Client:

Dublin City Council and Irish Water

Applicant:

Dublin City Council

Project:

Grand Canal Storm Water Outfall Extension

Report:

Appendix 17A: Construction Environmental Management Plan

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SECTION 1: Introduction

J. B. Barry and Partners have been commissioned to prepare this Construction Environmental Management Plan (CEMP) for the proposed development. The principal objective of this CEMP is to recommend measures to avoid, minimise and control adverse environmental impacts associated with the construction of the proposed Grand Canal Storm Water Outfall Extension (GCSWOE).

This document will provide a framework for recording environmental risks, commitments, and other environmental constraints for the duration of the proposed project as a whole. This document will also clearly identify the structures and processes that will be used to manage and control these aspects, whilst also seeking to ensure compliance with relevant environmental legislation, government policy objectives and project specific environmental objectives. This CEMP will provide a mechanism for monitoring, reviewing, and auditing environmental performance and compliance for the duration of the project.

An Environmental Impact Assessment Report (EIAR) and Appropriate Assessment Natura Impact Statement (AA NIS) have been prepared for the assessment and analysis of potential impacts on the receiving environment caused by a proposed project. The mitigation measures arising from the EIAR, and AA NIS are addressed in this CEMP. Therefore, the EIAR and AA NIS should be read in conjunction with this CEMP. A Resource and Waste Management Plan (RWMP) has also been prepared by J.B. Barry and Partners for the proposed development and should be considered along with this report. These documents all together support the planning application made directly to An Bord Pleanála by Dublin City Council.

The CEMP will be a working document and will be finalised by the Contractor following appointment and prior to commencing works on site. However, all of the content provided in the CEMP will be implemented in full by the Contractor and its finalisation by the Contractor will not affect the robustness and adequacy of the information presented and relied upon in the EIAR.

The CEMP is a dynamic document, and the Contractor will ensure that it remains up to date for the duration of the construction period. The CEMP may need to be altered during the lifecycle of the construction period to take account of monitoring results, legislative changes, outcomes of third-party consultations etc. Additional appendices may be added to the CEMP to accommodate monitoring results, permits etc.

1.1 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 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 of the tunnel and discharges sewage contaminated flows into the Grand Canal Basin. Periodic bacteriological contamination of the water in the Basin (in excess of the bathing water standards) after heavy rainfall events has been identified by Waterways Ireland from water quality testing and they have urged Irish Water and DCC to extend the outfall to the River Liffey as proposed.

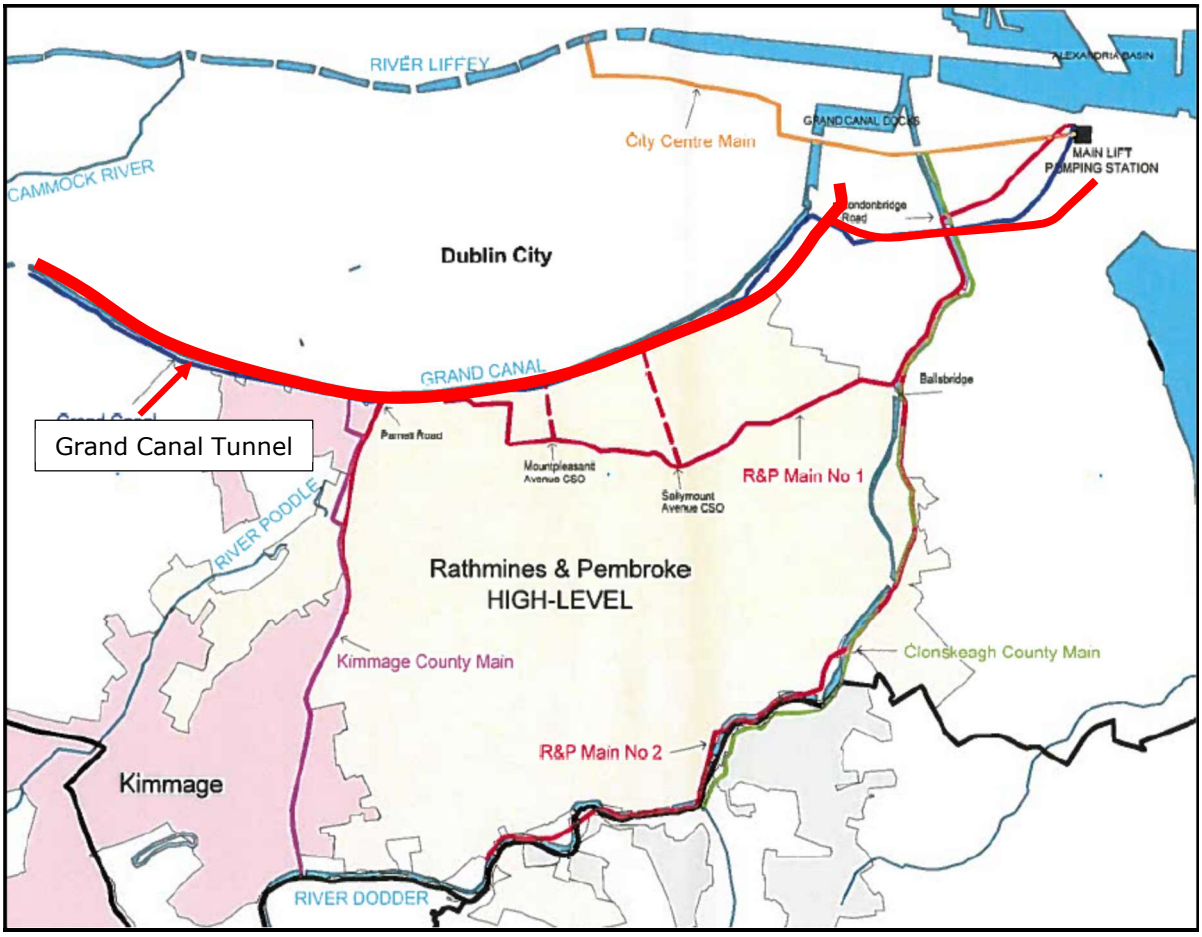

Figure 1.1 Grand Canal Tunnel

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

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

Dublin City Council (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 project consultant.

1.2 Objectives of CEMP

This CEMP sets out the procedures, standards, work practices and management responsibilities to address potential environmental effects that may arise from construction of the proposed GCSWOE. The CEMP will also comply with the requirements of the relevant authorities/environmental bodies.

The CEMP will be updated as necessary during the course of the construction phase and will be reviewed on a regular basis by the project manager/environmental manager on site. The CEMP will be reviewed by the Contractor on an ongoing basis, frequency and conditions for which will be stated in the Work Requirements.

The CEMP will provide a framework to:

- Formalise and disclose the programme for environmental management;
- Provide a framework for the implementation of environmental mitigation measures identified in the EIAR, AA NIS and planning conditions provided planning permission is granted;
- Present guiding principles and measures for the detailed method statements that will be produced during the pre-construction stage by the Contractor;
- Provide mitigation measures and environmental controls and ensure compliance with the Board planning consent (provided planning is granted);
- Specify roles and responsibilities for implementing the CEMP; and
- Describe the communication and reporting procedures.

This CEMP is a live document which will be developed further and/ or amended where necessary, subsequent to any information that may be made available from additional consultations, ongoing monitoring on site, appointment of a Contractor etc. Updates to this CEMP will be necessary due to any changes in environmental management practices and/or contractors. The CEMP will also require further updating and final agreement with the various stakeholders should the project secure Planning Permission, in line with all conditions which apply.

This document should not be considered a detailed construction method statement; this will be progressed by the contractors, appointed to undertake the individual works, prior to commencement of the works.

The CEMP is a specific, targeted, and 'stand-alone' plan to ensure that all of the mitigation measures, obligations, requirements and constraints identified in the EIA, AA NIS and planning conditions (subject to approval) are fully implemented under each specific contract in accordance with the Project Approval. The CEMP will be provided to the relevant local authority for consultation and approval (or as outlined in the planning conditions, should the project secure Planning Permission).

The Contractor will update the CEMP during pre-construction phase to include, as a minimum, the following:

- Management Structure for Construction and Operation Phases;
- Resources – roles and responsibilities;
- Training;
- Construction Activities and Sequencing;
- Method Statements;
- Communications;
- Management of Sub Contractors;
- Monitoring;
- Inspections and Auditing;
- Reporting;
- Corrective and Preventative Action Procedures;
- Procedures for Review and Improvement; and
- Records.

The CEMP will prior to construction phase be revised to include the following sub plans as appropriate:

- Construction Compound Management Plan;
- Traffic Management Plan;
- Noise and Vibration Management Plan;
- Water Quality Management Plan;
- Dust Management Plan;
- Construction and Demolition Waste Management Plan;
- Invasive Species Management Plan; and
- Emergency Incident Response Plan.

The CEMP is necessarily a "live" document which will be revised regularly. It is expected that amendments to the CEMP will be necessary to reflect inter alia changes in project scope, contract scheduling, contractor appointments, environmental management practices or regulations, and developments on the site. These reviews are necessary to ensure that environmental performance is subject to continual improvement.

1.3 Relevant Legislation

Throughout the lifecycle of any construction project, environmental management procedures are required to ensure that all appropriate legislation, policy and construction best practice are complied with, and the environmental effects of a development are minimised within best practicable means. Consideration will also be given to relevant adjacent developments in the management of future construction activities on site.

The environmental legislation, policy and best practice guidance contained within this CEMP are applicable at the time of writing. However, it is acknowledged that these can be subject to change. As such, the Contractor will be responsible for complying with current legal, policy and best practice guidance requirements applicable to their scope of works through the design and during construction of the proposed development.

Through effective implementation of the CEMP, the Contractor will demonstrate how construction activities and supporting design will properly integrate the requirements of environmental legislation, policy, good practice, and those of the environmental regulatory authorities and third parties.

The Contractor will comply with and implement all relevant Irish and EU safety, health and environmental legislation. The Contractor will be responsible for ensuring that any developments or changes to regulation and environmental legislation are complied with, even if they are not noted within this CEMP.

It should be noted that the appointed Contractor will be required to be aware of their obligations under legislation. Such legislation, includes, but is not restricted, to:

- Planning and Development Act, 2000 (as amended);
- Planning and Development Regulations 2001, S.I. No. 600 of 2001 (as amended);
- The Birds Directive: Council Directive of 2 April 1979 on the conservation of wild birds (79/409/EEC);
- The Birds Directive: Council Directive 2009/147/EC on the conservation of wild birds;
- The Habitats Directive: Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora;
- The European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. 477 of 2011) (as amended);
- Water Framework Directive (WFD): Directive 2000/60/EC of the European Parliament and Council establishing a framework for Community Action in the field of water policy (as amended);
- European Communities Environmental Objectives (Surface Waters) Regulations, 2009, S.I. No. 272 of 2009 (as amended);

- European Communities Environmental Objectives (Groundwater) Regulations 2010, S.I. No. 9 of 2010 (as amended);
- European Communities (Environmental Liability) Regulations, 2008, S.I. No. 547 of 2008 (as amended);
- Waste Framework Directive 2008/98/EC of the European Parliament and Council on waste;
- Waste Management Act of 1996, 2001 and 2003;
- The Water Pollution Acts of 1977 & 1990;
- The Wildlife Act 1976 & Wildlife (Amendment) Act, 2000;
- The Salmonid Regulations 1988, S.I. No. 293 of 1988;
- The Fisheries (Consolidation) Acts 1959 & 2001;
- Water Policy Regulations 2003, S.I. No. 722 of 2003 (as amended);
- Water Conservation Regulations 2008, S.I. No. 527 of 2008;
- European Communities (Drinking Water) Regulations 2014, S.I. No. 122 of 2014;
- Guidelines on protection of fisheries during construction works in and adjacent to waters (IFI, 2016);
- Litter Pollution Act of 1997, as amended, 2017;
- Litter Pollution Regulations 1999, S.I. No. 359 of 1999;
- European Communities (Waste Electrical and Electronic Equipment) Regulations 2011, S.I. 355 of 2011 (as amended);
- Waste Management (Facility Permit and Registration) Regulations 2007, S.I. No. 821 of 2007 (as amended);
- Waste Management (Collection Permit) Regulations 2007, S.I. No. 821 of 2007 (as amended);
- Waste Management (Miscellaneous Provisions) Regulations, 1998, S.I. No. 164 of 1998;
- Waste Management (Landfill Levy) Regulations 2008, S.I. No. 199 of 2008 (as amended);
- Waste Management (Hazardous Waste) Regulations 1998 (as amended);
- Waste Management Shipment of Waste Regulations 2007, S.I. No. 419 of 2007;
- European Communities (Shipments of Hazardous Waste Exclusively within Ireland) Regulations 2011, S.I. No 324 of 2011;
- Waste Management (Tyres and Waste Tyres) Regulations 2007 (as amended);
- European Union Batteries and Accumulators Regulations 2014, S.I. No. 383 of 2014 (as amended);
- Waste Management (Registration of Brokers and Dealers) Regulations 2008, SI No.113 of 2008;
- Waste Management (Prohibition of Material Disposal by burning) Regulations 2009, S.I No. 286 of 2009 (as amended);
- European Communities (Waste Directive) Regulations 2011, S.I. No. 126 of 2011 (as amended);
- European Waste Catalogue (EWC) and Hazardous Waste List 2002;
- Waste Management (Food Waste) Regulations 2009, S.I. No 508 of 2009 (as amended);
- Protection of the Environment Act 2003;
- European Union (Properties of Waste which Render it Hazardous) Regulations 2015, S.I. No. 233 of 2015;
- Air Quality Standards Regulations 2011, S.I. No. 180/2011;
- Air Pollution Act, 1987 (Air Quality Standards) Regulations, 1987 (as amended);
- Air Pollution Act, 1987 (Emission Limit Values for use of Asbestos) Regulations, 1990, S.I. No. 28 of 1990;
- EC (Control of Emissions of Gaseous & Particulate Pollutants from Non-Road Mobile Machinery) Regulations 2007, S.I. No.147 of 2007 (as amended);
- The EU Regulation 2037/2000 (CFC's, HCFC's, Halons) - Ozone Depleting Substances. Control of Substances that Deplete the Ozone Layer Regulations 2006, S.I. No 281 of 2006 (as amended);
- EU F Gas Regulations 2006, as amended, 2015, S.I. No. 517 of 2015;
- Environmental Protection Agency Act 1992 (Noise) Regulations, 1994 S.I. 174 of 1994;
- Environmental Noise Regulations 2006, S.I. No. 140 of 2006;
- European Communities (Noise Emission by Equipment for use Outdoors) Regulations, 2001, S.I No. 632 of 2001 (as amended);
- European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Amendment Regulations 1996, S.I No. 359 of 1996 and 2001, S.I No. 632 of 2001;
- Local Government (Planning and Development) Act 1963, S.I. No. 28 of 1963;

- Wildlife Act, 1976 (Protection of Wild Animals) Regulations, 1990, S.I. No. 112 of 1990 and Wildlife Amendment Act, 2000, S.I. No. 38 of 2000;
- European Communities Conservation of Wild Bird Regulations 1985, S.I. No. 291 of 1985 (as amended);
- Noxious Weed Act, 1936, S.I. No. 38 of 1936;
- Flora (Protection) Order, 2015, S.I. No 356 of 2015;
- The Forestry Act, 1946, S.I. No. 13 of 1946 (as amended);
- The National Monuments Act 1930, S.I. No. 2 of 1930 (as amended);
- European Union (Environmental Impact Assessment and Habitats) (Section 181 of the Planning and Development Act 2000) Regulations, 2013, S.I. No. 403 of 2013;
- Safety, Health, and Welfare at Work Act, 2005;
- Safety, Health, and Welfare at Work (Construction) Regulations, 2013; and
- Safety, Health, and Welfare at Work (Confined Spaces) Regulations, 2001.

1.4 Methodology

This document has been prepared in accordance with relevant best practice guidance and includes, but not limited to:

- C741- Environmental Good Practice on Site Guide (4th Edition) (CIRIA, 2015);
- C532- Control of Water Pollution from Construction Sites (CIRIA, 2001);
- C733- Asbestos in Soil and Made Ground: a Guide to Understanding and Managing Risks (CIRIA, 2014);
- BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites - Noise;
- BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites - Vibration;
- BS 7385: 1993 Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration;
- BS 8233:2014 Guidance on sound insulation and noise reduction for buildings;
- Guidance on Soil and Stone By-products in the context of article 27 of the European Communities (Waste Directive) Regulations 2011, Version 3 (EPA 2019);
- By-Product Guidance Note, A Guide to by-products and submitting a by-product notification under Article 27 of the European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011) (EPA, 2020);
- Waste Classification, List of Waste and Determining if Waste is Hazardous or Non-hazardous, (EPA 2018); and
- Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites (EPA 2013).
- Requirements for the Protection of Fisheries Habitat during Construction Works in and Adjacent to Waters (Inland Fisheries Ireland, 2016); and
- Framework and Principles for the Protection of the Archaeological Heritage (Department of Arts, Heritage, Gaeltacht and the Islands, 1999).

All available information of the proposed project has been incorporated into this CEMP. This document provides a detailed overview of key environmental considerations for the project as a whole, while also allowing for further refinement as the project progresses through to the construction stage. This CEMP identifies the key environmental considerations to be adhered to and delivered during the site construction and operation phase.

SECTION 2: Description of Proposed Development

2.1 Site Location

The development is located in the Grand Canal Docks, Dublin, Ireland. This area is in an urban environment and is a hub of modern apartment buildings and office and retail spaces which has been zoned as a Strategic Development Regeneration Area (SDRA) in the Dublin City Council Development Plan, 2016 – 2022, see Figure 2.1. The area is also known as a Key Developing Area (KDA) within the Development Plan, and also a Strategic Development Zone (SDZ) within the North Lotts and Grand Canal Planning Scheme, 2013.

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

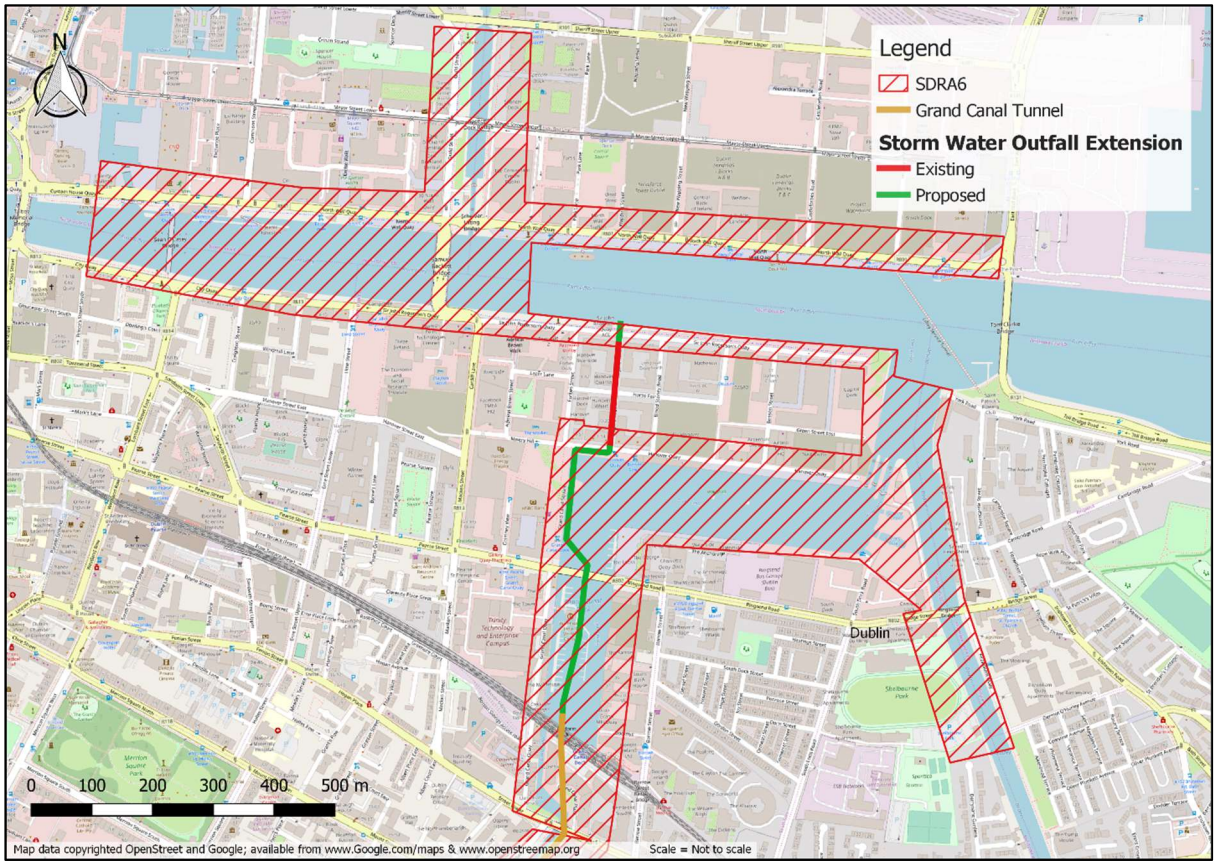

Figure 2.1 Site Location in context of the Strategic Development Regeneration Area (Dublin City Council Development Plan, 2016)

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 Sir John Rogerson's Quay 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 silt bed of the Grand Canal Basin, and 100m along existing road and pedestrian infrastructure, see Figure 2.2. The bed of the Basin is mostly flat with some gentle undulations; a maximum depth of 3.9m was observed by the Archaeological Diving Company (ARDCO) during a dive survey completed in 2008.

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

- Transition Chamber 1 at the existing Grand Canal Tunnel Outfall;
- Transition Chamber 2 at the transition point from the 5 No. 1.5m diameter pipeline to 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 in the design of 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 100years old, underneath the Basin;
- 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.

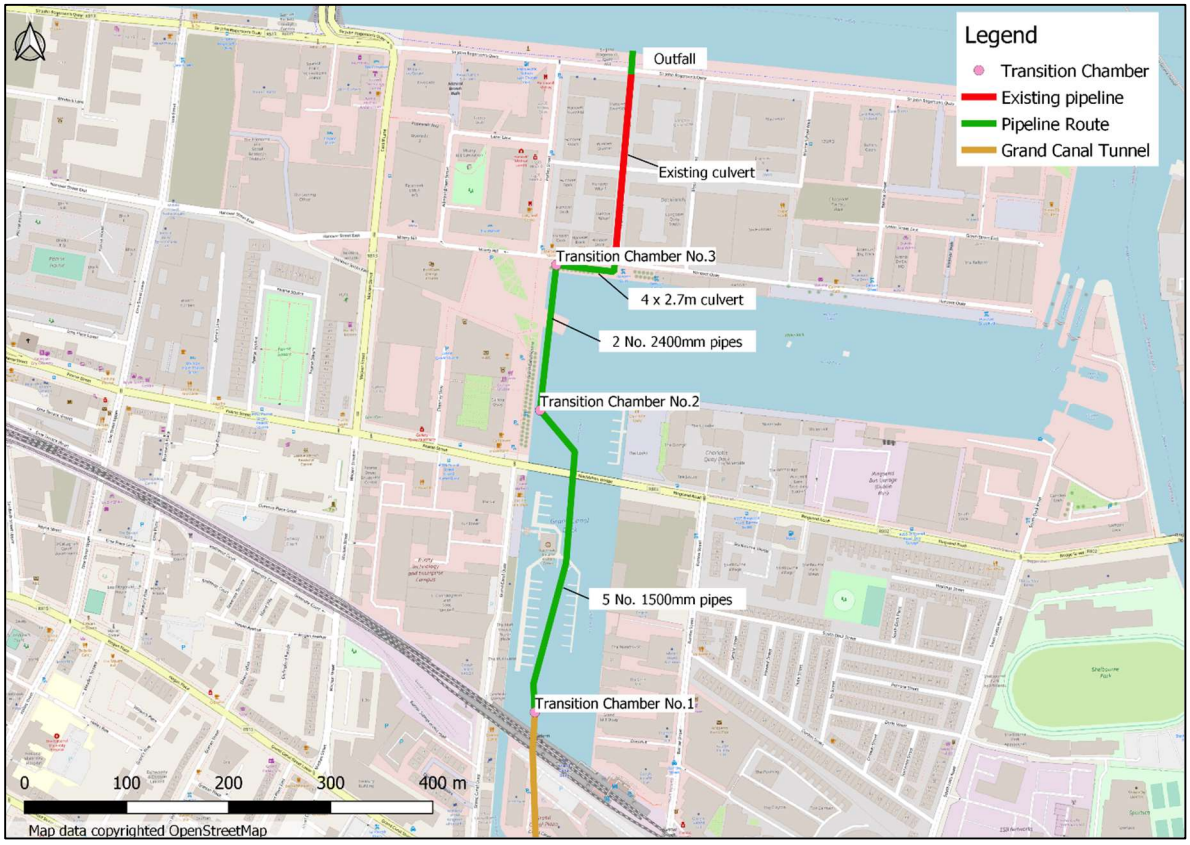

Figure 2.2 Grand Canal Storm Water Outfall pipeline within the Grand Canal Docks

2.3 Need for the scheme

Water quality in the Grand Canal Basin has been adversely affected 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 makes 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 majority of instances of microbiological contamination occurred in the Inner Basin in close proximity to the existing surface water outfall.

In 2017 Irish Water, Dublin City Council 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, to the satisfaction of the Working Group, that the primary source of pollution of the waters in the Basin is the discharge from the surface water section of the Grand Canal Tunnel.

It was concluded that if the Grand Canal Docks 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.

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: Existing Environment and Sensitive Receptors

3.1 Population

Located in the South Dock Electoral Division, the proposed development 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 South Dock Electoral Division falls within the larger South-East Inner City Local Electoral Areas (LEA).

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. These are all currently full. Visitor permits allows boats to enter the canal system and stay for up to 31 days.

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. This growth rate of 171% is significantly higher than that experienced by the Dublin City Council area as a whole and the state during the same period. But it is in line with the quantum of growth experienced in the wider inner-city LEAs, which also grew strongly. The inclusion of the area within the North Lotts and Grand Canal Dock Strategic Development Zone(SDZ) planning scheme (2014), supports this growth, with over 400,000 square metres of office space and over 2,000 homes to be developed across 22 hectares.

CSO Small Area Census figures can be used to provide a more detailed breakdown of the population within the South Dock Electoral Division. In 2016 a population of 3,164 persons resided in the 14 CSO Small Areas which had boundaries within a 100m of the proposed works, these are the population that are most likely to be directly impacted by the proposed development. Further details are presented in Population and Human Health chapter of the EIAR.

3.2 Biodiversity with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC

A desktop review and field survey were performed to undertake an initial assessment of the proposed project and to identify environmental constraints within the study area. A summary is provided below. Further details on habitats and biodiversity are presented in AA NIS and Biodiversity Section of Volume 2 of the EIAR.

3.2.1 Habitats

The Grand Canal Dock is a freshwater body of water located at the eastern end of the Grand Canal, where the canal can be accessed from the River Liffey. An aquatic ecological survey of the Grand Canal Dock and River Liffey Estuary was carried out by BEC Consultants Ltd. on the 28-29th July 2020 (BEC Consultants Ltd, 2020). The benthic habitat was investigated by means of a grab sample survey with six samples undertaken within Grand Canal Docks and four samples within the Liffey Estuary. The intertidal zone of the study area comprised the quay walls of the River Liffey along Sir John Rogerson's Quay. Species present were recorded. Habitat classification followed the Marine Habitat Classification for Britain and Ireland (JNCC, 2015).

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

this area is likely to be the result of the challenging estuarine habitat, with its varying salinity, along with historic pollution of the fine sediment, resulting in anoxic conditions.

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

No terrestrial invasive species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations (S.I. 477/2011) (as amended) were recorded in the terrestrial are of the Grand Canal Dock. 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 in the course of the survey undertaken by BEC Consultants Ltd, namely the Zebra Mussel *Dreissena polymorpha* and Nuttall's Waterweed Elodea nuttallii.

3.2.2 Designated Conservation Areas

The proposed development has been identified to have surface water connectivity with 7 no. Natura 2000 sites, refer to Table 3.1. A separate AA Screening Report (J. B. Barry & Partners, 2020) and NIS report (JBA, 2021) have been produced which examine the likely pathways and impacts of the proposed works on these Natura 2000 sites and recommends mitigation measures.

Table 3.1 Natura 2000 Sites

Designation	Name	Site Code	Distance via hydrological pathway
SPA	South Dublin Bay and River Tolka	004024	3.5km
SAC	North Dublin Bay	000206	5.1km
SPA	North Bull Island	004006	5.9km
SAC	South Dublin Bay	000210	7km
SAC	Rockabill to Dalkey Island	003000	9.7km
SAC	Howth Head	000202	10km
SPA	Howth Head Coast	004113	13km

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 proposed development is located within the Transition Zone of the Dublin Bay Biosphere UNESCO site and approximately 3.2km west from its Core Zone. In 2015 the Dublin Bay Biosphere was designated for its rich biological diversity and comprises Dublin Bay, North Bull Island, and adjacent lands, including parts of Dublin.

3.3 Cultural Heritage (including Architecture & Archaeology)

The Site and Monuments Record (SMR) lists all known archaeological sites and monuments in each county with accompanying maps locating these sites. All sites included in the Record of Monuments

and Places (RMP) are protected under the National Monuments Acts (1930–2004). The north part of the study area, at Sir John Rogerson's Quay, is located within the banks of the River Liffey, that are within the Dublin City Zone of Archaeological Potential (DU018-020), and Sir John Rogerson's Quay (DU018-020201-). There are several monuments listed in the RMP and SMR in the environs and within the study area. These are detailed within the Archaeology and Cultural Heritage Section of Volume 2 of the EIAR.

Nearby Protected Structures as listed in the Record of Protected Structures in the Dublin City Development Plan 2016-2022 and draft Dublin City Development Plan 2022-2028; structures listed within the National Inventory of Architectural Heritage (NIAH) that are located within the study area and structures located within and adjacent to the site listed in the Dublin City Industrial Heritage Record (DCIHR) are also detailed within the Archaeology and Cultural Heritage Section of Volume 2 of the EIAR.

There are no wrecks 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. There are a number of wrecks whose place of loss is specifically recorded as the River Liffey and are detailed in the EIAR.

3.4 Land, Soils and Water

3.4.1 Land, Soils, Geology and Hydrogeology

GSI Mapping indicates that the proposed development area is underlain by made ground and the lithology sediment is classified as 'Urban'.

GSI Mapping indicates that the proposed development area is underlain by dark limestone and shale from the Lucan Formation (GSI, 1:100,000 scale map, 2020) which is classified as a Li (Locally Important Aquifer - 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, the aquifer is not considered suitable as a groundwater source in this area.

GSI Mapping indicates that the groundwater vulnerability in the proposed development area is classified as "Low". There are no recorded public groundwater supply abstractions within 2 km of the proposed development. A review of the GSI karst database indicated that there are no karst features within 5 km of the proposed development.

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 soils at Hanover Quay and Sir John Rogerson's Quay are contaminated. Material that will be removed will be treated as contaminated material and transported to a suitably licensed facility. Further details are presented in Land, Soils, Geology and Hydrogeology Section of Volume 2 of the EIAR.

3.4.2 Water

The main hydrological feature of the area is the River Liffey, the River Dodder, the Grand Canal and Dublin Bay. The River Dodder flows in a north easterly direction to the east of the site and discharges to the River Liffey to the northwest of the site. The Grand Canal flows through the Grand Canal Dock at the site and discharges to the River Dodder immediately upstream of the confluence with the River Liffey. The River Liffey flows in an easterly direction to the north of the site and discharges to Dublin Bay approximately 1km downstream from the site. 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 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.

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).

The groundwater body which underlies the proposed works site is the groundwater body IE_EA_G_008. The Groundwater Vulnerability around the site is low to moderate, the WFD status for this groundwater body is currently under 'review' (EPA, 2020).

A water quality model study of the proposed discharge to the River Liffey was undertaken DHI Consultants.

The flood risk assessment (FRA) was undertaken to identify, quantify and communicate to decision makers and other stakeholders the risk of flooding associated with the proposed development. It is envisaged that there will be minimal flood risk to the site and the project based on the proposed recommendation and mitigation measures. Further details are presented in Water Quality and Hydrology Section of Volume 2 of the EIAR.

SECTION 4: Environmental Management Framework

4.1 Employer

Dublin City Council (DCC) as the planning applicant will ensure that competent parties are appointed to undertake the works and that sufficient resources are made available at all stages of the project for the appropriate management of risks to the environment.

4.2 Employers Representative

Employer and the Employers Representative (ER) are responsible for monitoring compliance with the CEMP. The Employers Representative will appoint temporary or permanent Specialists as required.

4.3 The Contractor

The Contractor(s) appointed to carry out works under the project will have responsibility for the organisation, direction and execution of environmental related activities in accordance with project environmental requirements including planning consents and other regulatory and contractual requirements.

4.4 Construction/ Environmental Manager

The Construction /Environmental Manager appointed by the Contractor will oversee the development of the CEMP and the implementation of recommended mitigation measures, planning conditions and other environmental protection measures as required. The Construction/Environmental Manager will act as the regulatory interface on environmental matters by reporting to and liaising with local authority for the relevant jurisdiction and other statutory bodies as required.

The Construction / Environmental Manager will act as the point of contact for all environmental matters for the Contractor and will be responsible for review and authorisation of all method statements and environmental plans for the proposed GCSWOE. The Construction / Environmental Manager/Contractor will be responsible for updating the CEMP and maintaining all environmental records relating to the works. The CEMP will detail the general tasks and communication lines for reporting procedures for all potential environmental risks, hazards or incidents which may relate to, but not be limited to, biodiversity, water quality, soil quality, dust, noise and vibration or archaeology.

The duties and responsibilities of Construction / Environmental Manager will include:

- Updating the CEMP and supporting environmental documentation and review/approval of Contractor method statements;
- Undertake inspections and reviews to ensure the works are carried out in compliance with the CEMP and monitor the implementation of the CEMP, particularly all proposed/required Environmental Monitoring;
- Ensure construction works and activities are completed in accordance with mitigation and best practice approach as presented in the Natura Impact Statement (NIS) and associated planning documentation;
- Ensure construction works and activities are completed in accordance with all planning conditions for the development;
- Ensure construction works and activities have minimal impact/disturbance to local landowners and the local community;
- Ensure construction works and activities have minimal impact on the Natural Environment;
- Be aware of the relevant legislation, codes of practice, guidance notes and good environmental working practice relevant to their work;
- Ensure compliance through audits and management site visits;

- Ensure timely notification of any environmental incidents to the relevant regulatory authorities;
- Adopt a sustainable approach to construction such as sustainable sources for materials supply where possible;
- Provide adequate environmental training and awareness for all project personnel;
- Using recycled materials if possible, e.g. excavated stone, clay and peat material;
- Avoidance of any pollution incident or near miss as a result of working around or close to existing watercourses and having emergency measures in place;
- Avoidance of vandalism;
- Keeping all watercourses free from obstruction and debris;
- Keep impact of construction to a minimum on the local environment, watercourses and wildlife;
- Correct fuel storage and refuelling procedures to be followed;
- Good waste management and house-keeping to be implemented;
- Air and noise pollution prevention to be implemented;
- Monitoring of the works and any adverse effects that it may have on the environment;
- Construction methods and designs will be altered where it is found there is an adverse effect on the environment;
- Comply with all relevant water quality legislation; and
- Ensure a properly designed, constructed and maintained drainage system appropriate to the requirements of the site is kept in place at all times.

4.5 Environmental Specialists engaged by the Contractor

To fulfil its obligations under the CEMP and to support its Construction/Environmental Manager, the Contractor will engage suitably qualified and experienced professionals including where necessary (i.e. depending on the scope of the contract):

- Archaeology;
- Biodiversity;
- Biodiversity– Invasive Species;
- Air Quality;
- Noise;
- Vibration;
- Dust; and
- Waste.

The Environmental Specialists will be appointed by the Contractor and will report to the Construction/ Environmental Manager and be responsible for the protection of sensitive environment encountered during the construction phase of the project.

The responsibilities and duties of the Environmental Specialists will include but not limited to the following:

- Review and input to the final construction phase CEMP in respect of environmental matters;
- In liaison with Construction/ Environmental Manager, oversee and provide advice on all relevant environmental mitigation measures set out in EIAR and AA NIS;
- Supervision of the necessary phases of construction and provide environmental advice.

4.6 Contacts

An emergency contact list will be generated during the pre-construction phase and will be included in this CEMP and made available to all project personnel. The Contact List will be displayed prominently in the Contractor's and Employer's Site facilities as well as at suitable locations where construction activity is being carried out. The contact list will include key environmental representatives that may need to be contacted in the event of an incident.

SECTION 5: Environmental Management Procedures

5.1 Training

The Contractor will ensure that an Environmental Training and Awareness Programme is established and that all personnel and subcontractors receive adequate training prior to the commencement of the construction phase. It will be ensured that all personnel are aware of their individual environmental responsibilities and environmental constraints to specific jobs. No person will work on site without first receiving environmental induction.

Training and awareness of personnel will continue throughout the construction phase and refresher training will be provided as required. Signed records of environmental training will be established and maintained and made available to the Employers Representative.

The environmental performance at the construction site will be on the agenda of all project management meetings. Elements of the CEMP, such as objectives, targets and the effectiveness of environmental procedures will be discussed at these meetings. All personnel will be invited to offer their comments on environmental performance at the site. All site monitoring results will be evaluated by the Construction/ Environmental Manager. Key findings along with any mitigation measures as required will be clearly communicated to the project team.

5.1.1 Environmental Induction

All site personnel will receive Environmental Induction that will be integrated into the general site induction on a case-by-case basis for each member of staff employed on-site depending on their assigned roles and responsibilities on site. This will ensure that personnel are familiar with the environmental aspects and impacts associated with their activities, that appropriate procedures are in place to control these impacts and that they fully understand the consequences of departure from agreed procedures. Formal records of such training along with records verifying the competency of the trainer will be maintained onsite for the duration of the project.

Where necessary, the Environmental Induction will as a minimum include:

- A copy of the Environmental Management Site Plans and discussion of the key environmental risks and constraints;
- An outline of the CEMP structure;
- A discussion of the applicable Works Method Statement;
- The roles and responsibilities of staff, including contractors, in relation to environmental management; and,
- An outline of the Environmental Incident Management Procedure.

5.2 Environmental Management- Coordination Meetings

In order to provide for effective coordination of environmental monitoring and management where there are simultaneous construction and operation activities being carried out through different Contractors, Employer and/or the Employer's Representative will arrange for regular meetings (every three months) to be attended by:

- Employer;
- The Employer's Representative;
- Contractor(s);
- Contractor(s) Construction/Environmental Manager(s); and
- Environmental Specialists – engaged by either the Client or the Contractor(s).

These meetings will be held at the Site Office.

5.3 Environmental Management- Contract Meetings

The Contractor's Construction/ Environmental Manager will hold monthly meetings and site walk overs with the ER (including such other statutory/regulatory bodies as the ER advises/requires). The Environmental Manager will create a schedule for the monthly meetings, which should take place 2 weeks after the monthly inspection. The agenda for the meetings will include the following items:

- Outcome of environmental inspections and/ or audits;
- Summary of Corrective Action Reports and any outstanding actions; and
- Non-compliances shown by environmental monitoring results.

The Construction/Environmental Manager will provide minutes of the monthly meeting and distribute them to all attendees.

5.4 Toolbox Talks

Toolbox talks would be held by the Construction/Environmental Manager at the commencement of new activities. The aims of the toolbox talks are to identify the specific proposed work activities that are scheduled work activities and associated environmental issues. In addition, the necessary work method statements and sub plans would be identified and discussed.

Toolbox talks will reflect the type of works being undertaken and the environmental impacts that may result from these activities e.g. training on water pollution prevention before works near watercourses. Training to be given will include the contents of this CEMP incorporating the following as appropriate:

- Protected species/habitats;
- Environmental incidents;
- Water pollution prevention;
- Spill control and spill kits;
- Dust and air quality;
- Erosion and sediment control; and
- Storage and use of petrol, diesel, and oils.

Site meetings would be held on a regular basis involving all site personnel. The objectives of the site meetings is to discuss the coming weeks proposed activities and identify the relevant work method statements and sub-plans that will be relevant. Additionally, any non-compliance identified would also be discussed with the aim to reduce the potential of the same non-compliance reoccurring.

5.5 Monitoring, Inspections and Audits

5.5.1 Monitoring

Mitigation and monitoring will be carried out so that the works are undertaken in a manner that does not give rise to significant negative impacts. All environmental monitoring results will be reviewed by the Employer and the Contractor on an ongoing basis to enable trends or exceedance of criteria to be identified.

5.5.2 Inspections

Routine inspections of construction activities will be carried out on a daily basis by the Contractors Construction/Environmental Manager to ensure all necessary measures to avoid or mitigate environmental impact, relevant to the construction activities are being implemented.

More detailed inspections will be carried out on a weekly basis by the Construction/Environmental Manager. The weekly inspections will be documented on the Weekly Inspection Sheet (Appendix A). Copies of the Weekly Inspection Sheet will be made available to the ER.

Once a month the weekly inspection will include a review of environmental documentation and records. The monthly inspection will be recorded and reported to the ER within five days of the inspection taking place.

5.5.3 Audits

The employer will arrange for third party independent Environmental audits to be carried out. In addition, regulatory bodies such as DCHG, DHPLG and NPWS may undertake site visits to monitor compliance with regulatory requirements. The Contractor will facilitate these visits. The Contractor's Construction/Environmental Manager will be available to provide information as required and deal with any issues which may arise on site.

The Contractor's Construction/Environmental Manager will be entitled to participate in all audits. Notwithstanding this the ER will provide the Contractor with a copy of each audit report detailing findings, non-conformances identified and proposed corrective action within five days of the audit.

Planned and documented audits aimed at evaluating the conformance of the environmental management system will also be carried out by the contactor. The Contractor's Construction/Environmental Manager will establish an Internal Audit and inspection calendar. Audits will be scheduled on the basis of status and importance of the activities and at an expected frequency of at least once every three months.

The auditor will read the relevant documentation, inspect the site and ask questions and observe in order to determine whether activities and related results comply with the planned arrangements and whether these arrangements are recorded on the Audit Checklist.

The audits items will include but not be limited to the list below:

- Review of documents and records to determine if all the requirements in the CEMP are being met;
- Site inspection and interviews; and
- Reporting with recommendations.

For any nonconformities found, the auditor initiates a Corrective Action Reports (CARs) to describe and record the findings.

The Verification of previous CAR is also recorded on the Audit Checklist and/or the CAR itself.

Upon completion of an audit, the auditor reviews all CAR(s) and prepares an Audit Report to summarise:

- Corrective action requests raised;
- Previous corrective action requests closed; and
- Observations.

5.6 Environmental Incident Response and Investigations

As part of the construction stage the Contractor will update the CEMP to include a contract specific EIRP (Emergency Incident Response Plan). Application of the procedures therein will be the responsibility of the Contractor.

The EIRP is a written procedure to deal with incidents that may result in an adverse impact (or impacts) on the environment or a breach of legislation, which include but are not limited to a

significant spillage. It should be noted that the EIRP is in addition to the Health and Safety Plan. The EIRP will address any emergency situations which may originate on the site during construction presenting an immediate and serious risk to the environment. The EIRP will include provision for minimising the effects of any emergency on the environment. In particular, it will address how accidental/emergency spills of hazardous substances (oils, hydraulic fluids, concrete/cement etc.) will be dealt with.

If an environmental incident occurs on-site the Contractor will ensure that the event is recorded on an Environmental Incident Form. All environmental incidents will be recorded including the following:

- Any malfunction of any environmental protection system;
- Any emission that does not comply with the requirements of the contract (e.g. noise and vibration);
- Any occurrence with the potential for environmental pollution; or
- Any emergency (e.g. significant spillages or fire outbreak).

In the event of an environmental incident, the Contractor will ensure that the following actions will take place:

- The Employers Representative will be immediately notified;
- If necessary, the Contractor will inform the appropriate regulatory authority. The appropriate regulatory authority will depend on the nature of the incident;
- The details of the incident will be recorded on an Environmental Incident Form which will provide information such as the cause, extent, actions and remedial measures used following the incident. The form will also include any recommendations made to avoid reoccurrence of the incident.
- A record of all environmental incidents will be kept on file by the Contractor. These records will be made available to the Employers Representative and the relevant authorities such as NPWS, if required.

5.7 Corrective Actions

A corrective action will be implemented to rectify any exceedance of criteria or targets for all the aspects of monitoring. Initially an investigation will be carried out to identify the cause and appropriate remedial measures will be implemented to prevent further exceedances.

Where new or amended environmental control measures are agreed as a result of third-party consultation, the Employer's Representative and the Contractor's Construction/Environmental Manager will ensure that the relevant CEMP(s) are updated accordingly.

5.7.1 Corrective Action Reports

A corrective action is implemented to rectify an environmental problem onsite such as changes to environmental control methods. The Corrective Action Report (CARs) (Appendix A) will detail the cause and effect of an environmental problem on site and the recommended corrective action that is required to remedy it. An appropriate timeline for closing out the corrective actions will be identified by the Contractor.

Corrective actions will be implemented by the Contractor. Corrective actions may arise from the following:

- Environmental Inspections or Audits;
- Environmental Incidents;
- Environmental Monitoring; and
- Environmental Complaints.

The CAR will detail the results of the investigation, any corrective and preventative actions required. The CAR will be verified by the Construction/Environmental Manager. The Contractor will make all CARs available to the ER.

Details of corrective actions required will be recorded on the Complaint Form and/ or the Corrective Action Form. The complainant will be informed of the corrective action undertaken. The Construction/ Environmental Manager will sign off the complaint as closed (with copy to the ER) when the issue has been resolved.

5.8 Reporting

5.8.1 Environmental Compliance Report

The Contractors will submit a monthly Environmental Compliance Report to the ER for review and approval in digital (word and pdf) and hardcopy. The contents of the Contractor's Environmental Compliance Report will include the following as a minimum:

- Summary of compliance/ non-compliance with the CEMP;
- Environmental Monitoring Programme results and interpretation;
- Key issues noted in inspections and/ or audits;
- Summary record of incidents and corrective actions;
- Summary of environmental complaints; and
- Summary record of environmental training (as appropriate).

5.8.2 Incident Investigation Reports

The Contractor will inform the ER of all environmental incidents immediately and will be provided with an initial report within 24 hours setting out the incident details and cause(s) if known. The Contractor will provide the ER with a copy of the completed Environmental Incident Report (Appendix A) and any further documentation requested by the ER in relation to the incident within 7 days of the incident occurring. The Contractor will respond to all comments made by the ER on any incident.

The Environmental Incident Report will contain details of the incident including the location, known and suspected causes and weather conditions. It will define the scale and actual/ potential impacts (short, medium, long term, temporary/ permanent) as well as required corrective actions and mitigation/ remediation/ compensation measures (as appropriate).

5.9 Environmental Records

The Contractor will maintain record of monitoring, tests, analytical results, method statement and plans. All records will be kept up dated and will be available for audits, inspections and periodical reporting. The Contractor will maintain the following environmental records (as a minimum) which will be made available for inspection to the ER and the relevant authorities, if required:

- Environmental Incident Form;
- Monthly Environmental Compliance Reports;
- Environmental Training Records;
- Register of environmental training;
- Register of environmental complaints;
- Corrective Action Reports;
- Environmental inspection and audit reports;
- All monitoring data (electronically in Excel);
- Waste Record Sheets;
- Safety Data Sheets; and
- Chemical Inventory.

SECTION 6: General Site Management

6.1 Working Hours/Period

The proposed general construction hours are 08:00 to 18:00 hrs, Monday to Friday and 08:00 to 14:00 hrs on Saturdays in accordance with standard working hours. Evening activities will be significantly reduced in order to manage any associated noise impacts in an appropriate manner.

Working outside these hours will only take place in exceptional circumstances or when the Contractor is working adjacent to sensitive receptors or adjacent to or in areas where disruption to sensitive core activities is to be kept to a minimum. Where construction hours are anticipated to alter, consultation with Dublin City Council will be undertaken.

6.2 Site Housekeeping

- Good housekeeping is an important part of good environmental practice and helps to maintain a more efficient and safer site. The site should be tidy, secure, and have clear access routes that are well signposted. The appearance of a tidy, well-managed site can reduce the likelihood of theft, vandalism, complaints and/or specific hazards that could affect the safe operation of the other businesses in the area, such as bird hazards and wind-blown litter.
- As outlined in the fourth edition of the Construction Industry Research and Information Association's (CIRIA's) 'Environmental good practice on site guide' (C741), when considering good housekeeping, the Contractor will implement the following steps:

  - Adequately plan the site with designated areas of materials and waste storage;
  - Segregate different types of waste as it is produced and arrange frequent removal;
  - Keep the site tidy and clean;
  - Ensure that no wind-blown litter or debris leaves the site, use covered skips to prevent wind-blown litter;
  - Keep hoardings tidy – repair and repaint when necessary, removing any fly posting or graffiti;
  - Frequently brush-clean wheel washing facilities;
  - Keep roads free from mud by using a road sweeper; and,
  - Ensure site is secure.

6.3 Establishment of the Site

The Site comprises an area of open water, referred to in this report as the Basin, which forms part of Grand Canal Docks, a historic dock on the eastern side of Dublin city centre. The basin is an inverted L-shaped formed by two rectangular arms aligned approximately north-south (the Inner dock/Basin) and east-west (the Outer Dock/Basin). The basin is bounded to the north by Hanover Quay, to the south by a viaduct carrying the Dublin Area Rapid Transport (DART) line, and to the west by a Grand Canal Quay. To the eastern end of the dock are two disused graving docks and three lock gates which connect the dock to the river Liffey. The dock is transected by a modern road bridge, McMahon Bridge, which connects Pearse Street to Ringsend Road west to east across the centre of the basin. The site also includes a small area of Asgard Road and a section Sir John Rogerson's Quay. These are composed of road carriageways in bitmac and pedestrian areas which are largely paved in natural stone flags and setts.

The Contractor will establish the site area, including site compound, set down area for vehicles, works areas, temporary set-down areas for material removed etc. prior to commencing work on the proposed project. These areas will need to be fenced to keep the public out of the work area and will be secured as appropriate to prevent pollution risk.

There will be three construction compounds set up as part of the construction phase. The first compound (Main Works Compound/ Main Compound) will be located at the eastern end of Hanover

Quay. The second compound (Compound for Inner Basin Works/ Inner Basin Compound) will be located at Grand Canal Quay adjacent to the Irish Waterways Visitors Centre. The third compound (SJRQ Compound) will be located at Sir John Rogerson's Quay, from Asgard Road to Blood Stoney Road. Refer to Volume 4, of the EIAR for Project Drawings.

If the working zone needs to be extended to accommodate machinery access the Project Manager will be notified before any extension of the works area can take place. No work will take place outside the working zone until the Project Manager has identified the extent of additional area required and confirmed works can occur in those areas in conjunction with the Employer.

The location of the site compound has been selected in order to avoid any impacts to the environment. The exact location of the site compound will be agreed with the Employers Representative and the Employer prior to commencement of works.

SECTION 7: Key Environmental Considerations

This section details on the general construction management measures to be undertaken during the Construction phase of GCSWOE.

7.1 Population and Human Health

This section includes the measures that are required to protect population and human health during the design and the execution of the project, refer to Table 7.1. The CEMP will be updated prior to the construction phase to further elaborate all measures (including method statements) to be employed in relation to all potential impacts on Population and Human Health; and how the following mitigation measures will be implemented.

Table 7.1 Population and Human Health Management Measures

Phase	Management Measure
Construction Phase	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 should be communicated to Waterway Ireland well in advance, to 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.
	A Detailed Traffic Management Plan will be prepared by the project supervisor in consultation with the stakeholders. This will co-ordinate the management of vehicular and pedestrian traffic adjacent to the site including road closures and diversions, to mitigate any traffic congestion or road safety impacts which may arise for road and pavement users. The plan will set out agreed procedures to control the movement of construction traffic and materials entering and leaving the site.
	Good engagement will be continued with the water-based recreation businesses operating in the Grand Canal Dock and their clients. This will be required to minimise any impacts on the proposed development on these stakeholders.
	The Contractor will be required to develop a comprehensive construction Noise and Vibration Management Plan with best practice being adopted to monitor and limit the hours when high noise levels are permitted; establish channels of communication with stakeholders; select and locate plant to minimise noise levels.
	A dust management plan will be prepared by the Contractor to monitor and prevent significant emissions.
	Temporary hoardings will be put in place around land-based works along Hanover Quay and Sir John Rogerson's Quay 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. Refer to Landscape and Visual Impact Section of Volume 2 of the EIAR. Any historical features that are temporary removed will be done in such a manner as to allow their reinstatement.
	All contracts will be tendered to reputable and competent Contractors with a track record in the safe delivery of this type of work. Only Contractors who adhere to Employers' strict health and safety standards will be invited to tender for the works. All workers will be required to conform to the Health and Safety plans of their respective employers, which will be subjected to regular audits by Employer and their consultants.
	It is recommended that a rodent and pest control plan is put in place so as to manage and limit any potential disturbance to populations that may utilise the site. The pest control plan will be in accordance with the Chartered Institute of Environmental Health's "*Pest minimisation Best practice for the construction industry"* guidelines or a similar appropriate standard.

Phase	Management Measure
Operational Phase	Overall, it has been determined that it is unlikely that there will be many potential negative impacts on population and human health during the operation phase of the scheme, conversely it is considered it will have significant positive impact on the area and the community. Therefore, mitigation measures have not generally been deemed necessary during the operational phase of the proposed development. However, in relation to plant noise the maintenance Contractor will ensure that any works are within the noise limits as set out in the EIAR.
	The vast majority of the changes to the landscape fabric of the site will take place underwater or underground, the design and materials of any new surface features will be sympathetic to the historic setting.
Monitoring Programme	Specific Health and Safety monitoring will be carried out in line with the Site Management Plan and Building Certification Regulations.

7.2 Biodiversity

This section includes the measures that are required to protect terrestrial and aquatic ecology during the execution of the project, refer to Table 7.2. The CEMP will be updated prior to the construction phase to further elaborate all measures (including method statements) to be employed in relation to all potential impacts on Biodiversity; and how the following mitigation measures will be implemented.

Table 7.2 Biodiversity Management Measures

Phase		Management Measure
Construction Phase	Best Practice Guidance	Relevant legislation and best practice guidance that will be considered includes but not limited to the following: ▪ CIRIA C532 Control of water pollution from construction sites. Guidance for consultants and contractors (CIRIA, 2019 - www.ciria.org); ▪ CIRIA C515 Groundwater control – design and practice, 2nd ed. (CIRIA, 2019 - www.ciria.org); ▪ CIRIA Guidance C741: Environmental good practice on site guide (Charles & Edwards, 2015; CIRIA, 2019 - www.ciria.org); and ▪ Inland Fisheries Ireland 2016 Guidance on Protection of Fisheries During Construction Works In and Adjacent to Waters.
	Site Compound	▪ Only plant and materials necessary for the construction of the works will be permitted to be stored at the compound location; ▪ A separate container will be located in the Contractors compound to store absorbents used to contain spillages of hazardous materials. The container will be clearly labelled and the contents of the container will be disposed of by a licenced waste Contractor at a licenced site. Records will be maintained of material taken off site for disposal; ▪ A maintenance programme for the bunded areas will be managed by the site construction/environmental manager. The removal of rainwater from the bunded areas will be their responsibility. Records will be maintained of materials taken off site for disposal; ▪ The site construction/environmental manger will be responsible for maintaining all training records; ▪ The contents of any tank will be clearly marked on the tank, and a notice displayed requiring that valves and trigger guns be locked when not in use; ▪ Drainage collection system for washing area to prevent run-off into surface water system; and

Phase		Management Measure
	Water Quality	▪ Adoption of a surface water plan including appropriate barrier controls to prevent potentially polluted surface water from the site reaching Grand Canal Basin or the River Liffey (e.g. bunding); ▪ Oil booms and oil soakage pads will be maintained on-site to enable a rapid and effective response to any accidental spillage or discharge. These will be disposed of correctly and records will be maintained by the environmental manager of the used booms and pads taken off site for disposal; and ▪ Fail-safe site drainage and bunding through drip trays on plant and machinery will be provided to prevent discharge of chemical spillage from the sites to surface water.
	Pollution Control and Spill Prevention	▪ Daily inspections and maintenance of plant and machinery checking for leaks, damage or vandalism will be made on all plant and equipment. The inspections will be recorded on a sign-off sheet on site; ▪ The site compound storage areas and cleaning areas will be rendered impervious and will be constructed to ensure no discharges will cause pollution to surface or ground waters; ▪ Designated locations for refuelling land-based plant and machinery off site, >100m from waterbody; ▪ Refuelling protocol to include: – Refuelling of barge/vessels to take place at designated area at/adjacent to site compound at Hanover Quay; – Vessels to be securely docked before attempting to refuel; – Clear and easy access for personnel to get from tank on quay to refuelling point on boat/barge; – Refuelling to be carried out under strict supervision of Environmental Officer; – Refuelling by trained, authorised and named personnel only; – Refuelling pipe to be supervised at all times; – Refuelling from storage tank by pump only, with automatic cut-off, and automatic retraction of hose pipe. Adequate length of hose required, to enable full and easy access to fuelling point on vessel; – No fuel to be stored at site compound; and – Spill kits and booms to be available in case of accidental spillage. ▪ Potentially contaminated run off from plant and machinery maintenance areas will be managed within the site compound surface water collection system; ▪ Damaged or leaking containers will be removed from use and replaced immediately; ▪ Emergency response awareness training for all Project personnel on-site works; ▪ Appropriate and sufficient spill control materials will be installed at strategic locations within the site and at barge/boat refuelling area at Hanover Quay; ▪ Spills kits for immediate use will be kept in the cab of mobile equipment; ▪ Spill kits will be stored in the site compound with easy access for delivery to site in the case of an emergency. A minimum stock of spill kits will be maintained at all times and site vehicles will carry spill kits at all times. Spill kits must include suitable spill control materials to deal with the type of spillage that may occur and where it may occur. Typical contents of an on-site spill kit will include the following as a minimum: – Absorbent granules. – Absorbent mats/cushions.

Phase		Management Measure
		– Absorbent booms. – Spill kits will contain gloves to handle contaminated materials and sealable disposal sacks. ▪ Track-mats, geotextile material and drain covers; ▪ Absorbent material will be used with pumps and generators at all times; ▪ All potentially polluting substances such as oils and chemicals used during construction will be stored in containers clearly labelled and stored with suitable precautionary measures such as bunding within the site compound; ▪ All used spill materials e.g. absorbent pads will be placed in a bunded container in the Contractor's compound. The material will be disposed of by a licenced waste Contractor at a licenced facility. Records will be maintained by the environmental site manager; and ▪ All tank and drum storage areas on the site will, as a minimum, be bunded to a volume not less than the following: – 110% of the capacity of the largest tank or drum within the bunded area; or – 25% of the total volume of substances which could be stored within the bunded area. , whichever is greater.
	Silt Control	▪ A silt curtain will be installed around the area of works within the Grand Canal Basin. The works within the basin will be carried out in two phases, the inner and outer basin. The silt curtain will be installed to screen the inner basin, i.e. south of MacMahon Bridge. Before works commence in the outer basin, i.e. north of MacMahon Bridge, a silt curtain will also be installed to screen the outer basin area off. The silt curtain is secured to an anchoring system and hangs within the waterbody. The curtain will be in place during the entire phase of the construction; ▪ The silt curtain will be inspected regularly and maintained to prevent failure during the work. Accumulated material upstream of the silt curtain will be carefully removed and properly disposed of. Any accumulated material will be removed before removing the silt curtain; ▪ Any silt to be removed will be in inspected for protected species by ECoW and which will be returned to the Basin; ▪ The silt to be disposed off will be moved to a suitable licensed facility off-site; ▪ Bunding will be installed along Hanover Quay, between the area of works along the quay and the Grand Canal Basin prior to works commencing in this area. All surface water run-off from the construction site will be directed to a temporary facility, where the flow will be attenuated, and sediment allowed to settle. Before passing through a hydrocarbon interceptor prior to discharge. Bunding will only be removed when sediment movement is no longer a risk; ▪ Silt-traps will be maintained and cleaned regularly during the course of site works; and ▪ Lock gates will be kept closed while the construction works take place within the basin. Only necessary controls of water levels within the basin will be permitted.
	Wet Concrete Leachate Control	The measures prescribed with regard to sedimentation and surface water run-off will also minimise the risk of input of cementitious material during construction. However, the following measures will also apply:

Phase		Management Measure
		▪ In order to prevent input of cementitious materials into the Grand Canal Basin from the below water elements of the construction, concrete structural elements will be precast, wherever possible; ▪ Concrete to be used below water will be a concrete mix for aquatic/marine environment, e.g. fast curing with good anti-washout properties; ▪ Where concrete or other wet materials are to be used over/below water, appropriate bunded platforms will be in place to capture any spilled concrete, sealants or other materials; ▪ For construction works within the basin a geotextile screen (silt curtain) and boom with oil barrier will be employed around aquatic works to restrict, silt or oil from polluting the water ; ▪ Batching of concrete will be done off site and delivered to site as required by Readymix truck; ▪ Only designated and trained operators experienced in working with concrete will be employed during the concrete pouring phase; ▪ Raw, uncured or waste concrete will be collected and stored appropriately for disposal by a licensed Contractor in accordance with the Waste Management Plan; ▪ A designated concrete washout area will be contained and impermeable; ▪ Large volumes of water with dissolved concrete can be pumped into a skip to settle out; settled solids will need to be appropriately disposed of off site; and ▪ Waters from wash facility will be recycled to the greatest extent feasible and will not be discharged directly to surface water drains, watercourses or soakaways. Waters that cannot be recycled will discharge through silt and full retention oil/petrol interceptor prior to discharge. A regular maintenance programme shall be put in place to ensure that the silt and hydrocarbon interceptors remain effective.
	Biosecurity	Measures will need to be put in place to ensure that there is no spread of invasive non-native species or diseases. There will be no disturbance of the Grand Canal Basin outside of the proposed project area. Sediment removed will be treated as contaminated and disposed of to a licensed facility off site. The Check-Clean-Dry approach will be followed, ensuring that all barges/ boats, PPE and equipment is cleaned before entering and leaving site. For more information refer to: www.nonnativespecies.org/checkcleandry.
	Protected Species	An Ecological Clerk of Works (ECoW) will, in the appropriate season and prior to construction works commencing visually check the Camden Lock structure for the Common Tern nest. If deemed necessary, a barrier will be put in place to prevent access to the nest and ensure there is no risk of disturbance during the construction period.
Operational Phase		No significant impacts have been identified during the operation phase, therefore mitigation measures are not proposed.

Phase		Management Measure
Monitoring programme		The Grand Canal Basin will be monitored during the construction phase of the project. The monitoring will measure the level of suspended solids in the water at different locations within the basin while works are taking place within the Grand Canal Basin. Should a significant increase of suspended solids be recorded, the works will temporarily stop and be 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.

7.3 Water Quality and Hydrology

This section includes the measures that are required to protect surface water and groundwater during the design and execution of the project, refer to Table 7.3. The CEMP will be updated prior to the construction phase to further elaborate all measures (including method statements) to be employed in relation to all potential impacts on Water Quality and Hydrology; and how the following mitigation measures will be implemented.

Table 7.3 Water Quality Management Measures

Phase		Management Measure
Construction Phase	Best Practice Guidance	Good construction management practices will be employed. Measures set out in the Construction Industry Research and Information Association CIRIA guidance note *Control of Water Pollution from Construction Sites, guidance for consultants and contractors* (CIRIA, 2019) will be adhered to.
	Dredging, piling and release of suspended solids into the surrounding waters	In order to reduce the impact of silt, 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 through the Basin. ▪ The Contractor will prepare and implement a surface water plan including appropriate barrier controls to prevent potentially polluted surface water from the site reaching Grand Canal Basin or the River Liffey (e.g. bunding); ▪ The dispersion of mud will be controlled at entry and exits to the site using wheel washes and/or road sweepers, and tools and plant will be washed out and cleaned in designated areas. Containment of wheel washings for treatment prior to discharge will be required; ▪ Where sheet piles and cofferdams are being installed, the Contractor will update the CEMP and provide method statements as to how the proposed mitigation measures will be achieved to minimise the disturbance and resuspension of sediments in the water; ▪ Silt fencing/curtain or similar will be installed along/around excavated ground where the risk of sediment runoff to the River Liffey or the Grand Canal basin exists; and ▪ Bunding will be installed along Hanover Quay, between the area of works along the quay and the Grand Canal Basin prior to works commencing in this area. All surface water run-off from the construction site will be directed to a temporary facility, where the

Phase		Management Measure
		flow will be attenuated, and sediment allowed to settle, before passing through a hydrocarbon interceptor prior to discharge. Bunding will only be removed when sediment movement is no longer a risk.
	Contaminated soils and surface run-off	▪ Silt-traps will be maintained and cleaned regularly during the course of site works; ▪ Lock gates will be kept closed while the construction works take place within the basin. Only necessary controls of water levels within the basin will be permitted; ▪ In order to prevent input of cementitious materials into the Grand Canal Basin from the below water elements of the construction, concrete structural elements will be precast, wherever possible; ▪ Concrete to be used below water will be a concrete mix for aquatic/marine environment, e.g. fast curing with good anti-washout properties; ▪ Where concrete or other wet materials are to be used over/below water, appropriate bunded platforms will be in place to capture any spilled concrete, sealants or other materials; ▪ Concrete mixing will be undertaken in designated impermeable areas to reduce the risk of runoff entering surface or groundwater environment; ▪ On-site concrete batching and mixing activities will only be allowed at the identified construction compound areas; ▪ A geotextile screen (silt curtain) and boom with oil barrier will be required around such aquatic works to prevent runoff, silt or oil from polluting the water; and ▪ Concrete waste and wash-down water will be contained and managed on site to prevent pollution of all surface watercourses.
	Accidental spillages	▪ Measures set out in the Construction Industry Research and Information Association (CIRIA) on the control and management of water pollution from construction sites (2006) will be adhered to by the Contractor. Good construction management practices will be employed; ▪ During the construction stage, all potentially harmful substances (e.g. oils, diesel, concrete etc.) will be stored in accordance with the manufacturer's guidelines regarding safe and secure buildings/compounds; ▪ The Contractor will ensure that adequate means to absorb or contain any spillages of these chemicals are available at all times. Suitable measures will be taken to minimise the potential for pollution arising from accidental spillage; ▪ Oil booms and oil soakage pads will be maintained on-site to enable a rapid and effective response to any accidental spillage or discharge. These will be disposed of correctly and records will be maintained by the environmental manager of the used booms and pads taken off site for disposal; ▪ Bunding through drip trays on plant and machinery will be provided to prevent discharge of chemical spillage from the sites to surface water; ▪ The site compound storage areas and cleaning areas will be rendered impervious and will be constructed to ensure no discharges will cause pollution to surface or ground waters; ▪ Designated locations for refuelling land-based plant and machinery off site, >100m from waterbody; ▪ Refuelling protocol to include: – Refuelling of barge/vessels to take place at designated area at/adjacent to site compound at Hanover Quay; – Vessels to be securely docked before attempting to refuel;

Phase		Management Measure
		– Clear and easy access for personnel to get from tank on quay to refuelling point on boat/barge; – Refuelling to be carried out under strict supervision of Environmental Officer; – Refuelling by trained, authorised and named personnel only; – Refuelling pipe to be supervised at all times; – Refuelling from storage tank by pump only, with automatic cut-off, and automatic retraction of hose pipe. Adequate length of hose required, to enable full and easy access to fuelling point on vessel; – No fuel to be stored at site compound; and – Spill kits and booms to be available in case of accidental spillage. ▪ Potentially contaminated run off from plant and machinery maintenance areas will be managed within the site compound surface water collection system; ▪ Spill kits will be stored in the site compound with easy access for delivery to site in the case of an emergency. A minimum stock of spill kits will be maintained at all times and site vehicles will carry spill kits at all times. Spill kits will include suitable spill control materials to deal with the type of spillage that may occur and where it may occur; ▪ Leaking or empty oil drums will be removed from site immediately and disposed of via an appropriately licensed waste disposal Contractor; ▪ All hazardous substances on-site will be controlled within an enclosed storage compounds that will be fenced off and locked when not in use to prevent theft and vandalism; and ▪ The appointed Contractor will ensure that no harmful materials will be deposited into the River Liffey or the Grand Canal Basin, including the drainage network, on or adjacent to the site.
	Biosecurity	The eradication of the invasive species from freshwater systems is virtually impossible, so biosecurity measures will be required to ensure that the proposed development does not result in their spread to other waterbodies.
	Flood risk	As a significant number of people will be located at the compound during the construction phase, a number of measures will be put in place to minimise flood risk. It is recommended that the finished floor level of the compound be constructed at a level greater than the 0.5% AEP flood level at the site. The 0.5% AEP coastal flood level nearest to Compound 3 is +3.11mOD, therefore the FFL of the compound will be set above this level. Materials will be carefully stored to prevent spillage in the event of an extreme flood.
Operational Phase		No significant impacts have been identified during the operation phase, therefore mitigation measures are not proposed.
Monitoring Programme		The Grand Canal Basin will be monitored during the construction phase of the project. The monitoring will measure the level of suspended solids in the water at different locations within the basin while works are taking place within the Grand Canal Basin. If a significant increase of suspended solids be recorded, the works will be temporarily stopped and be reassessed 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

Phase		Management Measure
		finds the discharge to have a negative impact on water quality and such measures take the Water Framework Directive into account.

7.4 Land, Soils, Geology and Hydrogeology

This section includes the measures that are required to manage waste impacts and to minimise impacts on the land soils during the construction phase of the project, refer to Table 7.4. The CEMP will be updated prior to the construction phase to further elaborate all measures (including method statements) to be employed in relation to all potential impacts on Land, Soils, Geology and Hydrogeology; and how the following mitigation measures will be implemented.

Table 7.4 Land, Soils, Geology and Hydrogeology Management Measures

Phase		Management Measure
Construction Phase	Management of Contaminated Material and Spoil Disposal	In order to mitigate potential impacts associated with contaminated material and spoil disposal, the contract documents for the scheme will include the following provisions: ▪ The Contractor will be required to update and finalise the RWMP addressing inter alia the treatment, storage, and disposal of contaminated material; ▪ All unsuitable (contaminated) material will be disposed of in accordance with all relevant legislation including the: – Department of the Environment and Local Government (DoELG) (1996 to 2008); – Waste Management Acts, the DoELG (1996); – Waste Management (Facility Permit and Registration) Regulations 2007, S.I. No. 821 of 2007 (as amended); – Waste Management (Collection Permit) Regulations 2007, S.I. No. 821 of 2007 (as amended); and – NRA (2008) Guidelines for the Management of Waste from National Road Construction Project. ▪ Material that cannot be re-used will be handled in accordance with the Landfill Directive (2003/33/EC); ▪ The Contractor will update and finalise the RWMP to provide details of the exact methods it is proposed to employ to remove spoil from the site and will include details of the location and end use of the spoil; ▪ As soil characteristics will vary during the construction operations, the Contractor will be required to implement, prior to the commencement of construction works, and thereafter maintain throughout the construction phase a comprehensive environmental monitoring programme in respect of the soil characteristics. If necessary, disposal outlets will be modified to ensure continuous compliance with all relevant regulations and with this EIAR; and ▪ A Project Waste Manager will be appointed by the Contractor to oversee the implementation and adherence to the plan during the construction phase of the project.
	Dredging and silt displacement and mobilisation	In order to reduce the impact of silt, 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 through the Basin.
		Management of vibration and earth movement will be required for the proposed works on Hanover Quay and Sir John Rogerson's Quay. In

Phase		Management Measure
	Ground movements and damage to quay walls	order to mitigate potential impacts the contract documents for the proposed works will include the following provisions: ▪ Condition surveys of the adjacent structures will be carried out prior to construction to provide a baseline for excavation monitoring and piling works; ▪ 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; ▪ Settlement monitoring will be carried out during construction to ensure settlements are within tolerable limits; and ▪ A specialist design and methodology to be approved by the Employer.
		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 Sir John Rogerson's Quay. Due to the fact that this a non-percussive piling technique this option will inherently reduce the level of piling vibration generated.
	Temporary Construction dewatering	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. These structures will provide 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.
	Accidental Spillage	Measures set out in the Construction Industry Research and Information Association (CIRIA) on the control and management of water pollution from construction sites (2006) will be adhered to by the Contractor. Good construction management practices will be employed. During the construction stage, all potentially harmful substances (e.g. oils, diesel, concrete etc.) will be stored in accordance with the manufacturer's guidelines regarding safe and secure buildings/compounds. The Contractor will ensure that adequate means to absorb or contain any spillages of these chemicals are available at all times. Suitable measures will be taken to minimise the potential for pollution arising from accidental spillage.
	Management of Invasive Species	Measures will need to be put in place to ensure that there is no spread of invasive non-native species or diseases. There will be no disturbance of the Grand Canal Basin outside of the proposed project area. Sediment removed will be treated as contaminated and disposed of to a licensed

Phase		Management Measure
		facility off site. Biosecurity methods will need to be followed based on the best industry practice guidance.
Operational Phase		Excavation of contaminated material will take place from open trench excavations on Hanover Quay and Sir John Rogerson's Quay. Surplus material may arise within the Basin also when positioning the pipeline. All surplus materials will be treated as contaminated material and will be disposed of in accordance with relevant legislation including the Department of the Environment and Local Government (DoELG) (1996 to 2008), Waste Management Acts, the DoELG (1998) Waste Management (Permit) Regulations, and the NRA (2008) Guidelines for the Management of Waste from National Road Construction Projects.
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. Movement monitoring will be carried out during any activities which may result in ground movements or movements of any nearby structures.

7.5 Air Quality and Climate

This section includes the measures that are required to minimise and manage dust and any other associated impacts on air quality and climate during the construction phase of the project, refer to Table 7.5. The CEMP will be updated prior to the construction phase to further elaborate all measures (including method statements) to be employed in relation to all potential impacts on Air Quality and Climate; and how the following mitigation measures will be implemented.

Table 7.5 Air Quality and Climate Management Measures

Phase	Management Measure
Construction Phase	▪ Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic; ▪ Any road that has the potential to give rise to fugitive dust will be regularly watered, as appropriate, during dry and/or windy conditions; ▪ Vehicles exiting the site will make use of a wheel wash facility where appropriate, prior to entering onto public roads; ▪ Vehicles using site roads will have their speed restricted, and this speed restriction will be enforced rigidly. On any un-surfaced site road, this will be 20 kph, and on hard surfaced roads as site management dictates; ▪ Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary; ▪ Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods; and ▪ During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.
	In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust would be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.
Operational Phase	As there are no predicted impacts to air quality or climate during the operational stage, there are no mitigation measures proposed.

7.6 Noise and Vibration

This section includes the measures that are required to mitigate noise and vibration during the design and execution of the project, refer to Table 7.6. 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. The Plan will also define noise and vibration monitoring and reporting. The NVMP will also include method statements for each phase of the works, the associated specific measures to minimise noise and vibration in so far as is reasonably practicable for the specific works covered by each plan and a detailed appraisal of the resultant construction noise and vibration generated.

Noise monitoring will determine the noise levels occurring at the nearest sensitive receptor due to site operations and to ensure they are kept within acceptable limits, by taking corrective action as necessary. Mitigation and monitoring will also ensure that the works are undertaken in a manner that does not give rise to significant negative impacts through minimising noise annoyance, noise disturbance or noise nuisance at noise sensitive receptors in the vicinity of the construction areas.

Table 7.6 Noise and Vibration Management Measures

Phase	Management Measure
Construction Phase	The Contractor will ensure that construction noise levels are limited to 65 dB $L_{Aeq,16hour}$ at the nearest noise sensitive location.
	The Contractor will ensure that construction noise levels are limited to 65 dB $L_{Aeq,16hour}$ at the nearest noise sensitive location. To mitigate impacts as a result of vibration the following thresholds will not be exceeded. 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 be required to develop a comprehensive construction Noise and Vibration Management Plan having de regard to the best practice outlined in BS 5228-1:2009+A1:2014 and BS 5228-2:2009+A1:2014. Amongst others, it is proposed that the following practices be adopted as a matter of course: ▪ Limiting the hours during which site activities likely to create high levels of noise are permitted; ▪ Establishing channels of communication between the Contractor, local authority and residents; ▪ Appointing a site representative responsible for matters relating to noise; ▪ Monitoring typical levels of noise during critical periods and at sensitive locations; ▪ Selection of plant with low inherent potential for generation of noise; and ▪ Siting of noisy plant as far away from sensitive properties as permitted by site constraints.

Phase	Management Measure
	▪ To ensure all plant is serviced and maintained and the plant used is of latest technology with inbuilt noise mitigation.
	The impact assessment conducted for the construction activity during the construction phase has highlighted that the predicted construction noise levels will be within the adopted criterion. Nevertheless, it will be a requirement for the Contractor to employ and implement best practice construction noise and vibration management techniques throughout the construction phase in order to further reduce the noise and vibration impact to nearby noise sensitive receptors.
	In the first instance, 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. The Plan will also define noise and vibration monitoring and reporting. The NVMP will also include method statements for each phase of the works, the associated specific measures to minimise noise and vibration in so far as is reasonably practicable for the specific works covered by each plan and a detailed appraisal of the resultant construction noise and vibration generated.
	The Contractor will provide proactive community relations and will notify the public and vibration sensitive premises before the commencement of any works forecast to generate appreciable levels of noise or vibration, explaining the nature and duration of the works. The Contractor will distribute information circulars informing people of the progress of works and any likely periods of significant noise and vibration.
	The BS5228 standards include guidance on several aspects of construction site mitigation measures, including, but not limited to: ▪ selection of quiet plant; ▪ control of noise sources; ▪ screening; ▪ hours of work; ▪ liaison with the public; and ▪ monitoring.
	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.
Operational Phase	It should be noted that the proposed development will not give rise to any significant levels of noise or vibration and therefore the associated impact is not significant.
Monitoring Programme	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.

7.7 Traffic and Transport

The CEMP will be updated prior to the construction phase to further elaborate all measures (including method statements) to be employed in relation to all potential impacts on Traffic and Transport; and how the following mitigation measures will be implemented. The Contractors will provide a Traffic Management Plan to be included in the CEMP during the pre-construction phase. This Traffic Management Plan will be developed in consultation with the ER on award of the Contract/s. The Table

7.7 below lists the mitigation measures proposed in relation to traffic management and pedestrian access

Table 7.7 Traffic and Transport Management Measures

Phase	Management Measure
Construction Phase	Construction related HGV trips will adhere rigidly to the Dublin City Council 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 Dublin City Council, An Garda Síochána, the Fire Service and the Ambulance service. When the works are awarded to a Contractor, the Preliminary Traffic Management Plan will be developed by the Project Supervisor Construction Phase into a Detailed Traffic Management Plan in full consultation with the same stakeholders. All traffic management plans, including working times, will be agreed with and approved by Dublin City County Council Transportation Department in advance of implementation.
	Either a stop and go or a temporary traffic signal system will be utilised to maintain two-way traffic flow on Sir John Rogerson's Quay 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.
Operational Phase	No mitigation measures are proposed for the operational phase of the Grand Canal Docks Storm Water Outfall Extension.

7.8 Archaeology and Cultural Heritage

This section includes the measures that are required to manage impacts and to minimise impacts on the archaeology and cultural heritage during the construction phase of the project, refer to Table 7.8. The CEMP will be updated prior to the construction phase to further elaborate all measures (including method statements) to be employed in relation to all potential impacts on Archaeology and Cultural Heritage; and how the following mitigation measures will be implemented.

Table 7.8 Archaeology and Cultural Heritage Management Measures

Phase	Management Measure
Pre-construction phase	▪ 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; ▪ Prior to the commencement of works 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; ▪ Prior to the commencement of works 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 ▪ Prior to the commencement of works 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.
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,

Phase	Management Measure
	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.
Operational Phase	No mitigation measures relating to the archaeological, architectural and cultural heritage resource are deemed to be necessary during the operational phase of the proposed development.
Monitoring Programme	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. The full implementation of the archaeological monitoring and excavation measures will ensure that there will be no residual impacts on any further features of archaeological potential not previously identified on site.

7.9 Waste Management

This section includes the measures that are required to manage waste impacts and to minimise impacts due to waste management during the construction phase of the project, refer to Table 7.9. The CEMP will be updated prior to the construction phase to further elaborate all measures (including method statements) to be employed in relation to all potential impacts on Waste Management; and how the following mitigation measures will be implemented.

Table 7.9 Waste Management Measures

Phase	Management Measure
Construction Phase	The surplus material arising from piling works and from excavated soil from open trench works on Hanover Quay and Sir John Rogerson's Quay 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.
	Management Plans including method statements will be developed for excavations and construction activities that may encounter contaminated or hazardous material.
	In order to mitigate potential impacts associated with contaminated material and silt/ soil disposal, the contract documents for the proposed development will include the following provisions: ▪ The Contractor will be required to update and finalise the CEMP during the pre-construction phase of the proposed development; ▪ The Contractor will be required to update and finalise the RWMP addressing inter alia the treatment, storage, and disposal of contaminated material; ▪ A Project Waste Manager will be appointed by the Contractor to oversee the implementation and adherence to the Waste Management Plan during the construction phase of the proposed development; ▪ All contaminated material will be disposed of in accordance with all relevant legislation including the Department of the Environment and Local Government (DoELG) (1996 to 2008) Waste Management Acts, the DoELG (1998) Waste Management (Permit) Regulations, the Guidelines for the Management of Waste from National Road Construction Projects (TII, 2017), East-Midland Region Waste Management Plan (2015-2021), and the Landfill Directive (2003/33/EC); ▪ All waste will only be removed by Waste Contractors authorised under the Waste Management (Collection Permit) (Amendment) Regulations (2008); and ▪ Waste will be delivered to authorised waste facilities in accordance with the Waste Management Acts 1996-2010.
	Other mitigation measures include: ▪ Fuels, waste fuels, and waste materials will be stored temporarily in designated areas that are isolated from surface water features. Skips will be closed over/ covered to prevent materials being blown or washed away and to reduce the likelihood of contaminated water leakage; ▪ All hazardous materials including waste oil, solvents, paints, and soil etc. will be stored in sealed containers and kept separate from inert waste materials while awaiting collection from the appropriate waste carrier; ▪ Re-fuelling, lubrication, storage areas and site offices will follow best practice procedures when setting up, operating, and taking down near surface water bodies; ▪ Contaminated soils will be removed as soon as possible from active working areas; ▪ Any potential hydrocarbon or hazardous material spills will be reported immediately to the following authorities, EPA, Dublin City Council, and the Eastern Regional Fisheries Board; ▪ A separate container will be located in the Contractors compound to store absorbents used to contain spillages of hazardous materials. The container will be clearly labelled and the contents of the container will be disposed of by a licenced

Phase	Management Measure
	Waste Contractor at a licenced site. Records will be maintained of material taken off site for disposal; ▪ All such spills will be recorded on an Incident Report Form; and ▪ On site segregation of waste materials will be carried out to increase opportunities for off-site recycling and disposal especially for waste generated at site compounds such as organic waste, packaging waste, mixed dry recyclables and mixed dry non-recyclable; ▪ A maintenance programme for the bunded areas will be managed by the site environmental manager. The removal of rainwater from the bunded areas will be their responsibility. Records will be maintained of materials taken off site for disposal; and ▪ Drainage collection system for washing area to prevent run-off into surface water system.
Operational Phase	The maintenance activities for the pipeline and the disposal of any waste arising as part of these activities will be done in accordance with relevant guidance documents and policies. No other mitigation measures are proposed for the operational phase of the project.

7.10 Material Assets

This section includes the measures that are required to material assets during the design and the execution of the project, refer to Table 7.10. The CEMP will be updated prior to the construction phase to further elaborate all measures (including method statements) to be employed in relation to all potential impacts on Material Assets; and how the following mitigation measures will be implemented.

Table 7.10 Material Assets Management Measures

Phase	Management Measure
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.
	Consultation has been undertaken with utility providers to determine the location of services prior to commencement of works. 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 MacMahon Bridge and the high-pressure gas mains on SJRQ. Any necessary re-routing of utilities will be identified and agreed with the relevant utility provider. A record of the position, size and type of all services encountered or affected by the works will be documented. Access to the existing fire hydrants along the Grand Canal Quay, Hanover Quay and Sir John Rogerson's Quay will not be hindered.
	As discussed in Volume 2 of the EIAR, Section 15 Landscape and visual impact, sensitive design in temporary works will be undertaken. Temporary hoardings will be put in place around land-based works along Hanover Quay and Sir John Rogerson's Quay 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.

Phase	Management Measure
	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 so under supervision of a qualified archaeologist, catalogued and 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. The relevant guidelines are discussed in each respective section elsewhere in this report.
Operational Phase	There are no specific mitigation measures required as part of the operational phase. As mentioned in Landscape and visual impact, handrails and gates to platforms and moorings will be designed in a style that is sympathetic to the historic setting of the docks. 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.
Monitoring Programme	Monitoring of material assets, other than that mentioned elsewhere in this report in respect of transport, visual amenity, and cultural heritage, will involve supervision of buried utilities where open trench excavation is scheduled. This will occur, at the discretion of the relevant utility provider, at Hanover Quay, and Sir John Rogerson's Quay. The present utilities here include: ▪ Hanover Quay: – BT Ireland. – E-Net. – ESB. – Gas Networks Ireland. – Irish Water (road drainage, foul and storm sewers). – Virgin Media. ▪ Sir John Rogerson's Quay: – BT Ireland. – E-Net. – ESB. – Eir. – Gas Networks Ireland. – Irish Water (road drainage, foul and storm sewers). – Virgin Media.

7.11 Landscape and Visual Impacts

This section includes the measures that are required to protect landscape and visual aspects during the design and the execution of the project, refer to Table 7.11. The CEMP will be updated prior to the construction phase to further elaborate all measures (including method statements) to be employed in relation to all potential impacts on Landscape and Visual; and how the following mitigation measures will be implemented.

Table 7.11 Landscape and Visuals Management Measures

Phase	Management Measure
Construction Phase	Temporary hoardings will be put in place around land-based works along Hanover Quay and Sir John Rogerson's Quay 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.
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.

7.12 Risk Management

This section includes the measures that are required to be undertaken for risk management and details emergency measures in different instances, refer to Table 7.12.

Table 7.12 Risk Management Measures

Phase	Management Measure
Emergency Response Plan	The Construction Environmental Management Plan (CEMP) and the Operational Stage Environmental Management Plan (OSEMP) will be developed, which will outline the site safety procedures that will be implemented during the lifecycle of the proposed project, as well as the site Emergency Response Plan (ERP). The Emergency Response Plan is to be continually developed over the lifetime of the proposed project. A Traffic Management Plan (construction and operational) will also be developed.
External Management Plans	Mitigation Measures that are external to the site but are relevant to this assessment include the Dublin City Council 'Major Emergency Plan' (2015), Dublin Port Emergency Management Plan (2013) which if implemented as intended, will limit the loss of life or injury to employees, contractors, visitors and local residents, damage to facilities and damage to the environment.
Damage to major underground utility services	Site investigation, slit trenching on all major utility services and underground services detection surveys to be undertaken. Hand excavation in close proximity to major services. Liaison with stakeholders.
Road Traffic Accidents	A Traffic Management Plan will be developed, along with a Site-Specific Risk Assessment.
Risk Assessment	The Emergency Response Plan is a live document that undergoes periodic monitoring, review and update throughout the lifetime of a project. The risk management and assessment of major accidents and/or disasters will be continued on an ongoing basis throughout the planning, design, construction and operational phases of the proposed project. Activities on site will be monitored to ensure risk does of major accidents does not increase over time on the site.

Appendix A: Environmental Management Forms

Corrective Action Form CAR No.:

Nature: ☐ Complaint ☐ Inspection ☐ Audit ☐ Environmental Monitoring ☐ Environmental Incident ☐ Other. Specify	
Description of problem and date identified:	
Requested by:	Date:
Investigation Findings:	
Investigated By:	Date:
Corrective Action Required:	
Handled By:	Completion Date:
Preventive Action Required:	
Handled By:	Completion Date:
Verification:	
Corrective / Preventive Yes ☐ Action Taken:	
No ☐	
Corrective / Preventive Yes ☐ Action Effective:	

No ☐	
Verified By (Environmental Manger):	Date:

Complaint Form

Name:	Address:
Phone Number:	Email Address:
Nature of Complaint ☐ Air (dust, particulates emissions, gas, odour) ☐ Water (stream pollution, mud) ☐ Land (Waste, oil spills, landfill, hazardous waste) ☐ Noise (hauling trucks, equipment) ☐ Housekeeping (wastes, mud/ dust on public road) ☐ Others (please specify):	
Details of complaint:	
Sign:__Date: _	

Office Use Only

Complaint Number:____Corrective Action Number: _____ Site condition at the time of complaint:
Corrective /Preventive Action Taken:

Complaint Closed by Environmental Manager:__Date:

Environmental Complaints Register

Complaint No.	Date	Time	Name of Person Making Complaint	Address	Phone Number	Email Address	Complaint Transmittal Type	Site condition at the time of complaint	Action Required	Corrective Action Number	Response given (Y/N)	Closed Date

Environmental Incident Form

CAR No.:

Date of Incident:	
Contractor: Contract Area:	
Witness: Role: Other Role: Witness:	
Description of location of Incident:	
Description of Incident:	
Cause of Incident:	
Weather Condition at the time of incident: Condition: Sunny/ Fine/ Overcast/ Light rain/ Heavy rain Temperature: °C Humidity: High/ Moderate/ Low Wind: Calm/ Light Breeze/ Strong Wind Direction:	
Scale of Incident: ☐ Small scale (within site) ☐ Isolated Site (within site) ☐ Large scale (outside site) ☐ Isolated Site (outside site)	
Potential Impacts: ☐ Air Pollution ☐ Surface Water Pollution ☐ Groundwater Pollution ☐ Other: ☐ Noise Pollution ☐ Soil Pollution ☐ Impact on Protected Areas	
Have environmental control measures been implemented	
Are the control measures inappropriate or ineffective	
Describe the non-compliance with reference to the CEMP	
Proposed corrective action	
Personnel responsible for corrective action?	

Signature on closure (Environmental Manger):	Date of closure:

Weekly Environmental Inspection Record Sheet

Contractor/ Sub-contractor:	Contract Area:
Inspection Reference/ Number:	Date:
Inspected by:	Role:
Other Attendees (Role)	
Weather Condition: Temperature: Rainfall: Wind speed and direction:	

Inspection Notes:

Weekly Environmental Inspection Record Sheet

Inspection Items	Implemented?			Remarks (i.e. specify location, good practices, problem observed, possible cause of nonconformity and/or proposed corrective/preventative actions)	Action by Date	Signed complet-ion date
	Yes	No	n/a			
General						
Confirm all works are confined to permitted work sites.						
Confirm works are undertaken within approved work times including haulage.						
Others (please specify)						
Air Quality and Dust Control						
Are the construction sites watered to minimize dust generated?						
Are stockpiles of dusty materials covered or watered?						
Cement debagging process undertaken in sheltered areas						
Are all vehicles carrying dusty loads covered/watered over prior to leaving the site?						
Does the public road have dirt/ dust or mud on it?						
Are dust controlled during percussive drilling or rock breaking?						

Hoarding provided along boundaries and properly maintained (any damage / opening observed, please indicate the location).						
Are speed control measures applied? (e.g. speed limit sign)						
Are equipment and vehicles regularly maintained?						
Others (please specify)						

Weekly Environmental Inspection Record Sheet

Inspection Items	Implemented?			Remarks (i.e. specify location, good practices, problem observed, possible cause of nonconformity and/or proposed corrective/preventative actions)	Action by Date	Signed complet-ion date
	Yes	No	n/a			
Water Pollution Control						
Are water discharge licenses valid?						
Are conditions of the license compiled with? (check the monitoring records and observe physically)						
Are measures provided to properly direct effluent to silt removal traps and hydrocarbon interceptors?						
Are sedimentation traps and tanks free of silt and sediment?						
Is sand and silt settled out in wheel washing bay and removed?						
Are leaks and spillages at the site cleared immediately?						
Are proper measures to control oil spillage during maintenance or to control other chemicals spillage? (e.g. provide drip trays)						
Are hazardous liquids/ chemicals stored in bunded areas?						
Trained staff are assigned for dealing with spills?						
Are spill kits / sand / saw dust used for absorbing chemical spillage readily accessible and replenished?						
Others (please specify)						

Weekly Environmental Inspection Record Sheet

Inspection Items	Implemented?			Remarks (i.e. specify location, good practices, problem observed, possible cause of nonconformity and/or proposed corrective/preventative actions)	Action by Date	Signed complet-ion date
	Yes	No	n/a			
Noise and Vibration Control						
Are noise and vibration instruments operating properly?						
Are noise limits being adhered to?						
Is plant maintained so it minimises construction noise sensitive receptors?						
Are all vehicles and mechanical plant used on the works fitted with effective exhaust silencers and maintained in good and efficient working order?						
Are vibration limits being adhered to?						
Others (please specify)						
Waste Management						
Is the site kept clean and tidy? (e.g. litter free, good housekeeping)						
Are separated labelled containers / areas provided for facilitating recycling and waste segregation?						
Are correct containers being used for segregation?						
Are construction wastes / recyclable wastes and general refuse removed off site regularly?						
Are construction wastes collected and disposed of properly by licensed collectors?						
Are chemical wastes, if any, collected and disposed of properly by licensed collectors?						
Are drip trays free of oil and water?						
Is litter, foam or other objectionable matters in nearby water drain/sewer cleaned?						
Are asbestos wastes handled by registered professionals?						
Is there a complete record of waste transfer notes?						
Others (please specify)						

Weekly Environmental Inspection Record Sheet

Inspection Items	Implemented?			Remarks (i.e. specify location, good practices, problem observed, possible cause of nonconformity and/or proposed corrective/preventative actions)	Action by Date	Signed complet-ion date
	Yes	No	n/a			
Protection of Flora and Fauna						
Is there any visible damage to flora and fauna?						
Is the SAC/ SPA adjacent the onshore compound free from ancillary construction activities?						
Is dust present on the flora along the Pigeon House Road (adjacent SAC/ SPA)?						
Is a marine mammal officer present during construction of the diffuser shaft?						
Others (please specify)						
Protection of Historical Heritage						
Are earthworks being monitored by a suitably licensed and qualified archaeologist?						
Are specified set back distances from quay walls being enforced?						
Others (please specify)						

Water Quality Monitoring Field Parameter Sheet

ID	Location Description	Date	Time	Flow Rate (l/s)	Temp. (°C)	pH	Cond. (µs/cm)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	Sample Collected (Y/N)	Observations	Sampler Initials

Visual Dust Check Monitoring Form

Date	Time	Location Description	Dust Presence (Y/N)	Intensity (Slight/ Moderate/ Heavy)	Description of Action to be taken	Other notes on conditions likely to lead to dust release (e.g. (weather and nature of construction activity)	Name of Inspector

Weather Conditions Record Sheet

Date	Time	Weather conditions (general)	Rainfall	Wind Speed (m/s)	Wind Direction	Sea state	Visibility	Implications for monitoring	Name of Recorder

Waste Management

Waste Removal Record Form

Date	Time	EWC Code	Weight (kg)	Volume (m^3)	Waste Facility Waste is being removed to (include Licence/Permit Number of Facility)	Waste Transport Contractor (include Licence/permit number & Vehicle Reg	Name of Inspector

Appendix B: CEMP Contact List

Client Contact Data

Table H1: Employer Data

Name	Designation	E-mail	Tel No.	
			Landline	Mobile

Employers Representative Contact Data

Table H2: Employers Representative Key Personnel contact details

Name	Designation	E-mail	Tel No.	
			Landline	Mobile