Client:

Dublin City Council and Irish Water

Applicant:

Dublin City Council

Project:

Grand Canal Storm Water Outfall Extension

Report:

Volume 1
Environmental Impact Assessment: Non-Technical Summary

BARRY & PARTNERS

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Glossary and Abbreviations

Acronym	Description
AA	Appropriate Assessment
AADT	Annual Average Daily Traffic
ABP	An Bord Pleanála
ACSU	Archaeological Consultancy Services Unit
ADCO	The Archaeological Diving Company Ltd
AM	Before midday
bec	Botanical, Environmental & Conservation Consultants Ltd.
BGL	Below Ground Level
BH	Borehole
BOD	Biological Oxygen Demand
BS	British Standards
c.	Circa (approximately)
C&D	Construction and Demolition
CA	Competent Authority
CD	Chart Datum
COD	Chemical Oxygen Demand
CEMP	Construction Environmental Management Plan
CESSM	Civil Engineering Standard Method of Measurement
CFA	Continuous Flight Auger
CIEEM	Chartered Institute of Ecology and Environmental Management
CIRIA	Construction Industry Research and Information Association
Ch.	Chainage
CSO	Combined Sewer Overflow
DART	Dublin Area Rapid Transport
dB	Decibels

Acronym	Description
DCC	Dublin City Council
DCIHR	Dublin City Industrial Heritage Record
DDDA	Dublin Dockland Development Authority
DMRB	Design Manual for Roads and Bridges
DEHLG	Department of the Environment, Heritage & Local Government. The Department is now the Department of Housing, Planning and Local Government.
DIN	Dissolved Inorganic Nitrogen
DoELG	Department of the Environment and Local Government
EC	European Commission
E. *coli*	Escherichia Coliforms
e.g.	For example
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EPA	Environmental Protection Agency
EQS	Environmental Quality Standard
ESB	Electricity Supply Board
etc.	Et cetera (and the rest)
EU	European Union
GCSWOE	Grand Canal Storm Water Outfall Extension
GCT	Grand Canal Tunnel
GCTS	Grand Canal Tunnel Sewer
GDA	Greater Dublin Area
GDSDS	Greater Dublin Strategic Drainage Study
GHG	Greenhouse Gases
GSI	Geological Survey Ireland
GSL	Geotechnical Specialists Ltd.
GWB	Groundwater Bodies

Acronym	Description
HDPE	High Density Polyethylene
HGVs	Heavy Goods Vehicle
Hz	Hertz
IAQM	Institute of Air Quality Management
IGI	Institute of Geologists of Ireland
ISO	International Organization for Standardization
ITM	Irish Transverse Mercator
IW	Irish Water
JNCC	Joint Nature Conservation Committee
L_{Aeq}	Equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period
L_{AeqT}	Equivalent continuous sound level over the time period T (in seconds)
L_{Amax}	Instantaneous maximum sound level measured during the sample period
L_{Amin}	Instantaneous minimum sound level measured during the sample period
L_{A10}	Sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise
L_{A90}	Sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise
L_{AX}	"A-weighted" Sound Exposure Level of the event considered (dB)
Li	Locally important aquifer unproductive except for local zones
LoW	List of Waste
LV	Light Vehicles
KDA	Key Developing Area
km	Kilometres
m	Metres
mg	Milligrams
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs

Acronym	Description
MRP	Molybdate Reactive Phosphate
MSFD	Marine Strategy Framework Directive
Mt CO_2eq	Million Tonnes Carbon Dioxide Equivalent
N	Nitrogen (unless otherwise defined within a Section)
NBDC	National Biodiversity Data Centre
NHA	Natural Heritage Areas
NIS	Natura Impact Statement
NIAH	National Inventory of Architectural Heritage
no.	Number
NPF	National Planning Framework
NPWS	National Parks and Wildlife Service
NRA	National Roads Authority
NSL	Noise Sensitive Locations
NSO	National Strategic Outcomes
NTA	National Transport Authority
NVMP	Noise and Vibration Management Plan
OD	Ordnance Datum
OS	Ordnance Survey
OSCADY	Optimised Signal CApacity and DelaY
OSI	Ordnance Survey Ireland
PM	After midday
PM_{10}	Particulate Matter <10µm
$PM_{2.5}$	Particulate Matter <2.5µm
pNHA	Proposed Natural Heritage Areas
PAH	Polycyclic Aromatic Hydrocarbon
r_1	Distance at which L_{AX} is expressed
r_2	Distance to the assessment location

Acronym	Description
RBMP	River Basin Management Plan
RFC	Ratio of Flow to Capacity
RMP	Record of Monuments and Places
RPO	Regional Policy Objective
RPS	Record of Monuments and Places
RSES	Regional Spatial and Economic Strategy
RWMP	Resource and Waste Management Plan
SAC	Special Areas of Conservation
SDRA	Strategic Development Regeneration Area
SDZ	Strategic Development Zone
SEA	Strategic Environmental Assessment
SJRQ	Sir John Rogerson's Quay
SI	Statutory Instrument
SIL	Site Investigations Ltd.
SMR	Sites and Monuments Records
SPA	Special Protected Areas
Spp.	Refers to all the species belonging to that family or genus
TII	Transport Infrastructure Ireland
TPH	Total Petroleum Hydrocarbon
TSAS	Trophic Status Assessment Scheme
UAIA	Underwater Archaeological Impact Assessment
UK	United Kingdom
UNESCO	United Nations Educational, Scientific and Cultural Organisation
WI	Waterways Ireland
WIID	Wreck Inventory of Ireland Database
WEEE	Waste Electrical and Electronic Equipment
WFD	Water Framework Directive

Acronym	Description
WQM	Water Quality Modelling
WWDA	Waste Water Discharge Authorisation
WWDL	Waste Water Discharge License
WWTP	Waste Water Treatment Plant
yr	Year
ZoI	Zone of Influence
ZTV	Zone of Theoretical Visibility
µg	Microgram

SECTION 1: Introduction

1.1 Overview

An Environmental Impact Assessment Report (EIAR) for the Grand Canal Storm Water Outfall Extension (GCSWOE) has been prepared on behalf of Dublin City Council (DCC) (the Applicant). The EIAR accompanies a planning application made directly to An Bord Pleanála (ABP) under Section 226 of the Planning and Development Act 2000 (as amended). An EIAR is an assessment and analysis of potential impacts on the receiving environment caused by a proposed project. As part of the screening and scoping stage for the project *Environmental Impact Assessment Screening Report* and *Environmental Impact Assessment Scoping Report* was prepared by J.B. Barry and Partners Ltd (2020), refer to Volume 3, Appendix 1A and Appendix 1B respectively.

This Non-Technical Summary (NTS) describes the Project, Environmental Impact Assessment (EIA) process and summarises the key environmental impacts arising from each of the environmental assessments carried out by a panel of experts in accordance with best practice. The environmental assessments involved desktop studies, site visits, surveys and site-specific investigations. The NTS also outlines the mitigation and monitoring measures proposed along with residual impacts identified.

1.2 Project Background

The Grand Canal Tunnel in Dublin City Centre 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;
- Provide a conduit for the overflows from the existing combined foul and storm sewers; and
- 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, north of canal bridge at Northumberland Road (Manhole 1), the tunnel splits with the foul component being conveyed to Ringsend Wastewater Treatment Plant and the stormwater component being conveyed to the Grand Canal Basin via a 3.2m diameter pipe.

The Basin, in this report, refers to the waterbody within Grand Canal Docks. The Docks, in this report refers to the overall area encompassing the Basin, quayside, and surrounding area.

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 and is also known as a Key Developing Area (KDA) within the Dublin City Council Development Plan, 2016 – 2022, and also a Strategic Development Zone (SDZ) within the North Lotts and Grand Canal Planning Scheme, 2013. 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. 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.

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

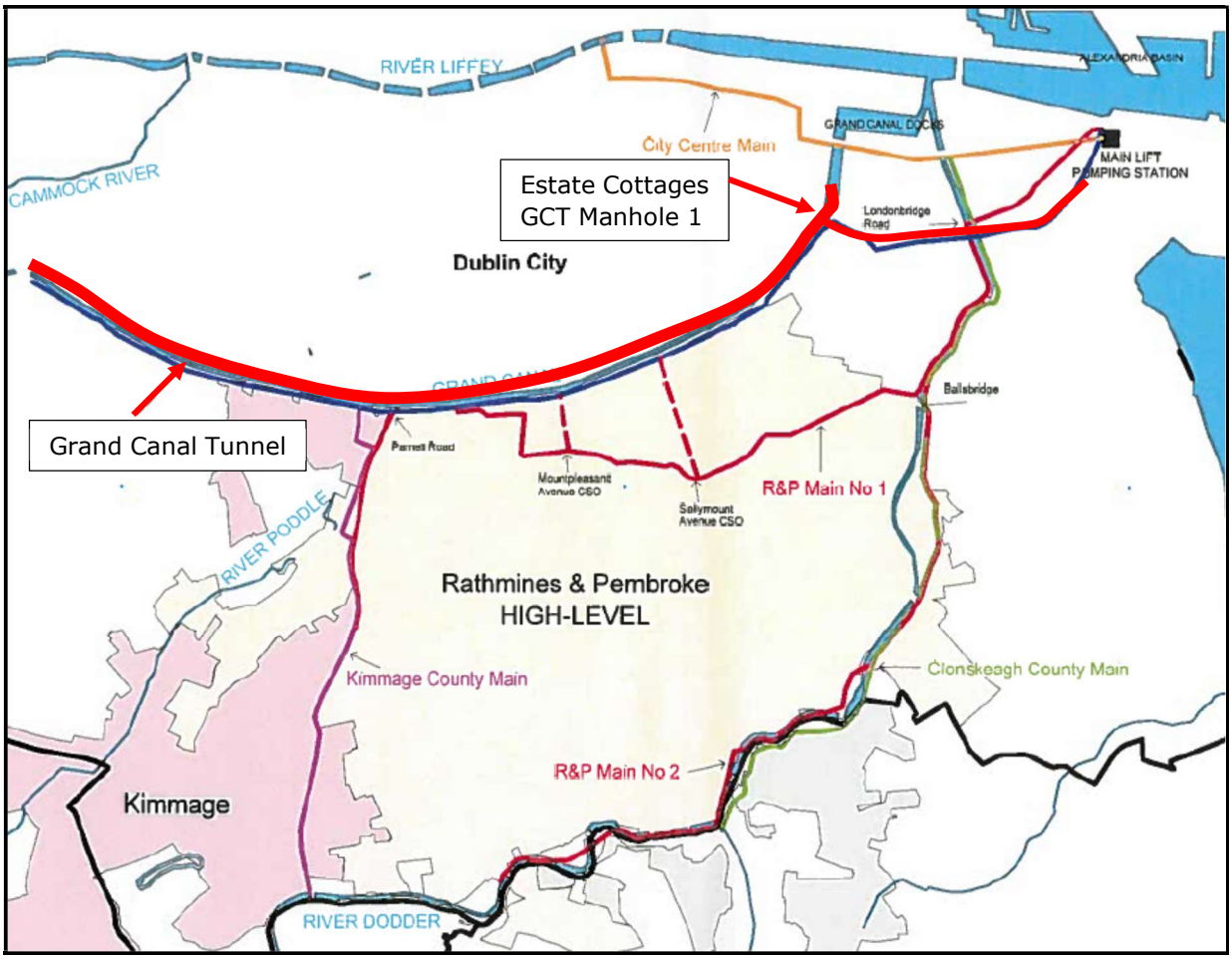

Figure 1.1 Grand Canal Tunnel

1.3 Planning History

In the early 1990's, arising from development and upgrading of the Grand Canal Docks and its environs, the Office of Public Works (who had responsibility for dock maintenance/operation) requested that the storm water discharge from the Grand Canal Tunnel be removed from the Grand Canal Basin. A study carried out by J. B. Barry and Partners in 1992 identified possible alternative options for re-routing the storm water discharge away from the Docks into the River Liffey. A preferred option was identified, cost estimates were prepared, and a report was submitted recommending implementation of the proposed project outlined herein.

This project began in 2002 where Phase 1 saw the construction of a 170m long 4.0x2.7m box culvert underneath Asgard Road, between Hanover Quay and Sir John Rogerson's Quay (SJRQ). The proposed Phase 2 of this project involves the connection of the Grand Canal Tunnel to the box culvert, completed as part of Phase 1, and the construction of the outlet structure into the River Liffey at SJRQ. In 2008/2009 the design prepared for Phase 2 proceeded to tender and a Section 25 certificate (planning consent) was granted by the Dublin Docklands Development Authority (DDDA). However, the project was put on hold in 2012, primarily due to the economic downturn. In 2015 the DDDA was dissolved, and the Section 25 certificate became void. In 2017 a feasibility study was completed to consider three more alternative pipeline routes through the basin and assess the most appropriate option. It was concluded that the original option was the optimal solution.

1.4 Applicant

DCC and Irish Water have agreed to jointly complete the Planning and Statutory Approvals and co-fund the extension of the Grand Canal Tunnel outfall pipe. DCC is making the application. J. B. Barry and Partners have been appointed as the Engineering consultant.

DCC is the authority responsible for local government in Dublin City and is governed by the Local Government Act 2001. Irish Water is a subsidiary of the Ervia Group (formerly Bord Gáis Éireann), which was incorporated as a company under the Water Services Act 2013. At present, Ervia's responsibility lies in the delivery of gas, water infrastructure and services throughout Ireland.

The application along with the Non-technical Summary and Environmental Impact Assessment Report (EIAR) for the proposed development has been prepared by the design team in J. B. Barry and Partners in conjunction with the Applicant. An AA Screening, Natura Impact Statement and Flood Risk Assessment have also been submitted as part of the planning application documents.

SECTION 2: Description of Proposed Development

2.1 Site Location

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 existing 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 the existing culvert beneath Asgard Road, built in 2002 as part of the Phase 1 works for this project. At the northern end of this existing culvert, a pipeline together with an outfall to the River Liffey will be constructed underneath SJRQ. The stormwater discharge will therefore have bypassed its previous outfall within the Basin and will discharge directly into the River Liffey/Lower Liffey Estuary. Refer to Figure 2.1.

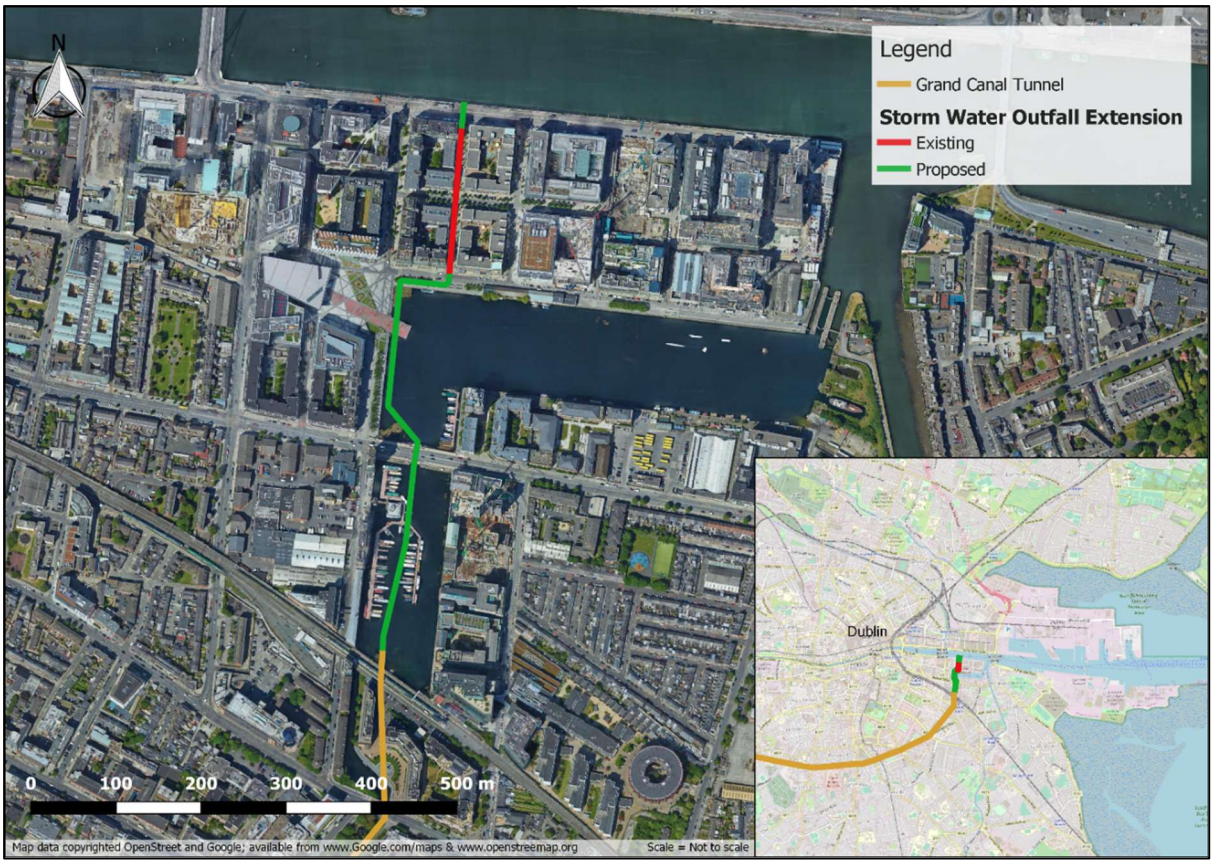

Figure 2.1 Overview of Grand Canal Storm Water Outfall Pipeline

2.2 Description of the Proposed Works

The proposed development will result in the re-routing of the stormwater section of the Grand Canal Tunnel to the River Liffey. This currently discharged into the Basin. The discharge periodically contains elevated concentrations of Faecal Coliform, BOD, Nutrients and Suspended Solids from Combined Sewer Overflows (CSOs). 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) culvert on Hanover Quay;
- Construction of new outfall structure at SJRQ into the River Liffey; and
- 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 bed of the Grand Canal Basin, and 100m along existing road and pedestrian infrastructure, see Figure 2.2.

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 the 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 connecting to the existing Phase 1 culvert on Asgard Road (see Volume 4, Project Drawings).

Particular constraints considered for the project include:

- Meeting canal draught requirements in terms of navigation; 1.9m minimum clearance;
- Avoiding the existing 8 foot (2.4m) diameter sewer, which is more than 100 years old, underneath the Basin at Mac Mahon Bridge;
- Minimising discharge velocities into the River Liffey; and
- Minimising risk of damage to the proposed extension pipe which could cause rapid drawdown of the Grand Canal Basin.

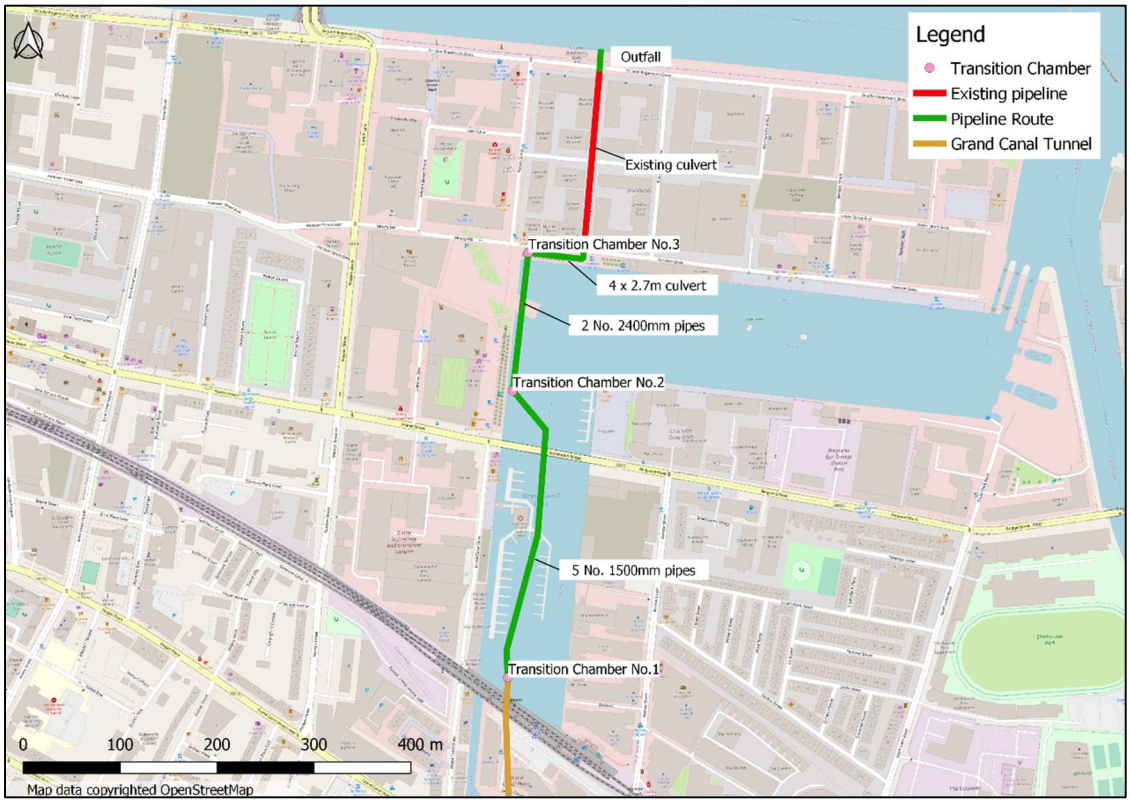

Figure 2.2 Grand Canal Storm Water Outfall pipeline within the Grand Canal Docks

2.3 Need for the scheme

Water quality in the Grand Canal Basin has been adversely affect over recent years by the existing stormwater outfall discharging combined/foul sewerage into the southern end of the Basin (also known as the Inner Docks) during periods of high rainfall. The long retention time and low throughput of water through the Basin make it vulnerable to pollution after these events. In 2016, the impact on water quality in the Grand Canal Docks resulted in complaints being made to the EPA by Waterways Ireland. The most severe instances of microbiological contamination occur in the Inner Basin in close proximity to the existing surface water outfall.

In 2017 Irish Water, DCC and Waterways Ireland agreed 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, that the primary source of the periodic pollution of the waters in the Basin is the discharge from the surface water section of the Grand Canal Tunnel.

It was concluded that if the Grand Canal Basin is to be usefully developed as an amenity in accordance with current policy, the existing discharge point of the Grand Canal Tunnel surface water outfall must be removed from the Basin (as proposed in the Dublin City Development Plan 2016-2022).

The solution involves the extension of the existing storm water outfall pipe to SJRQ where an outfall structure will be constructed into the River Liffey.

Primary objective:

- Extension of the Grand Canal Surface Water Outfall through the Grand Canal Docks to a new outfall at the River Liffey.

Primary drivers:

- To reduce pollution and improve water quality in the Grand Canal Basin; and
- To enhance the amenity value of the Grand Canal Docks.

SECTION 3: Legislative Context

3.1 Policy Overview

Dublin City Council are seeking planning permission for a storm water outfall extension at Grand Canal Dock which will discharge to the River Liffey. This planning application is being made in accordance with Section 226 of the Planning and Development Act 2000 on the basis that it relates to a Local Authority proposed development which is intended to be carried out wholly or partly on the foreshore and which requires environmental impact assessment.

This section sets out the legislative context governing the planning and development of the proposed project. This includes a strategic review of the planning policy context at a national, regional and local level and other relevant statutory and non-statutory planning documents.

Under a European context the following were considered:

- Environmental Impact Assessment Directive (Consolidated 2011/92/EU and 2014/52/EU);
- Birds and Natural Habitats Directives;
- EU Water Framework Directive (2000/60/EC);
- Marine Strategy Framework Directive (2008/56/EC); and
- Public Participation Directive (2003/35/EC).

Under a National context the following were considered:

- Water Services Act 2007;
- Water Services Policy Statement 2018-2025;
- River Basin Management Plan for Ireland 2018-202;
- Project Ireland 2040 – National Planning Framework; and
- Maritime Area Planning Act.

Regional strategies include Regional Spatial and Economic Strategy for the Eastern and Midland Region (RSES) which is a 12-year strategic regional development framework to guide development in the region. The primary aim of the RSES is to implement Project Ireland 2040 at the regional tier. The RSES seeks the provision of infrastructure and services in a sustainable, planned and infrastructure led manner to ensure the sustainable management of water, waste and other environmental resources. The key Regional Policy Objectives (RPOs) relating to the sustainable management of water and the achievement of water quality were considered.

At a local level, following policies and plans were taken into account:

- Dublin City Development Plan 2016-2022;
- Draft Dublin City Development Plan 2022-2028; and
- North Lotts and Grand Canal Dock Strategic Development Zone (SDZ).

The following reports and support studies were also considered:

- Dublin Docklands Social Infrastructure Audit 2015;
- North Lotts and Grand Canal Dock SDZ Water Animation Strategy 2018;
- 'Waters Edge' Tourism Framework for Docklands; and
- Grand Canal Basin Amenity Project Joint Working Group Report.

3.2 EIA Process

The structure and general sequence of this EIAR follows the EPA Guidelines (2022) and consists of the following steps or stages:

- **Screening -** Determining whether an EIA is required or not;
- **Scoping -** If an EIA is required, then the scope of the EIAR is established;
- **EIAR -** An Environmental Impact Assessment Report (EIAR) is prepared by the Applicant as part of the consent application. The EIAR sets out among other things a statement of the likely significant effects, if any, which the proposed project, if carried out, would have on the environment;
- **EIA -** Once the application is lodged, the competent authority (CA) (in this case, ABP) examines the EIAR, circulating it to statutory consultees while also making it available to the public. In addition to its own consideration of the information presented in the EIAR the CA takes account of other information submitted by the applicant, certain authorities and the public during the consent process; and
- **Consent Decision -** The consent decision is a key milestone which marks the end of the formal EIA process. The implementation of mitigation measures and any monitoring measures contained in the EIAR and consent decision continues after the formal EIA process is complete.

Article 4(1) and Annex I of the EIA Directive (2014/52/EU) lists projects for which an EIA is mandatory, whereas Article 4(2) and Annex II lists project types for which an EIA may be required. The EIA Screening Report is contained in Volume 3, Appendix 1A. Next, as part of the scoping stage, the *Environmental Impact Assessment Scoping Report* (Volume 3, Appendix 1B) was prepared by J.B. Barry and Partners Ltd. and issued to the relevant prescribed bodies and local authorities.

The EIAR for this project has been prepared by J. B. Barry & Partners with additional specialist input provided by competent experts in a variety of disciplines. The structure of the EIAR for the GCSWOE project is as follows:

- Volume 1 Non-Technical Summary;
- Volume 2 Environmental Impact Assessment: Main Report;
  - Section 1 Introduction;
  - Section 2 Description of the Proposed Development;
  - Section 3 Legislative Context;
  - Section 4 Assessment of Alternatives;
  - Section 5 Population and Human Health;
  - Section 6 Biodiversity;
  - Section 7 Water Quality and Hydrology;
  - Section 8 Land, Soils, Geology and Hydrogeology;
  - Section 9 Air Quality and Climate;
  - Section 10 Noise and Vibration;
  - Section 11 Traffic and Transport;
  - Section 12 Archaeology and Cultural Heritage;
  - Section 13 Waste Management;
  - Section 14 Material Assets;
  - Section 15 Landscape and Visual Impact;
  - Section 16 Summary of Interactions;
  - Section 17 Summary of Mitigation;
  - Section 18 Summary of Residual Impacts; and
  - Section 19 Cumulative Impacts.
- Volume 3 Environmental Impact Assessment Report: Appendices; and
- Volume 4 Project Drawings

3.3 Consultation

As part of the preparation of the EIAR, Irish Water and Dublin City Council undertook consultation with the public, interested parties, and prescribed bodies in respect of the proposed development. Prescribed bodies/stakeholders were identified as part of a Stakeholder Audit. This audit was maintained and updated throughout the project.

A number of statutory bodies were contacted throughout the different stages of the EIAR process. A summary of submissions received as part of this process is enclosed in Volume 3, Appendix 3A. The submissions received were communicated to each section specialist and where applicable have been addressed in each section.

Alongside this, a pre-application meeting was held with Foreshore Licensing Unit, a consultation meeting was held with DCC Transport Department regarding traffic management in the area during construction phase and regular meetings have been undertaken with Waterways Ireland regarding works within the basin. The Development Application Unit of the Department of Housing, Local Government and Heritage were approached by the project biodiversity consultants (JBA) in relation to a pre-planning consultation, they responded- '*The Department is not in a position to make specific comment on this particular referral at this time. No inference should be drawn from this that the Department is satisfied or otherwise with the proposed activity. The Department may submit observations/recommendations at a later stage in the process.*'

Consultations were carried out with Dublin Port Company. They indicated that the proposed development may restrict berthing for large ships along SJRQ in the immediate vicinity of the outfall. However, they acknowledge the need for the project and have issued a letter of no objection.

In addition to the above, each section specialist has consulted relevant Departments and Bodies in order to acquire additional information where needed to undertake the assessment.

A number of communications tools and channels were utilised including:

- A Frequently Asked Questions (FAQ) document;
- Project information pages on Irish Water and Dublin City Council website;
- Press release to regional newspapers; and
- Public Information Day Webinar. List of invitees included local organisations and businesses. A full list of invitees to the webinar is attached in the Volume 3, Appendix 3B.

3.4 Separate Consent Processes

In addition to the planning permission, other consents and considerations are also required for the construction and operation of the proposed GCSWOE project.

Irish Water are in process of submitting a Waste Water Discharge License review for the Ringsend agglomeration to account for the numerous overflows and the upgrade project at the treatment plant. The Ringsend agglomeration had a licence issued in 2010 (Licence D0034-01). The GCSWOE project will be included in the license review.

The location of the proposed outfall structure at SJRQ is between the high and low water marks and hence a foreshore license under the Foreshore Act 1933 (as amended) will be obtained for the works to be undertaken at SJRQ.

SECTION 4: Assessment of Alternatives

4.1 Overview

This section examines the main alternatives considered for the proposed development and provides an indication of the main reasons for the final scheme choice, taking into accounts the effects on the environment.

This scheme has a long history – the Grand Canal Tunnel was constructed in 1976 and it was originally proposed to discharge to the River Liffey but instead the outfall was located in the inner Grand Canal Basin which eventually discharges to the River Liffey. The Greater Dublin Strategic Drainage Study (GDSDS), which was adopted in 2005, noted *'The outfall for the Grand Canal storm sewer is located at the Grand Canal Dock but proposed works, some of which have been completed, will transfer these storm flows directly to the River Liffey'.* The SEA for the GDSDS was completed in 2008.

In 2001, an EIS was prepared to extend the Grand Canal Tunnel to the River Liffey, and Section 25 consent was obtained from the Dublin Dockland Development Authority (DDDA). Phase 1 of the project was constructed in 2002 as part of the DDDA's development of commercial and residential properties in the Dockland area. Tender documents were prepared for Phase 2 in 2010 but given the financial situation in Ireland at that time the project didn't proceed. In the interim the DDDA was disbanded, and it is therefore necessary to prepare a new planning application along with an updated EIAR.

A number of alternatives have been assessed under the Rathmines and Pembroke Drainage Area Plan, completed as part of the GDSDS:

- Storm Water Separation;
- Storm Water Storage; and
- Pipeline Upsizing.

It should be noted that while multiple options were considered under the Rathmines and Pembroke Drainage Area Plan these solutions don't eliminate overflows and therefore the intermittent pollution events are not resolved. The Rathmines and Pembroke Drainage Study (2015) does not identify what level of impact or proportion of impact that these discharges have on the water quality and how does this impact compare to that imposed on the Grand Canal Basin by the storm water discharges. This is because it assumed that the GCSWOE project (commenced in 2002) would be completed and the outfall extended to River Liffey (the GDSDS, North Lotts and Grand Canal Dock SDZ and the Docklands Master Plan (2008)).

4.2 Existing Infrastructure

The existing Grand Canal Tunnel, which was constructed in 1976, discharges stormwater underwater into the inner Grand Canal Basin. The outfall structure is located adjacent to the Barrow Street station and railway line and only the gantry and access manhole are visible.

The Phase 1 culvert, which is 170m long 4m wide and 2.7m high, was completed in 2002 as part of the development of the Docklands Area. It is located under Asgard Road between Hanover Quay and SJRQ. Provision was made for the future connections of Phase 2 on either side, one between the existing Grand Canal Tunnel in the Inner Basin, and the other towards the proposed outfall location on SJRQ. The aim of the project is to connect the Grand Canal Tunnel discharge location to the Phase 1 culvert and to a new outfall structure that discharges into the River Liffey.

4.3 Assessment of Alternatives

Significant Stakeholder consultation was undertaken over the development of the project including Waterways Ireland, Dublin City Council, Dublin Port Authority and the Harbour Master. The following physical constraints, which are still relevant today, informed the design and include:

- A minimum draught clearance of 1.9m to ensure that canal boats can access the basin;
- A minimum of 0.5m clearance over the "8-foot" Ringsend sewer at Mac Mahon Bridge – to protect the structure;
- Need to minimise boat draught restrictions in the Grand Canal Basin and for example, Waterway Ireland require the pipeline/culvert to be in the Hanover Quay Camphire rather than taking up berthing space along the quays; and
- The wall stability assessments identified that pipelines/structures should be offset a minimum of 8m from the Inner Basin quay wall and 4m from Outer Dock quay wall.

A number of alternatives have been assessed, these include:

- Do Nothing;
- Remove Pollution at Source; and
- Pipeline Options, layouts and construction methodologies.
  - Option 1
  - Option 2
  - Option 3
  - Option 4

4.3.1 Do Nothing Option

Under a "Do Nothing" option where Phase 2 of the Grand Canal Stormwater Outfall Extension project is not carried out the effects would be as follows:

- In times of heavy rainfall CSO (combined sewer overflows) from the south city catchment and the overflow from the River Poddle will enter the stormwater cell of the Grand Canal Tunnel and discharge to the Basin through the existing outfall. These flows contain a combination of storm water and sewage.
- The water quality in the basin will continue to be adversely impacted. The basin has very little other inflows and there is limited dilution or throughflow of water.
- This is a significant amenity area with a large number of canal boats – particularly in the Inner basin. Deterioration in water quality within the basin will limit the opportunity to develop water-based activities.
- The Grand Canal Tunnel is an integral component of the Greater Dublin Strategic Drainage Strategy. Flows in the tunnel will continue to increase due to on-going urbanisation of the catchment and also due to increased/more severe rainfall events due to climate change. As its capacity is maximised the flows to the basin will increase and the risk of overtopping the lock gates and causing localised flooding will increase.
- The elimination of the discharges of the Storm Water Outfall in the basin is referred to under Dublin Docklands Master Plan policy (IF3) with the purpose under the SEA of enhancement of water quality and biodiversity. The same objective is repeated in the North Lotts & Grand Canal Dock STZ (S13) and associated SEA prepared by Dublin City Council Planning and Economic Development Department. Should Phase 2 not proceed then these objectives will not be achieved.
- Should the project not proceed the Phase 1 culvert constructed in 2002 will become redundant and serve no useful purpose.

4.3.2 Remove Pollution at Source

Whilst current best practice is to construct separate storm and sewer pipe networks, many of the older pipe networks in Dublin City are combined. Currently the potential sources of flows in the GCT are as follows:

- River Poddle Flood Relief Flows;
- Stormwater sewers; Combined sewers and stormwater overflows – some parts of Dublin city include combined sewers i.e. the sewer is for both foul and stormwater. CSOs protect the Wastewater Treatment Plants (WWTPs) from being overloaded; and
- Foul service/sewer misconnections.

There are a number of different sources of pollutants to the stormwater cell of the GCT and it is not feasible to locate and remediate these at source. In addition, CSOs are an integral part of combined sewer networks. Instead, the discharge of the polluted water needs to be controlled and discharged to a location where there is adequate dilution and dispersion.

4.3.3 Pipeline Options

Figure 4.1 below shows the locations of the different pipeline routes, including the tunnelling option, considered as part of the development of the scheme. As all options remove the discharge from within the Grand Canal Basin and into the River Liffey where there is adequate dilution and dispersion the overall environmental impacts are similar and positive. The pipeline route options through the basin were assessed technically and economically together with the requirements of the Stakeholders in the Dock.

All options have been hydraulically designed to convey the stormwater discharge to the proposed outfall to the River Liffey on SJRQ. It should be noted that where canal boats need to cross over the pipelines then the 5 no. 1.5m diameter pipeline configuration is required to provide adequate draught. Where this is not necessary (along the quay wall in the outer basin) then the 2 no. 2.4m diameter pipelines provide the necessary hydraulic capacity. In addition, transition chambers are required where there is a change in pipe configuration. The SJRQ outfall structure, which connects into the existing Phase 1 culvert, is common to all options.

Option 1 was the preferred design and had been previously granted planning approval by the DDDA. This option was based on negotiations and the requirements stakeholders.

Option 2 is a direct pipeline from the tunnel outfall to the existing Phase 1 culvert.

Option 3 presents an alternative construction methodology, using tunnelling in place of traditional construction for a direct connection from Grand Canal Tunnel to Hanover Quay. The depth of this tunnel is determined based on the need to go under the existing 8ft city sewer below Mac Mahon Bridge and thus this option would be a syphon.

Option 4 is a variation of Option 1 where the pipework arrangement and route within the inner dock area have been altered. The route of the pipeline has been diverted to run along the Inner Dock Quay Wall.

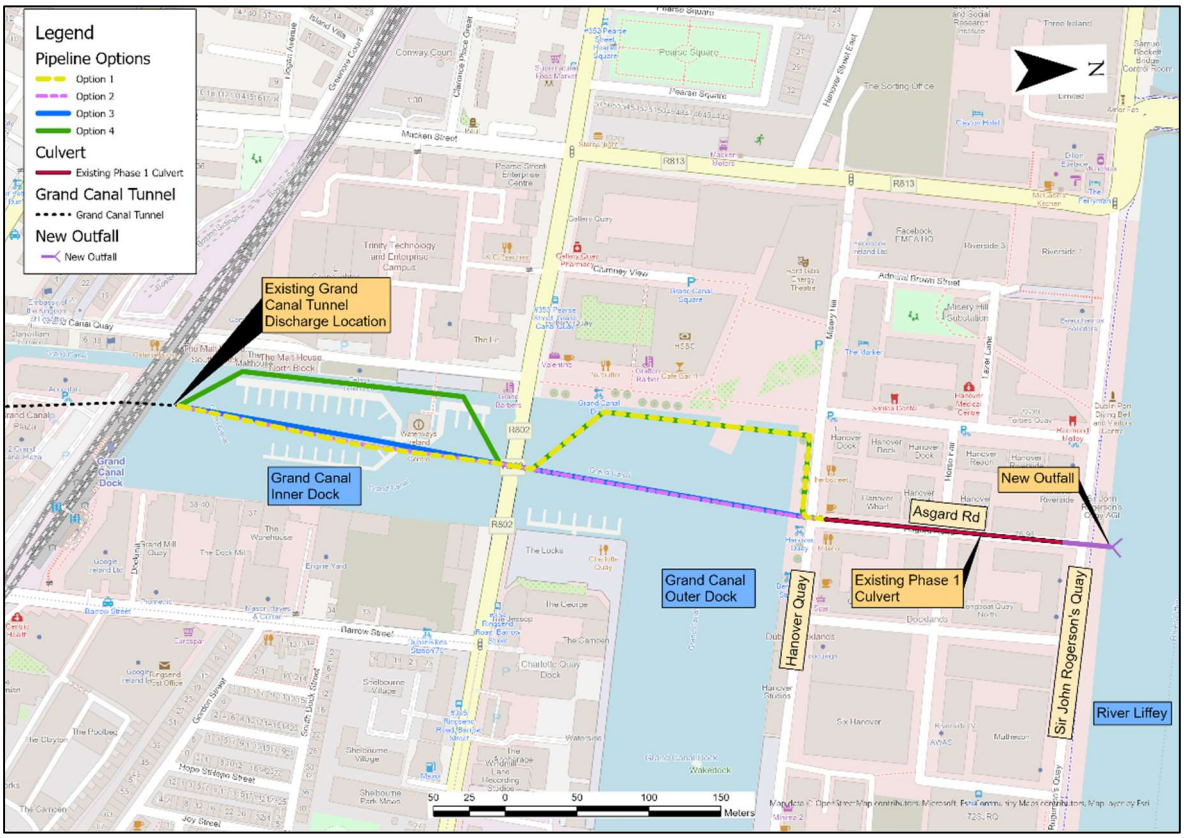

Figure 4.1 Pipeline Options

4.4 Comparison/ Assessment of Alternatives

As the "do nothing" option was not acceptable and the removal of pollution at source was neither feasible nor practical the extension of the outfall to the River Liffey bypassing the Basin was the preferred solution. The various pipeline route options were then considered. The following Table 4.1, also based on the 2017 feasibility study report (FSR), detailed the advantages and disadvantages of each option. This has been updated as part of the EIAR process to cater for recent developments in the catchment.

Table 4.1 Comparison of Pipeline Options

Option	Advantages	Disadvantages
Option 1	▪ Minimal dredging in Outer Dock (average depth approx. 400mm) ▪ Berth space retained along Hanover Quay ▪ Less disruption to mooring system in the Inner Dock than Option 4 ▪ Second lowest cost option ▪ Reduced risk compared with tunnelling ▪ Stakeholders, and specifically Waterways Ireland, prefer this option (and this was the one that had planning from the DDDA) ▪ Studies/investigations completed for this route (may need some updating)	▪ Significant disruption to landscaped area of Hanover Quay, including removal of trees, metal guards to trees, stone seating and planters. Reinstatement costs included in the cost estimate ▪ Construction work in HQ would be very visible to the public and potentially disruptive to the businesses in this area. ▪ Challenging work element threading pipe under the architectural platform in the outer dock ▪ Limited wayleave and more extensive traffic management constraints in Hanover Quay
Option 2	▪ Reduced disruptions to the traffic and the public in a busy area of Hanover Quay comparing with Option 1 and Option 4 ▪ Reduced risk compared with tunnelling	▪ Route not acceptable to WI due the mooring area for large ships that would be sterilized

Option	Advantages	Disadvantages
	▪ Less disruption to mooring system in the Inner Dock than Option 4 ▪ Challenging work element threading pipe under the architectural platform in the outer dock excluded ▪ Simple design, with 5 pipe system in all GC Basin ▪ Lowest cost option	▪ Less area available for boats circulation than Option 1 and Option 4
Option 3	▪ Simple design, with 2 pipe system in all GC Basin ▪ Less disruption to mooring system in the Inner Dock than the other options ▪ Avoids the architectural platform in the outer dock ▪ Reduction of groundwater pumping due tunnelling shafts can be sunk underwater	▪ Highest construction risk option due the tunnelling method, particular concern would be the potential to damage the existing 8ft city sewer, the nearby railway line and other structures could be damaged by vibration ▪ Given the need to go under the 8ft city sewer the pipeline would be a syphon with attendant potential maintenance issues ▪ Additional Site Investigations required due to the depth of the pipeline ▪ Access would be required from the quays in the inner dock via private property which may not be permitted (very built-up area). ▪ Access causeway and working platform would need to be constructed in the Inner Dock ▪ Significant disruption in Hanover Quay ▪ Highest cost option
Option 4	▪ More area available for boats circulation ▪ Significant section of pipeline offset from quay wall, reducing the amount of work to be completed from pontoons/barges. ▪ Berth space retained along HQ ▪ Reduced risk compared with tunnelling ▪ Minimal dredging in Outer Dock (average depth approx. 400mm)	▪ Additional Archaeological studies required ▪ Significant disruption to landscaped area of Hanover Quay, including removal of trees, metal guards to trees, stone seating and planters. Significant reinstatement costs ▪ Challenging work element threading pipe under the architectural platform in the outer dock ▪ Complicated design, 5 pipe system and 2 pipe system ▪ Most number of transition chambers ▪ Significant disruptions to mooring system in the Inner Dock ▪ Limited wayleave and more extensive traffic management constraints in Hanover Quay ▪ Significant impact on the structure of existing Waterways Ireland Visitor Centre due the pipeline proximity ▪ Third highest cost option

4.4.1 Preferred Pipeline Option

As all options remove the discharge from within the Grand Canal Basin and into the River Liffey where there is adequate dilution and dispersion, the overall environmental impacts on the Grand Canal Basin are similar and positive. The impact on the River Liffey is the same for all route options. Route preferences were generally based on construction impacts and design considerations to meet constraints within the basin.

Option 3, the tunnelling option has the highest cost and is also associated with the highest construction risk particularly in relation to damage to the existing 8ft city sewer, the railway line and nearby properties. This is the least favourable pipeline option. The next option that was disregarded was Option 4, due to the complexity of the pipeline configurations and the need for 5 transition chambers. There

would also be significant disruption & redesign required to the docking system for the canal boats in the inner dock. Option 1 is preferrable to Option 2 as it retains access to more of the berthing spaces on Hanover Quay and maximises the navigable area of the Outer Basin. Option 2 route is also not acceptable to Waterways Ireland due to the extent of mooring area for large ships that would be sterilized.

Option 1 emerges as the preferred option both in terms of Environmental and Technical criteria. Option 1 will enhance the amenity value of the basin, retains access to more of the berthing spaces on Hanover Quay and maximises the navigable area of the Outer Basin. Extensive consultations with Stakeholders, and in particular Waterways Ireland, has also confirmed Option 1 as the preferred option. It should be noted that this is the option that was previously brought to tender stage but not progressed.

Table 4.2 Summary of Comparison of Alternatives

Criteria	**Outfall Options**			
Environmental	**Option 1**	**Option 2**	**Option 3**	**Option 4**
Population and Human health	▲	▼	●	▼
Biodiversity	●	●	▲	●
Water Quality and Hydrology	●	●	●	●
Land, Soils, Geology and Hydrogeology (Including Waste Management)	▲	●	▼	●
Air Quality and Climate	●	●	●	●
Noise and Vibration	●	●	▼	●
Traffic and Transport	●	▲	▼	●
Archaeology and Cultural Heritage	●	●	●	▼
Material Assets	●	▼	▼	●
Landscape and Visual Impact	▼	●	●	▼
Technical	**Option 1**	**Option 2**	**Option 3**	**Option 4**
Constructability	●	●	▼	●
Risk	●	●	▼	●
Design	●	●	▼	▼
Cost	**Option 1**	**Option 2**	**Option 3**	**Option 4**
Cost	●	●	▼	●

▲ **More Favourable**

● **Neutral**

▼ **Less Favourable**

SECTION 5: Population and Human Health

5.1 Methodology

A desktop study of published policy documents and data was undertaken to appraise the location. The likely and significant potential impact upon population and human health receptors and population trends in the subject site and in the wider hinterland were assessed.

This assessment is a study of the potential direct and indirect socio-economic and public health impacts of the construction and operational phases of the development. Effects on receptors were assessed in terms of magnitude, quality, significance and duration.

5.2 Receiving Environment

5.2.1 Population

Located in the South Dock Electoral Division (as defined by the Central Statistics Office), the subject site is situated within one of the busiest parts of Dublin City Centre. The area comprises sizable working and residential populations, as well as visiting populations having regard to established recreational, tourism and cultural uses in Dublin Docklands. The resident population within the South Docks Electoral District has increased from 2,589 persons in 1991 to 7,004 persons in the 2016 census.

There are two principal resident groups in the Grand Canal Basin. In addition to the land-based resident population in the vicinity of the subject site, the waters of Grand Canal Dock include boat residences and recreational users. Waterways Ireland has 59 mooring locations in Grand Canal Dock, of which 20 are houseboat serviced mooring locations where residential extended mooring permits allow the holder to moor for up to one year. Visitor Permits allows boats to enter the canal system and stay for up to 31 days.

5.2.2 Employment and Economic Activity

While Dublin City has experienced an upward trend in economic performance in recent years, the docklands area in particular has evolved into a prime office location, with a strong presence of multi-national organisations and indigenous corporate headquarters. In the 2016 census, there were c. 4.93 jobs to resident worker in the South Dock Electoral District area, compared to 1.22 jobs to resident worker in the Dublin City Council area as a whole and 0.978 jobs to resident worker in Dublin City and Suburbs.

5.2.3 Social and Settlement Patterns

The South Dock Electoral Division, historically the focus of heavy industry, has more recently become synonymous with some major city centre visitor attractions. Adventure and water-based recreation activities have come to the fore with the Grand Canal Docks becoming the focus for wakeboarding, wind surfing, kayaking and paddle boarding activities. The area's rich maritime heritage can be explored in the Waterways Ireland Visitor Centre on Grand Canal Quay, the Diving Bell on SJRQ, Irelands smallest museum and a range of walking tours. There are also a number of parks and public spaces in the form of Grand Canal Square, Pearse Square Park, Chimney Park, a children's play park and the nearby South Dock Street Park.

Failte Ireland recognises the overall Docklands area as an area with much potential to develop as a visitor destination. The land use pattern in the South Docks Electoral Division area is changing rapidly. The traditional form was functionally segregated, with predominantly large industrial buildings along the quays and small terraced housing to the south. This form is giving way to predominantly high rise commercial or mixed commercial and residential buildings, with pockets of residential terraced housing remaining.

5.2.4 Human Health

Human health has the potential to be impacted upon by environmental factors such as air, water or soil through which contaminants could accumulate and have potential to cause harm through contact with human beings. This section of the EIAR focuses primarily on the potential likely and significant impact on Population and Human Health in relation to health effects/issues and environmental hazards from the other environmental factors and interactions that potentially may occur.

5.3 Potential Impacts

5.3.1 Construction Phase

The construction phase of the proposed development should not have a significant direct impact on the population numbers within the South Dock Electoral Division or the wider hinterland. There will be temporary impact on the boat-based residents in the 20 mooring locations in Grand Canal Dock who will need to be relocated to facilitate construction activities in the inner basin. *The magnitude of this change is considered locally high and the effect would be significant, short-term and negative*.

Increased road traffic and the potential for disruption to all modes of travel and access in the vicinity of the works due to closures and diversions could cause disturbance to the residential, working and recreational population of the area. Similarly, noise and dust emission during construction could also potentially impact on all sectors of the population. *In the absence of mitigation there is the potential for a slight, short-term negative effect.*

The construction phase of the proposed development will take approximately 24 months and will generate construction employment and support industries such as building supply services, professional and technical professions etc. These beneficial impacts on economic activity will be largely temporary and confined to the construction period. *This is considered to be a moderate, short-term positive effect.*

In the absence of mitigation, the proposed development could have an impact more generally on the economic activity of the surrounding area during the construction phase due to the associated nuisance of increased traffic and the potential for disruption to all modes of travel and access in the vicinity of the works. *In the absence of mitigation there is the potential for a moderate, short-term negative effect.*

There is potential for short-term adverse effects on the amenity of the recreational users of the area arising from temporary closure/restrictions on access to the water-based facilities during construction. Potential impairment of water quality in the Grand Canal Basin due to surface water run-off or through resuspension of particles or accidental spill of pollutants may also result in further temporary restrictions on access. However, in the absence of mitigation there is the potential for *a significant, short-term negative effect.*

The construction phase has the potential to adversely impact the townscape by the temporary degradation of the public realm. This will take the form of temporary hoarding around the construction zones on Grand Canal Quay, Grand Canal Square, Hanover Quay and SJRQ. There will also be three temporary construction compounds located at the eastern end of Hanover Quay, at Grand Canal Quay adjacent to the Irish Waterways Visitors Centre, and at SJRQ. Volume 2, Section 15 Landscape and Visual Assessment concludes that 'although there would be *adverse significant* landscape effects experienced during the construction phase and that these will all be *temporary or short-term and reversible'.* Settlement patterns are unlikely to be impacted by the relatively short-term duration of the construction phase. *This is considered to be a negligible, short-term, neutral effect.*

The potential risks or nuisances that may be caused to human beings during the construction phase have been assessed in other sections of this report along with corresponding mitigation measures considering air quality, water quality, traffic, noise, and vibration.

5.3.2 Operational Phase

There will be a *slight negative permanent effect* experienced by some residents and staff in buildings overlooking the Grand Canal Basin due to a slight increase in cluttering of their views. The proposed floating moorings platform are essential to the protection of the pipeline from damage by boats. This will extend along the edge of Grand Canal Quay/Square between the bridge and Hanover Quay. The proposed moorings will reduce slightly the visual prominence of the jetty due to reduction in the amount of open water surrounding it, and this will have a minor effect on the visual appeal of the jetty.

The Dublin Port Company have indicated that berthing at the SJRQ may be restricted in the vicinity of the outfall. This will result in *slight negative long-term effect*. However, it is envisaged that this will be counterbalanced by the water quality improvement resulting from proposed development. The existing community is highly sustainable with the majority of residents walking to work. If this pattern persists increased local employment will result in increased population in the area. It could potentially therefore result in a *moderate, long-term positive effect*. It is likely that increased local employment may result in a greater demand for housing and visitor accommodation in the area, which is in line with national, regional and local policies in relation to compact and consolidated growth in central urban locations and the co-location of housing with employment hubs. It is envisaged that the proposed development would potentially result in a *moderate, long-term positive effect*.

The potential risks or nuisances that may be caused to human beings during the operation phase have been assessed in other sections of this report considering air quality, water quality, traffic, noise, and vibration.

5.4 Mitigation Measures

A suite of mitigation measures will be required to ensure the prevention of impacts on population and human health. These measures are incorporated into the Construction Environmental Management Plan (CEMP) prepared in respect of the proposed development which will be updated and finalised by the Contractor prior to construction commencing. The CEMP is contained in the Volume 3, Appendix 17A to this EIAR.

Early consultation has been established between Waterways Ireland and the residents of the 20 houseboats located in serviced moorings in Grand Canal Dock who hold permits allowing them to moor there for up to one year. The timeframe of the proposed works in general and specific works impacting directly on these moorings has been communicated to Waterway Ireland who will ensure that these long-term residents and any persons proposing to use the short-term visitor moorings during the construction phase will be provided with alternative mooring arrangement for the duration as required.

5.5 Residual Impacts

Once the mitigation measures as proposed are implemented no residual significant impacts are expected to arise as a result of the construction and operation of the proposed development. However, the overall proposed development will result in a *slight, negative and short-term* impact during construction phase.

The Dublin Port Company have indicated that berthing at the SJRQ may be restricted in the vicinity of the outfall. This will result in *slight negative long-term effect* during the operational phase. However, the proposed development will result in *slight to moderate, long-term and positive* impacts on population and human health during the operation phase.

5.6 Monitoring

The monitoring measures outlined in Sections 7, 9, 10, 11 and 13 will be undertaken during the construction phase and will identify any issues arising during this phase of the proposed development. Specific Health and Safety monitoring will be carried out in line with the Site Management Plan and Building Certification Regulations.

SECTION 6: Biodiversity

6.1 Methodology

The biodiversity assessment was prepared with regard to the relevant national and international legislation, policies, plans and guidance documents. Sites of international importance including Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) are collectively known as Natura 2000 sites. Designated sites, which also include Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs), which are national designations, were also identified within the proposed development's area of influence. The designated search area was 15 km from the development for Natura 2000 sites, and 10km for NHA and pNHA sites. This distance defines the 'Zone of Influence' (ZoI) of the proposed development for protected sites.

The EIA Screening Report completed for the project (J. B. Barry & Partners, 2020) identified ecological features which occur within the proposed project site or within the wider ZoI of the project. Seven European designated sites have been identified to have surface water connection with the proposed project as they are located downstream of the site and Grand Canal pNHA (Site Code 002103) occurs within the proposed project site. Consultation was carried out with Central Fisheries Board in 2007 and Inland Fisheries Ireland in January 2020.

An Appropriate Assessment (AA) Screening Report (J. B. Barry & Partners, 2020) concluded that there is potential for significant effects on European sites arising from the proposed development. An AA Stage 2 Natura Impact Statement (NIS) has therefore been produced separate to this EIAR. The NIS assesses the likely significant effects and proposes mitigation measures to avoid any significant effect on any of the Natura 2000 sites identified within the ZoI.

A desk-based assessment was carried out to collate information regarding protected/ notable species and statutorily designated nature conservation sites in, or within close proximity to, the study area. A data search for protected and notable species was conducted using the National Biodiversity Data Centre Mapping System (NBDC, 2020). 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). 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).

6.2 Receiving Environment

The proposed development has been identified to have surface water connectivity with 7 no. Natura 2000 sites, South Dublin Bay and River Tolka SPA, North Dublin Bay SAC, North Bull Island SPA, South Dublin Bay SAC, Rockabill to Dalkey Island SAC, Howth Head SAC and Howth Head Coast SPA. The proposed development is located within the Grand Canal pNHA (002104). A further three pNHAs are located within the vicinity of the proposed development including North Dublin Bay pNHA (000206), South Dublin Bay pNHA (000210), and the Dolphins Dublin Docks pNHA (000201). The assessment for these Natura 2000 sites is included in the AA Screening/NIS. The proposed development is also located within the Transition Zone of the Dublin Bay Biosphere UNESCO site and approximately 3.2km west from its Core Zone.

Records of protected and notable species including birds, amphibians, fish and mammals present within the 10km grid square O13 during the past 10 years were collated from the National Biodiversity Data Centre (NBDC, 2020) database. Protected aquatic fauna in the River Liffey include Grey Seal, Common Seal, Atlantic Salmon, Lamprey and European Eel, as well as occasional cetaceans. There is a known nesting location for Common Tern (Annex I of the EU Birds Directive) on the Camden Lock structure at the outer end of the Grand Canal Basin. This nest site is known to regularly support a single pair of

Common Tern during the breeding season. It is considered that birds using this nest site may be associated with the population within the designated area of the SPA and pNHA.

The Grand Canal Basin has the WFD status 'Moderate' (2013-2018) which is a downgrade from previous period ('Good' (2010-2015)). The waterbody is 'At risk' of not meeting the WFD objectives (EPA, 2020). Liffey Estuary Lower has the WFD status 'Good' (2013-2018) which is an upgrade from previous period ('Moderate' (2010-2015)). The waterbody is 'At risk' of not meeting the WFD objectives with the main pressure being urban wastewater (EPA Catchments Unit, 2018). Groundwater Vulnerability around the site is low to moderate, the WFD status for this groundwater body is currently under 'review' (EPA, 2020).

The aquatic ecological survey of the Grand Canal Dock Basin and River Liffey Estuary carried out by BEC Consultants Ltd on 28-29th July 2020 did not identify any protected species or habitats within the site. Historically European Eel have been recorded in the Basin. The intertidal habitat on the quay wall was identified to be of local value. 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 along the pipeline route. However, the invasive non-native species Butterfly-bush *Buddleja davidii* was recorded along the quay wall at SJRQ. 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.* The freshwater shrimp *Crangonyx pseudogracilis* is a non-native species recorded within the Grand Canal Dock, however it is considered low risk as an invasive species.

6.3 Potential Impacts

6.3.1 Construction Phase

The construction phase impacts include:

- The ecological features of the Grand Canal pNHA are found in the canal section upstream of the Basin. While the Grand Canal Basin is part of the pNHA is does not support any of these ecological features. The unmitigated effect of this development would result in a *neutral impact* to a site of national importance.
- Potential impact to the aquatic benthic habitat in the Grand Canal Dock Basin will occur via land and surface water pathways. Loss of benthic habitat and species will occur at the footprint of the new pipeline within the Basin and where dredging will occur. Potential short-term release of pollutants (e.g. hydrocarbon from machineries, concrete) and sediments within the Basin will impact on water quality and potentially degrade the aquatic habitat. The unmitigated effect of this development would result in a *minor, short- term impact* to a site of local importance.
- Potential ecological impact to Dolphins Dublin Docks pNHA will occur via surface water pathway. Potential release of pollutants (e.g. hydrocarbon from machineries, concrete) and sediment within the Grand Canal Basin could impact on ecological receptors downstream, such as the Common Tern population. The risk and impact of such spills have been dealt with within the CEMP, which will be updated and finalised by the Contractor prior to construction commencing. The unmitigated effect to this development, in terms of potential pollutants, would result in a *moderate, short-term impact* to a site of national importance.
- During the construction phase, potential impact to the Lower River Liffey will occur via surface water pathway. Potential short-term release of pollutants and sediment within the Grand Canal Basin could impact on ecological receptors downstream, such as the habitat of the Lower River Liffey. The unmitigated effect of this development would result in a *minor, short-term impact* to a site of regional importance.
- Potential impact to the quay wall habitat will occur via land pathways. Loss of habitats and species will occur at the footprint of the new stormwater outfall at SJRQ. As the habitat on the quay wall occurs upstream of the current outlet from the Grand Canal Basin to River Liffey, no impacts are

anticipated via surface water pathway from works undertaken within the Basin. The unmitigated effect of this development would result in a *negligible, short-term impact* to a habitat of local importance.

- Potential impact to aquatic fauna including Grey Seal, Common Seal, cetaceans, River Lamprey, Sea Lamprey, Atlantic Salmon, European Eel and Otter may occur via surface water pathway. There are records of these species present along the coast, and within the River Liffey, Salmon and Lamprey spp. migrate further up the river to spawn. While these are mobile species, they are all present in the transitional reaches of River Liffey. Potential release of pollutants and sediment within the Grand Canal Basin can be transported downstream and could impact on these ecological receptors.
- There is a known nesting location for Common Tern on the Camden Lock structure at the outer end of the Grand Canal Basin. This nest site is known to regularly support a single pair of Common Tern during the breeding season. It is considered that birds using this nest site may be associated with the population within the designated area of the SPA and pNHA. There is also the potential for indirect impact via disturbance to the nesting Common Tern pair at Camden Lock structure due to construction works and increased human activity. The unmitigated effect of this development would result in a *minor, short-term impact* on species of regional importance.
- The only invasive species identified in the areas of proposed works are Nuttall's Waterweed and Zebra Mussel. Both these species are found in freshwater habitats and therefore, there will be no spread of these species downstream to estuarine and coastal habitats. There is the potential for an increased spread of the species within the Grand Canal Basin and they could outcompete native species in this habitat.

6.3.2 Operational Phase

The removal of the stormwater outfall in the Grand Canal Basin will lead to a reduction in input of polluted water. This would have a positive effect on the Basin as it would improve the water quality within the Basin and has the potential to improve the overall WFD status of the waterbody. This may allow for a more diverse fauna to colonise the benthic habitat.

Discharge of polluted water may have a negative impact on the Common Tern population at the Dolphins, Dublin Docks pNHA and other aquatic fauna. 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, BOD and DIN. Therefore, any discharge from the new stormwater outfall will not significantly impact on the Common Tern population of Dolphins, Dublin Docks pNHA. The unmitigated effect to this development would result in a *neutral impact* to a site of national importance or on species of regional importance.

6.4 Mitigation Measures

The assessment of potential effects on ecological features has identified potential entry of pollutants and resuspension of silt in the surface water during construction as the main source of impact. The proposed mitigation measures therefore focus on pollution and sediment control measures are summarised in the CEMP contained in the Volume 3, Appendix 17A to this EIAR.

6.5 Residual Impacts

With the implementation of proposed mitigation measures in place for the protection of surface water, the residual impact of the construction phase is assessed to be of temporary slight negative impact on account of the loss of habitat within the Grand Canal Basin and quay wall.

The overall residual impact during operation is assessed to be positive due to the improvement of water quality within the Grand Canal Basin.

6.6 Monitoring

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 will be temporarily stopped and re-assessed and further mitigation measures be put in place before works can continue.

During the operational phase, the water quality in the River Liffey will be monitored by the EPA (as part of the WFD). DCC will monitor the water quality from the new stormwater outfall. The water monitoring will enable comparison with the results of the modelling of the predicted water quality to ensure there will be no negative impact on River Liffey and downstream habitats and species. Adequate measures will be taken if the monitoring finds the discharge to have a negative impact on water quality and such measures take the Water Framework Directive into account.

SECTION 7: Water Quality and Hydrology

7.1 Methodology

Desktop studies and detailed site investigation programmes have been carried out to determine whether the change of the discharge location will impact on the water quality in the River Liffey estuary. The assessment also considers compliance with the relevant European and Irish legislation.

A water quality modelling study was undertaken to assess the impacts that the proposed GCSWOE project will have on the existing water quality of the River Liffey. The water quality modelling study collated the available information on stormwater discharge, River Liffey flows and water quality. The results are compared with the Water Framework Directive (WFD) Environmental Quality Standards (EQS) for the receiving waters. For this study it was agreed that the parameters of interest were the EQS that were relevant for transitional and coastal waters, namely:

- DIN (dissolved inorganic nitrogen);
- MRP (molybdate reactive phosphate);
- E. Coli; and
- BOD (biological oxygen demand).

Hydrographic surveys were undertaken to acquire the data to input into the Water Quality Model.

The water quality monitoring data from the following sources was reviewed and assessed:

- Water quality monitoring undertaken by Waterways Ireland in the Grand Canal Basin;
- Site specific water monitoring undertaken by Dublin City Council in the Storm compartment of the Grand Canal Tunnel;
- Water quality monitoring undertaken by Dublin City Council in the River Liffey; and
- National water monitoring undertaken by EPA in the River Liffey and Dublin Bay under WFD.

As per 'The Planning System and Flood Risk Management, Guidelines for Planning Authorities' (2009)', Stage 1 Flood Risk Identification and Stage 2 Initial Flood Risk Assessment (FRA) was undertaken and the risk of flooding from the each of the five sources of flooding (coastal, fluvial (river), groundwater, pluvial (rainfall) and from artificial drainage systems) to the proposed development was considered.

7.2 Receiving Environment

The main hydrological features of the area are the River Liffey, the River Dodder, the Grand Canal and Dublin Bay. Due to its proximity to Dublin Bay, the River Liffey is tidally influenced at the proposed development site due to direct connectivity to the Dublin Bay. The Grand Canal Basin is not subject to tidal influences due to the presence of the lock gates which maintain the water level within the basin at a constant 3.4 mOD.

7.2.1 Catchment Characterisation

The proposed development is located within Liffey and Dublin Bay Catchment (WFD Catchment ID 09) and Dodder_SC_010 Sub-catchment (WFD Sub-catchment ID 09_16). The Liffey and Dublin Bay catchment contains the largest population of any catchment in Ireland.

Grand Canal Basin is a contained waterbody in the Grand Canal Docks. Water quality in the Grand Canal Basin has been adversely affected over recent years by the existing stormwater outfall of the Grand Canal Tunnel which periodically contains combined/foul sewerage and discharges into the southern end of the Inner Basin after periods of high rainfall.

7.2.2 Existing Drainage

The stormwater compartment of the Grand Canal Tunnel and outfall tunnel to the dock were designed to accommodate flows from the suburban areas south of the Grand Canal as follows:

- North Crumlin storm drainage system;
- South Crumlin storm drainage system;
- River Poddle/Tymon Catchment; and
- Rathmines and Pembroke (Swan River) – storm overflows and storm drainage systems.

The Poddle/Tymon Surface Water Drainage Scheme is overflowed into the tunnel. The Crumlin North and Crumlin South storm water drainage systems are presently connected to the tunnel. The surface water drainage from Rathmines and Pembroke is also connected to the tunnel. The overflows from the Rathmines and Pembroke (Mountpleasant and Sallymount) CSOs occur after periods of intense rainfall when the collection sewers reach capacity.

7.2.3 Flood Risk Assessment

As the pipeline will be constructed underground/underwater it will not be vulnerable to flooding, however there could be some small flood risk during the construction of the terrestrial elements of the pipelines and structures. The Catchment Flood Risk Assessment and Management (CFRAMS) map and Dublin City Council Strategic Flood Risk Assessment (SFRA) flood extent map indicated that the terrestrial element of the proposed development site and construction compounds are located outside the fluvial flood extents and hence are located in fluvial Flood Zone C, where the risk of flooding is lowest. The OPW Summary Local Area Report shows no indication of previous fluvial related flooding at the proposed site. However, Compound 3 on SJRQ which is required for the construction of the development is located in Coastal Flood Zone A as identified in the ICPSS flood map and CFRAMS Coastal flood map. The Dublin City Council Strategic Flood Risk Assessment 2016 – 2022 also demonstrates this.

The aquifer vulnerability map classifies the site as having 'low vulnerability' which indicates a low water table and hence a low risk of groundwater related flooding. The proposed development site is well drained, hence surface water flooding is unlikely to be a significant issue. The OPW Summary Local Area Report also shows no indication of previous pluvial related flooding at the site. The Dublin SFRA indicates that the proposed development site has a low pluvial flood hazard.

A number of mitigation measures are proposed to minimise flood risk at compound 3. It is envisaged that there will be minimal flood risk to the site and the project based on the proposed recommendation and mitigation measures. Therefore, a Stage 3 Detailed Flood Risk Assessment was not undertaken.

7.2.4 Baseline Water Quality and Protected Area

Based on the 2013-2018 EPA monitoring information and data, both the Liffey Estuary Lower and Dublin Bay have 'Good' WFD status classification. The WFD Status for Grand Canal Basin (Liffey and Dublin Bay) has downgraded from' Good' in the 2010-2015 WFD cycle to 'Moderate' in the 2013-2018 WFD assessment cycle and it identified under 'Risk' of failing to meet the WFD objectives by 2027. The Liffey Estuary Lower transitional waterbody has received 'Good' status in the 2013-2018 WFD cycle and is under 'review' for waterbodies at risk.

The Liffey Estuary (WFD Code: EA_090_0300), including the River Tolka Basin has been designated as a nutrient sensitive area.

The proposed development has also been identified to have surface water connectivity with seven Natura 2000 sites. Grand Canal pNHA (Site Code 002103) occurs within the proposed project site. The ecological value of the Grand Canal pNHA lies in the diversity of species it supports along its linear habitats. The ecological features are found in the canal section upstream of the Basin. While the Grand Canal Basin is part of the pNHA is does not support any of the ecological features.

7.2.5 Water Quality Monitoring

A programme of intensive sampling and analysis has been underway within the Grand Canal Basin since September 2017 by Dublin City Council and Waterways Ireland to identify the pollution causes in the Grand Canal Basin. The water quality sampling carried out demonstrated that the primary source of pollution of waters in the Grand Canal Basin is the discharge from the surface water section of the Grand Canal Tunnel. The concentration of coliforms show a gradual decline towards the northern region of the basin as there are no other significant sources of pollution into the Grand Canal Basin. These data confirm that the Grand Canal Tunnel overflow discharges are the principal reason for the pollution of the Grand Canal Basin.

A programme of intensive sampling and analysis was undertaken within the River Liffey during 2019-2021 by Dublin City Council for monitoring purposes. The locations assessed do not comply with the regulation for bathing waters and that the discharge from the Dodder aggravates the water quality of the Liffey.

Water quality sampling and analysis undertaken within the storm section of the Grand Canal Tunnel by Dublin City Council provides a baseline of pollutants entering the stormwater component of the Grand Canal Tunnel and identifies the pollution causes in the Grand Canal Basin. The highest recorded E. coli count was 48,392 MPN/100ml in October 2021.

7.3 Potential Impacts

7.3.1 Construction Phase

During the construction phase, there is potential for temporary impacts on water quality to occur due to the mobilisation of sediments or accidental releases into the water bodies. The construction phase activities that can result in potential impacts include:

- Dredging and piling
- Release of suspended solids into surrounding waters
- Contaminated soils and surface run-off
- Accidental spillages
- Invasive Species
- Flood Risk

7.3.2 Operational Phase

Grand Canal Basin

The removal of the stormwater outfall from the Grand Canal Basin will lead to a reduction in input of polluted water. This would have a positive effect on the Basin as it would improve the water quality within the Basin and has the potential to improve the overall WFD status of the waterbody. The magnitude of impact will be *permanent moderate beneficial.*

River Liffey

The principal operational effect of the project will be a change in the water quality characteristics in the receiving waters. Stormwater with an intermittent overflow from combined sewers will be discharged into River Liffey and transported downstream and could indirectly impact on the water quality and thereby on ecological receptors downstream. In order to assess and quantify the impact a water quality model was run for a number of scenarios. The details of the water quality modelling exercise are contained in DHI report Numerical Modelling Report in Volume 3, Appendix 7A.

The model was run using available time series for flows and water quality in the River Liffey with and without the discharge from the stormwater outflow to the River Liffey at SJRQ. For the baseline the

model was run to reflect the present situation without any water quality inputs from the stormwater discharge at its new location on SJRQ.

The parameters selected to assess impacts are the EQS for "good" status in transitional and coastal waters (S.I. No. 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations 2009 (as amended)) include DIN, MRP, E. Coli and BOD.

The modelling identified that:

- For DIN there was **no discernible change** in the achievement of the EQS compared to the baseline, with the % difference in concentration in much of the Lower Liffey being below 1% and the higher levels constrained to the outfall area.
- For MRP there was **no discernible change** in the achievement of the EQS compared to the baseline, 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, however this parameter showed the greatest increases compared to the baseline. It was noted that even with this large percentage increase, 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.

All of the modelling highlighted the potential for localised increases in the occurrence of the water quality parameters, however the ability of the hydrodynamic system to dilute and remove these increases over relatively short spatial scales is demonstrated by the rapid reduction seen in the results as you move away from the proposed GCSWOE. Overall, the impact of the GCSWOE on the water quality in the receiving waters is considered to be *slight/imperceptible adverse*.

The removal of the stormwater outfall from the Grand Canal Basin will lead to a reduction in input of polluted water. This will have a positive effect on the Basin as it would improve the water quality within the Basin and has the potential to improve the overall WFD status of the waterbody. The magnitude of impact will be *permanent moderate and beneficial*. This positive impact on the Grand Canal Basin is considered to outweigh the slight/imperceptible adverse effect on the River Liffey water quality.

7.4 Mitigation Measures

A CEMP has been prepared and will be included in Volume 3, Appendix 17A to the EIAR which will be updated and finalised by the Contractor prior to construction commencing.

7.5 Residual Impacts

On implementation of the appropriate mitigation measures, it is expected that the potential impact during construction will be effectively mitigated. The residual impact of the construction phase is assessed to be of *small adverse magnitude and slight negative significance* on account of the short-term works to be carried out in the basin.

The residual impact during operation is assessed to be *positive* due to the improvement of water quality within the Grand Canal Basin. The principal operating impact of the extension of the stormwater outfall to River Liffey will be a change in the water quality of the receiving waters. The impact on the water quality within the River Liffey will be *slight/imperceptible*. The WQM report has shown that the hydrodynamic properties of the River Liffey will dilute and disperse contaminants over relatively short spatial scales with changes in pollution concentrations from the baseline being less than 1% in much of the Lower Liffey. There will be no discernible change in the ability to meet the surface water environmental quality standards (EQS).

There will be no impact on the designated bathing waters of Dublin Bay.

7.6 Monitoring

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 will be temporarily stopped and re-assessed and further mitigation measures be put in place before works can continue.

During the operational phase, the water quality in the River Liffey will be monitored by the EPA (as part of the WFD). DCC will monitor the water quality from the new stormwater outfall. The water monitoring will enable comparison with the results of the modelling of the predicted water quality to ensure there will be no negative impact on River Liffey and downstream habitats and species. Adequate measures will be taken if the monitoring finds the discharge to have a negative impact on water quality and such measures take the Water Framework Directive into account.

SECTION 8: Land, Soils, Geology, and Hydrogeology

8.1 Methodology

Desktop studies and detailed site investigation programmes have been carried out to determine the subsurface conditions of the proposed development site.

Site investigation data (e.g. borehole data) has been collected from a number of sources, some of which were conducted for this proposed development and some for nearby developments. The impact assessment took into account the criteria for rating attribute importance, magnitude of impact and significance of impact based on the *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes by National Roads Authority* (NRA) (NRA, 2009).

8.2 Receiving Environment

The proposed development is located entirely within a man-made environment and the construction works will interact with hardstanding road and pavement surfacing, quay walls, the bed of the Basin, and the River Liffey.

8.2.1 Geology

The proposed development is underlain by dark limestone and shale from the Lucan formation and predominantly comprises an uppermost stratum of made ground. No karst feature was identified within 5km of the proposed development. Bedrock recorded as "presumed weathered rock" was encountered in four boreholes within the Basin (Site Investigations Ltd, 1991) at -10.51mOD, -10.26mOD, -8.61mOD, and -10.21mOD, respectively. Bedrock was not encountered at the location of the proposed outfall at the River Liffey, and Boulder Clay was found to a depth of -14.71mOD at the boreholes' termination.

Due to the urban environment in which the development is proposed there are no potential future quarry or pit reserves. There are no designated Geological Heritage Sites within the 500m of the proposed development area. The construction and operational effects of the proposed development will not interact with the geological qualifying interests of any Geological Heritage Site.

8.2.2 Hydrogeology

The proposed development is underlain by Locally Important (Li) Aquifer that is Bedrock which is Moderately Productive only in Local Zones. It should be noted that due to the proximity to Dublin Bay and the Lower Liffey Estuary (saline conditions), and the fact that the site is underlain by made ground, it is unlikely that the aquifer will be exploited as a groundwater source in this area.

Groundwater vulnerability provides an indication of the ease at which potential contaminants may vertically migrate down through sub surface strata to an underlying aquifer. Geological Survey Ireland (GSI) mapping indicates that the groundwater vulnerability in the proposed development area is classified as "Low".

The GWB Water Framework Directive (WFD) status (2013-2018) is "Good". The groundwater risk status for the region is 'under review'. There are no recorded public groundwater supply abstractions within 2 km of the proposed development.

8.2.3 Ground Conditions

The proposed pipeline will be placed on the silt layer of the Basin. This will involve dredging or pushing aside of the silt along the footprint of the proposed pipeline to achieve the desired invert level.

The strata within the Basin generally comprise silt (basin deposits), coarse grained glacial till, fine grained glacial till and bedrock. The strata within the Hanover Quay generally comprise made ground, clay, gravel, clay and weathered rock. The strata within the SJRQ comprise made ground, silt, gravel, silt, gravel, clay and weathered rock. The strata within the River Liffey comprise silt, clay, gravel, clay and weathered rock.

8.3 Potential Impacts

8.3.1 Construction Phase

The impacts on the land, soils and hydrogeological environments are related to excavation and dredging. There will be no excavation of bedrock or the overlying boulder clay.

Excavation and disposal of contaminated soils

The soils at Hanover Quay and SJRQ are contaminated and the excavation of contaminated material from here will require disposal. The storage of contaminated soils has the potential to be mobilised by rainfall and run-off to surface water (the Basin or the Liffey). The impact will be *temporary in duration, small adverse in magnitude and slight negative in significance*.

Dredging and Piling

Grand Canal Basin

The disturbance and displacement of the silt bed of the Basin from lowering sections of the pipeline and construction of three no. Transition Chambers will result in the redistribution and suspension of silt on the bed of the Basin. The impact will be *permanent in duration, small adverse in magnitude and slight negative in significance.*

River Liffey

The installation of the cofferdam in the River Liffey to facilitate the construction of the outfall has the potential to mobilise silt and sediments from the river bed. There is a significant flow in the Liffey and taking into account the dilution effects and tidal flush the *magnitude of the impact will be negligible in magnitude and imperceptible in significance.*

Quay Walls

Excavations and piling have the potential to damage the existing Quay walls and other structures as a result of vibration and induced earth movements. The potential damage to quay walls as a result of pilling activities could result in an impact that will be *moderate adverse in magnitude and significant/moderate in significance.*

Accidental Spillages

Potential impacts during the construction phase include the potential for leakage or spillage of construction related materials on site. The natural groundwater flow in the shallow sediments will be towards the River Liffey where it discharges as baseflow. There are no groundwater users between the proposed works and the Liffey. Impacts on groundwater quality and soils would be *negative, short term in duration and imperceptible in significance.*

Temporary Construction Dewatering

Earthworks for the works on Hanover Quay and SJRQ will comprise excavations below the water table. Temporary dewatering will be required to facilitate construction. Due to the nature and variability of the permeability of the made ground and the response of groundwater levels to the tides it is difficult to predict the rate of inflow. Dewatering will require a barrier to prevent groundwater inflows during

excavation. Consequently, only the groundwater contained within the sealing wall will need to be pumped. No significant volumes of water will be abstracted during dewatering operations. The abstracted groundwater will be groundwater that currently discharges to the Liffey as baseflow. The proposed dewatering exercise is not considered likely to result in significant effects on the hydrogeological environment. The contractor will be required to apply for a Section 16 Wastewater Discharge Licence for the disposal of groundwater.

The impact of groundwater on the water quality of the River Liffey will *be negligible in magnitude and imperceptible in significance and will be temporary in duration.*

As contaminated soil will be removed from site, the contaminant flux to groundwater will be reduced. As such, the predicted impact on the hydrogeological environment is *permanent, positive and imperceptible.*

Temporary Site Compounds

Three locations have been identified as temporary construction compounds which will be made available during the construction works. They will be used as a store for dry materials (steel, precast concrete, etc.) and as a staging area for the works. It is not proposed to remove any significant volumes of soil from these sites. The proposed construction compound sites activities have low likelihood for significant impact/interaction with the land, soils and hydrogeological environment.

8.3.2 Operational Phase

There are no identified potential impacts on the land soils and geology environment associated with operational phase.

8.4 Mitigation Measures

A CEMP has been prepared and will be included in Volume 3, Appendix 17A to the EIAR which will be updated and finalised by the Contractor prior to construction commencing. A Resource and Waste Management Plan (RWMP) is contained in the Volume 3, Appendix 13A which will also be updated and finalised by the Contractor prior to construction commencing.

Mitigation measures will be in place for careful disposal of contaminated material and spoil. The Contractor will be required to adopt the use of a silt curtain for the works within the Grand Canal Basin. The silt curtain is to reach from top water level to the bed level. This will limit the silt generated from dispersing throughout the Basin.

Management of vibration and earth movement will be required for the proposed works on Hanover Quay and SJRQ. Appropriate batters or appropriate temporary works solutions such as sheet piling and trench boxes will be adopted during excavations above groundwater to ensure cut face stability. A sheet piled wall will not be permitted to be used to construct Transition Chamber 3 or the 2.7m by 4.0m culvert section in Hanover Quay. Construction will be carried out behind a secant wall. The use of secant piled wall will minimise working width, contain the existing contaminated material, limit any water ingress from the Basin and surrounding ground and reduce vibration mitigating the impact on the Quay walls and nearby buildings. Continuous Flight Augur (CFA) piling will be used to install the outfall structure and culvert on SJRQ. Due to the fact that this a non-percussive piling technique this option will inherently reduce the level of piling vibration generated.

Where excavations extend below groundwater, appropriate retention and construction dewatering systems will be adopted to mitigate the potential effects of drawdown on nearby structures, roads and major services. Piled cofferdams and secant piled walls will be installed.

8.5 Residual Impacts

Once the mitigation measures as proposed are implemented, no residual significant impacts (construction or operational) on the land soils and hydrogeological environment are expected to arise as a result of the construction and operation of the proposed development.

8.6 Monitoring

Any excavation will be monitored during earthworks to ensure the stability of side slopes and to ensure that the soils excavated for disposal are consistent with the descriptions and classifications according to the waste acceptance criteria testing carried out as part of the site investigations.

SECTION 9: Air Quality and Climate

9.1 Methodology

The applicable Air Quality standards in Ireland include the Air Quality Standards Regulations 2011 (S.I. No. 180/2011), which incorporate EU Directive 2008/50/EC, which has set limit values for a number of pollutants. The limit values in relation to Nitrogen Dioxide (NO_2) and Particulate Matter (PM_{10} and $PM_{2.5}$) are applicable to the proposed development as these are associated with traffic emissions and construction dust emissions.

With regards to larger dust particles that can give rise to nuisance dust, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction phase of a development in Ireland. Recommendations from the Department of the Environment, Heritage & Local Government (DEHLG, 2004) apply the German TA Luft limit value of 350 mg/(m^2*day) for dust deposition to the site boundary of quarries using the Bergerhoff methodology.

The UK Highways Agency has published an updated DMRB guidance document in relation to climate impact assessments *LA 114 Climate* (UK Highways Agency 2019). This guidance is specific to road projects but can be used for any project that causes a change in traffic. None of the road links impacted by the proposed development meet the scoping criteria of the guidelines and therefore a detailed assessment has been scoped out as there is no potential for significant impacts to climate as a result of construction traffic emissions.

In addition, there is the potential for embodied carbon associated with construction materials and activities to impact climate during the construction phase. The carbon emissions are calculated by multiplying the emission factor by the quantity of the material that will be used over the entire construction phase. Emissions factors are available from a number of recognized sources including the Civil Engineering Standard Method of Measurement (CESSM) Carbon and Price Book database (CESSM, 2013). However, due to the small scale of the proposed development and the short-term construction phase a detailed assessment of embodied carbon emissions has been scoped out of this assessment as there is no potential for significant impacts to climate from this element of the project.

9.2 Receiving Environment

With regard to NO_2, continuous monitoring data from the EPA (EPA, 2021) at suburban Zone A locations in Rathmines, Dun Laoghaire, Swords and Ballyfermot show that current levels of NO_2 are below both the annual and 1-hour limit values, with annual average levels ranging from 15 – 22 µg/m^3 in 2019. Based on the results at suburban and urban Zone A (Dublin) locations, an estimate of the background NO_2 concentration in the region of the proposed development is 22 µg/m^3.

Continuous PM_{10} monitoring carried out at the Zone A locations of Winetavern Street, Rathmines, Phoenix Park and Dún Laoghaire showed long term average concentrations are below the annual limit value of 40 µg/m^3. Based on the EPA data a conservative estimate of the current background PM_{10} concentration in the region of the proposed development is 16 µg/m^3.

Continuous $PM_{2.5}$ monitoring carried out at the Zone A location of Rathmines showed $PM_{2.5}/PM_{10}$ ratios ranging from 0.60 – 0.68 over the period 2015 – 2019. Based on this information, a conservative ratio of 0.7 was used to generate a background $PM_{2.5}$ concentration in the region of the proposed development of 11.2 µg/m^3.

9.3 Potential Impacts

9.3.1 Construction Phase

The greatest potential impact on air quality during the construction phase of the proposed development is from construction dust emissions and the potential for nuisance dust.

As part of the proposed development there will be the requirement for excavation of some materials in order to install the pipeline. It is expected that there will be approximately 5,500 m^3 of material removed from site during construction works. There is also the potential for a secant pile wall to be installed along the required section at Hanover Quay to facilitate the box culvert. Piling will also be required at SJRQ. According to the IAQM guidance as a worst-case these activities could be considered small in scale as the quantity of material is significantly less than 20,000 tonnes and the works areas are minor. This results in an overall low risk of dust soiling impacts and a negligible risk of dust related human health impacts and ecological impacts as a result of the proposed earthworks activities.

The dust emission magnitude for the proposed trackout is classified as medium and can be considered as worst-case as it reflects worst-case peak construction periods when there will be 38 HGV movements per day. This results in an overall medium risk of dust soiling impacts, a low risk of dust related human health impacts and a low risk of dust related ecological impacts as a result of the proposed trackout activities.

Overall, there is a medium risk of dust impacts as a result of the proposed development and therefore best practice dust mitigation measures are proposed. In the absence of mitigation there is the potential for *short-term, negative, imperceptible* impacts to air quality.

Traffic emissions would be the primary source of NO_2 associated with the proposed development, particularly due to the increase in HGVs accessing the site. However, a detailed assessment of traffic emissions associated with the construction phase of the proposed development has been scoped out as per the UK DMRB screening criteria (UK Highways Agency, 2019), therefore, the proposed development will not significantly impact NO_2 concentrations in the vicinity of the site and concentrations will remain similar to background levels. The construction stage traffic has the potential for a *neutral, imperceptible and short-term impact* on air quality.

There is the potential for a number of greenhouse gas emissions to atmosphere during the construction of the development. Construction vehicles, generators etc., may give rise to CO_2 and N_2O emissions. The Institute of Air Quality Management document *'Guidance on the Assessment of Dust from Demolition and Construction'* states that site traffic and plant is unlikely to make a significant impact on climate. Therefore, the potential impact on climate is considered to be *imperceptible, neutral and short-term*.

Dust emissions from the construction phase of the proposed development have the potential to impact human health through the release of PM_{10} and $PM_{2.5}$ emissions. However, the surrounding area is of low sensitivity to potential human health impacts as a result of construction dust emissions. In addition, it was found that there is an overall low risk of human health impacts from dust emissions in the absence of mitigation. Therefore, in the absence of mitigation there is the potential for *imperceptible, negative, short-term impacts* to human health as a result of the proposed development.

9.3.2 Operational Phase

Due to the nature of the proposed development, there will be no emissions to atmosphere during the operational phase. Therefore, there is no potential for impacts to air quality or climate as a result of the proposed development. No odorous emissions are predicted at the outfall pipe to the River Liffey during the operational phase due to the nature of the water passing through the outfall being stormwater, which is unlikely to contain particularly odorous components. The operational phase is considered *neutral* in terms of air quality and climate.

Climate change has the potential to alter weather patterns and increase the frequency of rainfall in future years. As a result of this there is the potential for an increased risk of flooding related impacts in future years. The proposed development will divert stormwater flows as a result of heavy rainfall events and discharge them into the River Liffey thereby reducing the potential flooding impacts further upstream.

The proposed development has been designed to account for increased flows associated with heavy rainfall events and therefore the impact as a result of climate change will be *imperceptible.*

No significant impacts to either air quality or climate are predicted during the construction or operational phases of the proposed development

9.4 Mitigation Measures

The proactive control of fugitive dust will ensure the prevention of significant emissions. Best practice dust mitigation measures are outlined within Section 9.6 of the EIAR. These measures are incorporated into the CEMP, included in Volume 3, Appendix 17A to the EIAR which will be updated and finalised by the Contractor prior to construction commencing.

9.5 Residual Impacts

Once the measures outlined in the CEMP are implemented, the impact of the proposed development in terms of air quality and climate will be *short-term, negative, localised and imperceptible* at nearby receptors.

9.6 Monitoring

During the construction phase, monitoring of dust emissions is not proposed as once the dust mitigation measures are implemented impacts will be imperceptible. Monitoring is not proposed for the operational phases of the proposed development as there are no significant impacts to air quality or climate predicted.

SECTION 10: Noise and Vibration

10.1 Methodology

There is no published statutory Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. Local authorities normally control construction activities by imposing limits on the hours of operation and consider noise limits at their discretion.

In the absence of specific noise limits, appropriate criteria relating to permissible construction noise levels for a development of this scale may be found in the British Standard BS 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites - Noise*. It should be noted that this assessment method is only valid for residential properties. Commercial premises would generally be considered to be less sensitive to construction noise depending on the nature of the commercial operation. The applicable day time noise limit for the proposed works is 65 dB $L_{Aeq,16hour}$.

Vibration standards are generally split into two categories, those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. In both instances, it is appropriate to consider the magnitude of vibration in terms of Peak Particle Velocity (PPV). In the case of road traffic, vibration is perceptible at around 0.5 mm/s and may become disturbing or annoying at higher magnitudes. However, higher levels of vibration are typically tolerated for single events or events of short duration.

British Standard BS 7385: 1993 - *Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration* states that there should typically be no cosmetic damage if transient vibration does not exceed 15 mm/s at low frequencies rising to 20 mm/s at 15 Hz and 50 mm/s at 40 Hz and above. British Standard BS 5228-1:2009+A1:2014 - *Code of practice for noise and vibration control on construction and open sites – Vibration* recommends that, for soundly constructed property and similar structures that are generally in good repair, a threshold for minor or cosmetic (i.e. non-structural) damage should be taken as a peak component particle velocity (in frequency range of predominant pulse) of 15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz and 50 mm/s at 40 Hz and above. Below these values minor damage is unlikely.

It is noted that a structural survey of the quay walls has indicated that they are not structurally sound and may be susceptible to structural damage from lower levels of construction vibration. Consideration of lower vibration criteria is therefore appropriate to ensure that structural damage does not occur due to works occurring in close proximity to the structure. In this instance, it is therefore proposed to apply the lower limits outlined in German Standard DIN 4150-3 (1999-02) Structural Vibration - *Effects of Vibration on Structures.*

10.2 Receiving Environment

An environmental noise survey was conducted to determine baseline noise levels at the nearest noise sensitive locations to the development. For details of the survey, refer to Volume 2 of the EIAR.

10.3 Potential Impacts

10.3.1 Construction Phase

From a noise and vibration perspective, the proposed construction activities can be subdivided into distinct activities or stages.

In the first instance, in order to create a dry work area for the transition and outfall chambers, temporary cofferdams will be installed at each work site. The cofferdams at Transition Chamber 1 and 2 will be comprised of sheet piles and the primary source of noise and vibration generated during this stage will

depend on the sheet piling method selected. The nearest vibration sensitive structure to the proposed work are the rail tracks at Grand Canal Dock.

Transition Chambers 1, 3 and the Outfall will require some demolition of the existing outfall structure (Chamber No. 1) and quay walls (Chamber 3 and the outfall on SRJQ). Piling is only required in the case of the outfall construction on SJRQ. The construction of the culvert at Hanover Quay will include extension excavation. It is proposed that works will involve design and installation of the temporary secant piled wall at Hanover Quay and the Continuous Flight Auger (CFA) piles for the outfall structure on SJRQ. The adoption of CFA piling as proposed for the outfall constitutes best practice for minimising noise and vibration.

Since the construction programme has been established in outline form only, it is not possible to accurately quantify construction noise or vibration levels. The results of the baseline survey confirm that construction noise levels will need to be limited to 65 dB $L_{Aeq,16hour}$ at the nearest noise sensitive locations to prevent significant impacts occurring. Vibration levels associated with construction activity at the nearest dwellings will not exceed the limits set in section above.

It is anticipated that peak construction haulage from the site will generate approximately 38 movements per day. Assuming the worst case of 38 HGV's, the worst case predicted noise level at the nearest receptor to the Hanover Quay (10 metres) would be expected to fall in the region of 56 dB $L_{Aeq, 1hour}$. The impacts of construction related traffic on public roads can be regarded as *slight.*

Elevated levels vibration arising from HGV movements can occur where the vehicle is traversing irregular or poorly surfaced roads at speed. A review of the haul routes confirms that that the local road network is generally in good condition. Therefore, the impact of vibration arising from construction traffic is expected to be insignificant.

10.3.2 Operational Phase

The only mechanical plant that may be required is a small motor to operate the penstock gate. Mechanical noise from this motor will be completely inaudible at both the nearest noise sensitive location and the nearest public amenity area or walkway. The impact from operational plant associated with the development will therefore be *negligible.*

Otherwise, noise impacts during the operational phase of the development will be limited works associated with maintenance of the outfall. It is expected that whilst this may generate high levels of noise, it would be expected that such operations would last a few hours and may only occur once or twice a year during the daytime period. The impact of these activities is therefore considered to be *negligible.*

10.4 Mitigation Measures

The contractor will ensure that construction noise levels are limited to 65 dB $L_{Aeq,16hour}$ at the nearest noise sensitive location.

Allowable vibration (in terms of peak particle velocity) at the quay walls outside of the permitted works area should not exceed:

- 3 mm/s at less than 10 Hz;
- 3 – 8 mm/s at 10 to 50 Hz; and
- 8 – 10 mm/s at 50 to 100 Hz (and above).

For soundly constructed property and similar structures that are generally in good repair, a threshold for minor or cosmetic (i.e. non-structural) damage should be taken as a peak component particle velocity (in frequency range of predominant pulse) of:

- 15 mm/s at 4 Hz;
- 20 mm/s at 15 Hz; and
- 50 mm/s at 40 Hz and above.

The Contractor will compile a Noise and Vibration Management Plan (NVMP) which will deal specifically with management processes and strategic mitigation measures to remove or reduce significant noise and vibration impacts, and cumulative noise and vibration impacts from the construction works.

Noise control measures that will be considered include the selection of quiet plant, enclosures and screens around noise sources, limiting the hours of work and noise monitoring.

10.5 Residual Impacts

Once the mitigation measures as proposed are implemented, no residual significant noise or vibration impacts are expected to arise as a result of the construction and operation of the proposed development.

10.6 Monitoring

Noise and vibration monitoring will be undertaken during the construction phase at the nearest noise sensitive location to the works area. Noise and vibration monitoring will be undertaken in accordance with Iarnród Éireann requirement at Transition Chamber 1. Vibration monitoring will also be completed during piling work at the Outfall works area.

SECTION 11: Traffic and Transport

11.1 Methodology

The assessment for Traffic and Transport is based on the findings of site visits, observations, on-site traffic counts, plans associated with the proposed project and consultation with the Design Team. Consultation meetings were held with Roads & Traffic Planning Division, DCC on 1st March 2021.

Due to the restrictions and guidance in place in response to the Covid-19 pandemic, traffic flows on the adjoining road network are lower than would be anticipated both pre and post Covid-19. Various levels of restrictions were in place from March 2020 until January 2022. However, it has been noted at the time of writing that traffic levels on the adjoining road network are approximately 85% of pre-Covid-19 levels (Based on TII TMU N01 040.0 S: 2019 AADT – 44,765, 2022 AADT – 38,031 & TII TMU M50 000.0 N: 2019 AADT – 86,729, 2022 AADT – 73,887 (accessed on 30th March 2022)). In order to produce a conservative estimate of traffic behaviour in the vicinity of the subject site, historic traffic data previously collected within the local area was obtained. These historic traffic counts were undertaken in 2020 prior to the Covid-19 pandemic as well as in 2016 and in 2019. The 2016 and 2019 traffic figures were factored up to estimate the 2020 base year traffic flows on the adjacent road network.

To establish the baseline and future year flows the historic traffic count data will be factored up to the base year 2020 and the construction year 2023 using *TII Project Appraisal Guidelines: Unit 5.3 Travel Demand Projections* (Transport Infrastructure Ireland, 2019). Due to the nature of the proposed scheme, no traffic associated with the scheme is anticipated beyond the construction stage and it has been determined that no assessment of the traffic impacts in either the year of opening or the any future design year is required.

11.2 Receiving Environment

There are a series of local roads and streets linking the site with the Regional Road Network. These local roads and streets include Grand Canal Quay, Pearse Street, Macken Street, SJRQ and the Samuel Beckett Bridge.

The construction compounds associated with the construction of the proposed scheme are located within the DCC HGV Cordon Area as per the HGV Management Strategy (DCC, 2021). The HGV Strategy provides for a ban on 5+ axle vehicles during the hours of 07.00-19.00 seven days a week from a designated cordon area and provides a limited permit scheme for 5+ axle vehicles that need to load/ unload within the city centre area. Due to the HGV Management Strategy, if needed, access to the site for 5+ axle HGVs will be via M50, Sheriff Street Upper (R101), Guild St, Samuel Beckett Bridge, SJRQ , Forbes Street or Macken Street, Pearse St and Grand Canal Quay and will be outside the hours of operation for the cordon or by permit as granted by DCC during the hours of operation of the HGV cordon.

As mentioned above, in order to produce a conservative estimate of traffic behaviour in the vicinity of the subject site for the baseline scenario, historic traffic data previously collected for five junctions near the subject site was obtained.

A capacity assessment of SJRQ/ Macken St junction and Pearse St (R802)/ Grand Canal Quay/ Ringsend St junction was undertaken utilising the survey results and the Transport Research Laboratory's (TRL) OSCADY (Optimised Signal CApacity and DelaY) software for signal-controlled junctions. The assessment demonstrates that both SJRQ/ Macken St junction and Pearse St (R802)/ Grand Canal Quay/ Ringsend St junction are operating within the normal design threshold in the AM and PM peak periods in 2020 baseline scenario.

11.3 Potential Impacts

11.3.1 Construction Phase

To establish the future year flows the historic traffic count data will be factored up to the Final Year of Construction - 2025 using TII Project Appraisal Guidelines: Unit 5.3 Travel Demand Projections.

The exact sequence and programme of works will be determined by the contractor, however assuming an even distribution of deliveries throughout the construction period it has been estimated that 7 HGV arrivals and 7 HGV departures will occur daily. Whilst these construction trip estimates are for the entire development, it has also been conservatively assumed that each compound will attract 7 HGV arrivals and 7 HGV departures in the AM and PM peak periods. In order to provide a robust assessment of the impact of the proposed development it has been conservatively assumed that the average daily arrivals and departures will occur in both the AM and PM peak periods. An additional allowance of 35% of the average daily HGV traffic occurring in the off-peak period, based on *TII Project Appraisal Guidelines: Unit 16.1 Expansion Factors for Short Period Traffic Counts* for the time period 10:00 to 16:00, was then applied. The resultant worse-case scenario is 38 HGV trips daily.

Overall, the traffic generated by the development will not result in any significant impact to the operation of the SJRQ/ Macken St junction in the AM or PM peak scenarios or the Pearse St (R802) /Grand Canal Quay/ Ringsend St junction in the PM peak scenario. However, the proposed development may result in *significant impacts* to the Pearse St (R802) /Grand Canal Quay/ Ringsend St junction in the AM peak scenario, however, this is based on a worst-case estimate of traffic generation and will be *short-term* in duration.

Works will be required on Grand Canal Quay, Hanover Quay, Asgard Road, and SJRQ. Temporary traffic management will be required along this route for the duration of this work. These measures will include lane and/ or footpath closures. A road closure may be required on Asgard Road however, it is anticipated that vehicular access to the carpark on Asgard Road will be maintained for the duration of the works. It is anticipated that either a stop and go or a temporary traffic signal system will be utilised to maintain two-way traffic flow on SJRQ for the duration of the works. The duration of the impact of these works will be short term in nature, with no residual impacts.

11.3.2 Operational Phase

It is not anticipated that the proposed development will result in any trip generation in the operational phase.

11.4 Mitigation Measures

The following Mitigation measures are proposed for the scheme:

- Construction related HGV trips will adhere rigidly to the DCC HGV Management Strategy and associated cordon.
- A Preliminary Traffic Management Plan will be drafted by the Project Supervisor Design Process for the works in full consultation with DCC, An Garda Síochána, the Fire Service and the Ambulance service prior to the issuing of tender documents.
- Either a stop and go or a temporary traffic signal system will be utilised to maintain two-way traffic flow on SJRQ where possible.
- Delivery vehicles will not utilise Blood Stoney Road to access the works site.
- Tracked excavators will be moved to and from the site on low-loaders and will not be permitted to drive on the street pavements.
- The Contractor is to arrange for staff parking. Contractor's, subcontractor's or supplier's vehicles or staff vehicles, or any vehicles associated with the works are not permitted to park, idle or queue on the public road network.

- Wheel washers / judder bars will be placed at all site access points to minimise the migration of detritus onto the public roads, where appropriate. The roads will be inspected and cleaned on a regular basis.
- Haul vehicles will be covered after loading to ensure there is no risk of construction material falling or to any prevent any nuisance due to dust particles.
- Water bowsers will be deployed within the sites during periods of hot weather to damp down potential dust generation from unbound surfaces.
- An Application for an Abnormal Load Permit will be made to DCC in advance for any abnormal loads exceeding the thresholds laid out in the Road Traffic (Construction and Use of Vehicles) (S.I. No. 5/2003) Regulations 2003. Where possible abnormal load movements will be restricted to evening or night-time to minimise disruption to local traffic and traffic on strategic routes.

11.5 Residual Impacts

The proposed development will result in a slight negative short-term impact during construction phase.

The proposed development will result in no long-term impacts during the operation phase.

11.6 Monitoring

No monitoring is proposed for the operational phase of the Grand Canal Storm Water Outfall Extension.

SECTION 12: Archaeology and Cultural Heritage

12.1 Methodology

The guidelines consulted for the assessment include *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (Environmental Protection Agency, 2022). The EPA quindolines were consulted and publications by the Department of Housing, Local Government and Heritage (DHLGH) includingthe *Framework and Principles for the Protection of the Archaeological Heritage* (originally published by Department of Arts, Heritage and Gaeltacht and the Islands 1999) and the *Architectural Heritage Protection Guidelines for Planning Authorities* (originally published by the Department of Arts, Heritage and the Gaeltacht, 2011) and the relevant *Advice Series* publications by DHLGH, including *Paving - The Conservation of Historic Ground Surfaces* (originally published by the Department of Arts, Heritage and the Gaeltacht, 2015)

This impact assessment was carried out involving a literature review and consultation of the following:

- Record of Monuments and Places (RMP) and Sites and Monuments Record (SMR) compiled and updated by the National Monuments Service and the National Historic Properties Service of the Department of Culture, Heritage and the Gaeltacht;
- The Dublin City Development Plan 2016-2022 and Draft Dublin City Development Plan 2022-2028 was consulted for Record of Protected Structures and list of Architectural Conservation Areas for Dublin City;
- National Inventory of Architectural Heritage (NIAH) for County Dublin and the Dublin City Industrial Heritage Record (DCIHR).
- The Topographical Files of the National Museum of Ireland;
- The results of previous and ongoing archaeological investigations;
- Historical maps held by the Map Library of Trinity College Dublin and aerial photography from the Geological Survey of Ireland;
- The Commons Sessional Papers (CSP) and Wreck Inventory of Ireland Database (WIID);

In addition to the desk study, a site inspection was conducted which sought to identify current and previous land use and to locate any features of archaeological potential or items of cultural heritage interest on the site. An additional pre-construction Underwater Archaeological Impact Assessment (UAIA) (refer to Volume 3, Appendix 12A) of the proposed extent of the in-water works area associated with the proposed project was carried out in September 2020 in relation to the requirement of the Department of Culture, Heritage and the Gaeltacht (Ref: G Pre00033/2020).

12.2 Receiving Environment

The field survey of the site was conducted by Donald Murphy of ACSU on two occasions, on the 25th of September 2020 and on the 9th of February 2021. The majority of the study area is located in the central underwater part of the Grand Canal Docks Basin.

The Grand Canal Dock including Hanover Quay is within Architectural Conservation Area and listed in the National Inventory of Architectural Heritage. The north part of the scheme, at SJRQ, is located within the banks of the River Liffey, that are within the Dublin City Zone of Archaeological Potential (DU018-020), Architectural Conservation Area and SJRQ (DU018-020201-). In addition, the site is located within the Grand Canal Docks Basin (NIAH Reg No. 50020499) that is listed in the National Inventory of Architectural Heritage and Dublin City Industrial Heritage Record and also forms a part of Canal Docks/ Britain Quay basin triple sea locks (RPS 987). There is a number of Protected Structures, architectural heritage structures as well as structures listed in the Dublin City Industrial Heritage Record (DCIHR) located along the Grand Canal Docks Basin. The only DCIHR asset located within the site is represented by Victoria Draw Bridge/ MacMahon Bridge.The quay has undergone frequent modern intervention/

remedial works along its extent. The proposed pipeline will impact a section of the quay wall here at Transition Chamber 3. The only Protected Structure within the works area itself is RPS ID. 7542 SJRQ- Granite ashlar quay walls, stone setts, mooring rings, steps, bollards, lamp standards and machinery. SJRQ is composed of neatly-cut/faced, regularly coursed, granite blocks measuring a uniform 1.20m in length x 300mm in height and 950mm in length x 300mm in height. This uniformity of construction is evident from the base of the capping stones to the base of the structure; the capping stones being of greater height at 400mm. A chamfer in the quay wall is located *c.* 2.5m from the top of the structure. A set of river-access steps are located *c.* 25m to the east of the identified location of the proposed outfall. A recessed mooring-hoop (250mm recess) is located *c*. 9m east of the outfall centre-point. In addition, two (2) rectangular recesses measuring 250mmm (length) x 150mm (width) x 0.25m (depth) are located at the point of impact. These rectangular recesses are likely to represent fixtures for a wooden access ladder or wooden buffer-posts to protect the quayside. No fixtures or fittings were visible below the water-line, the only noteworthy feature being the masonry chamfer detail present along the quay wall.

It should be noted, that two additions relevant to the site are listed in the Record of Protected Structures within the Draft Dublin City Development Plan 2022-2028; RPS ID 8844 Grand Canal Quay and RPS ID 8847 Hanover Quay. It is anticipated that the draft will be adopted in December 2022.
As set out in the draft Development Plan 2022-2028, under the proposed Policy BHA 18(a), the extant historic and traditionally laid stone setts to Sir John Rogerson's Quay (campshires) are to be protected, conserved and reintroduced; together with any associated gutter row(s) of setts; gutter flags or flat diorite gutters; diorite strip between central and side paving and traditional gullies, gratings and covers etc.

It should be noted, that such settings can only be impacted upon in two locations; at Hanover Quay and at Sir John Rogerson's Quay. However, only on SJRQ such surface was evident. Furthermore, stone setts at SJRQ are detailed as a part of PRS ID 7542. The existing surfaces at Hanover Quay should be reinstated upon completion.
In order to facilitate the works three temporary compound locations are also proposed. While no ground works are anticipated in relation to these and therefore no direct impact is expected, any vulnerable historic surfaces at compound locations will need to be protected. The site visit identified cast iron moorings along Hanover Quay (NIAH Reg. No. 50100342) that will require appropriate protection during the construction phase.

No additional structures or features of a built heritage or archaeological nature were identified within the study area. The features highlighted in the ADCO underwater survey consist of the quay walls and two elements located at SJRQ wall - two rectangular recesses, possibly for a ladder and a recessed iron mooring hoop

There are no shipwrecks with known location within the development area as listed within the Wreck Inventory of Ireland Database (WIID), and no wrecks were identified within the study area during the Underwater Archaeological Assessments carried out in relation to the proposed development in 2008 and 2020. However, there are a number of wrecks whose place of loss is specifically recorded as the River Liffey.

12.3 Potential Impacts

12.3.1 Construction Phase

There are two direct impacts on sites of known archaeological and cultural heritage significance. The first is the proposed storm water outfall to the River Liffey which will have a *direct negative impact, moderate and permanent* in nature on a small section of SJRQ, which is within the Dublin City Zone Of Archaeological Potential: DU018-020, within Architectural Conservation Area as marked on Map E of the Dublin City Development Plan 2016-2022 and is a recorded monument listed in the Record of Monuments and Places for County Dublin (DU018-020201-). SJRQ is also a Protected Structure (RPS 7542) in the

Dublin City Development Plan 2016-2022, that includes granite ashlar quay walls, stone setts, mooring rings, steps, bollards, lamp standards and machinery and is also recorded in the National Inventory of Architectural Heritage (NIAH Reg. No 50020465). Works relating to Sir Rogerson's Quay date as early as 1714. The proposed outfall will necessitate the removal of a small section (c. 13m) of the granite ashlar quay walls directly opposite Asgard Road. The wall at this location includes two rectangular recesses likely to have supported a wooden access ladder or buffering posts along the quay wall.

The second direct impact on a site of known cultural heritage significance is located along the north end of the Grand Canal Docks at Hanover Quay that is within Architectural Conservation Area as marked on Map E of the Dublin City Development Plan 2016-2022. At this location the pipeline running northwards through the Basin will be inserted and pass through a section of Hanover Quay, and link with existing culvert on Asgard Road built in 2002. Here the construction of the pipeline will require the removal of a small section (c. 7.3m) of the quay wall where it will have a *direct negative impact, moderate and permanent* in nature. The wall at this location consists of two courses of rough-cut limestone above the water level with large capping stones above. A set of access steps are located 6m from the western edge of the quay wall. Furthermore, it also has the potential to have a direct impact on a substantial possibly late 18th century stone wall (identified under licence 05E1045); exposed along the north side of Hanover Quay should it extend into the site. Should the late 18th century stone wall extend into the area to be impacted by groundworks associated with the proposed development, the wall will be perforated.
The groundworks will impact historic surfaces located at SJRQ and any such surfaces on Hanover Quay. There is also the potential to impact on any historic surfaces at the compound location. Finally, there is also some limited potential that construction works could directly impact previously unknown features or deposits of an archaeological nature should they be discovered during the course of the works.

12.3.2 Operational Phase

There will be no operational phase impacts on archaeology or cultural heritage features from the proposed development.

12.4 Mitigation Measures

12.4.1 Pre - Construction phase

The following mitigation measures will be carried out before Construction Works commence:

- A conservation expert (Grade 1 Conservation Architect preferably) with proven and appropriate expertise shall be employed to design, manage, monitor and implement all proposed new work from initial concept design stage through to construction stage and to ensure adequate protection of the historic fabric during the work. In this regard, all permitted works shall be designed to cause minimum interference to the structures and/or fabric. All works to the historic fabric shall be carried out in accordance with best conservation practice and the Architectural Heritage Protection Guidelines for Planning Authorities (2011) and Advice Series issued by the Department of the Environment, Heritage and Local Government. Any repair works shall retain the maximum amount of surviving historic fabric in situ. Items to be removed for repair off-site shall be recorded prior to removal, catalogued and numbered to allow for authentic re-instatement. All existing original features, in the vicinity of the works shall be protected during the course of the refurbishment works. All repair of original fabric shall be scheduled and carried out by appropriately experienced conservators of historic fabric. The architectural detailing and materials in the new work shall be executed to the highest standards so as to complement the setting of the protected structure and the historic area;
- A detailed pre-construction survey of the location of the outfall at SJRQ will be carried out and elements of SJRQ to be impacted upon will be recorded. This will include features within the works area such as cobbling, metal tracks, stone setts (also identified as historic street surfaces in Appendix 6 of the Draft Dublin City Development Plan 2022-2028 and protected in accordance with Policy BHA 18(a))and bollards that are part of the quays and any features that are deemed of

archaeological or architectural importance that might be impacted upon by the proposed works., The survey will include detailed plans and elevations of the quay wall at the outfall exit location crossed referenced against detailed photographic record; detailed set of drawings will be prepared, cross-referenced against marked-up photographs (to-scale photogrammetric survey)of the historic vertical and horizontal surfaces of the area to record the condition of the historic surfaces and to inform any repairs required. This will be carried out using a drone photographic survey, superimposed / cross referenced at scale on a set of CAD drawings so as to identify the presence of such features and to calculate the area of historic surfaces that may be impacted by the development and to identify the necessary repairs;

- A detailed pre-construction survey of the location of Transitional Chamber 3 at the junction of Grand Canal Docks and Hanover Quay will be carried out and elements of the north wall of the Grand Canal Docks along Hanover Quay to be impacted upon will be recorded. This will include any features within the works area such as the iron mooring points and stone steps and any other features that are deemed of archaeological, cultural heritage or architectural importance that might be impacted upon by the proposed works. The survey will include detailed plans and elevations of the quay wall at the outfall exit location; detailed set of drawings will be prepared, cross-referenced against marked-up photographs (to-scale photogrammetric survey)of the historic vertical and horizontal surfaces of the area to record the condition of the historic surfaces and to inform any repairs required. This will be carried out using a drone photographic survey, superimposed / cross referenced at scale on a set of CAD drawings so as to identify the presence of such features and to calculate the area of historic surfaces that may be impacted by the development and to identify the necessary repairs; and
- The removal of sections of wall (including as of yet unidentified sections) will be agreed in writing with both the City Archaeologist and Conservation Officer. The removal of quayside fixtures will also be agreed in writing with the City Archaeologist/Conservation Officer prior to removal.

12.4.2 Construction phase

The following mitigation measures will be carried out during the construction phase:

- The perimeter of the temporary construction compound at Hanover Quay will be placed at 1m distance from the edge of the quay wall. This will ensure that the cast iron moorings are outside the compound and will not be impacted. If for any reason this is not possible then the moorings will be removed for the duration of the works, stored safely and re-instated on completion. Any historic surfaces deemed vulnerable will be protected. A conservation specification and methodology for this aspect of the work shall be prepared by the conservation professional and submitted to the Conservation Officer for their written agreement in advance of works commencing. This will fully mitigate any impact on this part of Hanover Quay. No ground works are proposed within either compound area;
- As pre-development test excavation of areas to be impacted is not feasible due to the nature of works and location, monitoring of all groundworks will be necessary. Therefore, it is recommended that prior to groundworks/excavation a conservation specification and methodology for the careful lifting, protecting, and setting aside of the historic surfaces shall be prepared by the conservation professional and submitted to the Conservation Officer for their written agreement in advance of works commencing. Subsequently, following lifting of these historic surfaces in line with the agreed specification and methodology, breaking and removal of the deposits will be carried out by a suitably qualified archaeologist in line with a method statement prepared and approved by the City Archaeologist, and under Licence from the Department of Housing, Local Government & Heritage in consultation with the National Museum of Ireland. Should significant archaeological material be identified during works, preservation in situ where possible or preservation by record is recommended where other mitigation measures are not possible. This will require strategies to be implemented that will require consultation with the Department of Housing, Local Government & Heritage and the Dublin City Archaeologist and Conservation Officer of Dublin City Council;
- In the underwater areas (the area of the Grand Canal Basin and the River Liffey) archaeological monitoring during excavation/ moving of silts will be required by a suitably qualified archaeologist with maritime experience who will monitor the material being disturbed from the basin and riverbed.

Provisions will be made to fully resolve any archaeological material/ features/ deposits observed during the monitoring;

- Any quayside masonry and/or associated fixtures and fittings that require removal as part of the development will be recorded in advance, retained and every attempt will be made that these are re-instated. Where re-instatement is not possible suitable long-term storage or re-use options will be agreed in advance with the Dublin City Archaeologist and Conservation Officer; and
- Should any previously unknown, concealed historic fabric is discovered / uncovered in the course of opening up / excavation / construction work, the Conservation Officer shall be contacted and informed so as agree in writing a preferred methodology for its careful and authentic reinstatement.

If these recommendations are implemented the potential impact on archaeological and built heritage material will be sufficiently mitigated.

12.5 Residual Impacts

If the mitigation measures above are fully implemented there will be no residual impacts on the archaeological, architectural or cultural heritage resource as any features of significance would be preserved either in situ or by record.

12.6 Monitoring

Archaeological monitoring of all ground disturbance associated with the proposed development with the provision for recording and excavation (if required) will mitigate any potential impact and preserve any archaeological, architectural and cultural heritage features identified by record.

SECTION 13: Waste Management

13.1 Methodology

Desktop studies, site visits and site-specific investigations were conducted in the area of the proposed development. The desktop study included a review of applicable policy and legislation which creates the legal framework for resource and waste management in Ireland. The proposed construction methodology, design, and drawings for the proposed development were considered in the course of this assessment. The volume of surplus material expected to be removed during the course of construction was considered as part of this assessment, including the various sources of waste, potential haulage routes, disposal facilities, and necessary licences etc.

The criteria used to assess the potential impacts of the waste generation and management arising from the proposed development has been adopted from the *Guidelines on the Information to be contained in Environmental Impact Assessment Reports* (EPA, 2022).

13.2 Receiving Environment

Owing to the history of the area and from the geotechnical investigation campaign results there is a high probability of encountering contaminated soil during excavation works. Previous site investigations have indicated the presence of contaminated soils close to the proposed development. In order to establish the appropriate reuse, recovery and/or disposal route for the material to be removed off-site, waste will initially be classified as hazardous or non-hazardous in accordance with the '*Waste Classification- List of Waste and Determining if Waste is Hazardous or Non-hazardous'*, EPA 2018. Excavation works will be required to be carefully monitored by a suitably qualified person to ensure hazardous soil is identified and segregated from any potentially non-hazardous soil, where encountered.

13.3 Potential Impacts

13.3.1 Construction Phase

Excavation works, site compounds and temporary works facilities are likely to generate construction waste. The potential impacts associated with construction phase include:

- Spillage of contaminated material arising from minor dredging works and piling works in the Basin. This is considered a temporary moderate negative impact;
- Spillage of hydrocarbons and construction materials during works in the Basin and in the River Liffey. This is considered a temporary moderate negative impact;
- Spillage of contaminated material arising from terrestrial excavations on Hanover Quay, and SJRQ into the waters of River Liffey. This is considered a temporary moderate negative impact;
- Spillage of contaminated material arising from minor dredging works and piling works in the River Liffey during the construction of the new outfall structure. This is considered a temporary moderate negative impact;
- The waste generation and transport of waste from site may cause a number of direct and indirect impacts on other environmental aspects such as air quality (dust, odour), traffic, noise, water and human health; and
- The use of non-permitted waste contractors or unlicensed facilities could give rise to inappropriate management of waste and result in environmental impacts/pollution. Any waste generated on site during the construction phase will be segregated and removed by a licensed waste collector(s).

Waste generated from the works is not likely to result in a significant impact on the receiving environment given that standard best practice guidelines and procedures will be followed. Any material arisings on site will not be reused due to its nature as contaminated material. The potential effect of construction

waste generated from the proposed development is considered to be *a moderate, negative,* but *temporary.*

13.3.2 Operational Phase

There are no identified potential impacts associated with the operation phase of the proposed development other than those outlined in Volume 2, Section 7 Water Quality and Hydrology relating to normal operating stormwater discharges into the River Liffey.

13.4 Mitigation Measures

The surplus material arising from piling works and from excavated soil from open trench works on Hanover Quay and SJRQ will not be reused on site and will be transported offsite to a suitably licenced acceptance facility.

The contractor will be responsible for ensuring compliance with statutory obligations for the collection and transport of waste. All material will be treated as contaminated material and will be disposed of at suitably licenced facilities. Actions regarding waste material and removal will be undertaken as per the Guidelines for the Management of Waste from National Road Construction Projects, Transport Infrastructure Ireland, 2017.

Within the basin, waste will be minimised by the redistribution of displaced soil and silts. Redistribution of suitable displaced material will not extend more than 10 metres from the pipeline structure and will not raise the bed level above the top of the structure (0.8 mOD) on the basin bed thus maintaining the minimum draught for boat traffic within the basin. Resuspension of sediments will be confined within silt curtains during the construction stage in the basin.

A Construction Environmental Management Plan (CEMP) and Resource and Waste Management Plan (RWMP) has been prepared as part of the planning application submission and is attached as Volume 3, Appendix 17A and Appendix 13A, respectively, to this report. The CEMP and RWMP will be further updated by the Contractor during the pre-construction phase of the proposed development.

13.5 Residual Impacts

The waste generated from the works is not likely to result in a significant impact on the receiving environment given that standard best practice guidelines and procedures will be followed. Consequently, the resultant impact from the proposed development in relation to waste management is *short term, neutral and imperceptible*.

In terms of waste management there are no identified potential impacts associated with the operational phase of the proposed development.

13.6 Monitoring

All excavation will be monitored by a competent person during earthworks to ensure that the soils excavated for disposal are consistent with the descriptions and classifications according to the waste acceptance criteria testing carried out as part of the site investigations.

No monitoring is proposed for the operational phase of the project.

SECTION 14: Material Assets

14.1 Methodology

Consultation has been made with various utility providers that may have services within the area. Utilities that may be impacted upon by the proposed development have been mapped and their providers informed of the project details. Consultation has also been made with key stakeholders present in the local vicinity including community groups, statutory and non-statutory bodies, environmental groups, resident's associations, and local businesses etc.

The criteria used to assess the potential impacts of the waste generation and management arising from the proposed development has been adopted from the *Guidelines on the Information to be contained in Environmental Impact Assessment Reports* (EPA, 2022).

14.2 Receiving Environment

The Grand Canal Basin itself is a valuable amenity as a visual attraction, and as a waterbody for houseboats, transportation, and water-based recreation including boating, kayaking, water skiing, paddle boarding, etc. Due to water quality issues, immersive water sports are currently not permitted in the basin. Grand Canal Quay at the Waterways Ireland Visitor Centre, in the vicinity of the Inner Basin Construction Compound, has street furniture in the form of benches, trees with metal guards, lampposts, and bollards. Similarly, Hanover Quay, in the vicinity of the proposed Transition Chamber 3 and the buried culvert and SJRQ, in the vicinity of the proposed outfall structure and the SJRQ Construction Compound have other material assets such as public sitting, cast iron moorings etc in the vicinity.

Notable recreational facilities in the area include the Bord Gáis Energy Theatre, Flyefit, Freeman's Quay Leisure Centre, Lir Academy, Wakedock, WI Visitor Centre and the Diving Bell. Further afield there is the Aviva Stadium, Shelbourne Park Greyhound Stadium, Ringsend Park, South Dock Street Park, Irishtown Stadium, and Irishtown Nature Park/ Reserve. The Basin itself is used for recreational water sports by the general public. There are many businesses, shops, cafes, offices, and restaurants located within Grand Canal Docks along the quayside, on SJRQ, and in the immediate vicinity of the Docks. Grand Canal Docks is home to many residential apartments both new and old. Many of the residential apartment blocks along the Grand Canal Docks waterfront have commercial units at ground level.

The road network immediately adjacent Grand Canal Docks includes Grand Canal Quay, Hanover Quay, Misery Hill, Blood Stoney Road, Asgard Road, Forbes Street, Benson Street, MacMahon Bridge, and Ringsend Road. The Grand Canal Dart Station is located immediately south of the proposed development. A number of buses also serve the area.

The landownership along the entire route of the pipeline and the proposed construction compounds is under the ownership of either DCC or Waterways Ireland. Letters of consent to the planning application have been received have been received from both Waterways Ireland and DCC. No compulsory purchase orders from third parties will be required to complete the project.

Consultation has been undertaken with utility providers to determine the extent and location of services within the project area. Utility providers contacted include, BT Ireland, E Net, Eir, ESB, Gas Networks Ireland, Irish Water (IW) and Virgin Media.

There are a number of assets of value to the public in the vicinity of the Grand Canal Docks. These include quay walls, local buildings, cast iron mooring rings, cobblestone pavements etc. There are eleven internationally designated sites located within the identified Zone of Influence of the proposed development. A further four-non statutory nationally designated sites are located within the nearby vicinity of the proposed development.

14.3 Potential Impacts

14.3.1 Construction Phase

The potential impacts on material assets associated with construction phase include:

- Temporary reduction of amenity value of the Grand Canal Docks for the general public and local residents during the construction phase due to construction movements, noise, road diversions, hoarding;
- Temporary reduction of amenity value of SJRQ during construction works;
- Temporary reduction of recreational amenity use of the Basin during construction works;
- Temporary slight negative impact on traffic in the vicinity of the Docks during construction works due to HGV and construction traffic movements;
- Risk of reduction of water quality of the Basin and the River Liffey due to hydrocarbon and material spillage;
- Risk of damage to utilities during digging on Hanover Quay and SJRQ;
- Risk of damage to the MacMahon Bridge services and services that cross beneath it; and
- Permanent slight negative impact upon the cultural heritage of the area through digging on SJRQ and Hanover Quay, the quay walls of the Dock and SJRQ, and at the proposed outfall location in the River Liffey.

14.3.2 Operational Phase

The public amenity and recreation value of the Docks will experience a *significant permanent positive* impact as water quality will be improved within the Basin. The removal of the stormwater outfall in the Grand Canal Basin will lead to a reduction in input of polluted water. This would have a *permanent positive* effect and will improve the water quality within the basin and the overall WFD status of the waterbody. Due to the higher assimilative capacity of the River Liffey, changes in water quality there will be *not significant*. The Dublin Port Company have indicated that berthing at the SJRQ may be restricted in the vicinity of the outfall. This will result in *slight negative long-term effect* during the operational phase. There are no other direct or indirect impacts on commercial, residential, transport, utilities, geological heritage, archaeological and cultural heritage during the operational phase of the project.

14.4 Mitigation Measures

14.4.1 Construction Phase

Mitigation by avoidance will be the primary mitigation measure implemented during the proposed development. This will be applied during the construction phase in the avoidance of utilities such as underground services.

Management plans including method statements and risk assessments will be developed for excavations in proximity to underground utilities. Where excavations of intrusive works are located nearby utilities it may be necessary to have a plant protection officer/ representative from the respective utility provider onsite during the works. Any required supervision of excavation works nearby utilities will be agreed with the respective utility provider. In particular detailed individual method statements will be provided by the Contractor and developed in consultation with respective utility owner with respect to the 8ft city sewer under Mc Mahon Bridge and the high-pressure gas mains on SJRQ.

Any necessary re-routing of utilities will be identified, agreed with the relevant utility provider and carried out in advance of the main works. A record of the position, size and type of all services encountered or affected by the works will be documented.

Any existing street furniture, surfaces, and historic features such as the granite ashlar quay walls, stone setts, mooring rings, steps, bollards, lamp standards and crane tracks, which are to be temporarily removed for construction, will be done under the supervision of a qualified archaeologist They will also

be catalogued. Following the construction phase, the Campshires will be reinstated as existing. The extent of the existing quay wall requiring demolition to allow for the installation of the culvert will be minimised. Care will be taken not to damage the existing stone as they will be reinstated around the culvert structure.

All construction works will be temporary and carried out in accordance with best practice guidelines to minimise impacts upon receiving communities. A CEMP has been prepared and is included in Volume 3, Appendix 17A to the EIAR which will be updated and finalised by the Contractor prior to construction commencing. Method statements will be provided by the Contractor for the works in the vicinity of utilities and underground services.

14.4.2 Operational Phase

There are no specific mitigation measures to reduce impacts on services and the built environment required as part of the operational phase.

14.5 Residual Impacts

There will be a *short term moderate negative* impact on the public amenity of the Basin itself, the Grand Canal Docks, and SJRQ during the construction phase. This will be due to visual impact, recreation, removal of available public space, construction noise, and traffic diversions.

There will be a *short-term moderate negative* impact on residents in the immediate vicinity of the Grand Canal Docks and SJRQ from construction activities, most notably, noise, dust, vibration, visual impact, and traffic disruptions. There will be a *slight negative* impact on traffic during the construction phase due to diversions, road closures, and additional traffic due to construction traffic and HGV movements etc.

There will be a *significant permanent positive* impact on the amenity of the Grand Canal Basin for recreational users and the public as a result of the proposed development from moving the Storm Water Outfall to the River Liffey where it will be better assimilated.

There will be an occasional '*not significant' negative* impact on the receiving waters of the River Liffey during the operational phase of the proposed development. This will occur when there are CSO spills in the sewer catchment. This is not anticipated to significantly reduce the amenity value of the River Liffey or to impact upon its users as demonstrated by the water quality model.

The Dublin Port Company have indicated that berthing at the SJRQ may be restricted in the vicinity of the outfall. This will result in *slight negative long-term effect* during the operational phase.

Following reinstatement there will be no other negative impacts on material assets during the operational stage.

14.6 Monitoring

Monitoring of material assets will involve supervision of buried utilities where open trench excavation is scheduled.

SECTION 15: Landscape and Visual Impact

15.1 Methodology

The assessment is based on the recommendations in the *Guidelines for Landscape and Visual Impact Assessment* (GLVIA) as published by the Landscape Institute (UK) and the Institute of Environmental Management and Assessment (3rd Edition, 2013). The assessment also considers the landscape character assessment within the Dublin City Development Plan 2016-2022.

The LVIA, which was carried out during the Winter of 2020, was undertaken through a combination of desk studies and field surveys. The desk studies involved assessment of satellite imagery, Google Street View, historic and ordnance survey mapping, background search of the relevant policies from the local council and analysis of the Zone of Theoretical Visibility (ZTV). The site-work stage involved the verification of nearby views from the initial desk-based study. Field notes were recorded in relation to the likes of topography, land use, significant landscape features and overall landscape character.

When assessing the potential impacts on the landscape resulting from a proposed project, the criteria considered include, landscape character sensitivity, magnitude of likely impacts, significance of landscape effects.

15.2 Receiving Environment

The Docklands is designated as a strategic development and regeneration area (SDRA). The site is included within The North Lotts and Grand Canal Dock Special Development Area. The whole of the site area is designated as the Grand Canal Conservation Area.

The walls of the basin are constructed of roughly coursed calp limestone masonry, with squared calp coping and tooled granite coping, some replacement coping. Cast-iron bollards and mooring posts are regular features. The site also includes a small area of Asgard Road and a section SJRQ. These are composed of road carriageways in bitmac and pedestrian areas which are largely paved in natural stone flags and setts. Some historic elements of landscape on SJRQ including granite ashlar quay walls, stone setts, mooring rings, steps, bollards, lamp standards and inlaid crane tracks are listed in the Record of Protected Structures (RPS). All these elements of built heritage combine to help retain much of the historic character of the docks. Many taller modern buildings rise over the historic buildings of the docks in a medley of different forms and materials.

The area surrounding the dock is urban and composed of a range of mainly high and medium rise buildings largely of residential and commercial uses. Asgard road is a narrow street between medium-rise blocks of mainly residential and commercial development. The landscape of SJRQ is defined by its boundary with the River Liffey and views over to the North Lotts on the adjacent bank. Adjacent buildings are relatively bland, large scale and corporate in feel. The Diving Bell, used for nearly a century for constructing the quay walls of the docks, is located to the west of the site. A small building functioning as a 'Pig Trap' for an underground gas pipeline is located adjacent to where the outfall is to be constructed.

The basin and the areas of surrounding public open space in Grand Canal Docks are sensitive to infrastructure development due to their historic significance, designation as a conservation area and their high value for recreation and as a landmark destination for the city. Sensitivity is *high*. Sensitivity of Asgard Road and SJRQ is *medium* due to the presence of landscape features of historical importance but its overall lesser landscape amenity value. The surrounding urban areas have a much greater capacity to absorb change from infrastructure developments and an overall lower landscape value, they are therefore of lower sensitivity.

The North Lotts and Grand Canal Dock SDZ Planning Scheme (DCC, 2014) identifies key landmark features within the site context and identifies important Views and Vistas. Those that are either in close proximity to the site, or form backdrops to views across the site, and includes Alto Vetro Tower, Boland's Mills, Old North Wall Railway Station Complex, Poolbeg Generating Station Chimneys, St. Patrick's Church Spire (Ringsend) and the Gasworks. There are also a number of Designated Views & Prospects described within the North Lotts and Grand Canal Dock SDZ Planning Scheme (DCC, 2014).

15.3 Potential Impacts

15.3.1 Construction Phase

The construction phase will result in a partial, localised and temporary change in the landscape character of some areas of the basin and surroundings area. Temporary hoarding will be put in place to the edge of the construction zones on Grand Canal Quay, Grand Canal Square, Hanover Quay and SJRQ. There will be temporary loss of important historical landscape features on site; historic elements such as the quay wall, mooring rings, stone paving, mooring post etc. will be temporarily removed where necessary and reinstated upon completion of the works.

The three site compounds will result in a loss of public open space for the duration of their use throughout the construction phase. Construction access routes will reduce the amount of public space on some areas of Hanover Quay, Grand Canal Quay and SJRQ. The construction process would result in an increase in activity and visual clutter, which would have a temporary perceptual impact on the basin and surrounding areas

The magnitude of change would be locally *high* and the effect would be *temporary, significant, adverse* within the western side of the basin and the landscape of the surrounding public open spaces Grand Canal Quay, Grand Canal Square and Hanover Quay, which are included or adjacent to the proposed works. Beyond these areas the effect on landscape character would be lessened and there would be a gradual reduction of impact towards the eastern side of the basin where the landscape effect would be reduced to *moderate*. The magnitude of change for the landscape of Asgard Road would be *medium* and the effect would be *temporary, slight adverse*. For the landscape of SJRQ the magnitude of change would be locally *high* and the effect would be *temporary*, *moderate adverse.* The landscape of SJRQ has a greater capacity to accommodate change due to its larger urban grain and position next to the large expanse of the Liffey. The construction activity will appear relatively insignificant in comparison to the large scale of the surrounding landscape. Although there would be *adverse significant* landscape effects experienced during the construction phase these will all be *temporary* to *short-term and reversible.*

The construction will result in a change in views from surrounding residential and commercial receptors and those experienced by receptors using adjacent public open spaces. Views from adjacent public open spaces will be changed by the presence of construction machinery, coffer dams, hoarding, construction traffic and activity. The visual effect on the public open space receptors will be *significant to moderate, negative, temporary* to *short-term and* gradually reducing with distance to *imperceptible* towards south of the DART viaduct. The visual effect on the residential receptors will be *slight to moderate to significant (*depending on distance*), negative, temporary* to *short-term.* The visual effect on the commercial receptors will be *slight to moderate, negative, temporary to short-term*.

15.3.2 Operational Phase

The vast majority of the changes to landscape fabric of the site will take place underwater or underground. The only parts of the development within the basin that would be visible would be the above-water portions of Transition Chambers 1 and 2, and the proposed floating moorings adjacent to Grand Canal Square. The majority of the transition chambers would be underwater but would have above-water platforms which would be visible. The proposed floating moorings platform are essential to the protection of the pipeline from damage by boats.

Overall, the proposals would be well integrated into the receiving landscape. The proposals are mainly underwater or underground and visible parts would match the existing character of the docks which has similar features in existence. The scale of the visible changes to the basin will be small in relation to the overall scale of the docks and surrounding development. The presence of detracting features to the southern end of the basin i.e. the existing outfall structure, the DART overhead lines and DART footbridge, means that the proposals would sit well within the setting of the Inner Basin. Transition Chamber 2 will be integrated with the proposed moorings and will be similar to the existing mooring already present in the basin. The visible elements of proposals to Hanover Quay, Asgard Road and SJRQ would be limited to manhole covers and the outfall into the Liffey.

Once operational, the proposals will improve the water quality of the basin making usage for water-based activities safer, and this will have a positive effect on the landscape amenity. The landscape amenity will also be improved by the addition of the floating moorings which will allow a wider range of activities to be undertaken in the Outer Basin. There will be a beneficial change to the character of the docks as a whole through an increase in activity in the basin. The magnitude of change during the operational phase will be *low* and *positive.* The visual effect would therefore be *slight, positive and long-term.*

The operational phase will result in generally minor changes in views from surrounding residential and commercial receptors and those experienced by receptors using adjacent public open spaces. The visual effect on the public open space receptors will be *imperceptible.* The visual effect on the residential and commercial receptors in the perimeter of outer and inner basin will be *slight, negative, and permanent* at most. For the remaining residential and commercial receptors in the vicinity the visual effect will be *imperceptible.*

15.4 Mitigation Measures

15.4.1 Construction phase

Temporary hoardings will be put in place around land-based works along Hanover Quay and SJRQ and around the construction compounds. Also, temporary hoarding may be put in place to the edge of the construction zones on Grand Canal Quay and Grand Canal Square for works in the outer basin.

Any temporary removal for construction of existing street furniture, surfaces and historic features will be done in accordance to the advice from DCC City Architects' (Team 9). The requirements include the need for input/ engagement with the DCC Conservation Officer and the DCC Archaeologist prior to the works and a suitably qualified conservation expert to advise on and supervise the works to the Protected Structures. Such structures include the granite ashlar quay walls, stone setts, mooring rings, steps, bollards, lamp standards and crane tracks.

15.4.2 Operational phase

Manholes covers to use materials matching those surrounding by using recessed manhole covers with natural stone inserts.

Handrails and gates to platforms and moorings will be in a style that is sympathetic to the historic setting of the docks but will not be a pastiche by using direct copies of heritage styles. Simple colours and unornamented forms will be used that reflect the bollards, mooring posts and other historic remnants from the industrial use of the docks.

15.5 Residual Impacts

The proposed mitigation measures would not result in any significant changes to the anticipated effects. There may be a slight reduction in the temporary impacts on views from Grand Canal Quay, Grand Canal Square and SJRQ through the use of more visually permeable hoarding. However, the increase in visibility

of views would be balanced by the increased visibility of the construction works, and the impact would vary depending on the stage of construction.

The proposed mitigation measures would not result in any significant changes to the effects. The scope for mitigation is small and the expected pre-mitigation effects are already insignificant.

15.6 Monitoring

There would be no need for monitoring for landscape and visual effects.

SECTION 16: Interactions

16.1 Introduction

For any development with the potential for significant environmental impact there is also the potential for interaction amongst these individual impacts and the result of these interactions may either exacerbate the magnitude of the impact or ameliorate it. As recommended in the EPA 2022 guidelines, where a potential exists for significant environmental impacts to arise as a result of interaction, the relevant EIAR specialist has considered this in their Sections in Volume 2 of the EIAR. Mitigation measures have been prescribed in the appropriate Section to address associated effects, as required.

16.2 Assessment

There are cases where an effect on one element of the environment results in an effect on another element. In most cases the effect is automatically considered. For e.g., noise is assessed based on the effect of the proposed GCSWOE project on traffic during construction and the noise that the predicted traffic will generate which is compared with acceptable environmental standards which in turn are based on human health considerations.

To facilitate the understanding of, and interactions between, the various environmental disciplines, a workshop was convened for the environmental specialists and the design team. This workshop identified areas of interaction and the information exchange required to predict the direct and indirect effects of the proposed development. Where potential exists for interaction between two or more environmental topics, the relevant specialists have taken these into account when making their assessment and, where possible, complimentary mitigation measures have been proposed.

The interactions and interrelationships involved knowledge sharing and information exchange in relation to the following elements:

- Design and Construction Details: The design team provided project specific details to the specialist environmental team to ensure that they had sufficient information to determine the effects on the receiving environment;
- Sensitive receptors: Each specialist provided information on the receptors within their study area and their vulnerability to particular effects arising from the proposed development;
- Baseline and Modelling Data: For e.g., predicted traffic volumes provided by the traffic specialist were provided to the Noise and Vibration and Air specialists to predict the effects of the proposed development on the noise and air environments. Similarly, water quality modelling results were provided to the Ecologist to assess the potential impacts on the benthic fauna and the consequential effects on the food chain; and
- Impacts and mitigation measures: Each specialist assessed the effect of the other disciplines on the sensitive receptors within his / her discipline and where necessary recommended that mitigation was provided to meet the necessary environmental standards (where available).

As a result of this collaboration, the interactions and interdependent impacts/effects are addressed in the respective sections within the EIAR and appropriate mitigation and environmental standards recommended.

SECTION 17: Summary of Mitigation

The EIAR has assessed the impacts and resulting effects likely to occur as a result of the proposed Grand Canal Storm Water Outfall Extension (GCSWOE) project on the various aspects of the receiving environment.

In cases where impacts or potential impacts have been identified, mitigation has been proposed to reduce the significance of those impacts. These mitigation recommendations are contained in the specific environmental sections within Volume 2 of the EIAR. In addition to the mitigation measures proposed, appropriate management practices and commitments relating to construction activities are also provided.

The EPA Guidelines of the Information to be contained in Environmental Impact Assessment Report, 2022 defines mitigation measures as a *'A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements.'*

Many potential environmental impacts have been identified that are associated with construction activity and methodology. A CEMP has been prepared and is included in Volume 3, Appendix 17A to the EIAR which will be updated and finalised by the Contractor prior to construction commencing. This CEMP incorporates the environmental commitments and mitigation contained in the EIAR and will be further updated to include any conditions that may be attached to a planning permission.

SECTION 18: Summary of Residual Impacts

The residual impacts are the impacts that remain following the implementation and incorporation of the mitigation measures and environmental commitments. Ideally, in cases where a negative impact has been predicted, the residual impact following the implementation of mitigation measures and good construction practice will be "Neutral". However, in a few isolated cases, despite the fact that steps have been taken to minimise the impact, a residual negative impact remains. Where an impact is positive no mitigation is required.

On the basis of the assessment of potential impacts and the recommended mitigation measures in the EIAR, the proposed GCSWOE project is not likely to impose any significant adverse effects on the environment. The majority of impacts on the environment are either non-existent or of imperceptible/slight significance.

SECTION 19: Cumulative Impacts

19.1 Introduction

As stated in the DoHPLG (2018) guidance document, "*Effects are not to be considered in isolation but cumulatively i.e. when they are added to other effects. A single effect on its own may not be significant in terms of impact on the environment but, when considered together with other effects, may have significant impact on the environment. Also, a single effect which may, on its own, have a significant effect, may have a reduced and insignificant impact when combined with other effects*".

The EC Guidelines (1999) also considers 'Indirect Impacts' as well as 'Impact Interactions' in addition to 'Cumulative Impacts' and states that these three types of impact overlap. For the purposes of this assessment, these impacts were considered as follows:

- Indirect Impacts: Impacts on the environment that are not a direct result of the proposed development, often produced away from or as a result of a complex pathway; and
- Impact Interactions: Where two impacts have the potential to interact to create a new type of impact.

19.2 Assessment

In accordance with the EPA Draft 2017 Guidelines, an EIA Scoping Report was prepared (JBB, 2020) which identified existing and/ or approved projects with the potential for cumulative impacts with the proposed development. The Scoping Report considered three categories of plans/ projects based on the following:

- Existing or commenced projects with a valid planning permission within the vicinity of the proposed development that have the potential for significant cumulative effects with the proposed development;
- Approved projects with a valid planning permission that have not commenced construction within the vicinity of the proposed development that have the potential for significant cumulative effects with the proposed development; and
- Proposed projects that do not have planning permission but have the potential for significant cumulative effects with the proposed development.

19.2.1 Plans

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

- Dublin City Development Plan 2016-2022;
- Dublin Port Masterplan 2012-2040;
- Greater Dublin Area Cycle Network Plan (NTA, 2013);
- Greater Dublin Drainage Strategy;
- North Lotts and Grand Canal Planning Scheme, 2014;
- Poolbeg West Strategic Development Zone Planning Scheme;
- River Basin Management Plan; and
- Irish Water's Biodiversity Action Plan (BAP).

19.2.2 Projects

There are a number of identified existing and/ or approved third party projects in the vicinity that may have the potential to interact with the proposed development. A number of projects were identified at the Scoping stage of this project, and some have been identified since then. Projects that have been identified for consideration include :

- Alexandra Basin Redevelopment;
- Barrow Street Improvements;
- Inner Basin Boardwalk;
- Boland's Mill;
- Bus Connects;
- Canal Loop Greenway;
- Campshires Public Realm;
- Dart Underground;
- Dodder Greenway;
- Dodder Public Transportation Opening Bridge;
- Dublin District Heating System;
- Dublin Eastern Bypass project;
- Extension of Luas Red Line across the River Liffey;
- Grand Canal Greenway- Grand Canal Dock Section;
- Grand Canal Quay East;
- Liffey Cycle Route;
- Liffey-Tolka Project;
- Maintenance dredging in Dublin Port;
- Malthouse;
- Metrolink;
- MP2 Project, Dublin Port Company;
- North Lotts and Grand Canal Dock SDZ Water Animation Strategy 2018;
- Point Pedestrian Bridge;
- Poolbeg West Strategic Development Zone;
- Refurbishment of Camden Lock Gates;
- Ringsend Wastewater Treatment Plant Upgrade;
- South Campshire Flood Defence Wall project;
- Southern Port Access Route;
- Treasury Building; and
- Trinity East Innovation Hub.

Following screening projects identified for further assessment were:

- Alexandra Basin Redevelopment (ABR);
- Bus Connects;
- Dodder Public Transportation Opening Bridge;
- Dublin District Heating System;
- Grand Canal Greenway- Grand Canal Dock Section;
- Grand Canal Quay East development works;
- Maintenance dredging in Dublin Port;
- MP2 Project, Dublin Port Company;
- Ringsend Waste Water Treatment Plant Upgrade;
- South Campshire Flood Defence Wall Project; and
- Treasury Building.

This EIAR has considered potential cumulative impacts arising from the construction and operation of the proposed GCSWOE in accordance with the EIA Directive and corresponding guidelines. It has done so mainly through the integration of cumulative impacts in the undertaking of baseline surveys related to effects on Biodiversity, Water Quality, Noise and Vibration, Air Quality and Climate, Traffic and Transport, Landscape and Visual Impacts and Waste Management.

Having applied the mitigation measures to manage and reduce the risk of pollution, there will be no adverse significant impact upon the integrity of the European sites and receiving environment concerned. Also, following appropriate mitigation measures the residual impacts from the proposed GCSWOE

development are slight negative and short-term during construction phase. The proposed development is not likely to give rise to any significant or interactive cumulative impacts.