Sea Cliffs (1230) Dry Heath (4030)	**Construction Phase Effects** ▪ It is considered that the SAC is significantly remote, 9.6km from the proposed development and can thus be removed from further consideration of likely significant effects. **Operational Phase Effects** ▪ A 10km hydrological pathway, the River Liffey, and Dublin Bay, exists linking the proposed development to the SAC. However, this is considered significantly remote from the proposed development and can thus be removed from further consideration of likely significant effects.	**No**
Rockabill to Dalkey Island SAC (003000)	9.7km east Hydrological pathway; 9.7km via River Liffey	Reefs (1170) Harbour Porpoise (*Phocoena phocoena*) (1351)	**Construction Phase Effects** ▪ A 9.7km hydrological pathway, the River Liffey and Dublin Bay, exists linking the proposed development to the SAC. However, this is considered significantly remote from the proposed development and can thus be	**No**

European site (site code)	Distance from proposed works	Qualifying Interests	Source – Pathway – Receptor Linkages between the proposed development and the European site, with the potential to result in significant adverse effects.	Further Assessment Required
	and Dublin Bay		removed from further consideration of likely significant effects. **Operational Phase Effects** ▪ A 9.7km hydrological pathway, the River Liffey, and Dublin Bay, exists linking the proposed development to the SAC. However, this is considered significantly remote from the proposed development and can thus be removed from further consideration of likely significant effects.	
Howth Head Coast SPA (004113)	12.5km north east Hydrological pathway; 13km via River Liffey and Dublin Bay	Kittiwake (*Rissa tridactyla*) (A188)	**Construction Phase Effects** ▪ It is considered that the SPA is significantly remote from the proposed development and can thus be removed from further consideration of likely significant effects. **Operational Phase Effects** ▪ It is considered that the SPA is significantly remote from the proposed development and can thus be removed from further consideration of likely significant effects.	**No**
Dalkey Islands SPA (004172)	12km south east Hydrological pathway; 13km via River Liffey	Roseate Tern (*Sterna dougallii*) (A192) Common Tern (*Sterna hirundo*) (A193) Arctic Tern (*Sterna paradisaea*) (A194)	**Construction Phase Effects** ▪ It is considered that the SPA is significantly remote from the proposed development and can thus be removed from further consideration of likely significant effects. **Operational Phase Effects**	**No**

European site (site code)	Distance from proposed works	Qualifying Interests	Source – Pathway – Receptor Linkages between the proposed development and the European site, with the potential to result in significant adverse effects.	Further Assessment Required
	and Dublin Bay		▪ It is considered that the SPA is significantly remote from the proposed development and can thus be removed from further consideration of likely significant effects.	
Baldoyle Bay SPA (004016)	9.3km north east Hydrological pathway; 18km via River Liffey and Dublin Bay	Light-bellied Brent Goose (*Branta benicla hrota*) (A046) Shelduck *(Tadorna tadorna)* (A048) Ringed Plover (Charadrius hiaticula) (A137) Golden Plover (*Pluvialis apricaria)* (A140) Grey Plover (*Pluvialis squatarola*) (A141) Bar-tailed Godwit (*Limosa lapponica*) (A157)	The qualifying interests of this site area also included as qualifying interests of the North Bull Island SPA, with the exception of the Ringed Plover. **Construction Phase Effects** ▪ Noise due to construction is unlikely to disturb the qualifying species of the SPA which are located 9.3km north east. Noise due to construction can subsequently be removed from further consideration of likely significant effects. **Operational Phase Effects** ▪ An 18km hydrological pathway, the River Liffey and Dublin Bay, exists linking the proposed development to the SPA. This is considered significantly remote from the proposed development and can thus be removed from further consideration of likely significant effects.	**No**
Baldoyle Bay SAC (000199)	9.3km north east Hydrological pathway;	Tidal Mudflats and Sandflats (1140) *Salicornia* Mud (1310) Atlantic Salt Meadows (1330) Mediterranean Salt Meadows (1410)	**Construction Phase Effects** ▪ A 20km hydrological pathway, the River Liffey, and Dublin Bay, exists linking the proposed development to the SAC. However, this is considered significantly remote from the	**No**

European site (site code)	Distance from proposed works	Qualifying Interests	Source – Pathway – Receptor Linkages between the proposed development and the European site, with the potential to result in significant adverse effects.	Further Assessment Required
	20km via River Liffey and Dublin Bay		proposed development and can thus be removed from further consideration of likely significant effects. **Operational Phase Effects** ▪ It is considered that the SAC is significantly remote from the proposed development and can thus be removed from further consideration of likely significant effects.	
Ireland's Eye SPA (004117)	12.7km north east Hydrological pathway; 17km via River Liffey and Dublin Bay	Cormorant *(Phalacrocorax carbo)* (A017) Herring Gull *(Larus argentatus)* (A184) Kittiwake *(Rissa tridactyla)* (A188) Guillemot *(Uria aalge)* (A199) Razorbill *(Alca torda)* (A200)	**Construction Phase Effects** ▪ It is considered that the SPA is significantly remote from the proposed development and can thus be removed from further consideration of likely significant effects. **Operational Phase Effects** ▪ It is considered that the SPA is significantly remote from the proposed development and can thus be removed from further consideration of likely significant effects.	**No**
Ireland's Eye SAC (002193)	12.9km north east Hydrological pathway; 17km via River Liffey and Dublin Bay	Perennial Vegetation of Stony Banks (1220) Vegetated Sea Cliffs (1230)	**Construction Phase Effects** ▪ It is considered that the SAC is significantly remote from the proposed development and can thus be removed from further consideration of likely significant effects. **Operational Phase Effects** ▪ It is considered that the SAC is significantly remote from the proposed development and	**No**

European site (site code)	Distance from proposed works	Qualifying Interests	Source – Pathway – Receptor Linkages between the proposed development and the European site, with the potential to result in significant adverse effects.	Further Assessment Required
			can thus be removed from further consideration of likely significant effects.	
Malahide Estuary SAC (00205)	13km north east Hydrological pathway; 25km via River Liffey and Dublin Bay	Tidal Mudflats and Sandflats (1140) *Salicornia* Mud (1310) Atlantic Salt Meadows (1330) Mediterranean Salt Meadows (1410) Marram Dunes (White Dunes) (2120) Fixed Dunes (Grey Dunes) (2130)	**Construction Phase Effects** ▪ It is considered that the SAC is significantly remote from the proposed development and can thus be removed from further consideration of likely significant effects. **Operational Phase Effects** ▪ It is considered that the SAC is significantly remote from the proposed development and can thus be removed from further consideration of likely significant effects.	**No**
Malahide Estuary SPA (004025)	13km north east Hydrological pathway; 25km via River Liffey and Dublin Bay	Great Crested Grebe (*Podiceps cristatus*) (A005) Brent Goose (*Branta bernicla hrota)* (A046) Shelduck *(Tadorna tadorna)* (A048) Pintail (*Anas acuta*) (A054) Goldeneye (*Bucephala clangula*) (A067) Red-breasted Merganser (*Mergus serrator*) (A069) Oystercatcher (*Haematopodidae)* (A130) Golden Plover (Pluvialis apricaria) (A140) Grey Plover (*Pluvialis squatarola*) (A141) Knot (*Calidris canutus*) (A143) Dunlin (*Calidris alpina alpina*) (A149) Black-tailed Godwit (*Limosa limosa*) (A156) Bar-tailed Godwit (*Limosa lapponica)* (A157) Redshank (*Tringa tetanus*) (A1612) Wetlands (A999)	**Construction Phase Effects** ▪ It is considered that the SPA is significantly remote from the proposed development and can thus be removed from further consideration of likely significant effects. **Operational Phase Effects** ▪ It is considered that the SPA is significantly remote from the proposed development and can thus be removed from further consideration of likely significant effects.	**No**

European site (site code)	Distance from proposed works	Qualifying Interests	Source – Pathway – Receptor Linkages between the proposed development and the European site, with the potential to result in significant adverse effects.	Further Assessment Required
Glenasmole Valley SAC (001209)	12.5km south west Hydrological pathway; 17km upstream via River Dodder	Orchid-rich Calcareous Grassland (6210) *Molinia* Meadows (6410) Petrifying Springs (7220)	**Construction Phase Effects** ▪ It is considered that the SAC is significantly remote from the proposed development and can thus be removed from further consideration of likely significant effects. **Operational Phase Effects** ▪ It is considered that the SAC is significantly remote from the proposed development and can thus be removed from further consideration of likely significant effects.	**No**
Wicklow Mountains SAC (002122)	12km south Hydrological pathway; 23km upstream via River Dodder	Oligotrophic Waters containing very few minerals (3110) Dystrophic Lakes (3160) Wet Heath (4010) Dry Heath (4030) Alpine and Subalpine Heaths (4060) Calaminarian Grassland (6130) Species-rich *Nardus* Grassland (6230) Blanket Bogs (Active) (7130) Siliceous Scree (8110) Calcareous Rocky Slopes (8210) Siliceous Rocky Slopes (8110) Old Oak Woodlands (91A0) Otter (*Lutra lutra)* (1355)	**Construction Phase Effects** ▪ It is considered that the SAC is significantly remote from the proposed development and can thus be removed from further consideration of likely significant effects. **Operational Phase Effects** ▪ It is considered that the SAC is significantly remote from the proposed development and can thus be removed from further consideration of likely significant effects.	**No**
Wicklow Mountains SPA	12km south Hydrological pathway;	Merlin (*Falco columbarius)* (A098) Peregrine (*Falco peregrinus)* (A103)	**Construction Phase Effects** ▪ It is considered that the SPA is significantly remote from the proposed development and	**No**

European site (site code)	Distance from proposed works	Qualifying Interests	Source – Pathway – Receptor Linkages between the proposed development and the European site, with the potential to result in significant adverse effects.	Further Assessment Required
(004040)	23km upstream via River Dodder		can thus be removed from further consideration of likely significant effects. **Operational Phase Effects** ▪ It is considered that the SPA is significantly remote from the proposed development and can thus be removed from further consideration of likely significant effects.	

3.7 Cumulative assessment

Article 3(3) of the Habitats Directive 92/47/EC refers to cumulative effects caused by the projects or plans that are currently under consideration together with the effects of any existing or proposed projects or plans. When assessing impacts in this way, it can be established if there may be an overall significant effect on a European site (Natura 2000 site).

Ringsend Wastewater Treatment Plant Upgrade

The Appropriate Assessment Stage 2, Natura Impact Statement for the proposed Ringsend Wastewater Treatment Plant (WWTP) Upgrade concluded that the upgrade of the treatment process at Ringsend would not have any significant effects on the integrity of any European site.

Mitigation measures were implemented here to include:

- Construction within the boundaries of the South Dublin Bay and River Tolka Estuary SPA to take place outside of the times that Brent Geese are absent from the area, i.e. works must take place between 1st May and 31st August.
- Reinstatement of the works area within the SPA in time for the return of Brent Geese in September/ October.
- Provision of screening to prevent visual disturbance to bird species.
- Implementation of invasive species management Plan.
- Implementation of Construction and Environmental Management Plan.
- Implementation of Dust Management Plan.
- Implementation of Construction Noise and Vibration Management Plan.

Monitoring measures were also implemented to include:

- Monitoring for disturbance to waterbirds including monthly surveys on nearby grassland areas in Winter during construction and for one year thereafter.
- Monitoring for potential changes in waterbird population related to effluent discharge.
- Monitoring for invasive plant species in the immediate vicinity of the development.

It can be concluded that the discharge from proposed development may result in negative cumulative effects on the conservation interests of European sites in conjunction with the proposed Ringsend Wastewater Treatment Plant Upgrade. Further assessment is required.

The Dublin Eastern Bypass

The Dublin Eastern Bypass is proposed to be located approx. 630m east of the proposed outfall at Sir John Rogerson's Quay. The bypass route proposes to travel across the Dublin Port area by underground tunnel or at-grade road and bridge. The route is proposed to travel along south the East Wall Road, along the alignment of the Tom Clarke Bridge (East Link Toll Bridge) and the R131. The potential for cumulative negative effects exist if the construction timeframes between the two projects occurred concurrently or overlapped.

However, this is considered unlikely as the Draft Transport Strategy for the Greater Dublin Area 2016-2035 (NTA, 2016) outlines that the project is not planned to be built before will not before 2035. The project is currently in the early design phase there are no detailed design plans or construction methodology for the proposed Dublin Eastern Bypass.

Therefore, it can be concluded that there are no expected cumulative effects on any European site from the proposed development in combination with the Dublin Eastern Bypass.

Bloodstoney Road Bridge over the River Liffey

Dublin City Council are progressing the plan for a new pedestrian and cyclist bridge over the River Liffey which will span from Blood Stoney Road at Sir John Rogerson's Quay to New Wapping Street, North Wall Quay. The proposed bridge is included within the North Lotts and Grand Canal SDZ Planning Scheme

2014. The bridge is to be located approximately 75m from the proposed outfall location at Sir John Rogerson's Quay. The new bridge is seen as being a continuation of the Campshire environment for cyclists and pedestrians. The planning for the proposed Blood Stoney Bridge has not yet been submitted. Construction for this project is planned to commence midway through 2021 and will take approximately 18 months to complete (DCC, 2019). If construction timeframes overlapped between the proposed Grand Canal Docks Storm Water Outfall and the bridge at Bloodstoney Road, there may be the potential for negative cumulative effects of sedimentation loading in the River Liffey which may negatively impact nearby European sites.

Therefore, it cannot be concluded that there will not be likely significant effects on European sites from the proposed development in combination with the Bloodstoney Road Bridge over the River Liffey. Further assessment is required.

The Royal Canal Greenway

The Royal Canal Greenway starts at the River Liffey in Dublin and travels 228km, including a loop at Mullingar, through Kildare and Meath, to Cloondara on the River Shannon in Longford. It is a mixture of greenway off-road cycle paths and walking trails. This route is currently under construction in specific areas and is expected to terminate in 2019. The location of start of the greenway in Dublin is to be confirmed, however the outfall of the Royal Canal is located at the Scherzer Bridge on the North Wall Quay; it is possible that the greenway will begin near this location, approx. 300m from the outfall of the proposed development.

The construction of the Royal Canal Greenway expected to result in some impacts on the Royal Canal pNHA involving permanent habitat loss, and temporary habitat disturbance and modification during the construction phase. The Royal Canal Greenway is expected to give rise to cumulative effects with the Grand Canal Greenway, discussed in its own right, below. It is expected that these two greenway developments will result in a permanent positive impact on the environment by providing a comprehensive cycling route linking areas of North and South Dublin with counties Kildare, Meath, and Longford. This is likely to result in an increase in leisure cycling and cycling tourism.

There are no expected cumulative effects on any European site from the proposed development in combination with the Royal Canal Greenway.

The Grand Canal Greenway

The Grand Canal Greenway is an improvement to a 4.6km section of shared walking and cycling greenway along the existing northern Grand Canal in the townlands of Hazelhatch, Loughtown Lower, Balscott, Stacumney Cottage, Mullauns, Coolscuddan, Gollierstown and Ballymakaily. The improvement works consist of the provision of access controls such as pedestrian and cycle friendly gates, and improvement to the towpath by increasing path widths, undergrounding utilities, and landscaping along the route. The improvements of the Royal Canal and Grand Canal Greenways is expected to result in a significant permanent positive impact on the environment by improving the public domain and providing a more extensive cycling and amenity route to Dublin and neighbouring counties.

There are no expected cumulative effects on any European site from the proposed development in combination with the Royal Canal Greenway.

Dublin City Development Plan 2016 – 2022

The Dublin City Development Plan 2016 – 2022 sets out provisions for the Strategic Development Regeneration Area 6 (SDRA6). The proposed development is located within a portion of this SDRA, see Figure 3.5. The plans for this build upon The North Lotts and Grand Canal Planning Scheme, 2013.

The L shaped bend located on Hanover Quay is located in corridor zoned as Zone Z9, "To preserve, provide and improve recreational amenity and open space and green networks". The location of the outfall in the River Liffey crosses another corridor within Zone Z9. The works in this area will be temporary in nature. Works will consist of digging sections of pavement and laying pipeline underground. Construction will be moderately more intensive at Sir John Rogerson's Quay with the development of the

outfall to the River Liffey. The works will cater for an improvement in the amenity of the area by improving the water quality in Grand Canal Docks.

The Dublin City Development Plan 2016 – 2022 sets out a number of specific objectives for the area including:

- "To ensure that the character of the Docklands is retained and enhanced".
- "To facilitate the development of a new district centre and ancillary retail hubs as articulated in the North Lotts and Grand Canal Dock strategic development zone".

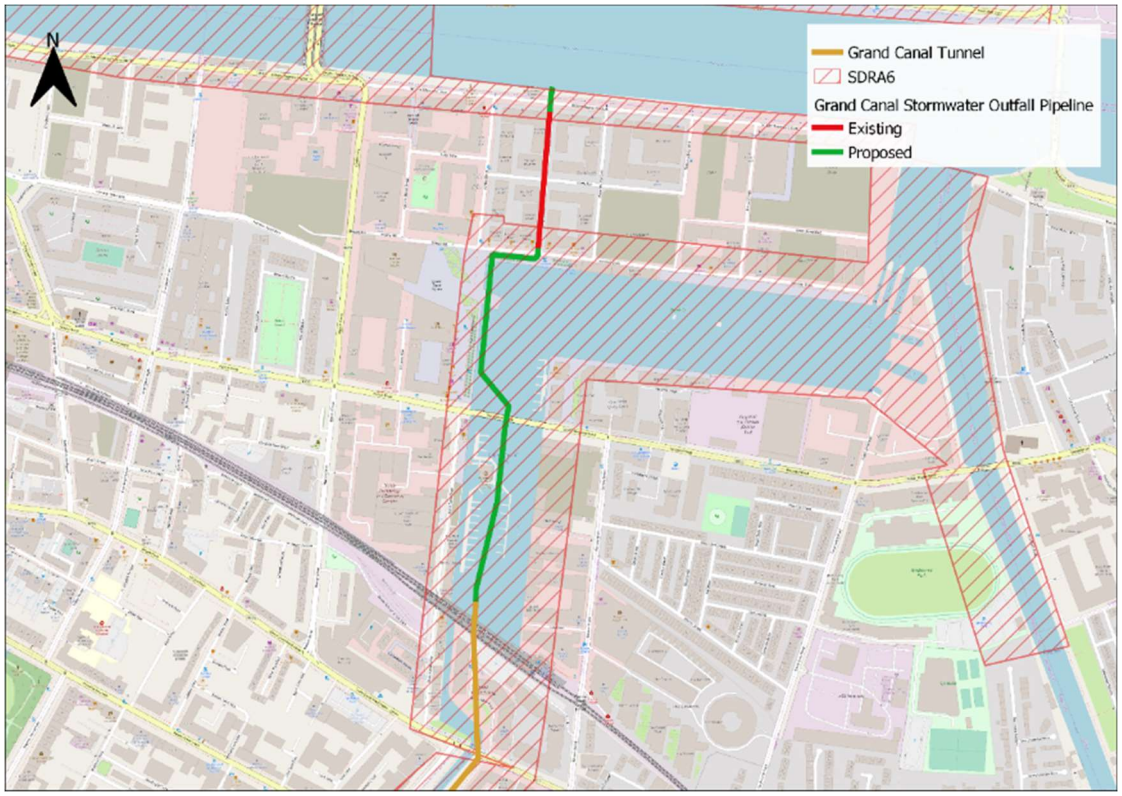

Figure 3.5 SDRA6 The North Lotts and Grand Canal Planning Scheme, 2013 (Ref Openstreet Maps www.openstreet.ie)

An Appropriate Assessment Stage 2 Natura Impact Statement was completed in 2016 and published as part of the Dublin City Development Plan (volume 6). The zone of influence for this Plan was identified as 15km. The concluding statement in this appropriate assessment stage 2 report ruled out the potential for significant effects on European sites as a result of the Plan. The potential likely significant impacts from core strategies, and their related mitigation measures are outlined as follows:

- The housing strategy will result in an increase of 29,500 housing units. This has the potential to cause a change of water quality due to developments, and the potential to disturb species and European sites. Relevant mitigation measures include:
  - Promoting the development of vacant or under-utilised sites in line with environmental surveys including flora and fauna.
  - Protecting flora, fauna, and habitats by conserving NHAs, SPAs, and SACs.
  - Promoting the progressive reduction of pollution of groundwater and preventing its further pollution.
  - Ensuring development is permitted in tandem with available water supply and wastewater treatment and to manage development.
  - Promoting sustainable design and construction to help reduce emissions from the demolition and construction of buildings.

- The employment, enterprise, and retail strategies will support the consolidation of the city centre and development of the regeneration areas will encourage movement of people, which has the potential to impact European sites. Relevant mitigation measures include:

  - Promoting sustainable development by balancing complex sets of economic, environmental or social goals in planning decisions.
  - Developing a sustainable network of safe, clean, attractive pedestrian routes, lanes, and cycleways in order to make the city more coherent and navigable.
  - Improving pedestrian and cycle access routes to strategic level amenities while ensuring that ecosystem functions are not compromised, and biodiversity is conserved.
  - Ensuring development is permitted in tandem with available water supply and wastewater treatment services.
  - Promoting sustainable design and construction to help reduce emissions from the demolition and construction of buildings.

- The sustainable infrastructure strategy has the potential to significantly impact European sites. Relevant mitigation measures include:

  - Protecting flora, fauna, and habitats which have been identified by Articles 10 and 12 of the Habitats Directive.
  - Promoting and maintaining the achievement of at least 'good' status in all waterbodies in the city.
  - Promoting the progressive reduction of pollution of groundwater and preventing further pollution.
  - Supporting initiatives to reduce marine pollution in Dublin Bay.

- The public transport strategy has the potential to significantly impact European sites by way of disturbance, change in water quality, and noise pollution. Relevant mitigation measures include:

  - Carrying out road capacity improvements subject to environmental and conservation considerations.
  - Maintaining air and noise quality in accordance with good practice and relevant legislation.
  - Improving pedestrian and cycle access routes to strategic level amenities while ensuring that ecosystem functions are not compromised, and biodiversity is conserved.

A number of mitigation measures have been prepared and applied to the policies and objectives that have been screened in for Appropriate Assessment as follows:

- SI1: to support Irish Water in provision of high-quality drinking water, water conservation, and in the development of water and wastewater systems to meet public demands in the city and wider region, in accordance with the Greater Dublin Water Supply Strategic Study, and the Greater Dublin Strategic Drainage Study.
- SI2: to support Irish Water to ensure the upgrade of wastewater infrastructure, in particular Ringsend wastewater treatment plant, marine outfall, and orbital sewer.
- SI3: to ensure that development is permitted in tandem with available water and wastewater treatment. Also, to manage development whereby there is adequate capacity.
- SI4: to promote and maintain good status in all waterbodies in the city.
- SI5: to promote the enhancement of aquatic ecosystems and wetlands.
- SI6: to promote the protection and improvement of the aquatic environment through reduction of discharges and emissions.
- SI7: to promote the reduction of groundwater pollution.
- SI8: to mitigate the effects of floods and draughts.
- GI20: to seek the improvement of water quality, bathing facilities, and other recreational opportunities in the coastal, estuarine and surface water environments in the city. Also, to protect ecology and wildlife of Dublin Bay.
- GI21: to support initiatives to reduce marine pollution in Dublin Bay in with other organisations, to raise awareness, and to have regard to the Marine Strategy Framework Directive (2008/56/EC).

- GI23: to protect flora, fauna and habitats, which have been identified by Articles 10 and 12 of the Habitats Directive, Birds Directive, Wildlife Acts 1976-2012, the Flora (Protection) Order 2015 S.I. No. 356 of 2015, European Communities (Birds and Natural Habitats) Regulations 2011 to 2015.
- GI24: to conserve and manage all natural heritage areas, SACs and SPAs designated, or proposed to be designated, by the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.
- GI25: to make provisions for habitat creation/ maintenance and facilitate biodiversity by encouraging the development of linear parks, nature trails, wildlife corridors, urban meadows and urban woodlands.
- GI26: to have regard to the conservation and enhancement of significant non-designated areas of ecological importance in accordance with development standards set out in this plan.

The revised policies and objectives following relevant mitigation measures are outlined below.

- Policy SC3: to develop a sustainable network of safe, clean, attractive pedestrian routes, lanes and cycleways in order to make the city more coherent and navigable. The mitigation measures applied include GI23, GI24, GI25, and GI26.
- Policy GH8: to promote the sustainable development of vacant or under-utilised infill sties and to favourably consider higher-density proposals which respect the design of the surrounding development and the character of the area. The mitigation measures applied include GI23, GI24, GI25, and GI26.
- Policy RD2: to require that proposed retail developments for large-scale or sensitive sites in line with environmental requirements, are accompanied by a retail design brief guided by the key principles contained in the "Retail Design Manual – DECLG, 2012", www.environ.ie. The mitigation measures applied include GI23, GI24, GI25, and GI26.
- Policy MT7: to improve the city's environment for walking and cycling through the implementation of improvements to thoroughfares and junctions and also through the development of new and safe routes, including the provision of foot and cycle bridges. Routes within the network will be planned in conjunction with Green Infrastructure Objectives and on foot of (inter alia) the NTA's cycle network plan for the Greater Dublin Area and the National Cycle Manual having regard to policies GI5 and GI018. The mitigation measures applied include GI23, GI24, GI25, and GI26. A clause was inserted in the Transport and Movement chapter that stated, "all development proposals shall be subject to Article 6 EU Habitats Directive Appropriate Assessment".
- Policy MT12: to improve the pedestrian environment and promote the development of a network of pedestrian routes which link residential areas with recreational, educational and employment destinations to create a pedestrian environment that is safe and accessible to all. The mitigation measures applied include GI23, GI24, GI25, and GI26. A clause was inserted in the Transport and Movement chapter that stated, "all development proposals shall be subject to Article 6 EU Habitats Directive Appropriate Assessment".
- Policy SI8: to mitigate the effects of floods and droughts subject to environmental assessment. The mitigation measures applied include GI15, HI16, GI17, and GI016.
- Objective MT01: to encourage intensification and mixed-use development along public transport corridors and at transport nodes where sufficient public transport capacity and accessibility exists to meet the sustainable transport requirements of the development, having regard to conservation policies set out elsewhere in this plan and the need to make best use of urban land. Dublin City Council will seek to prepare SDZ's, LAP's, or other plans for areas surrounding key transport nodes where appropriate, in order to guide future sustainable development. The mitigation measures applied include GI23, GI24, GI25, and GI26. A clause was inserted in the Transport and Movement chapter that stated, "all development proposals shall be subject to Article 6 EU Habitats Directive Appropriate Assessment".
- Objective MT09: to develop, within the lifetime of this plan, the Strategic Cycle Network for Dublin city – connecting key city centre destinations to the wider city and the national cycle network, and to implement the NTA's Greater Dublin Area Cycle Network Plan, to bring forward planning and design of the Santry River Greenway, incorporating strongly integrative social and community development initiatives. The mitigation measures applied include GI23, GI24, GI25, and GI26. A clause was inserted in the Transport and Movement chapter that stated, "all development proposals shall be subject to Article 6 EU Habitats Directive Appropriate Assessment".
- Objective MT031: to initiate and/or implement the following road improvement schemes and bridges within the six-year period of the development plan, subject to the availability of funding and

environmental requirements and compliance with the "Principles of Road Development" set out in the NTA transport strategy:

- River Road.
- Richmond Road.
- Malahide Road/ R107 (including North Fringe improvements).
- Blackhorse Avenue.
- Clonshaugh Road Industrial Estate.
- Ballymun (improved town centre linkage).
- Kilmainham/ South Circular Road.
- Link from Military Road to Conyngham Road.
- East Wall Road/ Sheriff Street to North Quays.
- Cappagh Road.
- Dodder Bridge.
- Liffey Valley Park pedestrian/ cycle bridge.
- Cycle/ pedestrian bridges that emerge as part of the evolving Strategic Cycle Network and Strategic Green Infrastructure Network.
- Newcomen Bridge (upgrading for pedestrian and cyclist use).
- Three new bridges proposed as part of the North Lotts and Grand Canal Dock SDZ.

The mitigation measures applied include GI23, GI24, GI25, and GI26. A clause was inserted in the Transport and Movement chapter that stated, "all development proposals shall be subject to Article 6 EU Habitats Directive Appropriate Assessment".

- GIO19: to maintain beaches at Dollymount, Sandymount, Merrion, and Poolbeg/ Shell Banks to a high standard, and to develop their recreational potential as a seaside amenity, in order to bring them to "Blue Flag" standard subject to Article 6 Assessment of the Habitats Directive. The mitigation measures applied include GI23, GI24, GI25, and GI26. A clause was inserted in the Green Infrastructure and Open Space chapter that stated, "all development proposals shall be subject to Article 6 EU Habitats Directive Appropriate Assessment".

The proposed development may contravene a number of mitigation measures set out in the Plan including GI20, GI21, GI23, GI24, and GI26. Therefore, there may be cumulative effects on European sites from the proposed development in combination with the Dublin City Development Plan 2016 – 2022. Further hydrological assessment is required to quantify the effects upon the receiving waters.

The North Lotts and Grand Canal Dock Planning Scheme

As previously mentioned, the Irish government designated lands at North Lotts and Grand Canal Docks in the Dublin docklands as a site for the Strategic Development Zone, see Figure 3.5. This was designated on the 18th December 2012.

A Natura Impact Statement (NIS) and Strategic Environmental Assessment (SEA) Report was carried out for the North Lotts and Grand Canal Dock Planning Scheme in November 2013 by the Planning and Economic Department of Dublin City Council. One of the objectives of the Planning Scheme was outlined as W3, *To provide adequate wastewater treatment, water distribution networks and drawing networks,* and specifically *to complete the relocation of the Grand Canal Surface Water Outfall from the Grand Canal Dock Basin to the River Liffey*. The relocation of the Grand Canal Surface Water Outfall from the Basin to the River Liffey has been targeted as a priority environmental objective within the Planning Scheme. This task has been identified as having no impact on any European site and has consequently been screened out within the Appropriate Assessment Stage 2 NIS for the Planning Scheme.

There are no expected cumulative effects on any European site from the proposed development in combination with the objectives as set out in the North Lotts and Grand Canal Dock Planning Scheme.

River Basin Management Plan 2018 – 2021

The River Basin Management Plan (RBMP) seeks the long-term delivery of water quality improvement in Ireland. An Appropriate Assessment Stage 2 Natura Impact Statement was developed (Department of Housing, Planning and Local Government, 2018) It sets out provisions for designated bathing waters and

states that investigation is currently being undertaken to identify potential solutions for non-compliances at Merrion Strand and Sandymount Strand within Dublin Bay.

The RBMP also sets out areas in Ireland as "Areas for Action" (AFA). The proposed development is located within the River Dodder AFA. The River Dodder is noted for its importance as a trout fishery and for recreation. A number of mitigation measures are proposed in the RBMP in the context of improving integration with the requirements of protected areas, in particular, water dependent habitats and species where water quality is an integral component towards achieving or maintaining favourable conservation status. Relevant mitigation measures are summarised below as follows:

- Rural diffuse and point source pollution measures: commitments to the extension of the grant scheme for repairs, upgrades and replacement of domestic waste water treatment systems in river catchments with a high status objective.
- Urban waste water and urban run-off measures: when siting new infrastructure, discharge points must be carefully considered in terms of the assimilative capacity of the receiving waters and accounting for all discharges to the water body. In addition, discharge points must be carefully considered in terms of proximity to European sites. If these alternatives involve the building of a new plant or an extension to an existing plant within or adjacent to an SAC/ SPA, screening for AA/ AA will be required as per the normal planning and environmental assessment procedures.
- Aquatic and riparian invasive alien species: the list of 9 invasive species prioritised through Regulation (No. 1143/2014) on 'the prevention and management of the introduction and spread of invasive alien species' should include further species of importance in an Irish context. Enhanced cooperation between public authorities on invasive alien species should include those at the freshwater/ marine interface.
- The physical condition of the water environment: improved hydromorphology assessment tools should include for the hydromorphological requirements supporting the favourable conservation status of water dependent species e.g. salmon, lamprey.
- Protected areas and high status waters: measure N4 should acknowledge the need for environmental assessment and appropriate assessment of local solutions prior to implementation with particular attention paid to other protected habitats and species which could be unintentionally impacts e.g. Kingfisher and Otter. Currently there is no prioritised list of water dependent birds which could be targeted through the RBMP process. The NPWS and Birdwatch Ireland should liaise with the EPA to develop such a list in an effort to establish stronger links between the Water Framework Directive and the Birds Directive. Every effort should also be made to expedite the establishment of the blue dot programme and the high status working group. Annex II species and Annex I habitats should be afforded higher objective statuses.

The proposed development may contravene a number of mitigation measures set out in the RBMP as outlined above. Therefore, there may be cumulative effects on European sites from the proposed development in combination with the River Basin Management Plan 2018 – 2022. Further hydrological assessment is required to quantify the effects upon the receiving waters.

Dublin City Council Planning Permissions (Online Map Viewer)

The Dublin City Council Planning Permission Online Map Viewer (www.dublincity.ie) and the National Planning Database (www.myplan.ie) was accessed in February 2020 to identify any plans or projects in the study area. These include the following:

- Permission for development on protected structure, The Malt House South and No.1-4 Malt House Apartments, Grand Canal Quay, Dublin 2, Ref DSDZ4160/19, 05/11/2019.
- Permission for development at site at Block G, Capital Dock, Ref DSDZ4159/19, 11/11/2019.
- Permission for demolition and development of 4 additional floors of office space at 1 Grand Canal Quay, Dublin 2, Ref 3395/19, 06/08/2019.
- Permission has been granted for an extension of 25mm diameter relief vent pipework on Sir john Rogerson's Quay (Planning Application Ref DSDZ4165/17). An Appropriate Assessment Screening Report was submitted as part of the application with the conclusive finding that there are no significant impacts upon European sites likely to occur as a result of the proposed development.

- Permission is sought at a site of 1ha known as the former Boland's Mill incorporating No.33, 34, 35, and 35A Barrow Street, Dublin 4 (Planning Application Ref DSDZ4835/19). The planning application proposed amendments to the previously granted application consisting of revised external glazing, reconfiguration of stairway. There are no likely significant effects expected to arise from the proposed development.
- Permission is sought for the amalgamation of two adjacent restaurants/ cafes to one combined unit (Planning Application Ref DSDZ2202/20). There are no likely significant effects expected to arise from the proposed development.

There are no significant effects likely to arise from the cumulation of the proposed development with any of the aforementioned proposed plans/ projects.

Regional Planning Guidelines for the Greater Dublin Area 2010 – 2022

The Royal Canal and Grand Canal are recognised as major recreational and amenity sites for walking and cycling and this is recognised by the Regional Planning Guidelines for the Greater Dublin Area 2010 - 2022. An objective of these planning guidelines is the provision of linkages between river and canal corridors within the Greater Dublin Area and adjoining regions to create interconnected routes and improve the amenity of the area.

The Grand Canal and the Royal Canal may link together via the Grand Canal Docks. Therefore, the proposed development meets this objective through improving the amenity of the area and improving the water quality of the basin. This is expected to increase the attractiveness of the area for cycling amenity and tourism.

There are no expected significant effects that are likely to arise from the cumulation of the proposed development with the Regional Planning Guidelines for the Greater Dublin Area 2010 - 2022.

3.8 Conclusion of Stage 1 – Screening Process

17 European sites designated for protection at European level under the E.U. Habitats Directive (92/43/EEC) and the E.U. Birds Directive (79/409/EEC) amended in 2009 (Directive 2009/147/EC), have been identified within a 15km radius of the proposed development. Three of these European sites and their associated qualifying interests/ conservation objectives are adjudged to be within the sphere of influence of the proposed development. These sites are South Dublin Bay and River Tolka Estuary SPA, North Bull Island SPA, and North Dublin bay SAC. This conclusion is based upon the source-pathway-receptor model.

Source of pollution

- Sedimentation and run-off of pollutants during the construction phase entering the Grand Canal Docks/ River Liffey and Dublin Bay which may act as a hydrological pathway to relevant European sites.
- Intermittent discharge (rainfall related) consisting of polluted combined sewage stormwater overflow form the South Dublin sewer during the operational phase. The discharge will contain high concentrations of faecal coliforms, BOD, nutrients and suspended solids.

Pathway

The discharge will be diluted and attenuated in the River Liffey and carried out in Dublin Bay.

Receptor

The receptors include the European sites, South Dublin Bay and River Tolka Estuary SPA, North Bull Island SPA, and North Dublin bay SAC.

It is the opinion of J. B. Barry and Partners that it cannot be concluded that there is no real likelihood of significant effects on European sites. Consequently, in adopting the precautionary principle, it is concluded that in the interest of providing a quantified statement of any impacts to An Board Pleanála, the Appropriate Assessment should proceed to Stage 2 with the preparation of a NIS to accompany the planning application. A detailed water quality modelling exercise will be undertaken to assess the magnitude of any potential impacts. The NIS will not be finalised until the water quality modelling exercise is complete. The NIS will be drafted by an Ecologist procured from the Irish Water Framework.

SECTION 4: Reference

The following sources have been consulted in the preparation of this Appropriate Assessment Screening Report:

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- **European Commission (EC)**. (2018). Assessment of Plans and Projects Significantly Affecting Natura 2000 sites: Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (European Commission Environment Directorate-General).
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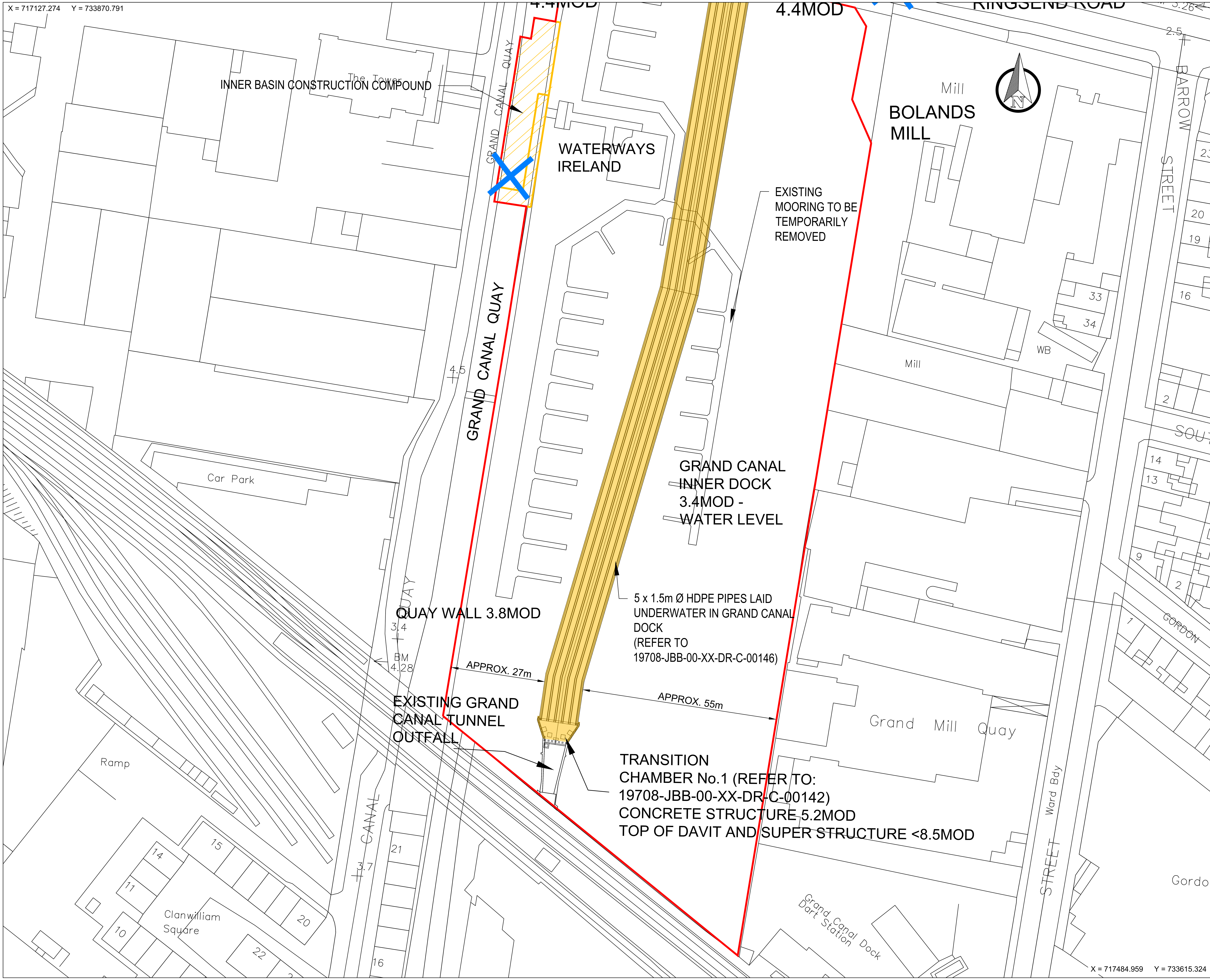
B Site Layout



NOTES

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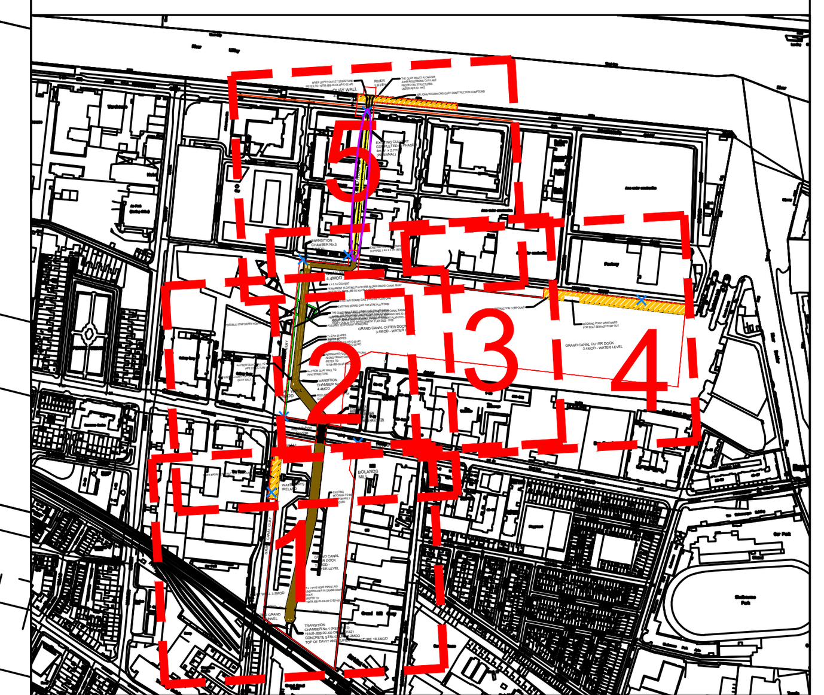

LEGEND

- SITE NOTICE LOCATIONS
- GAS — EXISTING GAS MAIN
- RED LINE BOUNDARY
- POSSIBLE TEMPORARY HOARDING
- PHASE 1 CULVERT COMPLETED IN 2002
- EXISTING WAYLEAVE
- PROPOSED WAYLEAVE
- ENCLOSED CONSTRUCTION COMPOUND

Rev.	Suit.	Description	Drawn	Ch'kd	Date
P03	S3	ISSUED FOR PLANNING	LS	NK	MAY 2022
P02	S1	ISSUED FOR EIAR	LS	NK	MAY 2022
P01	S1	ISSUED FOR EIAR	LS	NK	APRIL 2022

Client:

Obair i gcomhpháirtíocht / Working in partnership — Dublin City Council — Uisce Éireann : Irish Water

Consultant:

J. B. Barry and Partners Limited
Consulting Engineers

Classon House
Dundrum
Business Park
Dundrum Road
Dublin 14
D14 T9T0

Tel: +353-1-4851400
email: info@jbbarry.ie
website: www.jbbarry.ie

Project:

GRAND CANAL DOCK
STORM OUTFALL

Drawing Title:

SITE LAYOUT PLAN

GRAND CANAL SCHEME AT GRAND CANAL DOCKS BASIN, GRAND CANAL QUAY, HANOVER QUAY, SIR JOHN ROGERSONS QUAY AND ASGARD RD, DUBLIN 2

SHEET 1 OF 5

Drawn by :	LS	Date :	MAY 2022
Checked by :	NK	Date :	MAY 2022
Approved by :	KOD	Date :	MAY 2022
Internal Project REFS :	19708		
Scales :	1:500 @ A1, 1:1000 @ A3		
Stage :	PLANNING		

Drawing No. :	Revision	Suitability
19708-JBB-00-XX-DR-C-00184	P03	S3

X = 717143.450 Y = 734082.401

4.4MOD

Factory

EXISTING BOARD GAIS THEATRE PLATFORM

POSSIBLE TEMPORARY HOARDING

THE QUAY WALLS ENCLOSING THE GRAND CANAL BASIN ARE PROPOSED PROTECTED STRUCTURES (RPS ID: 8844 AND RPS ID: 8847) ADDED UNDER DRAFT DUBLIN CITY DEVELOPMENT PLAN 2022 - 2028

GRAND CANAL OUTER DOCK
3.4MOD - WATER LEVEL

2 x 2.4m Ø PIPES
(REFER TO:
19708-JBB-00-XX-DR-C-00147)

PERMANENT FLOATING PLATFORM ALONG GRAND CANAL QUAY
(REFER TO:
19708-JBB-00-XX-DR-C-00148)

4m FROM QUAY WALL TO PIPE STRUCTURE

RED LINE INCLUDES TOP OF QUAY WALL

TRANSITION CHAMBER No.2
4.4MOD

QUAY WALL
4.4MOD

EXISTING CITY SEWERS LAID BENEATH THE BASIN BED (REFER TO 19708-JBB-00-XX-DR-C-00133)

QUAY WALL
4.4MOD

QUAY WALL
4.4MOD

INNER BASIN CONSTRUCTION COMPOUND

WATERWAYS IRELAND

BOLANDS MILL

RINGSEND ROAD

MacMahon Bridge

Ramp
Gallery Quay
CHIMNEY VIEW
Ramp
Gallery Quay
GRAND CANAL QUAY
4.5
4.6
5.9
2.5
BM 3.26
Landing Stage
25
20
CHARLOTTE QUAY
32–79
200–242
147–199
Charlotte Quay Dock
111–146
1–31
80–110
The Tower
Mill
1–8
11–33
23
20
SHELBOURNE
Ward Bdy

X = 717501.550 Y = 733826.745

NOTES
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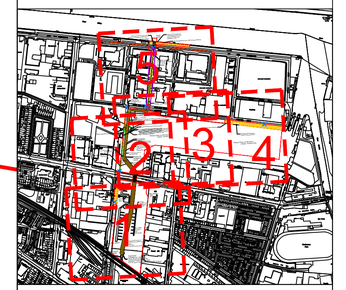

LEGEND

- SITE NOTICE LOCATIONS
- GAS — EXISTING GAS MAIN
- RED LINE BOUNDARY
- POSSIBLE TEMPORARY HOARDING
- PHASE 1 CULVERT COMPLETED IN 2002
- EXISTING WAYLEAVE
- PROPOSED WAYLEAVE
- ENCLOSED CONSTRUCTION COMPOUND

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email: info@jbbarry.ie
website: www.jbbarry.ie

Project:
GRAND CANAL DOCK
STORM OUTFALL

Drawing Title:
SITE LAYOUT PLAN
GRAND CANAL SCHEME AT GRAND CANAL DOCKS
BASIN, GRAND CANAL QUAY, HANOVER QUAY, SIR JOHN ROGERSONS QUAY AND ASGARD RD, DUBLIN 2
SHEET 2 OF 5

Drawn by :	LS	Date :	MAY 2022
Checked by :	NK	Date :	MAY 2022
Approved by :	KOD	Date :	MAY 2022
Internal Project REFS :	19708		
Scales :	1:500 @ A1, 1:1000 @ A3		
Stage :	PLANNING		
Drawing No. :	19708-JBB-00-XX-DR-C-00185	Revision	P03
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X = 717271.606 Y = 734146.920

TRANSITION CHAMBER No.3 4.4MOD

EXISTING CULVERT COMPLETED IN PHASE 1 4m X 2.7m (INTERNAL)

South Dock House

HANOVER QUAY

QUAY WALL 4.4MOD

4 x 2.7m CULVERT

PERMANENT FLOATING PLATFORM ALONG GRAND CANAL QUAY (REFER TO: 19708-JBB-00-XX-DR-C-00148)

EXISTING BOARD GAIS THEATRE PLATFORM

THE QUAY WALLS ENCLOSING THE GRAND CANAL BASIN ARE PROPOSED PROTECTED STRUCTURES (RPS ID: 8844 AND RPS ID: 8847) ADDED UNDER DRAFT DUBLIN CITY DEVELOPMENT PLAN 2022 - 2028

POSSIBLE TEMPORARY HOARDING

GRAND CANAL OUTER DOCK 3.4MOD - WATER LEVEL

2 x 2.4m Ø PIPES (REFER TO: 19708-JBB-00-XX-DR-C-00147)

Tank

Ramp

Area under construction

Factory

MAIN CONSTRUCTION COMPOUND

GRAND CANAL QUAY

4.5

4m FROM QUAY WALL TO PIPE STRUCTURE

TRANSITION CHAMBER No.2 4.4MOD

QUAY WALL 4.4MOD

RED LINE INCLUDES TOP OF QUAY WALL

20

CHARLOTTE QUAY

25

Landing Stage

32–79

200–242

147–199

Charlotte Quay Dock

EXISTING CITY SEWERS LAID BENEATH THE BASIN BED (REFER TO 19708-JBB-00-XX-DR-C-00133)

1–31

111–146

80–110

Waterside Apts

1–98

205–242

The Waterside

The Anchorage

Ramp

MacMahon Bridge

MacMahon Bridge

5.9

BM 3.26

2.5

QUAY WALL 4.4MOD

RINGSEND ROAD

X = 717629.776 Y = 733891.016

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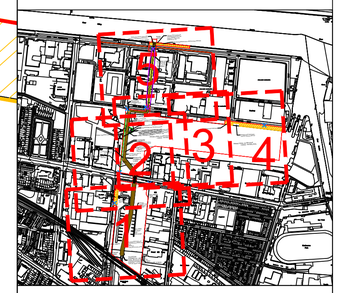

LEGEND

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- ENCLOSED CONSTRUCTION COMPOUND

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SHEET 3 OF 5

Drawn by :	LS	Date :	MAY 2022
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Stage :	PLANNING		
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		Suitability	S3

X = 717436.893 Y = 734148.926

Tank

Ramp

Area under construction

QUAY

BENSON

GREEN STREET EAST

Factory

HANOVER QUAY

MAIN CONSTRUCTION COMPOUND

MOORING POINT MAINTAINED
FOR BOAT SEWAGE PUMP OUT

GRAND CANAL OUTER DOCK
3.4MOD - WATER LEVEL

TE QUAY

200–242

Waterside Apts

1–98

205–242

The Waterside

The Anchorage

Ramp

Tanks

Grand Canal Wharf

–110

BM 3.26

2.5

Bus Depot

X = 717795.043 Y = 733893.043

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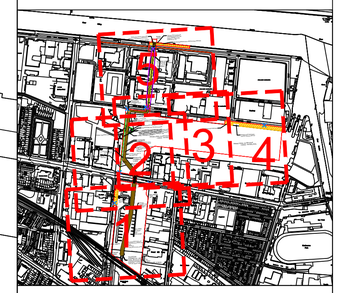

LEGEND

- SITE NOTICE LOCATIONS
- GAS — EXISTING GAS MAIN
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SHEET 4 OF 5

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Scales :	1:500 @ A1, 1:1000 @ A3		
Stage :	PLANNING		
Drawing No. :	19708-JBB-00-XX-DR-C-00187	Revision	P03
		Suitability	S3

X = 717236.461 Y = 734337.766

RIVER LIFFEY OUTLET STRUCTURE
(REFER TO: 19708-JBB-00-XX-DR-C-00145)

RIVER LIFFEY

THE QUAY WALLS ALONG SIR JOHN ROGERSONS QUAY ARE PROTECTED STRUCTURES UNDER RPS ID: 7542

QUAY WALL
3.0MOD

14.4

SIR JOHN ROGERSONS QUAY CONSTRUCTION COMPOUND

HWM

EXISTING CULVERT
COMPLETED IN PHASE 1
4m W x 2.7m H
(INTERNAL)

TRANSITION
CHAMBER No.3
4.4MOD

EXISTING CULVERT COMPLETED
IN PHASE 1 4m X 2.7m (INTERNAL)

QUAY WALL
4.4MOD

4 x 2.7m CULVERT

PERMANENT FLOATING PLATFORM ALONG GRAND CANAL QUAY
(REFER TO: 19708-JBB-00-XX-DR-C-00148)

X = 717594.408 Y = 734082.072

NOTES
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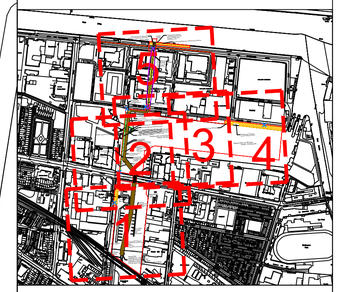

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SHEET 5 OF 5

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Stage :	PLANNING		
Drawing No. :	19708-JBB-00-XX-DR-C-00188	Revision	P03
		Suitability	S3

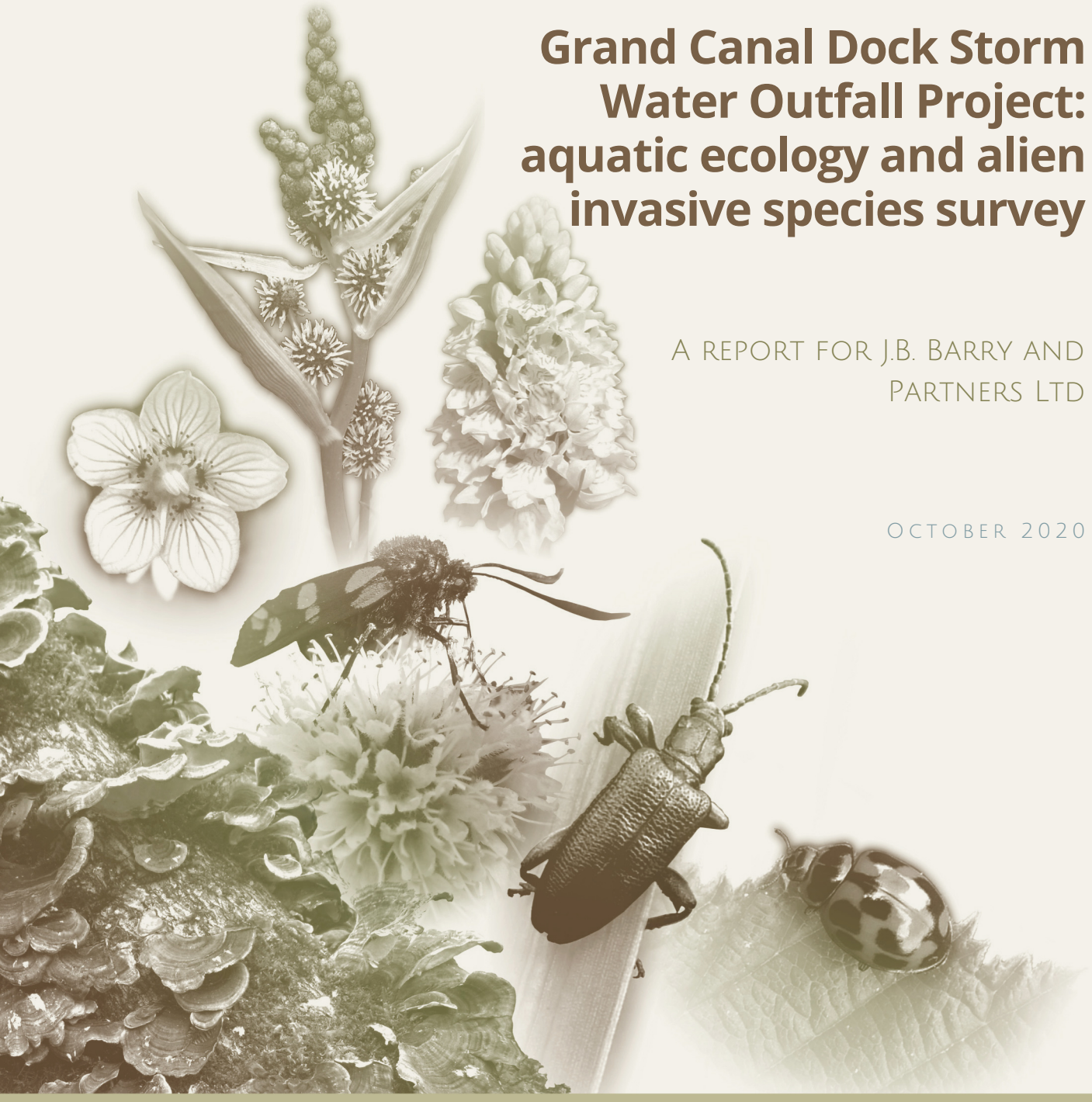
C Aquatic Ecology and Alien Invasive Species Report - BEC Consultants Ltd (2020)

bec CONSULTANTS

Grand Canal Dock Storm Water Outfall Project: aquatic ecology and alien invasive species survey

A REPORT FOR J.B. BARRY AND PARTNERS LTD

OCTOBER 2020



John T. Brophy

Grand Canal Dock Storm Water Outfall Project: aquatic ecology and alien invasive species survey

Report prepared for:

J.B. Barry and Partners Limited,
Classon House,
Dundrum Business Park,
Dundrum Road,
Dublin 14,
D14 T9T0

October 2020

Botanical, Environmental & Conservation Consultants Ltd,
65 Holywell, Dundrum, Dublin 14.
Website: www.botanicalenvironmental.com
Email: info@botanicalenvironmental.com

DOCUMENT CONTROL SHEET

Client	J.B. Barry and Partners Limited
Project title	Grand Canal Dock SWOP
Project number	PRJ288
Document title	Grand Canal Dock Storm Water Outfall Project: aquatic ecology and alien invasive species survey
Citation	Brophy, J.T. (2020) Grand Canal Dock Storm Water Outfall Project: aquatic ecology and alien invasive species survey. Unpublished Report by BEC Consultants Ltd.

Author(s)	**Reviewed by**	**Approved by**	**Version**	**Issue date**
John T. Brophy M.Sc. CEcol, MCIEEM	Jim Martin PhD, MCIEEM	Jim Martin	Draft	24/08/2020
JB	JM	JM	Final	19/10/2020

Table of Contents

1 Introduction

BEC Consultants Ltd was contracted by J.B. Barry and Partners Ltd to carry out an aquatic ecological survey of the Grand Canal Dock and River Liffey Estuary, as well as an Alien Invasive Species (AIS) survey of the terrestrial habitats, as part of the Grand Canal Dock Storm Water Outfall Project.

2 Background

2.1 Study Area

The study area for this survey comprised the Grand Canal Dock at the eastern end of the Grand Canal, as well as the River Liffey Estuary outside the dock and the terrestrial area along the route of the pipe from the Grand Canal Dock to the River Liffey Estuary (Figure 1).

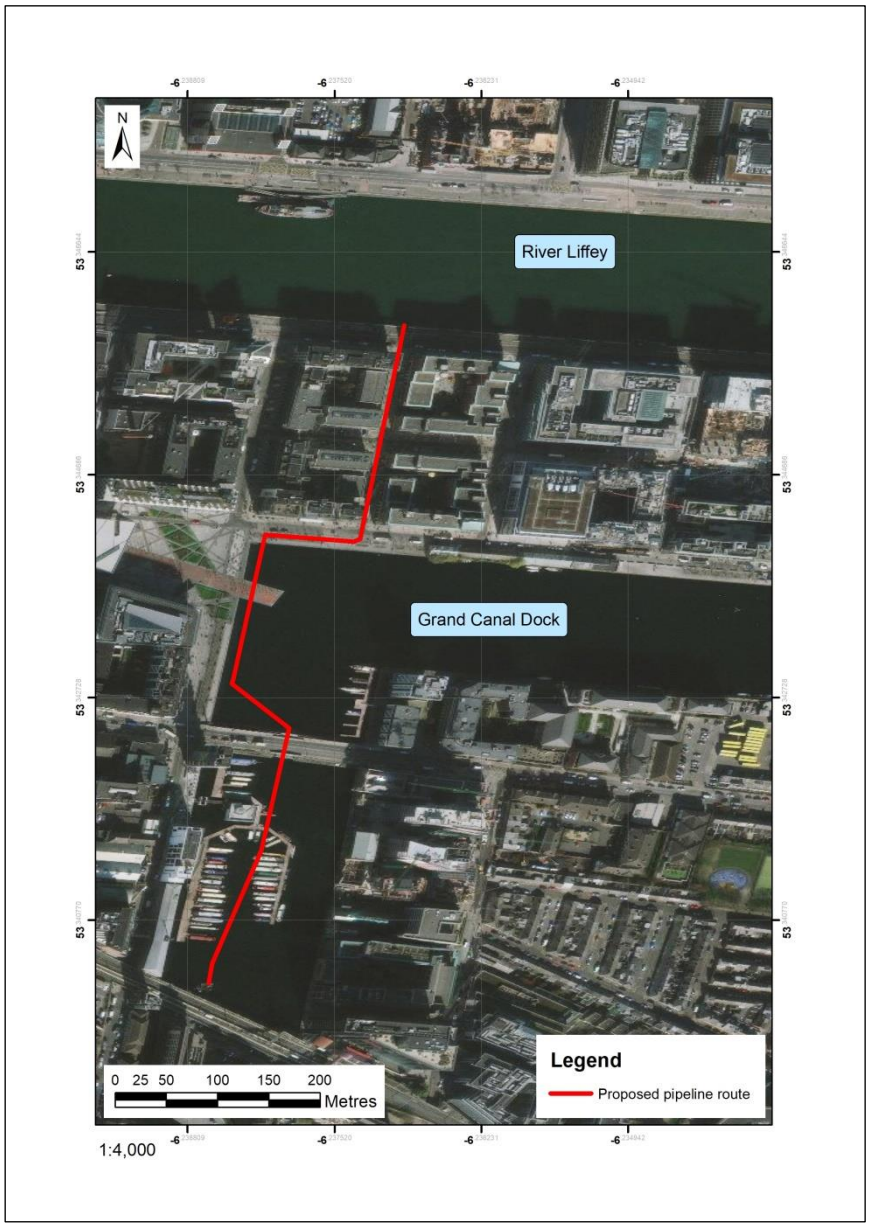


Figure 1. Map of the study area comprising the Grand Canal Dock and the River Liffey Estuary, showing the proposed pipeline route

3 Methods

3.1 Aquatic survey

The benthic habitat of the Grand Canal Dock and the River Liffey Estuary was investigated by means of a grab sample survey, based on the methodology of Davies *et al*. (2001). A 0.25 m^2 Van Veen grab was deployed from a Pioner Multi workboat at ten sample stations: six within Grand Canal Dock and four in the Liffey Estuary (Appendix I, Figure A1. Appendix II, Table A1). At each sample station, three grab samples were taken and the results pooled. For sediment samples, the retrieved sample was sieved on-site through a 1 mm sieve and the residue preserved in 70% industrial methylated spirits (IMS) in a labelled container. For samples dominated by vegetation and algae, the sample was returned to the laboratory and washed over a 1 mm sieve before being preserved in 70% IMS.

In the course of the survey, additional data was collected including water depth, salinity and temperature.

Faunal samples were washed into a white tray and the macroinvertebrates extracted into labelled vials for identification. Identification was carried out using stereoscopic and compound microscopes and standard freshwater species keys.

The intertidal zone of the study area comprised the quay walls of the River Liffey along Sir John Rogerson's Quay. This area was examined and the species present recorded.

Where the data allowed, a biotope was assigned to a survey location following the Marine Habitat Classification for Britain and Ireland (JNCC, 2015).

3.2 Terrestrial AIS survey

The AIS survey comprised of a walkover survey of the terrestrial habitats along the pipe route. The focus of this survey was species listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations (S.I. 477/2011) (as amended). These are species for which there is a legal imperative to prevent their spread. The location of any AIS would be recorded using a handheld GPS and an estimate made of the number or cover of the species.

4 Results

4.1 Aquatic survey

The aquatic survey was carried out on 28-29th July 2020 in dry, overcast conditions. The benthic grab survey of the Grand Canal Dock returned a total of 22 species or higher taxa, comprising 361 individuals (Appendix II, Table A2). These were freshwater species, with the most abundant species being the water slater *Asellus aquaticus* and the snail *Bithynia tentaculata*. Other common species included the snail *Bithynia leachii*, the leech *Erpobdella octoculata*, the zebra mussel *Dreissena polymorpha*, the freshwater shrimp *Crangonyx pseudogracilis* and oligochaete worms of the family Naididae.

The submerged aquatic plants recorded in the course of the survey were Nuttall's Waterweed (*Elodea nuttallii*), Rigid Hornwort (*Ceratophyllum demersum*) and Spiked Water-milfoil (*Myriophyllum spicatum*), with filamentous algae and the stonewort *Nitella flexilis* agg. also present.

Depths within the Grand Canal Dock ranged from 2 m to 4.5 m.

No fauna were recovered from the benthic grabs taken in the River Liffey Estuary. All grabs comprised fine, anoxic mud with some leaf detritus, with the surface water salinity ranging from 16.7 to 17.6 PSU. Water depth at the time of survey ranged from 6.2 m to 6.9 m, with the survey undertaken close to low water. The lack of any fauna means that the habitat cannot be more precisely defined than SS.SMu.SMuVS Sublittoral mud in variable salinity (estuaries) after JNCC (2015).

The intertidal habitat of the River Liffey Estuary along Sir John Rogerson's Quay comprised a band along the quay wall dominated by horned wrack (*Fucus ceranoides*) with green algae (*Ulva* spp.). The fauna was limited to the barnacle (*Austrominius modestus*) and the sea slater (*Ligia oceanica*). This habitat was assigned to LR.LLR.FVS.Fcer *Fucus ceranoides* on reduced salinity eulittoral rock after JNCC (2015).

Aquatic alien invasive species recorded in the course of the aquatic survey include zebra mussel and Nuttall's Waterweed, both recorded within Grand Canal Dock. Both of these species are listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations (S.I. 477/2011) (as amended). The freshwater shrimp *Crangonyx pseudogracilis* is also non-native, but is considered low risk as an invasive species.

4.2 Terrestrial AIS survey

The terrestrial AIS survey was carried out on 29th July 2020. This covered the terrestrial habitats from the upper Grand Canal Dock down to the proposed outfall location at the River Liffey on Sir John Rogerson's Quay.

No invasive species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations (S.I. 477/2011) (as amended) were recorded in the course of the survey.

A number of introduced species, mainly garden escapes, were recorded along the quay wall at Sir John Rogerson's Quay and the quay wall of the Grand Canal Dock. These include: Canadian Fleabane (*Conyza canadensis*), Ivy-leaved Toadflax (*Cymbalaria muralis*), Red Valerian (*Centranthus ruber*) and Butterfly-bush (*Buddleja davidii*). Most of these species are considered naturalised in Ireland and are common and widespread in built-up areas and waste ground. Butterfly-bush in considered more problematic, due to its ability to spread and out-compete native species.

5 Discussion

The Grand Canal Dock is located at the eastern end of the Grand Canal, where the canal can be accessed from the River Liffey. The main water source for the Grand Canal is the Milltown Feeder, which flows from Pollardstown Fen, Co. Kildare, supplying the canal with high quality water. The Water Framework Directive (WFD) status of the Grand Canal immediately upstream of the Grand Canal Dock is 'Good' in the period 2013-2018 and it is considered to be 'Not at risk' (EPA, 2020a). However, the Grand Canal Dock itself is of 'Moderate' status and is considered to be 'At risk' of not meeting its WFD objectives (EPA, 2020a). This reduced water quality is due to the existing storm water outfall, which discharges to the upper Grand Canal Dock; the extension of which to Sir John Rogerson's Quay is the focus of this study. The reduced water quality within the Grand Canal Dock is evident in the result of the benthic survey, particularly within the upper dock. Sample stations S1 and S2 are closest to the outfall and are dominated by the leech *Erpobdella octoculata* and oligochaetes, respectively. These species are tolerant of organic pollution and tend to dominate where such pollution occurs and excludes more sensitive species. The presence of abundant filamentous algae at some of the stations is further evidence of organic pollution occurring within the Grand Canal Dock.

The high species richness of molluscs is expected for a waterbody with hard water, such as the Grand Canal. The abundance of *Bithynia tentaculata* reflects the dense macrophyte layer above the muddy bottom of the Grand Canal Dock (Anderson, 2016a). *Theodoxus fluviatilis* is a snail species that lives in hard water conditions, on hard surfaces (Anderson, 2016b).

The water slater *Asellus aquaticus* is a widespread species in Ireland found in a range of habitats, including rivers, lakes and canals. It is considered to be very tolerant of organic pollution (Toner *et al*., 2005).

The caddisfly *Agraylea multipunctata* was recorded in the course of the benthic survey and on the wing around the Grand Canal Dock. It is a species of still and slow-moving water of canals, lakes and rivers, as well as weedy ponds and is habitat specialist of filamentous algae (Wallace *et al*., 2003; O'Connor, 2015; Barnard & Ross, 2012). The second caddisfly species recorded was *Ceraclea senilis*, which is found in still or slow-flowing water, typically on sponges on rocks or woody debris (Wallace *et al*., 2003, Graf *et al*., 2008). Both species are widely distributed in Ireland (O'Connor, 2015).

Overall, there was a high level of correspondence between the macroinvertebrate species recorded in the previous survey (EcoServe, 2001) and the current survey. Only three species were recorded in the previous survey and not the current survey: the snail *Valvata cristata*, phantom midges (Chaoboridae) and mites (Hydracarina). Some groups that were only identified to family level in the

previous survey were identified to species in the current survey, including the leeches (Hirudinea) and caddisflies (Trichoptera), which may have increased the number of species recorded. Notably, the zebra mussel was not recorded in the previous survey, while it was recorded at two sample stations in the current survey. This species is thought to have arrived in Ireland into the River Shannon in 1993/94 and spread from there (Minchin *et al.,* 2005). Due to its absence in the survey carried out by EcoServe (2001), it appears that zebra mussels have only become established in the Grand Canal Dock sometime after 2001. Zebra mussels can be spread by transport of larvae in flowing or carried water, or by adults attached to boats, equipment, *etc*. (Minchin *et al*., 2003).

The freshwater shrimp *Crangonyx pseudogracilis* was also recorded from the Grand Canal Dock in the current survey, but not in the previous survey (EcoServe, 2001). This non-native species was first recorded in Ireland from a pond in the Phoenix Park, Dublin in 1969 (Holmes, 1975), and has since spread across Ireland NBDC, 2020). Whether *C. pseudogracilis* is having a significant negative effect on the Irish freshwater environment is unknown; however, it has been shown that predation by the native freshwater shrimp *Gammarus duebeni* has controlled the spread of *C. pseudogracilis* in places and that the species has also provided an additional food source for trout (MacNeil *et al*., 2013; 1999).

Spiked Water-milfoil is widespread in Ireland (NBDC, 2020b), being found in flowing and still waters that are both calcareous and meso-eutrophic or eutrophic (Preston & Croft, 1997). Rigid Hornwort is nationally rare, but can be locally abundant in the Royal and Grand canals (Caffrey *et al*., 2006). It is a species that can only survive in still or slow-flowing, lowland waterbodies and has a strong preference for eutrophic waters (Preston & Croft, 1997).

Nitella flexilis agg. is a stonewort that is found in lakes, ponds, ditches, pits, springs, streams, canals and rivers, and has been recorded widely in Ireland (Moore, 1986). *Nitella flexilis* agg. is able to compete reasonably well with other submerged aquatic plants and is able to tolerate a range of pH levels.

The River Liffey along Sir John Rogerson's Quay falls within the Liffey Estuary Lower waterbody for the purposes of the WFD. As of the period 2013-2018, the Liffey Estuary Lower is considered 'Good' status, but 'At risk' (EPA, 2020a). This is an increase from 'Moderate' status in the previous round of assessment in 2010-2015; however, the fish element that was responsible for 'Moderate' status being assigned in the previous round was not assessed in the period 2013-2018, resulting in the 'Good' status being assigned (EPA, 2020b; IFI, 2010). The current benthic survey returned no fauna from the anoxic mud that forms the estuary bed. These results are not dissimilar from those of EcoServe (2001), who recorded a single water slater and leech from their samples in the Liffey Estuary in the same location. Given the salinity recorded within the estuary in the current survey was above 16 PSU, these freshwater species must have washed down from further upstream on that occasion. The lack of fauna in this area is likely to be the result of the challenging estuarine habitat, with its varying salinity, along with historic pollution of the fine sediment, resulting in anoxic conditions.

The intertidal habitat within the study area is limited to the quay wall and has a low species richess, to be expected from the estuarine situation. This type of habitat is common within the River Liffey Estuary and other estuaries around Ireland with similar conditions.

No terrestrial or estuarine AISs were recorded in the course of the survey and so there will be no issues in relation to the terrestrial works and those at Sir John Rogerson's Quay. Within the Grand Canal Dock, however, two species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations (S.I. 477/2011) (as amended) were recorded: zebra mussel (*Dreissena polymorpha*) and Nuttall's Waterweed (*Elodea nuttallii*). In Ireland, Nuttall's Waterweed was limited to a single population in Dublin by 1984 (Simpson, 1984), but the species has spread across the country to numerous waterbodies (NBDC, 2020c). Nuttall's Waterweed can be spread by seed or plant fragments (Hoffmann *et al*., 2013).

The eradication of these invasive species from freshwater systems is virtually impossible, so biosecurity measures will be required to ensure that the proposed development does not result in their spread to other waterbodies.

Butterfly Bush is an invasive species, particularly of disturbed ground and urban areas, though it not listed on the Third Schedule. It spreads from cuttings and through the dispersal of abundant seeds, which can germinate in numbers when soil is disturbed. To minimise the risk of spreading this species within the project area, individuals present should be cut back to the stump in late spring to early summer. The stump should then be immediately treated by brushing on a systemic weed killer (NRA, 2010).

The water quality status of the Grand Canal Dock would be improved by the removal of the existing storm water outfall discharging into such an enclosed area by its extension out to the River Liffey Estuary. While this would divert the potentially polluting discharge into the River Liffey Estuary, the greater dilution factor due to the river flow and tidal exchange would mean the negative effect of any discharge would be reduced.

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Appendix I – Map

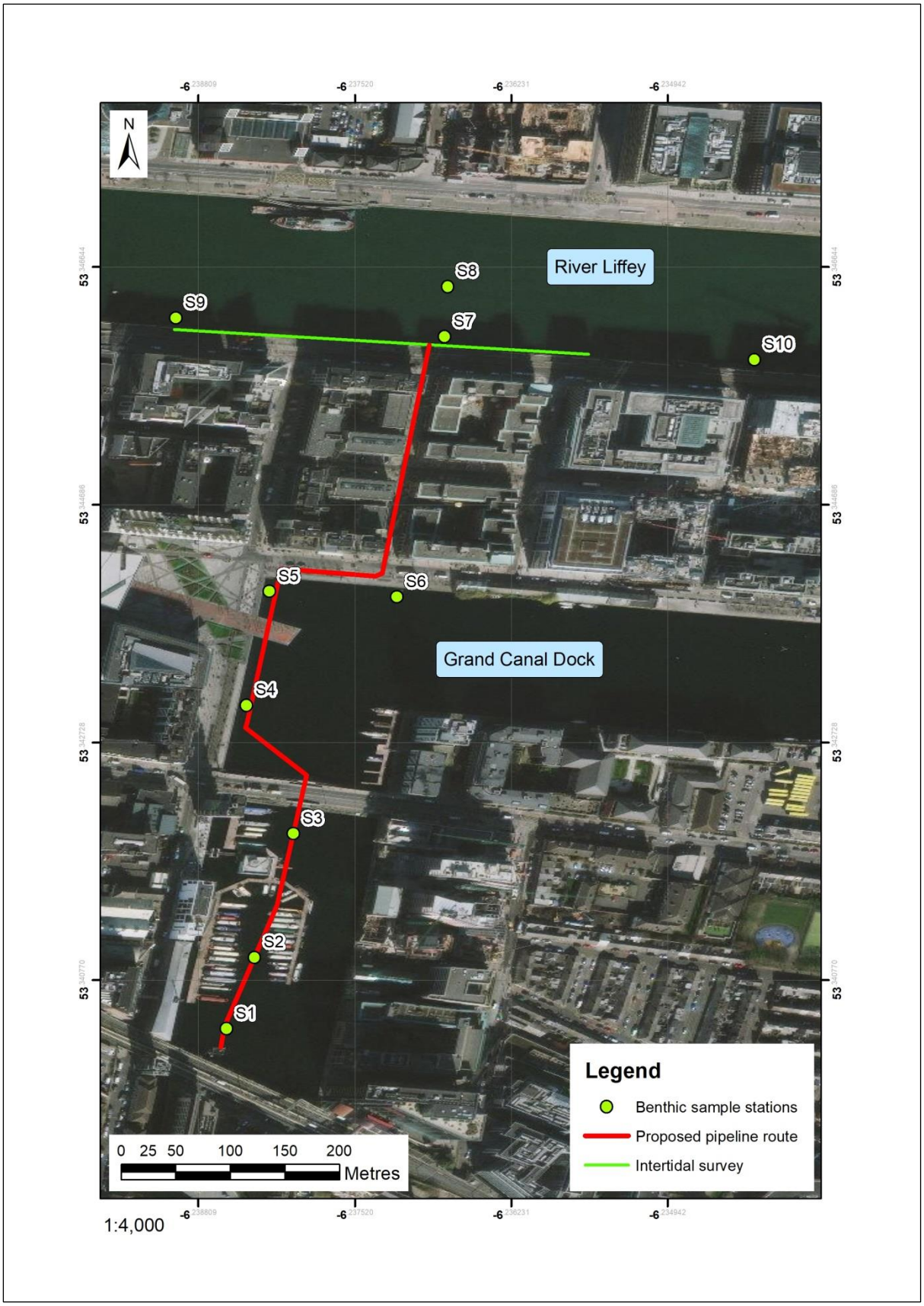

Figure A1. Map showing the benthic grab sample stations (S1-S10) and the area inspected as part of the intertidal survey (green line) at the Grand Canal Dock and River Liffey Estuary on 28-29/07/2020. The proposed pipeline route is in red.

Appendix II – Tables

Table A1. Locations of benthic sample stations for the Grand Canal Dock SWOP in degrees decimal minutes

Station	Location	Latitude (DDM)	Longitude (DDM)
S1	Grand Canal Dock (Upper)	53° 20.4223' N	6° 14.3148' W
S2	Grand Canal Dock (Upper)	53° 20.4574' N	6° 14.3008' W
S3	Grand Canal Dock (Upper)	53° 20.5186' N	6° 14.2817' W
S4	Grand Canal Dock (Lower)	53° 20.582' N	6° 14.305' W
S5	Grand Canal Dock (Lower)	53° 20.6383' N	6° 14.2936' W
S6	Grand Canal Dock (Lower)	53° 20.6355' N	6° 14.2305' W
S7	River Liffey Estuary	53° 20.7641' N	6° 14.207' W
S8	River Liffey Estuary	53° 20.7889' N	6° 14.2052' W
S9	River Liffey Estuary	53° 20.7734' N	6° 14.3398' W
S10	River Liffey Estuary	53° 20.7528' N	6° 14.0537' W

Table A2. Macroinvertebrate species recorded in the course of the Grand Canal Dock SWOP benthic survey on 28/07/2020. Stations 1-6 were within Grand Canal Dock. Stations 7-10 were in the River Liffey, but no fauna were recorded.

Station	1	2	3	4	5	6
Species						
OLIGOCHAETA						
Naididae (former Tubificidae)	-	39	-	-	-	-
HIRUDINEA						
Hemiclepsis marginata	1	-	-	-	-	-
Erpobdella octoculata	18	-	-	-	-	-
Glossiphonia complanata	1	-	-	-	-	-
Alboglossiphonia heteroclita	-	-	1	-	-	-
MOLLUSCA						
Gastropoda						
Bithynia tentaculata	9	-	22	62	8	12
Bithynia leachii	1	-	4	6	2	5
Bathyomphalus contortus	-	-	2	1	-	-
Gyraulus albus	-	-	-	-	-	1
Gyraulus laevis	-	-	1	-	4	2
Theodoxus fluviatilis	-	-	-	4	-	1
Hippeutis complanatus	-	-	-	1	10	-
Valvata piscinalis	-	-	-	-	5	1
Physa fontinalis	-	-	-	-	-	2
Radix peregra	-	-	-	-	-	1
Bivalvia						
Dreissena polymorpha	-	-	-	9	4	-
Pisidium sp.	6	-	-	1	-	-
CRUSTACEA						
Isopoda						
Asellus aquaticus	3	-	11	32	2	36
Amphipoda						
Crangonyx pseudogracilis	1	-	3	2	-	8
INSECTA						
Trichoptera						
Agraylea multipunctata (larva)	-	-	-	-	-	5
Agraylea multipunctata (pupa)	-	-	-	-	1	1
Agraylea multipunctata (adult)	-	-	-	-	-	1
Ceraclea senilis (pupa)	-	-	-	1	-	-
Diptera						
Chironomidae (pupa)	-	-	-	-	-	1
Chironomidae (larva)	-	-	-	-	-	6
Total species	**8**	**1**	**8**	**9**	**8**	**12**
Total individuals	**40**	**39**	**44**	**119**	**36**	**83**

CONSULTANTS

BEC Consultants Ltd.
65 Holywell, Dundrum,
Dublin 14, D14 P5W0

Email: info@botanicalenvironmental.com
Web: www.botanicalenvironmental.com

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Offices at
Dublin
Limerick

Registered Office
24 Grove Island
Corbally
Limerick
Ireland

t: +353 (0) 61 345463
e:info@jbaconsulting.ie

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