# Chapter 13
# Water

## Contents

# 13. Water

## 13.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) assesses the impact of the Ringsend to City Centre Core Bus Corridor Scheme (hereafter referred to as the Proposed Scheme) on the surface water environment during both the Construction and Operational Phases. The following attributes of each surface water body (receptor) are considered: hydrology, hydromorphology and water quality. Hydrogeology is dealt with specifically in Chapter 14 (Land, Soils, Geology & Hydrogeology).

During the Construction Phase, the potential surface water impacts associated with the development of the Proposed Scheme have been assessed (see Section 13.4.4), including potential impacts from construction runoff and watercourse disturbance due to utility diversions, road resurfacing and road realignments.

During the Operational Phase, the potential surface water impacts associated with changes in surface water runoff, increased hardstanding and watercourse disturbance have been assessed (see Section 13.4.5).

The assessment has been carried out according to best practice and guidelines relating to surface water assessment, and in the context of similar large-scale infrastructural projects.

An assessment of Proposed Scheme compliance with the Water Framework Directive (WFD) (Directive 2000/60/EC) requirements is provided in Appendix A13.1 (Water Framework Directive Compliance Assessment) in Volume 4 of this EIAR; the status of WFD water bodies and protected areas within the Study Area are provided in Section 13.3.9 and a summary of the conclusions of the WFD assessment is provided in Section 13.6.3.

Flooding has been assessed within a Scheme Specific Flood Risk Assessment (FRA) report (Appendix A13.2 in Volume 4 of this EIAR). The results of this assessment have been summarised in Sections 13.3.10 and 13.4.6 of this chapter.

The aim of the Proposed Scheme when in operation is to provide enhanced walking, cycling and bus infrastructure on this key access corridor in the Dublin region, which will enable and deliver efficient, safe, and integrated sustainable transport movement along the corridor. The objectives of the Proposed Scheme are described in Chapter 1 (Introduction). The Proposed Scheme which is described in Chapter 4 (Proposed Scheme Description) has been designed to meet these objectives.

The design of the Proposed Scheme has evolved through comprehensive design iteration, with particular emphasis on minimising the potential for environmental impacts, where practicable, whilst ensuring the objectives of the Proposed Scheme are maintained. In addition, feedback received from the comprehensive consultation programme undertaken throughout the option selection and design development process have been incorporated, where appropriate.

## 13.2 Methodology

### 13.2.1 Study Area

The baseline study area for this assessment is 500m from boundary of the Proposed Scheme. It is anticipated that any likely significant impacts from the Proposed Scheme would occur at local water bodies and given the nature and extent of the Proposed Scheme, the 500m study area is considered appropriate to encompass all those water bodies that may be susceptible to significant impacts. Therefore, any identified surface water bodies within that area have been considered as receptors, including those classified under the WFD including riverine, transitional water bodies, lake (water) bodies and coastal water bodies, and also non-WFD classified water bodies. Artificial drainage features, such as existing Sustainable Urban Drainage Systems (SuDS) have not been considered as receptors within the baseline assessment.

The nearest surface water abstraction point is Leixlip Reservoir (IE_EA_09_69), which is approximately 5km (kilometres) upstream of the Proposed Scheme. This is a major public water supply abstraction point

(approximately 195,000m$^3$/day (cubic metres per day)) which supplies approximately 600,000 people, serving Fingal, Kildare and North Dublin. However, due to separation from the Proposed Scheme and the fact that it is upstream of the study area, there is considered to be no potential for the Proposed Scheme to interact with this abstraction point and, accordingly, this abstraction point has not been considered further in the assessment.

## 13.2.2 Relevant Guidelines, Policy and Legislation

### 13.2.2.1 Water Framework Directive (WFD)

The WFD established a framework for the protection of both surface water bodies and groundwaters. The WFD provides a vehicle for establishing a system to improve and / or maintain the quality of water bodies across the European Union (EU). It requires all water bodies (rivers, lakes, groundwater, transitional, coastal) to attain 'Good Water Status' (qualitative and quantitative) by 2027.

There are a number of WFD objectives under which the quality of water is protected. The key objectives at EU level are the general protection of the aquatic ecology, specific protection of unique and valuable habitats, the protection of drinking water resources, and the protection of bathing water. The objective is to achieve this through a system of river basin management planning and extensive monitoring. 'Good Status' means both 'Good Ecological Status' and 'Good Chemical Status'.

The WFD was initially transposed into Irish law in by S.I. No. 722/2003 – European Communities (Water Policy) Regulations 2003, as amended (hereafter referred to as the Water Policy Regulations). The Water Policy Regulations outline the water protection and water management measures required to maintain high status of waters where it exists, prevent any deterioration in existing water status and achieve at least Good Status for all waters.

Subsequently, S.I. No. 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations 2009, as amended, (hereafter referred to as the Surface Waters Regulations and S.I. No. 9/2010 - European Communities Environmental Objectives (Groundwater) Regulations 2010, as amended, (hereafter referred to as the Groundwater Regulations) were promulgated to regulate WFD characterisation, monitoring and status assessment programmes in terms of assigning responsibilities for the monitoring of different water categories, determining the quality elements and undertaking the characterisation and classification assessments.

The Water Policy Regulations require the assessment of permanent impacts of a scheme / project on WFD water bodies, (rivers, lakes, estuaries, coastal waters, and groundwater). Typically, the permanent impacts include all operational impacts, but can also include impacts from construction, depending on the length and / or nature of the works etc. of the Proposed Scheme, as some potential construction impacts could be considered permanent in the absence of mitigation. An assessment of the compliance of the Proposed Scheme with WFD requirements is provided in Appendix A13.1 (Water Framework Directive Compliance Assessment) in Volume 4 of this EIAR; a statement of the status of WFD water bodies and protected areas within the Study Area are provided in Section 13.3 and a summary of the conclusions of the WFD assessment is provided in Section 13.6.3.

In the absence of WFD assessment guidance specific to Ireland, the assessment has been carried out using the UK Environment Agency's 'Water Framework Directive assessment: Estuarine and Coastal waters' 2016 (updated 2017) (Environment Agency 2016). No specific guidance exists for freshwater water bodies; however, this guidance was used as the basis of the UK's Planning Inspectorate (PINS) Advisory Note 18 'Water Framework Directive' June 2017 (PINS 2017) in which it sets out the stages of an assessment. On this basis it is considered appropriate to use for the assessment of the Proposed Scheme.

### 13.2.2.2 River Basin Management Plans

River Basin Management Plans (RBMPs) provide the mechanism for implementing an integrated approach to the protection, improvement and sustainable management of the water environment and are published every six years.

The second cycle RBMP 2018 - 2021 was published by the Department of Housing, Planning and Local Government (DHPLG) in April 2018 and covers Ireland as a whole (DHPLG 2018). For the second cycle, the

original (2009) Eastern, South-Eastern, South-Western, Western and Shannon River Basin Districts have been merged to form one national River Basin District (RBD). For 'At Risk' water bodies, the RBMP 2018 - 2021 identified the frequency of significant pressures impacting these receptors as follows: agriculture (53%), hydromorphology (24%), urban wastewater (20%), forestry (16%), domestic wastewater (11%), urban runoff (9%), peat (8%), extractive industry (7%) and mines and quarries (6%).

In September 2021, the Minister for Housing, Local Government and Heritage, published the draft River Basin Management Plan for Ireland 2022-2027 for public consultation (DHLGH 2021). The consultation period closes March 2022. The draft RBMP sets out at the outset that it is published in the context of a rapidly changing policy landscape at European and International levels and against a backdrop of 'widespread, rapid and intensifying climate change'. In addition, Ireland is now experiencing a sustained decline in water quality following many years of improvements, therefore stronger measures are now required to achieve sustainable water management in order to address and adapt to the impacts of climate change and achieve the desired outcomes for biodiversity.

Image 13.1 presents the ecological status of water bodies in Ireland over the past two cycles of the RBMP and illustrates the reduction in water quality, particularly in relation to the reduced percentage of water bodies achieving high status and increased percentage achieving bad status. The reductions in water quality are especially notable for rivers; for other water bodies the changes are more mixed; some reductions, some improvements. The draft RBMP cites a 4.4% net decline in the status of water bodies, and notes that this is mostly driven by a decline in the status of river water bodies.

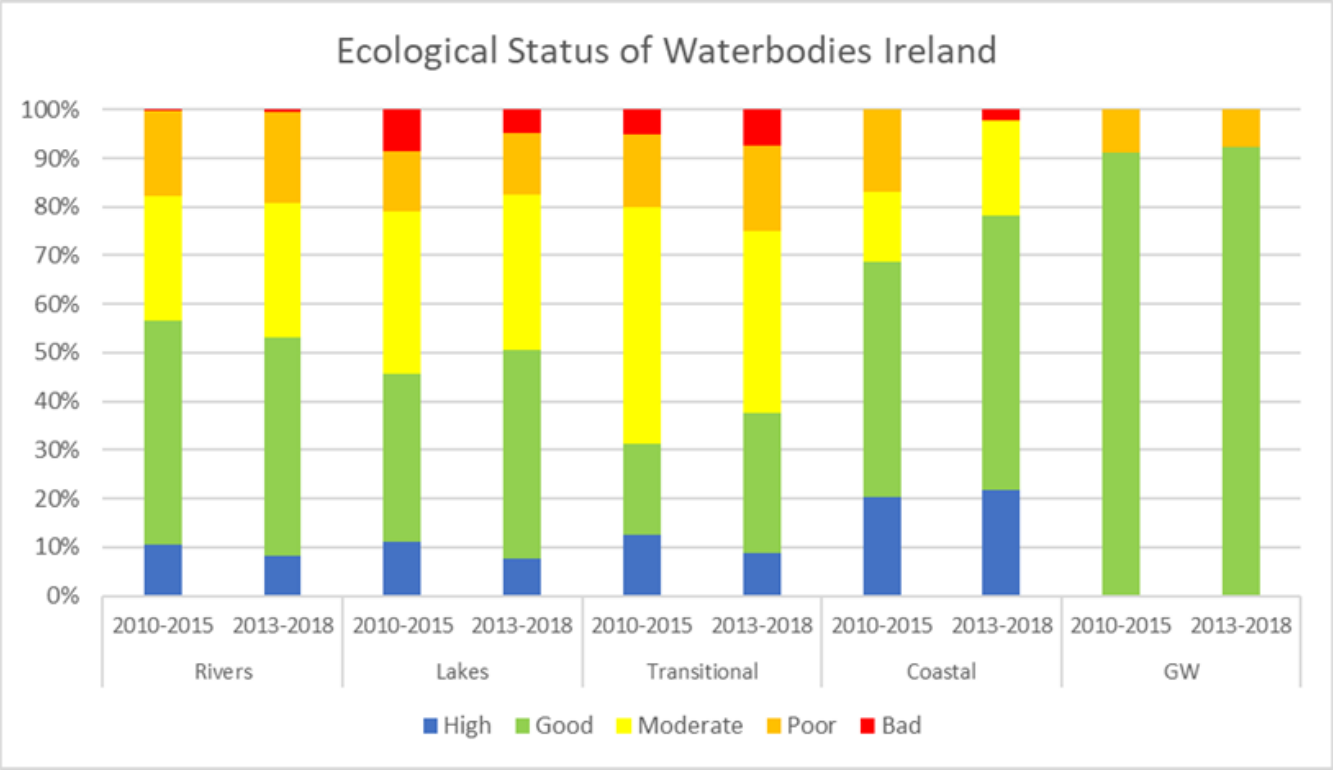


**Image 13.1 Ecological Status of Water bodies in Ireland**

The characterisation and risk assessments carried out for the third cycle show that 33% of water bodies are 'At Risk' of not meeting their environmental objective of good or high status. Of these, 46% are impacted by a single significant pressure. Agriculture remains the most common pressure followed by hydromorphology, forestry and urban wastewater. There has been an increase in water bodies impacted by agriculture since the second cycle RMBP.

The draft RBMP sets out a Programme of Measures (PoMs) necessary to deliver the objectives of the WFD in full and to contribute to other environmental priorities.

#### 13.2.2.3 Guidelines

The guidance detailed in Table 13.1 has also been consulted during the preparation of this Chapter, where relevant.

**Table 13.1: Guidelines**

| EIA Topic | Guidance |
|---|---|
| **EIA / General** | • Environmental Protection Agency (EPA) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA 2022);<br>• European Commission (EU) Environmental Impact Assessment of Projects. Guidance on the Preparation of the Environmental Impact Assessment Report (EU, 2017) |
| **Water** | • Transport Infrastructure Ireland (TII) Road Drainage and the Water Environment guidance document (TII, 2005)<br>• National Road Authority (NRA) Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes (NRA 2005)*;<br>• Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (hereafter referred to as the TII Assessment Guidelines) (NRA 2009)*; and<br>• The Department of the Environment, Heritage and Local Government (DEHLG) and the Office of Public Works (OPW) Planning System and Flood Risk Management Guidelines for Planning Authorities (hereafter referred to as the FRM Guidelines) (DEHLG and OPW 2009). |

*The NRA and Rail Procurement Agency merged to establish a new agency – Transport Infrastructure Ireland (TII). As a result, all previous NRA documents are now referred to as TII documents.

### 13.2.3 Data Collection and Collation

Information on the baseline environment including hydrology, hydromorphology and water quality of the receptors within the study area has been collected and collated by undertaking both a desk study and field surveys.

#### 13.2.3.1 Data Sources used to Undertake Desk Study

Table 13.2 details the data sources consulted during the assessment.

**Table 13.2: Data Sources used to Undertake the Desk Study**

| Assessment Attribute | Title |
|---|---|
| **General** | • Ordnance Survey of Ireland (OSI) - current and historic mapping; and<br>• Aerial photographs (i.e., Google Maps). |
| **Surface Water Quality and Hydromorphology** | • WFD Ireland Database;<br>• EPA - water quality monitoring database and reports. EPA Water Environment Maps (EPA 2022);<br>• EPA Environmental Data Maps;<br>• National Parks and Wildlife Service (NPWS) - designated sites (NPWS 2020); and<br>• Inland Fisheries Ireland (IFI) - fishery resources. |
| **Hydrology** | • Catchment Summaries;<br>• RBMP 2018 – 2021 (DHPLG 2018); and<br>• EPA - flow and water level measurements. |
| **Water/Flood Risk** | • OPW National Flood Information Portal (OPW 2020) |

#### 13.2.3.2 Field Surveys

Field walkover assessments were carried out in March 2020 and March 2022. In March 2022, survey points were identified upstream of the Proposed Scheme, downstream of the Proposed Scheme and at the location of the proposed DPTOB and were visited to inform the determination of baseline conditions in order to identify the likely impacts of the Proposed Scheme. In addition, in March 2022 a walkover the whole route was carried out (Survey point R1 on Figure 13.2) and detailed visual inspections were carried out at five locations where structures are proposed (R2 to R6). Further details of the locations and the results of the survey are provided in Section 13.3.4.

Observations were made from bridges and from the top of riverbanks. The following observations were recorded at each survey location:

- Flow conditions (recording observations such as homogenous flow, low flow, or high flow);
- Riverbed (recording observations such as the sediment type and whether there was any deposition);
- Water quality (recording any potential sources of pollution as well as visual indicators of poor quality (e.g., presence of sewage fungus, litter, or foam lines);
- Bank stability (recording any instances of erosion and aggradation);
- Natural and manmade features of the river (including modifications, examples of structures could include culverts, weirs, or bridges);
- Runoff pathway and risk (recording the pathway for any surface runoff to the watercourse and the likelihood of surface runoff to the river);
- Riparian vegetation (recording the surrounding vegetation); and
- Outfalls and discharges (recording any outfalls and discharges and whether these were active at the time of the survey).

No water quality sampling was carried out; information relating to the quality of the water bodies was drawn from the EPA's online mapping and information portals, as detailed in Section 13.2.3.1.

## 13.2.4 Appraisal Method for the Assessment of Impacts

### 13.2.4.1 General Approach

The method for the assessment of impacts has been adapted from the Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (hereafter referred to as the TII Guidelines) (NRA 2009), specifically Section 5.6. The assessment also took account of the guidance set out in the Environmental Protection Agency (EPA) Guidelines on Information to be Contained in Environmental Impact Assessment Reports (hereafter referred to as the EPA Guidelines) (EPA 2022). In addition the relevant provisions of the EU's Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (EU 2017) have been considered in preparing this chapter of the EIAR.

The surface water environment is intrinsically linked to flood risk, ecological receptors and groundwater, considered in the FRA Report (Appendix A13.2 in Volume 4 of this EIAR), Chapter 12 (Biodiversity) and Chapter 14 (Land, Soils, Geology & Hydrogeology), respectively. Commercial and recreational use of the water environment is not included in the scope of this Chapter, as commercial and recreational interests are considered and assessed in Chapter 10 (Population) and Chapter 19 (Material Assets).

The TII Assessment Guidelines outline how impact type, magnitude, and duration should be considered relative to the importance of the hydrological receptor and its sensitivity to change in order to determine significance of the impacts.

The overall impact on surface water receptors (i.e. rivers, canals, transitional water bodies, coastal water bodies and lakes) as a result of the Proposed Scheme will be determined based on two parameters:

1. The sensitivity of the water body attributes (hydrology, water quality and geomorphology) to change; and
2. The magnitude of the impacts on water body attributes.

### 13.2.4.2 Sensitivity of Receptors

The sensitivity of surface water attributes to changes as a result of the Proposed Scheme are determined by a set of criteria including their relative importance or 'value' (e.g., whether features are of national, regional, or local value). Table 13.3 outlines the criteria for estimating the sensitivity of receptors and their attributes.

**Table 13.3 Criteria Used to Evaluate the Sensitivity of Surface Water Receptors (NRA 2009, adapted to include WFD Assessment Guidelines (Environmental Agency 2016)**

| Sensitivity | Criteria | Typical Example |
|---|---|---|
| **Extremely High** | Receptor (or receptor attribute) has a very high quality or value on an international scale | • Any WFD water body which is protected by European Union (EU) legislation (e.g. Designated 'European Sites' (Special Areas of Conservation (SACs) and Special Protection Areas (SPAs)) or 'Salmonid Waters'; and<br>• A water body that appears to be in natural equilibrium and exhibits a natural range of morphological features (such as pools and riffles). There is a diverse range of fluvial processes present, free from any modification or anthropogenic influence. |
| **Very High** | Receptor (or receptor attribute) has a high quality or value on an international scale<br>or<br>very high quality or value at a national scale | • Any WFD water body (specific EPA segment) which has a direct hydrological connection of <2km to European Sites or protected ecosystems of international status (SAC / SPA or Salmonid Waters);<br>• WFD water body ecosystem protected by national legislation (Natural Heritage Area (NHA) status);<br>• A water body that appears to be largely in natural equilibrium and exhibits a diverse range of morphological features (such as pools and riffles). There is a diverse range of fluvial processes present, with very limited modifications; and<br>• Nutrient Sensitive Areas. |
| **High** | Receptor (or receptor attribute) has a moderate value at an international scale<br>or<br>high quality or value on a national scale | • A WFD water body with High or Good Status;<br>• A Moderate WFD Status (2013 to 2018) water body with some hydrological connection (<2km) to European Sites or protected ecosystems of international status (SAC / SPA or Salmonid Waters) further downstream;<br>• WFD water body which has a direct hydrological connection to sites / ecosystems protected by national legislation (NHA status);<br>• A water body that appears to be in some natural equilibrium and exhibits some morphological features (such as pools and riffles). There is a diverse range of fluvial processes present, with very limited signs of modification or other anthropogenic influences; and<br>• Direct hydrological connectivity to Nutrient Sensitive Areas. |
| **Medium** | Receptor (or receptor attribute) has some limited value at a national scale | • WFD water body with Moderate WFD Status (2013 to 2018);<br>• WFD water body with limited (>2km <5km) hydrological importance for sensitive or protected ecosystems (much further downstream);<br>• A water body showing signs of modification or culverting, recovering to a natural equilibrium, and exhibiting a limited range of morphological features (such as pools and riffles). The watercourse is one with a limited range of fluvial processes and is affected by modification or other anthropogenic influences;<br>• Evidence of historical channel change through artificial channel straightening and re-profiling; and<br>• Some hydrological connection downstream Nutrient Sensitive Areas. |
| **Low** | Receptor (or receptor attribute) has a low quality or value on a local scale | • Water body with Bad to Poor WFD Status (2013 to 2018) with no hydrological connection to European Sites or national designated sites.<br>• A WFD water body with ?5km hydrological connection to European Sites or nationally designated sites;<br>Or<br>• A non-WFD water feature with minimal hydrological importance to sensitive or protected ecosystems; and / or economic and social uses;<br>• A highly modified watercourse that has been changed by channel modification, culverting or other anthropogenic pressures. The watercourse exhibits no morphological diversity and has a uniform channel, showing no evidence of active fluvial processes and not likely to be affected by modification. Highly likely to be affected by anthropogenic factors. Heavily engineered or artificially modified and could dry up during summer months; and<br>• Many existing pressures which are adversely affecting biodiversity. |

#### 13.2.4.3 Magnitude of Impact

The scale or magnitude of potential impacts (both beneficial and adverse) depends on both the degree and extent to which the Proposed Scheme may impact the surface water receptors during the Construction and Operational Phases.

Factors that have been considered to determine the magnitude of potential impacts include the following (EPA 2022):

- Nature of the impacts;
- Intensity and complexity of the impacts;
- Expected onset, duration, frequency, and reversibility of the impacts;
- Cumulation of the effects with the impacts of other existing and/ or approved projects; and
- Possibility of effectively reducing the impacts.

Table 13.4 outlines the criteria for determining the magnitude of impact on surface water receptors.

**Table 13.4: Criteria for Determining the Magnitude of Impact on Surface Water Receptors (NRA 2009)**

| Nature of Impact | Description | Scale and Nature of Impacts |
|---|---|---|
| **High Adverse** | Results in loss of attribute and/or quality and integrity of the attribute | • Loss or extensive change to a fishery.<br>• Loss of regionally important public water supply.<br>• Loss or extensive change to a designated nature conservation site.<br>• Reduction in water body WFD classification or quality elements.<br>• Results in loss of receptor and/or quality and integrity of receptor.<br>• An impact, which has a high likelihood of occurrence and that has the potential to alter the character of a small part or element of the receptor in the medium-long term. This could be frequent or consistent in occurrence, and result impact which may alter the existing or emerging trends. |
| **Medium Adverse** | Results in effect on attribute and/or quality and integrity of the attribute | • Partial loss in productivity of a fishery.<br>• Degradation of regionally important public water supply or loss of major commercial/industrial/agricultural supplies.<br>• Contribution to reduction in water body WFD classification.<br>• Results in impact on integrity of receptor or loss of part of receptor.<br>• An impact, which has reasonable likelihood of occurrence and that has the potential to alter the character of a small part or element of the receptor in the medium term. This could be intermittently or occasionally, and result impact which may be consistent with existing or emerging trends. |
| **Low Adverse** | Results in some measurable change in attributes, quality or vulnerability | • Measurable impact but with no change in overall WFD classification or the status of supporting quality elements.<br>• Minor impacts on water supplies.<br>• Results in minor impact on integrity of receptor or loss of small part of receptor.<br>• An impact, which has low likelihood of occurrence and that has some potential to alter the character of a small part or element of the receptor in the short term. This could be on a once-off occasion or rare occurrence, and result impact which may be consistent with existing or emerging trends. |
| **Negligible** | Results in effect on attribute, but of insufficient magnitude<br>to affect the use or integrity | • No measurable impact on integrity of the attribute.<br>• Results in an impact on receptor but of insufficient magnitude to affect either use or integrity. |

| Nature of Impact | Description | Scale and Nature of Impacts |
|---|---|---|
| **Low Beneficial** | Results in some beneficial effect on attribute or a reduced risk of negative effect occurring | • Has some potential to results in minor improvement WFD quality element(s) |
| **Medium Beneficial** | Results in moderate improvement of attribute quality | • Contribution to improvement in water body WFD classification. |
| **High Beneficial** | Results in major improvement of attribute quality | • Improvement in water body WFD classification. |

#### 13.2.4.4 Significance of Impacts

The significance of an impact is determined by combining the sensitivity of the receptor with the predicted magnitude of impact, as shown in Table 13.5.

**Table 13.5: Categories of Environmental Impacts (EPA 2022)**

| Importance of Attribute | Magnitude of Impact | | | |
|---|---|---|---|---|
| | Negligible | Small | Moderate | Large |
| **Extremely High** | Range Imperceptible / Not Significant / Slight | Very Significant | Profound | Profound |
| **Very High** | Imperceptible | Significant / Moderate | Very Significant | Profound |
| **High** | Imperceptible | Moderate / Slight | Significant / Moderate | Profound / Very Significant |
| **Medium** | Imperceptible | Slight | Moderate | Significant |
| **Low** | Imperceptible | Imperceptible | Slight | Slight / Moderate |

#### 13.2.4.5 Methodology for Operational Phase Traffic Impact Assessment

Traffic modelling (see Chapter 6 (Traffic & Transport)) has been carried out for two scenarios; the Do minimum and Do Something (i.e., respectively without and with the Proposed Scheme) for 2028 and 2043. In addition to predicting how traffic on the main route of the Proposed Scheme could change, it also includes modelling for predicted traffic on side roads. This allows an understanding of whether the Proposed Scheme could result in increased traffic on those side roads via displacement.

This is important from a surface water perspective because, whilst the main route will continue to discharge to the same catchment as existing, there is the potential for displaced traffic on side roads which discharge to a different water body. This could lead to a change in pollutant loadings and consequent impacts on that water body.

To help determine this, the TII Road Drainage and the Environment (2015) guidance was consulted. It states that roads carrying less than 10,000 Annual Average Daily Traffic (AADT) are lightly trafficked and therefore pollutants occur in lower concentrations. As such, no significant impact on receptors are considered likely. Therefore, this was used as a threshold point to determine whether there was the potential for impacts on water bodies.

The threshold was built into a ‘decision tree’ approach (see Diagram 13.1) for the assessment of impacts from displaced traffic.

In order to determine which water body drainage from side roads carrying displaced traffic would discharge to, the Proposed Scheme Catchment Plans were consulted (see Proposed Surface Water Drainage Works (BCIDD-ROT-DNG_ZZ-0016_XX_00-DR-CD-0001) in Volume 3 of this EIAR).

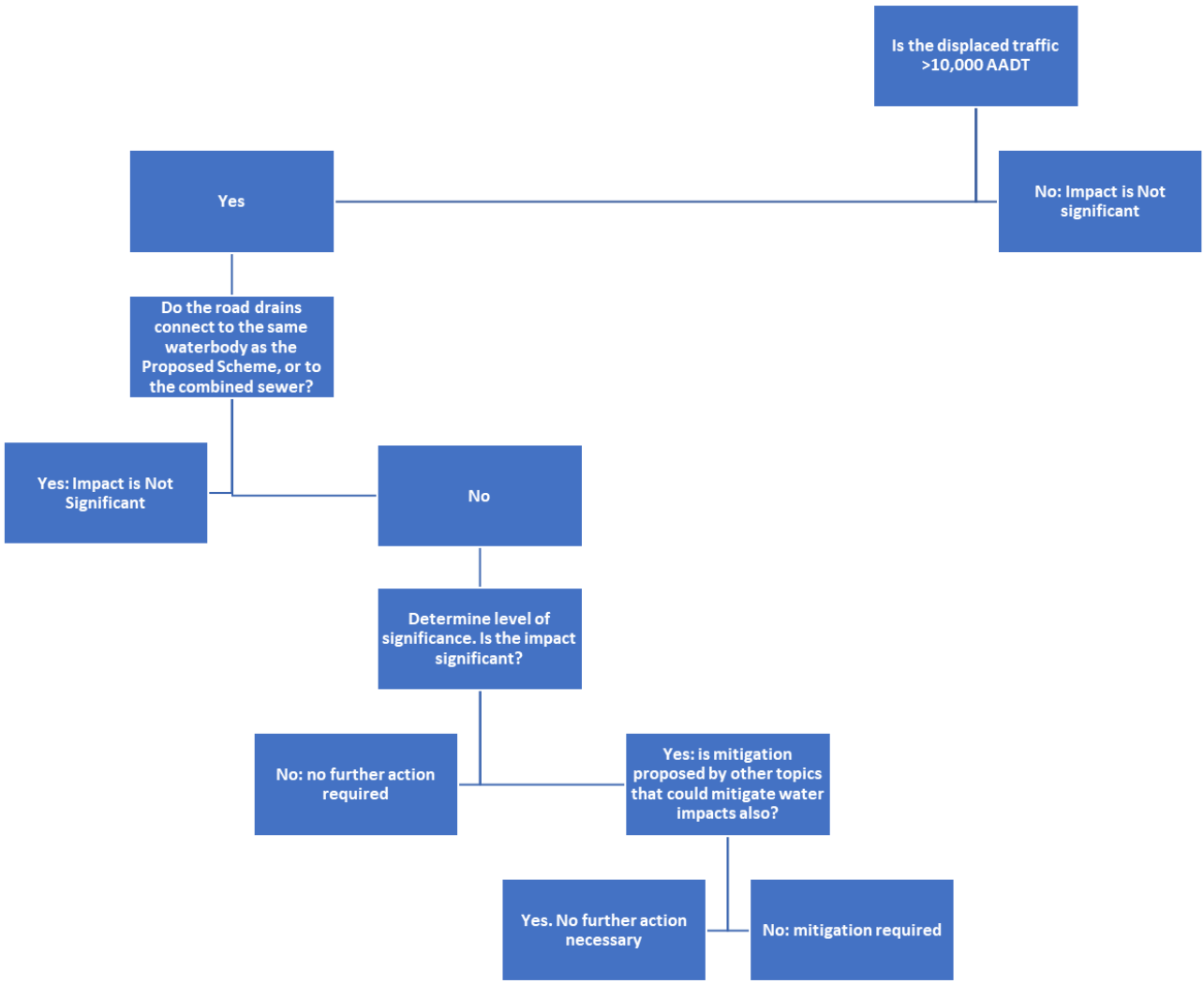


**Diagram 13.1 Traffic Assessment Decision Tree**

If, through the decision tree, it is determined that a new water body is potentially impacted upon, a qualitative assessment of the potential impact will be carried out. For the sections of road being considered in this assessment, the use of the Highways Agency Risk Assessment Tool (HAWRAT) is generally not considered appropriate; and it is considered that it would be disproportionate level of assessment for the scale of the Proposed Scheme unless new levels of AADT are above 11,000 (see below) . Taking into account the existing urban nature of the roads under consideration, the following criteria are applied to determine the magnitude of impact on the new receptor:

- If road section length <100m, magnitude is negligible (whatever the AADT);
- If AADT >10,000 and < 10,500 magnitude is small;
- If AADT >10,500 and <11,000 magnitude is moderate; and
- For AADT >11,000, the HAWRAT spreadsheet will be used to check for potential impacts from heavy metals and sediment.

## 13.3 Baseline Environment

### 13.3.1 WFD Catchment Overview

The study area lies within Hydrometric Area (HA) 09 (Liffey and Dublin Bay) and is within the River Liffey catchment. There is one sub catchment within the study area, the Dodder_SC_010. The Liffey and Dublin Bay

Catchment Summary (Liffey Catchment Assessment 2010 – 2015 (HA 09) (EPA 2018) describes this catchment as including the area drained by the River Liffey and by all streams entering tidal water between Sea Mount and Sorrento Point in County Dublin, draining a total area of 1,616km$^2$. There are five water bodies within the study area; Liffey Estuary Upper, Liffey Estuary Lower, the Royal Canal, the Dodder_050 and Dublin Bay (refer to Figure 13.1 in Volume 3 of this EIAR). The largest urban centre in the catchment is Dublin City. The other main urban centres, relevant to the study area are Ringsend and Irishtown. The Liffey and Dublin Bay catchment contains the largest population (approximately 1,255,000) of any catchment in Ireland and is characterised by a sparsely populated, upland south-eastern area underlain by granites and a densely populated flat, low lying limestone area over the remainder of the catchment basin. The catchment area is heavily urbanised and industrialised.

### 13.3.2 EPA Surface Water Monitoring

The EPA assesses the water quality of rivers and streams across Ireland using a biological assessment method (EPA 2018). The EPA assigns biological river quality (biotic index) ratings from Q5 to Q1 to watercourse sections (refer to Table 13.6). Q5 denotes a watercourse with high water quality and high community diversity, whereas Q1 denotes very low community diversity and bad water quality. This data will be used to inform baseline receptor importance.

The WFD also considers heavily modified water bodies (HMWB) and artificial surface water bodies (AWB). The WFD requires HMWB and AWB to achieve good ecological potential rather than Good Status.

**Table 13.6: EPA Scheme of Biotic Indices or Quality (Q) Values (EPA 2018)**

| Biotic Index 'Q' Value | WFD Status | Pollution Status | Condition | Quality Class |
|---|---|---|---|---|
| Q5, Q4 - Q5 | High | Unpolluted | Satisfactory | Class A |
| Q4 | Good | Unpolluted | Satisfactory | Class A |
| Q3 - Q4 | Moderate | Slightly Polluted | Unsatisfactory | Class B |
| Q3, Q2 - Q3 | Poor | Moderately Polluted | Unsatisfactory | Class C |
| Q2, Q1 - Q2, Q1 | Bad | Seriously Polluted | Unsatisfactory | Class D |

### 13.3.3 Surface Water WFD Status

The EPA river dataset is designed as a geometric river network for monitoring, management and reporting purposes. The EPA has split up rivers and streams into smaller sections to allow areas to be easily distinguished. These segments are assigned segment codes (estuaries and canals are not assigned segment codes). The EPA's segmented coding and naming system has been applied throughout this Chapter.

Water bodies within the study area, included in this assessment, are (see Figure 13.1 in Volume 3 of this EIAR):

- Liffey Estuary Upper;
- Liffey Estuary Lower;
- Royal Canal (Royal Canal Main Line (Liffey and Dublin Bay)) (hereafter referred to as the Royal Canal) (Artificial Water body AWB);
- Dodder_050; and
- Dublin Bay.

The WFD Status of the water bodies within the study area of the Proposed Scheme are detailed in Table 13.7.

**Table 13.7: WFD Surface Water Status**

| WFD Water body Name | WFD Sub-Catchment | Heavily Modified? | Type | Status (2016 to 2021) | Key Pressures: Elements Causing or with Potential to Cause Less Than Good Status | Risk Categorisation |
|---|---|---|---|---|---|---|
| Liffey Estuary Upper | N/A | No | Transitional | Good | Stormwater Overflows | At Risk |
| Liffey Estuary Lower | N/A | Yes | Transitional | Moderate | Urban wastewater<br>Stormwater Overflows | At Risk |
| Royal Canal Main Line (Liffey and Dublin Bay) | N/A | Yes - AWB | Canal | Good | No data available | Review |
| Dodder_050 | Dodder_SC_010 | No | River | Moderate | Anthropogenic<br>Urban runoff<br>Stormwater Overflows | At Risk |
| Dublin Bay | N/A | N/A | Coastal | Good | No data available | Not At Risk |

### 13.3.4 Field Survey

The results of the field survey in March 2022 are detailed in Table 13.8.

**Table 13.8: Survey Information for Sites along the Proposed Scheme**

| Survey Attribute | Survey Location R2 | Survey Location R3 | Survey Location R4 | Survey Location R5 | Survey Location R6 |
|---|---|---|---|---|---|
| Location | Boat club York Road | Dodder Bridge tie in | Scherzinger Bridge-George's Dock | Scherzinger Bridge – Royal Canal | Custom House Quay Board walk |
| Date | 02/03/2022 11:14 | 01/03/2022 17:02 | 01/03/2022 17:38 | 01/03/2022 17:32 | 01/03/2022 17:13 |
| Climate Observations | Raining | Clear skies | Clear skies | Clear skies | Clear skies |
| Waterbody Crossed | Yes | Yes | Yes | Yes | Yes |
| Construction Compound | No | No | No | No | No |
| Closest Waterbody | Liffey Estuary Lower | Liffey Estuary Lower | Liffey Estuary Lower | Liffey Estuary Lower | Royal Canal Mainline |
| Distance to Waterbody | Directly adjacent to waterbody | Directly adjacent to waterbody | Directly on top of the waterbody | Directly on top of the waterbody | Directly on top of the waterbody |
| River Flow | Fast | Low | Low | Moderate | Low |
| Water Quality | Very dilute due to high tide and fast flows caused by the wind | Poor water quality, strong odour, hydrocarbons may be present | Stagnant water under the bridge, looks to be of poor quality | Tidal waterbody, scum on the surface of the waterbody but no obvious signs of contamination | Scum and sheen identified on surface of waterbody |
| Run-off Pathway | Potential pathway from impermeable surface on road | Potential pathway from impermeable surface on path | Potential pathway over Scherzer bridge | Potential pathway from impermeable roads and path over bridge | Potential pathway over bridge |
| Run-off Risk | High | High | High | Medium | Medium |

| Survey Attribute | Survey Location R2 | Survey Location R3 | Survey Location R4 | Survey Location R5 | Survey Location R6 |
|---|---|---|---|---|---|
| Riverbed observations | River bed not visible at high tide | Sand, silt, and mud visible on the river bed | Bed not visible | Not visible | Mud and clay material present on river bed |
| Riverbank observations | Banks are concrete | Banks are concrete | Banks are concrete | Banks are concrete | Banks are concrete |
| Features | Flood defence built up, slip way built beside survey point | Weir present, bridge noted further downstream | Weir in place as well as bridge. One section is cut off and is dewatered | Concrete banks and bridge over river | Bridge and weir |
| Barriers | - | - | Bridge and cut off wall | - | - |
| Riparian Detail | Some vegetation growth present alongside of wall | None | None | None | Some vegetation growth on the river bed |
| Comments | Some potential for contaminated land impacts in the area of future development | Some debris noted, low tide at the time of survey. Main contamination issue would be in relation to sediment | - | - | Water looks of poor quality, bridge is narrow at this location, little contaminated land issues |

### 13.3.5 Designated Sites

The designated sites that are considered in Section 13.3.9 as part of the determination of sensitivity for each water body are located within the Liffey and Dublin Bay catchment. The sites described comprise Nutrient Sensitive Areas, Special Areas of Conservation (SAC), Special Protection Areas (SPA), proposed Natural Heritage Areas (pNHAs), Nutrient Sensitive Areas, salmonid rivers, shellfish areas and marine bathing waters.

A review of the Natura 2000 network was conducted to determine those European sites which are within the study area and / or hydrologically connected to the water bodies listed in Section 13.3.3. A full assessment of potential impacts designated European Sites, including hydrological links and water dependent species or habitats, is contained within Chapter 12 (Biodiversity) and Figure 12.2 in Volume 3 of this EIAR shows the hydrological connectivity to the Proposed Scheme. The following Natura 2000 sites were identified to be relevant to this assessment:

- South Dublin Bay and River Tolka Estuary SPA (site code 004024) ((approximately 1.5km from the closest point of the Proposed Scheme);
- North Bull Island SPA (site code: 004006) (approximately 3.5km from the closest point of the Proposed Scheme);
- Baldoyle Bay SPA (site code: 004016) (approximately 18km from the closest point of the Proposed Scheme);
- Baldoyle Bay SAC (site code:000199(approximately 16km from the closest point of the Proposed Scheme));
- Ireland's Eye SPA (site code: 004117) (approximately 16km from the closest point of the Proposed Scheme);
- Ireland's Eye SAC (site code: 002193) (approximately 16km from the closest point of the Proposed Scheme);
- Dalkey Islands SPA (site code: 004172) (approximately 12km from the closest point of the Proposed Scheme);
- North Dublin Bay SAC (site code: 000206); (approximately 1.5km from the closest point of the Proposed Scheme)

- South Dublin Bay SAC (site code: 000210) (approximately 6km from the closest point of the Proposed Scheme);
- Rockabill to Dalkey Island SAC (site code: 003000) (approximately 8km from the closest point of the Proposed Scheme);
- Howth Head Coast SPA (site code: 004113) (approximately 9km from the closest point of the Proposed Scheme); and
- Howth Head SAC (site code: 000202) (approximately 9km from the closest point of the Proposed Scheme).

In addition, the following Natural Heritage Areas proposed for designation under Irish national legislation (pNHA) located within the study area / hydrologically connected are:

- Royal Canal pNHA (site code: 002103);
- South Dublin Bay pNHA (site code: 000210);
- Dolphins, Dublin Docks pHNA (site code: 000201);
- North Dublin pHNA (site code: 000208);
- Howth Head pHNA (site code: 00202);
- Ireland's Eye pHNA (site code: 000203);
- Baldoyle Bay pHNA (site code: 000199); and
- Dalkey Coastal Zone and Killiney Hill pHNA (site code: 001206).

There is one Nutrient Sensitive Area in the area of assessment within the Liffey and Dublin Bay catchment. This is the Liffey Estuary Nutrient Sensitive Area as per the Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment (hereafter referred to as the UWWT Directive) (refer to Figure 13.2 in Volume 3 of this EIAR).

There is one designated shellfish area in Malahide. The shellfish area is compliant with the relevant standards and there are no water quality issues of concern (as per the Sea Fisheries Protection Authority (SFPA) and Marine Institute Monitoring Programme).

There are five designated marine bathing waters within 5km and potentially hydrologically connected to the Proposed Scheme. The EPA published its Bathing Water Quality- A Report for the Year 2020 in May 2020 (EPA 2020d) and the website beaches.ie keeps this information regularly updated. The beaches and the most up to date assessment (checked February 2022) of their quality is provided below:

- Dollymount Strand – Poor Quality (approximately 4km from the closest point of the Proposed Scheme);
- North Bull wall – Poor Quality (approximately 3.5km from the closest point of the Proposed Scheme);
- Half Moon Beach – Excellent quality (approximately 5.5km from the closest point of the Proposed Scheme);
- Shelley Banks – Excellent Quality (approximately 6.5km from the closest point of the Proposed Scheme);
- Sandymount Strand – Poor Quality (and was closed for the Summer 2021 bathing season) (approximately 8.5km from the closest point of the Proposed Scheme - hydrologically); and
- Merrion Strand – Sufficient Quality however a 'No swim' restriction is in place (365 days a year) (approximately 9km from the closest point of the Proposed Scheme).

No other designations, including salmonid rivers, were identified within the study area during the desk study.

### 13.3.6 Drinking Water Supply (Surface Water)

There are no Geological Survey Ireland (GSI) Public Supply Source Protection Areas or National Federation of Group Water Schemes (NFGWS) Source Protection Areas within the study area. None of the river segments within the study area is designated as a Drinking Water River.

### 13.3.7 Known Pressures

The EPA online interactive map and database for water (EPA 2021) was reviewed to identify the presence on water bodies and the presence of point source discharges from EPA licenced activities within the study area. Pressures common to all water bodies in the study area are discharges from urban waste-water systems (via storm water overflows (SWOs)) and urban surface runoff. Further details on these for each water body are provided in Section 13.3.9.

The following IE / IPC licensed sites were identified within the study area:

- IPC Licenced Facility Everlac Paints Limited, 8 Hanover Quay, Dublin 2, Reg No: P0468-01;
- IPC Licenced Facility Brooks Thomas Limited, Upper Mayor Street, Dublin 1, Reg No: P0345-01;
- IPC Licenced Facility Becbay Limited, South Bank Road, Dublin 4, Reg No: P0164-01;
- IEL Facility Synergen Power Limited, Dublin Bay Power Plant, Dublin 4, Reg No: P0486-02; and
- IEL Facility Van Leer Ireland Limited, Cranmer Lane, Dublin 4, Reg No: P0107-01.

### 13.3.8 Existing Drainage

A desk study of the existing road drainage system within the study area, using online mapping tools (Google Street View and OpenStreetMap) and historical sewer network information, was conducted to determine the existing road drainage and level of treatment and attenuation provided currently. Based on this assessment, the existing road and bridge network consists primarily of kerb and gully, with no treatment or attenuation within the network. No SuDS were identified within the study area.

The pressures identified for the water bodies in the study area include diffuse pollution and discharges from SWOs. These pressures result from failures in the drainage system, either as a result of insufficient capacity, poor maintenance or incorrectly connected wastewater from domestic or commercial properties. It is likely that some or all of these issues are present within the study area.

The existing drainage system drains to a combined sewer with Stormwater Overflows to Liffey Estuary Lower (see Table 13.9). The catchments are associated with section of the Proposed Scheme as follows:

- Section 1 – Talbot Memorial Bridge to Tom Clarke East Link Bridge; and
- Section 2 – Tom Clarke East Link Bridge to Sean Moore Road.

**Table 13.9 Existing Drainage**

| Existing Catchment Reference | Type of Network, Foul/Combined (CW), Surface Water (SW) | Proposed Scheme Section ID | Existing Outfalls |
|---|---|---|---|
| R_01 | SW | Section 1 | Liffey Estuary Lower |
| R_02 | SW | Section 1 | Liffey Estuary Lower |
| R_03 | SW | Section 1 | Liffey Estuary Lower |
| R_04 | SW | Section 1 | Liffey Estuary Lower |
| R_05 | SW | Section 1 | Liffey Estuary Lower |
| R_06 | CW | Section 1 | Combined Sewer |
| R_07 | SW | Section 1 | Liffey Estuary Lower |
| R_08 | CW | Section 1 | Combined Sewer |
| R_09 | SW | Section 1 (Dodder Public Transport Bridge) | Liffey Estuary Lower |
| R_10 | SW | Section 2 | Liffey Estuary Lower |
| R_11 | CW | Section 2 | Combined Sewer/Liffey Estuary Lower |

### 13.3.9 Surface Water Features

The five water bodies within the study area are discussed in this Section. All of these water bodies flow into the Liffey Estuary Lower and subsequently Dublin Bay (refer to Figure 13.1 in Volume 3 of this EIAR). The River Dodder is contained within the RBMP 2018 - 2021 'Priority Areas for Action' (DHPLG 2018). The desk study did not identify any surface water features within the study area which are not classified as WFD waterbodies. Hydromorphological characteristics were assessed during field surveys (refer to Section 13.3.4). The study area includes highly modified straight planform water bodies with walled or artificial riparian zones, although they are not designated as Highly Modifies Waterbodies (HMWB) under the WFD. A summary of the baseline condition of each of these WFD waterbodies is detailed below.

**Table 13.10: Distance of the water bodies within the study area to the Proposed Scheme and the individual sections of the Proposed Scheme**

| Waterbody | Nearest Proposed Scheme Section | Approx. Distance from Proposed Scheme (m) | Number of Crossings |
|---|---|---|---|
| Liffey Estuary Upper | Section 1 | 40 | 0 |
| Liffey Estuary Lower | Section 1 | 0 (adjacent) | 2 * |
| Royal Canal | Section 1 | 0 | 1 |
| Dodder_050 | Section 1; also close to Section 2 | 153 | 0 |
| Dublin Bay | Section 2 | 430 | 0 |

*This includes the Dodder Public Transport Bridge (DPTOB) which does not cross the River Dodder, but the Liffey Estuary Lower waterbody.

#### 13.3.9.1 Liffey Estuary Upper

Liffey Estuary Upper is a transitional water body and is within the Liffey Nutrient Sensitive Area. It is fed by the Camac_040, Liffey_190 and Poddle_010 and flows into Liffey Estuary Lower before reaching Dublin Bay. The waterbody covers an area of 0.2km$^2$ from the National War Memorial Garden to approximately 40m upstream of the Talbot Memorial Bridge, which marks the upstream limit of the Liffey Estuary Lower.

The Proposed Scheme does not cross the Liffey Estuary Upper as the Liffey Estuary Upper is situated upstream of the Proposed Scheme. The Liffey Estuary Upper is also not adjacent to the Proposed Scheme, meaning that no surface water outfalls from working areas of the Proposed Scheme drain into it. Normally an upstream water body is not included in an assessment as no impacts are likely; however, given the tidal nature of this water body and the Liffey Estuary Lower (i.e., movement of water in both directions) impacts are considered possible. For this reason, it is included in the assessment.

Liffey Estuary Upper has a Good WFD status, although it is characterised as being At Risk of not maintaining good ecological status by 2027. The main pressure on the water body arises from the discharge of SWOs from the combined sewer system which takes wastewater to Ringsend Wastewater Treatment Plant (WwTP). The key impacts are nutrient pollution and alterations to habitats due to morphological changes (EPA 2018a; EPA 2020a; EPA 2020b).

In terms of assigning sensitivity, as this water body is a Nutrient Sensitive Area and a WFD Protected area; it is assessed by the EPA as being of Good Ecological Status. It has an indirect hydrological connection to European designated sites; at its closest point, it is approximately 6km from North Dublin Bay SAC. It is therefore assigned Very High sensitivity.

#### 13.3.9.2 Liffey Estuary Lower

Liffey Estuary Lower is a transitional water body and is within the Liffey Nutrient Sensitive Area (refer to Figure 13.2 in Volume 3 of this EIAR). It is fed by the Dodder_050, Tolka Estuary and Liffey Estuary Upper and flows into Dublin Bay. The estuary covers an area of 4.80km$^2$ from Talbot Memorial Bridge to beyond the Poolbeg Lighthouse and North Bull Lighthouse where it drains into the Dublin Bay.

The Proposed Scheme will run parallel to Liffey Estuary Lower on both banks of the water body, crossing it twice at Samuel Beckett Bridge and at the DPTOB. Liffey Estuary Lower has a Good WFD status and is At Risk of not achieving the WFD objective of Good Status by 2027. The main risk is urban wastewater discharged from SWOs. The key impacts are considered to be nutrient pollution and alterations to habitats due to morphological changes (EPA 2018a; EPA 2020a; EPA 2020b).

In terms of assigning sensitivity, this water body is a Nutrient Sensitive area and a WFD protected area; it is assessed by the EPA to be of Moderate Ecological Status; it has a direct hydrological connection with South Dublin Bay and Tolka Estuary SPA and North Dublin Bay SAC. A less direct connection is also made with South Dublin SAC, however the 1.8km harbour wall prevents immediate mixing of the estuary and the bay South Dublin Bay SAC. At its closest point to the Proposed Scheme, this water body is approximately 1.9km from the South Dublin Bay and Tolka Estuary SPA and 4km from the North Dublin Bay SAC. This water is therefore assigned Very High sensitivity.

#### 13.3.9.3 Royal Canal

The Royal Canal is an artificial water body (AWB), primarily used for recreation and was constructed in the 18th century, shortly after the Grand Canal. The Royal Canal is 146km long and runs from the River Liffey in Dublin to Cloondara on the River Shannon, with an 8km branch line into the town of Longford. Along the length of the Royal Canal there are 46 sets of locks. The Proposed Scheme will cross over the entry channel of the Royal Canal where it meets the Liffey Estuary Lower at Spencer Dock. Waterways Ireland are responsible for the monitoring of this water body, which has good ecological potential WFD status, and is under review regarding whether it is At Risk of not maintaining this to 2027 and beyond.

In terms of assigning status, this water body is identified as a Potential National Heritage Area (pNHA) and is of Good Ecological Potential. It is therefore assigned High sensitivity.

#### 13.3.9.4 Grand Canal and Grand Canal Basin

The Grand Canal is an artificial water body (AWB), primarily used for recreation although originally designed for industrial purposes. Constructed in the 18th century, the Grand Canal traverses the country from Dublin to Shannon for approximately 131km. Waterways Ireland are responsible for the monitoring of this water body. The Grand Canal becomes the Grand Canal Basin north of Grand Canal Street Upper. The Proposed Scheme does not cross the Grand Canal (Basin) however it is in the Study Area, at approximately 130m south of the DPTOB at its closest point at the east end of Hanover Quay. However, it has been excluded from the assessment because it is upstream of the Proposed Scheme and is not tidal; water flows through the locks to Liffey Estuary Lower, it does not flow in the return direction.

#### 13.3.9.5 Dodder_050

The River Dodder has a total catchment area of 167.7km$^2$ and rises on the northern flanks of the Dublin Mountains, flowing north through the Upper and Lower Glenasmole reservoirs and onward through South Dublin, becoming tidal near Lansdowne Road before entering the River Liffey at Ringsend (EPA 2018a; EPA 2020b).

The EPA segment of the River Dodder within the study area is Dodder_050. It is 29.6km in length and includes the lower segment of the river from Templeogue to where it joins the Liffey Estuary Lower at Ringsend.

The Proposed Scheme does not cross the Dodder_050; its confluence with the Liffey Estuary Lower is approximately 150m upstream of the Proposed Scheme. Upstream from this point, the Dodder_050 is 170m from Section 2 of the Proposed Scheme at its closest point as the Proposed Scheme crosses Cambridge Road.

The Dodder_050, at its closest point to the Proposed Scheme, is upstream of the Proposed Scheme and as such would not normally be included within the assessment However, given the scale of the proposed works for the DPTOB, the tidal movement of the Liffey Estuary Lower, and the fact that the River Dodder is itself tidal up to Ballsbridge, there is a possibility of impacts. The water body has therefore included within the assessment.

It has Moderate status and is At Risk of not achieving Good Status by 2027 (EPA 2020b). A range of significant pressures have been identified, such as, anthropogenic pressures, diffuse urban sources of pollution and SWOs (EPA 2018a; EPA 2018b).

The most recent Biological Q Value assessment of the River Dodder was in 2019. Five stations were monitored along the length of the watercourse, Q3 to Q4 was the lowest assigned Q Value, details of which are provided below (EPA 2020c):

> *'Satisfactory ecological conditions continue in the upper reaches [Station 0010 and 0100] with the diversity of pollution sensitive macroinvertebrates indicating a return to high ecological conditions upstream of the Reservoir [Station 0010]. A welcome improvement to good ecological conditions was noted at Old Bawn [Station 0300] in August 2019, after a decline in 2016. Station 0620 (Springfield Ave) also improved slightly to Moderate conditions, while the lowest station at Beaver Row [Station 0900] remained Moderate'.*

In terms of assigning sensitivity, the River Dodder has Moderate Ecological Status; it has a direct ecological connection to the Liffey Estuary Lower which is a Nutrient Protected Area; it has an indirect hydrological connection to South Dublin Bay and Tolka Estuary SPA (2.9km) and North Dublin Bay SAC (5km). It is not a designated Salmonid River, however there is an important trout fishery and salmon in the lower sections of the River Dodder with ongoing work to remove weirs opening up more of the river for passage (EPA 2018a) (IFI Consultation Response January 2021). It is therefore assigned a High sensitivity.

#### 13.3.9.6 Dublin Bay

Dublin Bay is a United Nations Educational, Scientific and Cultural Organization (UNESCO) Biosphere Reserve which protects the areas in Dublin Bay of high ecological value and also the surrounding areas which support the associated protected species and habitats (see Figure 13.1 in Volume 3 of the EIAR). The Biosphere covers most of Dublin Bay (300km$^2$) and aims to ensure the protection of its water quality and biodiversity (Dublin Bay Biosphere 2020). There are a number of European designated habitats within Dublin Bay including North Dublin Bay SAC, South Dublin Bay SAC and the South Dublin Bay and Tolka Estuary SPA. Bathing Waters within Dublin Bay comprise of Merrion Strand, Sandymount Strand, Dollymount Strand and Seapoint (EPA 2018a).

The coastal water body has Good Status and is Not At Risk of not meeting the WFD objectives by 2027 (EPA 2020b). However, it does receive nutrient input from Ringsend WwTP via discharges from it to the Liffey Estuary Lower.

In terms of assigning sensitivity, its international and national designations make it Extremely High sensitivity.

#### 13.3.9.7 Summary of Baseline Receptor Sensitivity

Table 13.11 presents a summary of the waterbodies and their sensitivity.

**Table 13.11: Baseline Receptor Sensitivity**

| Water body Section ID | Attributes | Indicator / Feature | Sensitivity |
|---|---|---|---|
| Liffey Estuary Upper | Transitional water body | Designated Nutrient Sensitive Area<br>Indirect hydrological connection with South Dublin Bay and River Tolka Estuary SPA (4.2km) and North Dublin Bay SAC (6km)<br>Good WFD Status | Very High |
| Liffey Estuary Lower | Transitional water body | Designated Nutrient Sensitive Area<br>Direct hydrological connection with North Dublin Bay SAC (4.2km d/s of works) and South Dublin Bay and River Tolka Estuary SPA (1.9km d/s of works)<br>Moderate WFD Status | Very High |
| Royal Canal Main Line (Liffey and Dublin Bay) | AWB | Good ecological potential<br>Direct hydrological connection to Liffey Valley Lower (Nutrient Sensitive Area)<br>pNHA | High |

| Water body Section ID | Attributes | Indicator / Feature | Sensitivity |
|---|---|---|---|
| Dodder_050 | River | Direct hydrological connection with Designated Nutrient Sensitive Area (Liffey Estuary Lower)<br>Moderate WFD Status | High |
| Dublin Bay | Coastal water body | Designated North Dublin Bay SAC | Extremely High |

### 13.3.10 Flood Risk

Flood Risk is not considered as part of the impact assessment in this Chapter; a separate Site Specific FRA has been completed for the Proposed Scheme. However, given the connectivity between this assessment and the FRA, a summary of the baseline flood risk and the assessment of future risk from the FRA is provided here for ease of reference.

The FRA has been prepared for the Proposed Scheme in accordance with the Department of the Environmental, Heritage and Local Government (DEHLG) and the Office of Public Works (OPW) Planning System and Flood Risk Management Guidelines for Planning Authorities (hereafter referred to as the FRM Guidelines) (DEHLG and OPW 2009). A copy of the FRA Report is included in Appendix A13.2 in Volume 4 of this EIAR.

The FRM Guidelines define three Flood Zones, namely:

- Flood Zone A – where the probability of flooding from rivers and the sea is highest (greater than 1% Annual Exceedance Probability (AEP) or 1 in 100 year for river flooding or 0.5% AEP or 1 in 200 for coastal flooding);
- Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 0.1% AEP or 1 in 1,000 year and 1% AEP or 1 in 100 year for river flooding and between 0.1% AEP or 1 in 1,000 year and 0.5% AEP or 1 in 200 year for coastal flooding); and
- Flood Zone C – where the probability of flooding from rivers and the sea is low (less than 0.1% AEP or 1 in 1,000 for both river and coastal flooding).

Flood Zone C covers all areas which are not in Flood Zone A and Zone B.

Potential sources of flooding have been identified and are described in detail in the FRA. Below is a summary of the key findings.

#### 13.3.10.1 Coastal Flood Risk

CFRAM and ICPSS maps indicate that the Proposed Scheme is at risk from coastal flooding. Sections of the route have been identified to be within Flood Zone A as per the Guidelines.

#### 13.3.10.2 Surface Water Flood Risk

Surface water flooding occurs when the local drainage system cannot convey stormwater flows from extreme rainfall events. The rainwater does not drain away through the normal drainage pathways or infiltrate into the ground but instead ponds on or flows over the ground instead. Surface water flooding is unpredictable as it depends on a number of factors including ground levels, rainfall, and the local drainage network.

#### 13.3.10.3 Groundwater Flood Risk

Groundwater flooding is a result of upwelling in occurrences where the water table or confined aquifers rises above the ground surface. This tends to occur after long periods of sustained rainfall and/or very high tides. High volumes of rainfall and subsequent infiltration to ground will result in a raising of the water table. Groundwater flooding tends to occur in low-lying areas, where with additional groundwater flowing towards these areas, the water table can rise to the surface causing groundwater flooding. No previous reports or geological indicators were found for groundwater flooding within the vicinity of the proposed scheme. Therefore, the risk of groundwater flooding is considered low, and no further assessment is required.

#### 13.3.10.4 Pluvial Flood Risk

Pluvial flooding results from heavy rainfall that exceeds ground infiltration capacity or more commonly in Ireland where the ground is already saturated from previous rainfall events. This causes ponding and flooding at localized depressions. Pluvial flooding is commonly a result of changes to the natural flow regime such as the implementation of hard surfacing. CFRAM maps indicates that some areas of the site are at risk of pluvial flooding.

#### 13.3.10.5 Fluvial Flood Risk

CFRAM and ICPSS maps indicate that the Proposed Scheme is at risk from coastal flooding. Sections of the route have been identified to be within Flood Zone A as per the Guidelines.

## 13.4 Potential Impacts

This section presents potential impacts that may occur due to the Proposed Scheme, taking into account the proposed drainage design as set out in Section 13.4.1, but in the absence of any further mitigation. This informs the need for mitigation or monitoring to be proposed (refer to Section 13.5). Predicted 'residual' impacts taking into account any proposed mitigation is then presented in Section 13.6.

### 13.4.1 Characteristics of the Proposed Scheme

Full details of the Proposed Scheme are provided in Chapter 4 (Proposed Scheme Description) but elements of relevance to the surface water impact assessment are provided below.

#### 13.4.1.1 Impermeable Areas and Drainage Design

The drainage design is based on a number of general principles, which are set out in the document 'BusConnects Core Bus Corridor Drainage Design Basis' (NTA 2020). This includes principles relating to SuDS: a SuDS drainage design has been developed as a first preference and in accordance with the SuDS hierarchy as described in the CIRIA SUDS manual (CIRIA 2015). The CIRIA SuDS Manual recommends that when considering SuDS solutions, the preferred approach is a hierarchy whereby runoff using source control solutions (e.g., pervious surfacing) are considered first; where source control is not possible or cannot fully address an increase in runoff from a development, residual flows are then managed using site controls (e.g., bioretention / infiltration basins). If this is not practical or residual flows remain above existing runoff rates, regional controls (e.g., attenuation ponds or tanks) are used. SuDS provide the dual benefits of controlling flows and treating water quality. In areas where the catchment is proposed to remain unchanged as no additional impermeable areas are proposed, the design consists of relocating existing gullies (where possible) to new locations.

The drainage design principles have informed the drainage design (see Chapter 4 (Proposed Scheme Description) and Appendix A4.1 (Preliminary Design Guidance Booklet for BusConnects Core Bus Corridors) in Volume 4 of this EIAR)) which will ensure no net increase in the surface water flow discharged to any receptors.

The proposed drainage design includes the relocation and addition of drainage gullies. Attenuation will be in the form of filter drains and oversized pipes. These SuDS measures allow a level of treatment and / or attenuation to be provided before discharge to the network, reducing the impact on water quality as well as preventing an increase in runoff rates.

The following SuDS types are proposed for the Proposed Scheme:

- Oversized pipe; and
- Infiltration trench.

The details of drainage measures proposed for each catchment and subsequently each water body are provided in Table 13.12 and Table 13.13. No new outfalls are proposed.

**Table 13.12: Proposed SUDS and Impermeable Area**

| Existing Catchment Reference | Water body | Approx. Impermeable Surface Area m² | | | SUDS Measures Proposed |
|---|---|---|---|---|---|
| | | Existing | Additional Impermeable | Percentage Change % | |
| R_01 | Liffey Estuary Lower | 4254 | 0 | 0 | None |
| R_02 | Liffey Estuary Lower | 7134 | 0 | 0 | None |
| R_03 | Liffey Estuary Lower | 20462 | 0 | 0 | None |
| R_04 | Liffey Estuary Lower | 9457 | 0 | 0 | None |
| R_05 | Liffey Estuary Lower | 4636 | 0 | 0 | None |
| R_06 | Combined sewer to Ringsend WwTP | 9201 | 0 | 0 | None |
| R_07 | Liffey Estuary Lower | 3856 | 0 | 0 | None |
| R_08 | Combined Sewer to Ringsend WwTP | 10469 | 0 | 0 | None |
| R_09 | Liffey Estuary Lower | 14,400 | 6,050 | 42 | Inflow from proposed Dodder bridge. OSP |
| R_10 | Liffey Estuary Lower | 19,256 | 1,901 | 9.9 | Infiltration trench |
| R_11 | Combined sewer to Ringsend WwTP | 8,824 | 1,086 | 12.3 | Infiltration trench |

**Table 13.13 Summary of Increased Impermeable areas per water body**

| Water body | Approx. Impermeable Surface Area m² | | |
|---|---|---|---|
| | Existing | Additional Impermeable | Percentage Change % |
| Liffey Estuary Lower | 83,455 | 7,952 | 89.5 |
| Ringsend WwTP | 928,494 | 61,086 | 4.383.8 |

### 13.4.1.2 Key Infrastructure Proposed

Key infrastructure elements for the Proposed Scheme are described in detail within Chapter 4 (Proposed Scheme Description) of this EIAR. Chapter 5 (Construction) describes the Construction Phase for the works related to these key infrastructure elements.

There are a number of locations along the route of the Proposed Scheme where new infrastructure is proposed and is of relevance to this assessment:

- Deconstruction, relocation, and reassembly of the existing Scherzer Bridges (and construction of replacement carriageway bridges (and associated works));
- Construction of new pedestrian boardwalks along Custom House Quay and North Wall Quay;
- Construction of the DPTOB and associated works; and
- Construction of low-level retaining wall adjacent to Samuel Beckett Bridge.

### 13.4.2 'Do Nothing' Scenario

In the Do Nothing Scenario the Proposed Scheme would not be implemented and there would be no changes to existing highway infrastructure, so infrastructure provision for buses, pedestrians and cyclists would remain the same.

The Baseline (see Section 13.3) includes a description of the current status of the environment in and around the area in which the Proposed Scheme will be located and identifies the existing pressures on the water bodies within the study area; these are identified and categorised under the RBMP 2018-2021 process under baseline conditions (i.e., what is there at present) and reported by the EPA. The RBMP categorises significant pressures impacting waterbodies in Ireland into 14 categories, and identifies measures and actions aimed at addressing each pressure. This supports the analysis of future trends expected in the water environment in order to determine the 'evolution of the baseline without the development'. Future trends will be more noticeable, predictable, and measurable in the short to medium-term in relation to water quality, whereas hydrological and hydromorphological changes are subject to more long-term trends.

Future trends are determined based on the significant pressures identified under the RBMP, and the measures and actions in relation to policy and monitoring identified for the water bodies to meet the requirements of the WFD Directive and any information available detailing progress on those measures or actions.

The most significant pressures to water bodies within the study area are diffuse urban runoff and urban wastewater from agglomeration and CSOs. RBMP 2018-2021 includes a measure for further investigation under the Local Authority Water Programme (LAWPRO) to determine the nature and extent of the impacts. The Draft RBMP proposes six separate measures to address Urban Runoff pressures, including the development of strategies and guidance for nature-based solutions, including SuDS and the preparation of integrated urban drainage management plans.

Urban runoff which relates to a mixture of misconnections, leakage from sewers, and runoff from paved and unpaved areas, has been identified as a significant pressure to the Dodder_050. During investigations, mean annual concentrations of phosphate and ammonia were found to have exceeded their respective EQS values in 2011, 2012 and 2015. During invertebrate sampling, moderate siltation was observed. Further investigation is required to determine the nature and extent of the impacts.

Urban waste-water pressures from WwTPs and agglomeration networks have been identified as pressures to Dodder_050, Liffey Estuary Lower and Liffey Estuary Upper. These involve both urban wastewater discharges from SWOs and discharges from WwTPs.

The Draft RBMP includes an action for Irish Water to continue investment in wastewater infrastructure with Irish Water investing in 83 wastewater treatment plants and 10 collection networks at an estimated cost of €1.022bn, over the period 2020-2024. In addition. As part of Ireland's National Recovery and Resilience Plan (2021), Irish Water will be delivering its enhanced Ambition Programme, which aims to deliver 10 priority wastewater treatment plant projects whose discharges have been identified as being significant pressures on receiving water bodies.

With these investigations, programmes and actions in place to locate and improve deficient infrastructure, it is anticipated that pressures from urban wastewater and urban runoff will be reduced over the coming years. Therefore, in the absence of the Proposed Scheme the surface water environment in the area should improve particularly in relation to water quality.

### 13.4.3 Do Minimum

The potential for changes in traffic loading on side roads, as set out in Section 13.2.4.5 of this chapter, means that the assessment of potential operational impacts from the Proposed Scheme is required to consider an additional future baseline scenario, as well as Do Nothing; Do Minimum, in line with the assessment of impacts on traffic as set out in Chapter 6 (Traffic and Transport).

The 'Do Minimum' scenario (Opening Year 2028, Design Year 2043) represents the likely traffic and transport conditions of the direct and indirect study areas including for any transportation schemes which have taken place,

been approved or are planned for implementation, without the Proposed Scheme in place. This scenario forms the reference case by which to compare the Proposed Scheme ('Do Something') for the quantitative assessments. Further detail on the Proposed Scheme and demand assumptions within this scenario is included in Chapter 6 (Traffic & Transport).

The outputs of the transport modelling for these future scenarios are used in the operational impact assessment in Section 13.5.3 of this chapter. In terms of the potential future baseline of the surface water environment under these two scenarios, there is a great deal of uncertainty, however it is reasonable to assume that the measures set out in the current and draft RBMPs (once agreed) will be implemented and improvements to water bodies in terms of their biological, water quality and hydromorphology will continue to enable as many water bodies as possible to achieve 'Good' status by 2027.

## 13.4.4 Construction Phase

### 13.4.4.1 Introduction

Chapter 5 (Construction) outlines the principal Construction Phase activities required to complete the Proposed Scheme and includes details of activities such as new or improved bridges, road widening and narrowing, new and / or improved footpaths, cycle tracks, pavement repairs, road resurfacing, junction upgrades, new or improved lighting, bus stops, retaining walls and any other upgrade works.

In addition to a detailed description of the works involved, Chapter 5 (Construction) also details the location of Construction Compounds, the location and duration of any necessary traffic diversions, hours of working, and numbers of personnel involved.

The duration of the Construction Phase for the Proposed Scheme is specified in Chapter 5 (Construction). Four Construction Compounds will be required to construct the Proposed Scheme:

- Construction Compound R1 at George's Dock Scherzer Bridges;
- Construction Compound R2 at Royal Canal Scherzer Bridges;
- Construction Compound R3A/R3B at Sir John Rogerson's Quay; and
- Construction Compound R4 at York Road.

These Construction Compounds will be in place for the full duration of the extent of the works they support and will be removed following completion of such works.

The assessment considers the potential impacts of the Proposed Scheme construction activities prior to mitigation or control measures being implemented.

### 13.4.4.2 Potential Construction Phase Impacts

There are a number of potential impacts which, in the absence of mitigation, could occur during the construction of the Proposed Scheme in relation to hydrology, water quality and hydromorphology. The potential for any of these types of impacts are considered for different construction activities for each water body within the study area. These include but are not limited to the following:

13.4.4.2.1 Hydrology

- Change in the natural hydrological regime due to an increase in discharge because of dewatering activities (if required) during construction. This may alter the groundwater regime and affect the baseflow to a surface water receptor;
- Disruption to local drainage systems due to diversions required to accommodate the construction works;
- Modifications to the hydraulic characteristics of water features through modifications to the channel dimensions during construction of outfalls and culverts, where required; and
- Temporary increase in hard standing areas and / or soil compaction during construction works which could result in temporary increased runoff rates to water bodies.

13.4.4.2.2 Water Quality

- Silty water runoff containing high loads of suspended solids from construction activities. This includes the stripping of topsoil / road surface during site preparation; the construction of widened roads; the dewatering of excavations and the storage of excavated material;
- Contamination of waterbodies with anthropogenic substances such oil, chemicals, or concrete washings. This could occur because of a spillage or leakage of oils and fuels stored on site or direct from construction machinery; and the storage of materials or waste in close proximity to waterbodies or drains connected to the waterbodies;
- Re-exposure of historically settled contaminants within or near to waterbodies because of working within or in near to the water body.

13.4.4.2.3 Hydromorphology

- Increased sediment loading as a result of silty water runoff or dewatering activities, introducing a sediment plume, potentially leading to the smothering of bed substrate and changes to existing morphological features;
- In-stream working which can lead to localised changes in the flow and sediment processes within the channel; and
- Modifications to the morphological characteristics of the water body such as alterations to banks for construction of over bridges or other works.

### 13.4.4.3 Assessment of Predicted Impacts on Receptors

Detailed assessment of the potential impacts on receptors is provided here and a summary table for all receptors provided in Table 13.14.

13.4.4.3.1 Liffey Estuary Upper

The proposed works along the north quays are wholly within the Liffey Estuary Lower catchment. However, the Liffey Estuary Upper begins immediately upstream of the westernmost extent of works (i.e., Talbot Memorial Bridge) and, as the estuary is tidal, there is the potential for water quality impacts on the Liffey Estuary Lower to be passed upstream on a flood tide and potentially impact the Liffey Estuary Upper. Proposed works along the north quays include in-channel working to provide for the construction of the proposed pedestrian boardwalks at Custom House Quay and at the junction of Excise Walk and North Wall Quay, as well as the intrusive works near to the water body at the George's Dock and Royal Canal Scherzer Bridges. The magnitude of impact would be lower than that for the Liffey Estuary Lower, due to dilution effects of the incoming tide and the altered water chemistry, including sedimentation that this would also bring. As a result, it is predicted that impacts would be short-term, adverse, of negligible magnitude. Therefore, the impacts will be of Imperceptible significance.

The proposed works to the south quays also have the potential to impact the Liffey Estuary Upper in a similar way. The proposed works on the south side of the Liffey estuary Lower are, for the most part, not intrusive, consisting largely of junction realignments and reconfiguration of existing roads and cycleways. Impacts associated with these activities would result in adverse short-term impacts of negligible magnitude. Therefore, the impacts will be of Imperceptible significance.

The construction of the DPTOB (further details are outlined in Section 13.4.4.3.2) also has the potential to result in impacts on this water body. The proposed works are 1.5km downstream of the Liffey Estuary Upper's most downstream extents, however there is potential for significant sediment releases to be carried upstream on an incoming tide. The potential impact is reduced by the characteristics of the incoming tide which would be higher in sediment in drier weather, and the distance, which would allow for some settlement. In wet weather the water body itself would be high in sediment loads. As a result, potential impacts will be short-term, adverse and of small magnitude, resulting in a significance impact of Moderate to Significant.

13.4.4.3.2 Liffey Estuary Lower

13.4.4.3.2.1 Junction and Carriageway Upgrades

The carriageway and bridge upgrades, and associated works from Talbot Memorial Bridge to Tom Clarke East Link Bridge along the north quays (not including structures) have the potential to result in short term, adverse impacts of negligible magnitude. Therefore, the impacts will be of Imperceptible significance.

The junction upgrades and associated works at Talbot Memorial Bridge to Tom Clarke East Link Bridge along the south quays involve reconstruction of the carriageway, adjustments to paving and footpaths, and lighting and services adjustments. The magnitude of the impact is anticipated to be negligible, adverse short-term, Therefore, the impacts will be of Imperceptible significance.

Road widening and associated works including crossing upgrades and cycleway from Tom Clarke East Link Bridge to Sean Moore Road are not considered to be intrusive. However, due to the proximity of the works to the water body there is potential, for increased sediment in runoff impacting water quality. However, given the size of the Liffey Estuary here and the nature of these works, potential impacts will be short-term, adverse and of negligible magnitude, resulting in an impact of Imperceptible significance.

13.4.4.3.2.2 Boardwalk at Custom House Quay

For the pedestrian boardwalk at Custom House Quay, it will be primarily supported through being attached to the former Dublin City Council's (DCC) Dublin Docklands offices (proposed to be redeveloped); it will also include a freestanding structure which will be supported by three hollow steel piles. Potential impacts could occur during:

- Preparatory works to the quay walls; and
- Installation of the three piles.

Again, these works are not on a large scale and the connection to the former DCC Dublin Docklands offices is likely to result in short term, adverse impacts of negligible magnitude, given the scale of dilution in the water body, resulting in impacts of Imperceptible significance. The piling has greater potential for impacts as it can lead to the remobilisation of sediment from the bed of the estuary, which may also contain contaminants from historical industrial discharges in addition to hydrocarbons from runoff of local roads. The dilution effect of the water body will again be a factor for these relatively minor intrusive works. Potential impacts will be short term, adverse impacts and of small magnitude, resulting in an impact significance of Moderate to Significant.

13.4.4.3.2.3 Boardwalk at Excise Quay

For the pedestrian boardwalk at the junction of Excise Quay and North Wall Quay, it is proposed that it would be secured to the quay wall using stainless steel anchors. Potential impacts could arise during the following activities:

- Preparatory works to the quay walls;
- Coring of quay walls to facilitate ground anchors;
- Installation of grout from land side;
- Installation of fixings for steel elements into the quay walls; and
- Installation of substructure for the landslide support.

Works for this structure, whilst on the edge of the water body, are not large in scale, although there is potential for grout and silt / dust from the quay wall to enter the water body. Given the scale of dilution of the water body compared to this activity, it is likely potential impacts will be short term, adverse and of negligible magnitude, resulting in an impact of Imperceptible significance.

13.4.4.3.2.4 Scherzer Bridges at George's Dock and the Royal Canal

The Scherzer Bridges will be deconstructed, restored, and reassembled in different locations to their existing positions as outlined in Chapter 4 (Proposed Scheme Description). Potential impacts could occur during the following activities:

- Pouring of concrete associated with the new replacement carriageway bridge; and
- Piling behind the canal walls.

The piling behind the canal walls will not impact upon the Liffey Estuary Lower (potential impacts on the Royal Canal are discussed in Section 13.4.4.3.3). The pouring of concrete could impact the water body if there is any concrete washout over land. Potential impacts will be short-term, adverse and of negligible magnitude, resulting in an impact of Imperceptible significance.

Construction Compounds R1 at George's Dock Scherzer Bridges and R2 at Royal Canal Scherzer Bridges have the potential to impact upon the Liffey Estuary Lower in the event of a spill of hydrocarbons or other noxious materials. They are both near the water body; albeit R2 is closer to the Royal Canal (See Section 13.4.4.3.3). There are existing manmade barriers at each of the proposed sites which would limit the overland flow of any spillages to the water body; in addition, surface water sewers in both locations drain to a combined sewer system thereby removing a hydrological pathway to the water body via that route. As a result, and via overland flows only, a spillage at one or both of the Construction Compounds will result in a short term, adverse impact of small magnitude, resulting in impacts of Moderate to Significant significance.

13.4.4.3.2.5 Dodder Public Transport Opening Bridge (DPTOB)

Major works are proposed to construct a new bridge between Sir John Rogerson's Quay and Thorncastle Street / York Road. It will be a bascule bridge structure with a lifting section to enable vessel navigation to and from the Dodder_050 and Grand Canal Dock. The bridge structure will cross the Liffey Estuary Lower approximately 150m downstream of its confluence with the Dodder_050 and Grand Canal Dock. There will be a large bascule pier (as well as a smaller support pier) within the channel of this part of the estuary. The bed of the estuary will be excavated in this location to facilitate the installation. Material excavated for foundations and through piling for the bridge piers and abutments will be disposed of in accordance with the requirements set out in Chapter 18 (Waste & Resources)). As a result, it is not anticipated that there would be significant impacts associated with this activity.

On the eastern bank of the River Dodder channel at the Liffey Estuary Lower, at the St. Patrick's Rowing Club (SPRC), land reclamation on a shallow mud flat area is proposed to accommodate the eastern approach road and cycle paths, as well as the relocated SPRC building and facilities. The proposed reclamation boundary is aligned with Sir John Rogerson's Quay, upstream, and with the southern abutment of the Tom Clarke East Link Bridge, downstream.

The bridge piers and abutment construction will be within cofferdams; piles will be driven into the bed of the Liffey Estuary Lower to provide a central support for the piers; after which concrete will be poured. The reclaimed land will be constructed using sheet-piling and the building of a platform structure. No subsoil or similar material will be used as infill for the construction.

Potential impacts from these activities include:

- Increased sediment loading in estuary water from silty water runoff (as soil is stripped to the east) and as the cofferdams and area behind the sheet piling are dewatered (as the water levels reach their lowest point);
- The remobilisation of historically contaminated sediment from the estuary bed – soil samples collected from the bed of the estuary in this location; only one sample was identified as hazardous at Sir John Rogerson's Quay, it had elevated arsenic and hydrocarbons. Although leachability assessments indicated that the arsenic is not mobile;
- Hydrocarbon contamination from machinery working within the cofferdam and on barges; and
- Concrete contamination of the water body.

Potential impacts will be short-term, adverse and of a moderate magnitude, resulting in a Very Significant impact.

A computational model was undertaken to assess the hydrodynamics of the Dodder_050 and Liffey Estuary Lower and to assess the effects of the proposed bridge on the circulation patterns of the estuary (See Appendix A13.3 (Hydrodynamic Modelling of the Dodder Estuary)). The hydrodynamic model was run to simulate the effect of the proposed construction works. The construction scenario simulated cofferdams in place around all the bridge piles

and also the fender piles in place. This scenario significantly contracts flow through the bridge resulting in significantly increased velocity and shear stress over the existing scenario and thus giving locally. This would result in a short term, adverse impact of small magnitude resulting in impacts of Significant to Moderate significance.

The main Construction Compound (R4) for the DPTOB is proposed to be on the eastern side in the vicinity of York Road / Thorncastle Street (and on the proposed area of reclaimed land as construction progresses), while a secondary Construction Compound (R3A/R3B) is located on the western side along Sir John Rogerson's Quay. This location is near to the water body and there is therefore potential for contamination because of silty water runoff as soil is stripped and contamination as a result of accidental spillages. Given the proximity to the water body, and that the surface water system in this area outfalls to the Liffey Estuary Lower, there are potential pathways to it via overland, ground, or surface water sewer routes. The worst case would be via surface water sewers which would have a more direct hydrological connection to the water body, and it would be more difficult to contain. The potential impact in this location of an accidental spillage of hydrocarbons will be short to medium term (depending on the size of the spill), adverse and of moderate to large magnitude, resulting in an impact of Profound significance.

#### 13.4.4.3.3 Royal Canal Main Line (Liffey and Dublin Bay)

There is a potential to impact the Royal Canal as a result of the proposed improvement works along the north quays in its vicinity, particularly in respect to the refurbishment of the Scherzer Bridges and construction of replacement carriageway bridges. There is no surface water connection to the canal from roads in the area, however there is some potential for increased sediment and concrete in runoff overland because of the proposed works to the Scherzer Bridges. Potential impacts will be short term, adverse and of small magnitude, resulting in an impact of Slight to Moderate significance.

Construction Compound R2 has the potential to impact upon this water body; it is within 10m at its closest point. There is, however, a barrier to overland flows in the form of the mechanisms which operate the sea lock in this location which will limit the likelihood of any spillages reaching the water body. There are no surface water drains in this area. A spillage will result in a short term, adverse impact of small magnitude, resulting in impacts of Significant to Moderate significance

There is no potential for indirect impacts on Royal Canal as a result of impacts to Liffey Estuary Lower. The canal locks prevent water from the estuary flowing into the canal.

#### 13.4.4.3.4 Dodder_050

The construction of the DPTOB has potential to directly impact the Dodder_050. The bridge is proposed directly over Liffey Estuary Lower, approximately 150m downstream of the confluence of the Dodder_050 and the Liffey Estuary Lower. The Dodder_050 is tidal at this point, up to Ballsbridge and, as a result, there is the potential for the proposed bridge works to impact upon water quality and potentially conveyance on an incoming tide. The potential impacts on the Dodder_050 are similar to those on Liffey Estuary Lower (see Section 13.4.4.3.2.5) (excluding the scouring associated with the coffer dams and sheet-piling), however there would be some dilution, and dispersal of most contaminants as well as settling of suspended solids over 150m; in addition there would already be an increased sediment load in the water body during an incoming tide. As a result, potential impacts will be short term, adverse and of small magnitude, resulting in an impact of Slight to Moderate significance.

Required works for the Proposed Scheme between Tom Clarke East Link Bridge and Sean Moore Road are not considered to be intrusive. In addition, the works are approximately 350m from the Dodder_050, therefore there is minimal potential for increased water levels and river flow in the area in the absence of mitigation. Potential impact will be short term, adverse and of negligible magnitude, resulting in an impact of Imperceptible significance.

#### 13.4.4.3.5 Dublin Bay

There are no direct impacts anticipated on Dublin Bay as there is no direct hydrological connectivity from the Proposed Scheme to Dublin Bay. There is potential for indirect impacts on it from the Liffey Estuary Lower, however. Having said this, due to the distance from the proposed works (approximately 4km) and the subsequent

dilution of any water quality impacts, the potential impact on Dublin Bay will be short term, adverse and of negligible magnitude resulting in an impact of Imperceptible significance.

13.4.4.3.6 Summary of Potential Construction Phase Impacts

**Table 13.14: Summary of Potential Construction Phase Impacts on waterbodies within the Study Area**

| Water body Name | Project Activity | Predicted Impacts | | | |
|---|---|---|---|---|---|
| | | Description of Impacts | Sensitivity of Receptor | Magnitude of Impacts | Significance of Effects |
| Liffey Estuary Upper | Carriageway works and bridge upgrades– North and South Quays | • Increased surface water runoff<br>• Increased sediment in runoff<br>• Anthrophonic sources (fuel etc) | Very High | Negligible | Imperceptible<br>Short-term<br>Adverse |
| | Custom House Boardwalk | • Increased sediment in runoff<br>• Anthrophonic sources (fuel etc) | Very High | Negligible | Imperceptible<br>Short-term<br>Adverse |
| | Excise Walk Boardwalk | • Increased sediment in runoff<br>• Anthrophonic sources (fuel etc) | Very High | Negligible | Imperceptible<br>Short-term<br>Adverse |
| | Scherzer Bridges | • Increased sediment in runoff<br>• Concrete washings<br>• Anthrophonic sources (fuel etc) | Very High | Negligible | Imperceptible<br>Short-term<br>Adverse |
| | DPTOB | • Increased sediment load<br>• Concrete washings.<br>• Anthrophonic sources (fuel etc) | Very High | Small | Moderate to Significant<br>Short term<br>Adverse |
| Liffey Estuary Lower | Junction, carriageway and bridge upgrades | • Increased surface water runoff;<br>• Increased sediment in runoff;<br>• Anthrophonic sources (fuel etc) | Very High | Negligible | Imperceptible<br>Short-term<br>Adverse |
| | Custom House Quay Boardwalk | • Increased sediment load;<br>• Remobilisation of contaminants;<br>• Concrete washings;<br>• Anthrophonic sources (fuel etc) | Very High | Small | Moderate to Significant<br>Short term<br>Adverse |
| | Excise Walk Boardwalk | • Concrete washings;<br>• Anthrophonic sources (fuel etc) | Very High | Negligible | Imperceptible<br>Short-term<br>Adverse |

| Water body Name | Project Activity | Predicted Impacts | | | |
|---|---|---|---|---|---|
| | | Description of Impacts | Sensitivity of Receptor | Magnitude of Impacts | Significance of Effects |
| | Scherzer Bridges at George's Dock and the Royal Canal | • Increased sediment in runoff;<br>• Anthrophonic sources (fuel etc) | Very High | Negligible | Imperceptible<br>Short-term<br>Adverse |
| | DPTOB | • Increased sediment load;<br>• Remobilisation of contaminants;<br>• Concrete washings;<br>• Anthrophonic sources (fuel etc);<br>• Scouring | Very High | Medium | Very Significant<br>Short-term<br>Adverse |
| | Construction Compounds (R3 and R4) | • Increased sediment in runoff;<br>• Anthrophonic sources (fuel etc) | Very High | Medium to Large | Profound<br>Short to medium term<br>Adverse |
| Royal Canal Main Line (Liffey and Dublin Bay) | Scherzer Bridges | • Increased surface water runoff;<br>• Increased sediment in runoff;<br>• Anthrophonic sources (fuel etc) | High | Small | Slight to Moderate<br>Short-term<br>Adverse |
| Dodder_050 | DPTOB | • Increased sediment load;<br>• Remobilisation of contaminants;<br>• Concrete washings;<br>• Anthrophonic sources (fuel etc); | High | Small | Slight to Moderate<br>Short-term<br>Adverse |
| | Junction and carriageway upgrades and associated works. | • Increased surface water runoff;<br>• Increased sediment in runoff;<br>• Anthrophonic sources (fuel etc) | High | Negligible | Imperceptible<br>Short term<br>Adverse |
| Dublin Bay | DPTOB | • Increased sediment load;<br>• Remobilisation of contaminants;<br>• Concrete washings;<br>• Anthrophonic sources (fuel etc); | Extremely High | Negligible | Imperceptible<br>Short term<br>Adverse |

## 13.4.5 Operational Phase

### 13.4.5.1 Overview of Potential Impacts

The potential impacts for the Operational Phase are related to water quality and hydromorphology only. No potential changes to hydrology are predicted as the drainage design ensures no net increase in runoff rates.

Potential impacts that could include:

- Deterioration in water quality from increased levels of 'routine' road contaminates, such as hydrocarbons, metals, sediment and chloride (seasonal) due to:
  - Potential increase in pollution and sediment load entering surface water receptors from new or widened roads;
  - Increased impermeable area, and changes to the nature, frequency and numbers of vehicles using the Proposed Scheme; and
  - Dispersal of traffic onto other side roads which may drain to a different catchment or have less stringent pollution control infrastructure.
- Hydromorphology changes due to:
  - Changes in the flow regime due to increased surface water runoff or discharges, in new locations, resulting in changes to sedimentation processes and the structure of riverbanks.

### 13.4.5.2 Assessment of Potential Impacts – Increases in Impermeable Areas

Detailed assessment of the potential impacts on each receptor during the Operational Phase are provided in this section and is summarised in Table 13.16.

13.4.5.2.1 Liffey Estuary Upper

There is no hydrological connection from the Proposed Scheme to the Liffey Estuary Upper during the Operational Phase, therefore there are no impacts from that source. There is a very small increase in impermeable area draining to the Liffey Estuary Lower (See Section 13.4.5.2.2); however, this would not result in any impacts on the Liffey Estuary Upper on an incoming tide as impacts downstream are predicted to be of Imperceptible significance.

13.4.5.2.2 Liffey Estuary Lower

The DPTOB is a new structure crossing a water body; the existing impermeable area in this catchment (R_09), which includes land to the east and west of the proposed bridge, is 14,400m$^2$. The reclaimed land to the east of the proposed bridge is likely to be largely permeable, however as this is not confirmed it has been assessed as being impermeable as a worst case scenario. There will be an increase in impermeable area associated with the surface water from the bridge itself, of 6,050m$^3$, equating to a 42% increase in impermeable area for this catchment. The surface water will be directed to existing surface water networks to the east and west and attenuated using oversized pipes.

The only other increase in impermeable area proposed is in Catchment R10, where the existing path along the western boundary of Ringsend Park is being widened to facilitate a pedestrian and cycle path. Surface water from the existing footpath currently drains over the edge into grassland. The proposed pedestrian and cycle path will result in a net increase of 1,902m$^2$ in the impermeable area draining to the Liffey Estuary Lower (see Drainage Catchment Drawings BCIDD-ROT-DNG_RD-0016_XX_00-DR-CD-0001). This represents a 14.9% increase in impermeable area at this location. Surface water from the proposed pedestrian and cycle path will drain to an infiltration trench. This will reduce runoff rates to existing.

The overall increase in impermeable area in catchments discharging to the Liffey Estuary is 9.8%. Given the scale and nature of this increase, and the provision of attenuation potential impacts will be permanent, beneficial and of negligible magnitude, resulting in an impact of Imperceptible significance.

13.4.5.2.3 Royal Canal Main Line (Liffey and Dublin Bay)

There is no hydrological connection from Proposed Scheme to the Royal Canal Main Line during the Operational Phase, therefore there are no impacts.

13.4.5.2.4 Dodder_050

There is no hydrological connection from Proposed Scheme to the Dodder_050 during the Operational Phase, therefore there are no impacts from that source. There is a very small increase in impermeable area draining to the Liffey Estuary Lower (See Section 13.4.5.2.2); however, this would not result in any impacts on the Dodder_050 on an incoming tide as impacts downstream are predicted to be of Imperceptible significance.

13.4.5.2.5 Dublin Bay

There is no hydrological connection from Proposed Scheme to Dublin Bay during the Operational Phase, therefore there are no impacts. There is a very small increase in impermeable area draining to the Liffey Estuary Lower (See Section 13.4.5.2.2); however, this would not result in any impacts on Dublin Bay as impacts are predicted to be of Imperceptible significance on Liffey Estuary Lower and the proposed works are greater than 2km from Dublin Bay SAC. In addition, the proposed SuDS ensure there will be no new surface water directly outfalling to the Liffey Estuary Lower from this area.

### 13.4.5.3 Structures

13.4.5.3.1 Custom House and Excise Quay Boardwalks

These structures do not interfere with the movement of water in the Liffey Estuary Lower and there are no discharges from them. There will be no operational impacts from these structures.

13.4.5.3.2 Scherzer Bridges at George's Quay and Royal Canal

These structures do not interfere with the movement of water in the Liffey Estuary Lower and there are no discharges from them. There will be no operational impacts from these structures.

13.4.5.3.3 Dodder Public Transport Opening Bridge (DPTOB)

There is potential for impacts on the Liffey Estuary Lower and the Dodder_050 during the Operational Phase from the proposed DPTOB as it is a large new structure with a central pier and abutments built into the estuary, close to the confluence of the two waterbodies, both of which are tidal in this location. There will be no water quality impact during the Operational Phase of the DPTOB because runoff from the additional catchment (i.e., the DPTOB) is to be treated by permeable paving, swales / basins and attenuated by oversized pipe. There is potential for it to impact upon the movement of water in this location and so a hydrodynamic model was developed to predict what those impacts might be.

The hydrodynamic model of the potential impacts of the DPTOB on the hydrodynamics and morphology of the Liffey Estuary Lower (See Appendix A13.3 (Hydrodynamic Modelling of the Dodder Estuary)) concludes that:

> *'Under normal tide and fluvial flow conditions the impact of the Proposed Scheme at both the bridge crossing and Rowing Club facility (reclaimed land) will not result in any significant effect either on the hydrodynamics or the morphology of the Liffey and Dodder channels. A localised effect on hydrodynamics will occur at the proposed bridge crossing site adjacent to the proposed piers during flood events. This is likely to give rise to some potential local scouring along the eastern bank of the [Dodder]* as a result of deflection of flow by the proposed Bascule pier. The effect of this is localised to the immediate vicinity of the proposed bridge and western and northern side of the Rowing Club Site. These flood events are rare and short lived and will result in only localised changes to the potential scouring pattern with no significant morphological impacts identified downstream.'*

The water body in this location (i.e. at the DPTOB) is the Liffey Estuary Lower and not the River Dodder as reported above (See Figure 13.1 in Volume 3 of this EIAR).

The localised nature of the hydromorphological impacts and the prediction by the model that these would only occur during flood events, means that potential impacts will be short-term, adverse and of negligible magnitude, resulting in impacts of Imperceptible significance.

The localised nature of these impacts mean there would be no hydromorphological impact on the Liffey Estuary Upper or Dublin Bay as a result of the DPTOB.

13.4.5.3.4 Assessment of Potential Impacts – Traffic Redistribution

The only water body that may be impacted by traffic is the Liffey Estuary Lower; there is no direct hydrological connection to the other waterbodies. Three catchments (R_06, R_08 and R_11) drain to the combined sewer system; any SWOs would discharge to Liffey Estuary Lower.

Surface water drainage on the route of the Proposed Scheme will continue to discharge to existing catchments; a reduction in traffic numbers along this route is anticipated and it would lead to a reduction in the routine contaminants discharging to the Liffey Estuary Lower. Potential impacts will be permanent, beneficial and of negligible magnitude, resulting in impacts of Imperceptible significance.

Traffic modelling (see Chapter 6 (Traffic & Transport)) was carried out for two scenarios Do minimum and Do Something for 2028 and 2043. This allows us to see if the Proposed Scheme will result in increased traffic via displacement onto side roads. A review of the data identified that, for most cases, any increases in traffic on side roads would not lead to AADTs being above 10,000. However, twelve road sections were identified as having traffic of >10,000 AADT under the 2028 and / or 2043 Do Something scenarios (see Table 13.15).

These were largely confined to three roads: Luke Street, Amiens Street (extending to North Parade) and Summerhill Avenue. In most cases, the displaced traffic is on sections of road that would drain to the Liffey Estuary Lower and so no significant impact is anticipated. For North Parade and Summerhill Avenue, surface water drains to combined sewer here, so no significant impacts are anticipated.

**Table 13.15 AADT for Road Sections where increase >10,000 in 2028 and 2043**

| Road Name | A_B (GIS) | Length of Section (km) | 2028 Do Min | 2028 Do Some-thing | % | 2043 Do Mini-mum | 2043 Do Some-thing | % | Closest existing drainage route | Likely change in drainage catchment? | Significant Impact? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Amiens Street | 2101_2224 | 0.115 | 10467 | 11117 | 6 | 9974 | 10171 | 11 | Liffey Estuary Lower | No | No |
| Amiens Street | 2175_2233 | 0.194 | 8914 | 10100 | 13 | 8442 | 8913 | 20 | Liffey Estuary Lower | No | No |
| North Strand Road | 2231_2371 | 0.217 | 11210 | 11934 | 6 | 9984 | 10551 | 20 | Combined Sewer | Yes | No |
| Amiens Street | 2233_2196 | 0.045 | 8927 | 10132 | 13 | 8062 | 8536 | 26 | Liffey Estuary Lower | No | No |
| Summerhill Parade | 2371_2607 | 0.058 | 10688 | 11284 | 6 | 9528 | 10064 | 18 | Combined Sewer | Yes | No |

| Road Name | A_B (GIS) | Length of Section (km) | 2028 Do Min | 2028 Do Some-thing | % | 2043 Do Mini-mum | 2043 Do Some-thing | % | Closest existing drainage route | Likely change in drainage catchment? | Significant Impact? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Amiens Street | 2449_2175 | 0.062 | 8903 | 10178 | 14 | 8456 | 8845 | 20 | Liffey Estuary Lower | No | No |
| Guild Street | 2467_2468 | 0.163 | 8112 | 10725 | 32 | 7919 | 8535 | 35 | Liffey Estuary Lower | No | No |
| Summerhill Parade | 2607_2184 | 0.114 | 10926 | 11522 | 5 | 9771 | 10306 | 18 | Combined Sewer | Yes | No |
| Luke Street R802 | 6113_6429 | 0.062 | 7699 | 11277 | 46 | 7142 | 11819 | 58 | Liffey Estuary Lower | No | No |
| Lombard St E | 6120_6422 | 0.076 | 10631 | 10730 | 1 | 9964 | 10200 | 8 | Liffey Estuary Lower | No | No |
| Luke Street R802 | 6429_6120 | 0.126 | 7353 | 10972 | 49 | 6790 | 11488 | 62 | Liffey Estuary Lower | No | No |
| Luke Street R802 | 6447_6113 | 0.059 | 7303 | 10915 | 49 | 6733 | 11431 | 62 | Liffey Estuary Lower | No | No |

#### 13.4.5.3.5 Summary of Potential Operational Phase Impacts

**Table 13.16: Summary of Potential Operation Phase Impacts on waterbodies within the Study Area**

| Water body Name | Project Activity | Predicted Impacts | | | |
|---|---|---|---|---|---|
| | | Description of Impacts | Sensitivity of Receptor | Magnitude of Impacts | Significance of Effects |
| Liffey Estuary Upper, Royal Canal, Dodder_050 Dublin Bay | Increase in impermeable area draining to the water body | • No impacts predicted | N/A | N/A | No impacts |
| Liffey Estuary Lower | Increase in impermeable area draining to the water body | • Increased surface water runoff;<br>• Increased sediment in runoff;<br>• Anthropogenic sources (fuel etc);<br>• Increased scouring of watercourse. | Very High | Negligible | Imperceptible |

| Water body Name | Project Activity | Predicted Impacts | | | |
|---|---|---|---|---|---|
| | | Description of Impacts | Sensitivity of Receptor | Magnitude of Impacts | Significance of Effects |
| Liffey Estuary Upper<br>Royal Canal, Dodder_050<br>Dublin Bay | Custom House Boardwalk, Excise Quay Boardwalk, Scherzer Bridges at George's Quay and Royal Canal, DPTOB | • No impacts predicted | N/A | N/A | No impacts |
| Liffey Estuary Lower, Dodder_50 | DPTOB | • Hydromorphological – scouring at eastern bank | Very High | Negligible | Imperceptible |
| Liffey Estuary Upper<br>Royal Canal, Liffey Estuary Lower<br>Dodder_050<br>Dublin Bay | Traffic | • No impacts | N/A | N/A | N/A |

## 13.4.6 Summary of FRA

Summary text from the FRA (Appendix 13.2 in Volume 4 of this EIAR) is provided in this section.

### 13.4.6.1 Fluvial & Coastal Flood Risk

The Proposed Scheme requires minimal changes to land cover and will likely have a negligible impact on the existing fluvial flood regime. It runs within an existing dense urban area; there are no proposed changes to contributing catchment areas and all discharge will be attenuated to existing greenfield runoff rates.

Although the Proposed Scheme has been identified as liable to flood from fluvial sources, the nature of the Proposed Scheme means the impact will likely be negligible. As per Circular PL 2/2014 of Environmental, Community and Local Government (13/08/2014), minor proposals in areas of flood risk (such as the Proposed Scheme) are unlikely to raise significant flooding issues as long as they do not increase flood risk. The Proposed Scheme will not have adverse impacts or impede access to a watercourse, floodplain or flood protection and management facilities and will be flood resilient in design. As per Circular PL 2/2014, the Proposed Scheme does not require a Justification Test and is suitable for the associated flood risk. Therefore, no further assessment is required with regard to fluvial flood risk.

### 13.4.6.2 Groundwater Flooding

No previous reports or geological indicators were found for groundwater flooding within the vicinity of the proposed scheme. Therefore, the risk of groundwater flooding is considered low, and no further assessment is required.

### 13.4.6.3 Pluvial Flooding

The implementation of SuDS (including oversized pipe and infiltration trenches) will mitigate against potential pluvial flooding. Therefore, the risk of pluvial flooding is considered low, and no further assessment is required.

#### 13.4.6.4 Surface Water Flooding

The Proposed Scheme will incorporate SuDS for the purpose for managing surface water in terms of both flow and quality. Therefore, the risk of surface water flooding is considered low, and no further assessment is required.

#### 13.4.6.5 Justification Test

The Proposed Scheme is categorised by the Planning System and Flood Risk Management Guidelines for Planning Authorities (DoEHLG and OPW, 2009) as a 'highly vulnerable development' and is required to pass the justification test if any part of the development is located within Flood Zone A or Flood Zone B.

Although the Proposed Scheme is within Flood Zone A and has been identified as liable to flood from fluvial sources, the nature of the Proposed Scheme means the impact will likely be negligible. As per Circular PL 2/2014 of Environmental, Community and Local Government (13/08/2014), minor proposals in areas of flood risk (such as the Proposed Scheme) are unlikely to raise significant flooding issues as long as they do not increase flood risk. The development will not have adverse impacts or impede access to a watercourse, floodplain or flood protection and management facilities and will be flood resilient in design. As per Circular PL 2/2014 the Proposed Scheme does not require a Justification Test and is suitable for the associated flood risk. Therefore, no further assessment is required with regard to fluvial flood risk.

For more information on this see Appendix A13.2 (Flood Risk Assessment) in Volume 4 of this EIAR.

## 13.5 Mitigation and Monitoring Measures

### 13.5.1 Introduction

This section sets out the measures envisaged to avoid, prevent, or reduce any potential significant adverse effects on the environment identified in Section 13.4 and, where appropriate, identify any proposed monitoring of the efficiency of implementing those mitigation measures. This section covers both the Construction and Operational Phases. Construction works will take place in accordance with Appendix A5.1 (Construction Environmental Management Plan (CEMP)), which is included in Volume 4 of this EIAR.

### 13.5.2 Construction Phase

#### 13.5.2.1 Mitigation Measures

In terms of mitigation, a Surface Water Management Plan (SWMP) has been prepared (provided in the CEMP, Appendix A5.1 in Volume 4 of this EIAR), which details control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Scheme. It will be a condition within the Employer's Requirements that the successful contractor(s), immediately following appointment, must detail in the SWMP how it is intended to effectively implement all the applicable measures identified in this EIAR and any additional measures required pursuant to conditions imposed by An Bord Pleanála to any grant of approval.

At a minimum, all the control and management measures set out in the SWMP will be implemented. This includes measures relating to:

- Construction Compounds management including the storage of fuels and materials;
- Control of Sediment;
- Use of Concrete;
- Management of vehicles and plant including refuelling and wheel wash facilities; and
- Monitoring.

#### 13.5.2.2 Site Specific Mitigation Measures

Following implementation of the mitigation measures outlined in the SWMP, the majority of impacts will not be significant. There are a few activities however that require additional mitigation to ensure impacts are not significant.

##### 13.5.2.2.1 Custom House Boardwalk

The three piles to support the pedestrian boardwalk will be hollow steel tubes. As a result, this means they will not result in the displacement of material from the estuary bed which could create a preferential pathway for historic contaminants.

For associated works to the quay wall to secure the boardwalk to the DCC building, sheeting will be attached below the area of works to catch any debris. In-channel and river bank working general principles as set out in the SWMP will apply. In addition:

- The steel piles may be driven from the land if feasible, reducing the need for machinery in the water;
- All construction machinery operating within or close to any water body will be mechanically sound to avoid leaks; and
- The area of disturbance of the watercourse bed and bank will be the absolute minimum required for the installation of the piles.

##### 13.5.2.2.2 Scherzer Bridges

The main concerns relating to the Scherzer Bridge at the Royal Canal and Georges Dock are as a result of overland runoff of surface water carrying debris, silt, and concrete washings. There is also the potential for hydrocarbon contamination from vehicles and plant. These will largely be addressed through the general mitigation measures, however the pouring of concrete associated with the replacement carriageway bridge directly over the Royal Canal and adjacent to the Liffey Estuary Lower means additional measures are required.

The pouring of concrete will take place in dry weather only. Silt fences or similar will be installed to prevent overland flow into the canal or the Liffey Estuary Lower.

Oher general water protection principles as set out in the SWMP will apply.

##### 13.5.2.2.3 Dodder Public Transport Opening Bridge (DPTOB)

The main control measures for works to construct the DPTOB are the installation of coffer dams for the bridge itself and sheet piling for the reclaimed land. Once dewatered internally, these allow the construction to be undertaken in a dry area and minimise the potential for contaminants entering the water body.

The coffer dams and area behind the sheet piling will be dewatered via silt-buster tanks (or similar) and discharged directly to the estuary. The appointed contractor will liaise with the suitably qualified ecologist and/or environmental specialist engaged by them to ensure that any required permits/licences are obtained.

Any requirement to rescue fish or other fauna during this process will be carried in a manner as specified in Chapter 12 (Biodiversity). As the water level approaches the estuary bed, there is a greater risk of disturbing sediments; at this point the rate of emptying will be slowed to allow the silt-buster tanks to continue to operate efficiently.

The dynamic nature of the waterbody in this area i.e., estuarine would result in varied level of suspended solids depending on the time of year and weather conditions. Therefore, the NTA will ensure that monitoring will be carried out monthly for a period of at least six months prior to the commencement of construction at this location, in the manner and of a frequency necessary to inform any applications for permits or licenses to discharge that may be required. The NTA will also ensure that any discharges from the coffer dam will comply with conditions set out in all relevant permits and licenses.

13.5.2.2.4 Construction Compounds

Construction compounds R1 and R2 have limited ability to impact upon nearby water bodies. The general measures for the Construction Compounds as set out in the SWMP are sufficient to control these potential impacts and no additional measures are required.

Activities within the Construction Compounds on either side of the DPTOB (R3A/R3B and R4) will be largely controlled as set out in general measures in the SWMP. In addition, all surface water drains in the vicinity will be identified and either stopped up or bunded on the side closest to both Construction Compounds. A cutoff drain or equivalent measure and a silt fence will be installed along the estuary side of the Construction Compounds. The appointed contractor will ensure that appropriate spill control equipment is available (e.g., a suitably sized floating boom), to control any spillages to the river should a spillage occur. The CEMP includes an Environmental Incident Response Plan, which will apply for the management of any incidents that may occur.

### 13.5.3 Operational Phase

Mitigation for the Operational Phase has been built into the design of the Proposed Scheme, which is outlined in Section 13.4.1.1. No additional mitigation is required.

In the Operational Phase, the infrastructure (including the maintenance regime for SuDS and monitoring of waterbodies) will be carried out by the relevant local authority and will be subject to their management procedures.

## 13.6 Residual Impacts

### 13.6.1 Construction Phase

Following the implementation of mitigation measures outlined in Section 13.5 and the SWMP within the CEMP (Appendix A5.1 in Volume 4 of this EIAR), there are, no significant impacts predicted on any of the receptors in this study area. Residual impacts are presented in Table 13.17.

**Table 13.17: Summary of Residual Construction Phase Impacts on Water Bodies within the Study Area**

| Water body Name | Project Activity | Predicted Impacts | | |
|---|---|---|---|---|
| | | Description of Impacts | Significance of Impacts | Post mitigation significance |
| Liffey Estuary Upper | Carriageway works and bridge upgrades– North and South Quays | • Increased surface water runoff<br>• Increased sediment in runoff<br>• Anthrophonic sources (fuel etc) | Imperceptible Short-term Adverse | Imperceptible Short-term Adverse |
| | Custom House Boardwalk | • Increased sediment in runoff<br>• Anthrophonic sources (fuel etc) | Imperceptible Short-term Adverse | Imperceptible Short-term Adverse |
| | Excise Walk Boardwalk | • Increased sediment in runoff<br>• Anthrophonic sources (fuel etc) | Imperceptible Short-term Adverse | Imperceptible Short-term Adverse |
| | Scherzer Bridges | • Increased sediment in runoff<br>• Concrete washings<br>• Anthrophonic sources (fuel etc) | Imperceptible Short-term Adverse | Imperceptible Short-term Adverse |
| | DPTOB | • Increased sediment load<br>• Concrete washings.<br>• Anthrophonic sources (fuel etc) | Moderate to Significant Short term Adverse | Imperceptible Short-term Adverse |
| Liffey Estuary Lower | Junction and carriageway upgrades and | • Increased surface water runoff;<br>• Increased sediment in runoff;<br>• Anthrophonic sources (fuel etc) | Imperceptible Short-term Adverse | Imperceptible Short-term Adverse |
| | Custom House Quay Boardwalk | • Increased sediment load;<br>• Remobilisation of contaminants;<br>• Concrete washings;<br>• Anthrophonic sources (fuel etc) | Moderate to Significant Short term Adverse | Imperceptible Short-term Adverse |

| Water body Name | Project Activity | Predicted Impacts | | |
|---|---|---|---|---|
| | | Description of Impacts | Significance of Impacts | Post mitigation significance |
| | Excise Walk Boardwalk | • Concrete washings;<br>• Anthrophonic sources (fuel etc) | Imperceptible<br>Short-term<br>Adverse | Imperceptible<br>Short-term<br>Adverse |
| | Scherzer Bridges at George's Dock and the Royal Canal | • Increased sediment in runoff;<br>• Anthrophonic sources (fuel etc) | Imperceptible<br>Short-term<br>Adverse | Imperceptible<br>Short-term<br>Adverse |
| | DPTOB | • Increased sediment load;<br>• Remobilisation of contaminants;<br>• Concrete washings;<br>• Anthrophonic sources (fuel etc);<br>• Scouring | Very Significant<br>Short-term<br>Adverse | Imperceptible<br>Short-term<br>Adverse |
| | Construction Compounds (R3 and R4) | • Increased sediment in runoff;<br>• Anthrophonic sources (fuel etc) | Profound<br>Short to medium term<br>Adverse | Imperceptible<br>Short-term<br>Adverse |
| Royal Canal Main Line (Liffey and Dublin Bay) | Scherzer Bridges | • Increased surface water runoff;<br>• Increased sediment in runoff;<br>• Anthrophonic sources (fuel etc) | Slight to Moderate<br>Short-term<br>Adverse | Imperceptible<br>Short-term<br>Adverse |
| Dodder_050 | DPTOB | • Increased sediment load;<br>• Remobilisation of contaminants;<br>• Concrete washings;<br>• Anthrophonic sources (fuel etc); | Slight to Moderate<br>Short-term<br>Adverse | Imperceptible<br>Short-term<br>Adverse |
| | Junction and carriageway upgrades and associated works | • Increased surface water runoff;<br>• Increased sediment in runoff;<br>• Anthrophonic sources (fuel etc) | Imperceptible<br>Short term<br>Adverse | Imperceptible<br>Short-term<br>Adverse |
| Dublin Bay | DPTOB | • Increased sediment load;<br>• Remobilisation of contaminants;<br>• Concrete washings;<br>• Anthrophonic sources (fuel etc); | Imperceptible<br>Short term<br>Adverse | Imperceptible<br>Short-term<br>Adverse |

### 13.6.2 Operational Phase

Mitigation for the Operational Phase has been built into the design of the Proposed Scheme. As a result, no residual significant impacts are anticipated for any water body in the study area. This is summarised in Table 13.18.

**Table 13.18: Summary of Predicted Operational Phase Impacts on Water Bodies within the Study Area**

| Water body Name | Project Activity | Predicted Impacts | | |
|---|---|---|---|---|
| | | Description of Impacts | Significance of Impacts | Post mitigation Significance |
| Liffey Estuary Upper<br>Royal Canal, Dodder_050<br>Dublin Bay | Increase in impermeable area draining to the water body | • No impacts predicted | No impacts | N/A |
| Liffey Estuary Lower | Increase in impermeable area draining to the water body | • Increased surface water runoff;<br>• Increased sediment in runoff;<br>• Anthropogenic sources (fuel etc);<br>• Increased scouring of watercourse. | Imperceptible<br>Short term<br>Beneficial | Imperceptible<br>Short term<br>Beneficial |
| Liffey Estuary Upper<br>Royal Canal, Dodder_050<br>Dublin Bay | Custom House Boardwalk, Excise Quay Boardwalk, Scherzer Bridges at George's Quay and Royal Canal, DPTOB | • No impacts predicted | No impacts | N/A |
| Liffey Estuary Lower | DPTOB | • Hydromorphological – scouring at eastern bank | Imperceptible | Imperceptible<br>Short term<br>Beneficial |
| Liffey Estuary Upper<br>Royal Canal, Liffey Estuary Lower<br>Dodder_050<br>Dublin Bay | Traffic | • No impacts | No Impacts | N/A |

### 13.6.3 Summary of WFD Assessment

A full WFD Assessment is provided in Appendix A13.1 (Water Framework Directive Compliance Assessment) in Volume 4 of the EIAR. A summary is provided here for ease of reference.

#### 13.6.3.1 Overview

Taking into consideration the anticipated impacts of the Proposed Scheme on the biological, physico-chemical and hydromorphological quality elements, following the implementation of design and mitigation measures, it is concluded that it will not compromise progress towards achieving Good ecological Status (GES) or cause a deterioration of the overall Good Ecological Potential (GEP) (in the case of heavily modified or artificial waterbodies) of any of the water bodies that are in scope. Therefore, the Proposed Scheme does not require assessment under Article 4.7 (Table 13.19).

**Table 13.19: Compliance of the Scheme with the environmental objectives of the WFD**

| Environmental Objective | Proposed Scheme | Compliance with the WFD Directive |
|---|---|---|
| No changes affecting high status sites | There are no waterbodies with high status in the study area. | Yes |
| No changes that will cause failure to meet surface water good ecological status or potential or result in a deterioration of surface water ecological status or potential | After consideration as part of the detailed compliance assessment, the Proposed Scheme will not cause deterioration in the status of the water bodies during construction following the implementation of mitigation measures; during operation, no significant impacts are predicted. | Yes |
| No changes which will permanently prevent or compromise the Environmental Objectives being met in other water bodies | The Proposed Scheme will not cause a permanent exclusion or compromise achieving the WFD objectives in any other bodies of water within the River Basin District. | Yes |
| No changes that will cause failure to meet good groundwater status or result in a deterioration groundwater status. | The Proposed Scheme will not cause deterioration in the status of the groundwater bodies. | Yes |

The WFD also requires consideration of how a new scheme might impact on other water bodies and other EU legislation. This is covered in Articles 4.8 and 4.9 of the WFD. Article 4.8 states:

> '*a Member State shall ensure that the application does not permanently exclude or compromise the achievement of the objectives of this Directive in other bodies of water within the same river basin district and is consistent with the implementation of other Community environmental legislation*'.

All water bodies within the study area have been assessed for direct impacts. The assessment concludes that the Proposed Scheme will not compromise the achievement of the objectives of the WFD for any water body in the study area. In addition, the Proposed Scheme has been assessed for the potential for cumulative impacts with other Proposed Developments within 1km of the Study Area. This concludes that in combination with other Proposed Developments the Proposed Scheme will not compromise the achievement of the objectives of the WFD for any water body. Therefore, the Proposed Scheme complies with Article 4.8.

Article 4.9 of the WFD requires that: '*Member States shall ensure that the application of the new provisions guarantees at least the same level of protection as the existing Community legislation*'.

The Habitats Directive (1992) promotes the maintenance of biodiversity by requiring Member States to take measures to maintain or restore natural habitats and wild species listed on the Annexes to the Directive at a favourable conservation status, introducing robust protection for those habitats and species of European importance. No impact is anticipated as there are no designated areas within 2km of the Proposed Scheme. There are European designated sites in the wider vicinity of the Proposed Scheme which have been assessed and are presented in the Appropriate Assessment Screening Report and Natura Impact Statement (NIS) submitted with this application.

The Nitrates Directive (1991) aims to protect water quality by preventing nitrates from agricultural sources polluting ground and surface waters and by promoting the use of good farming practices. The Proposed Scheme will not influence or moderate agricultural land use or land management.

The revised Bathing Water Directive (rBWD) (2006/7/EC) was adopted in 2006, updating the microbiological and physico-chemical standards set by the original Bathing Water Directive (BWD) (76/160/EEC) and the process used to measure/monitor water quality at identified bathing waters. The rBWD focuses on fewer microbiological indicators, whilst setting higher standards, compared to those of the BWD. Bathing waters under the rBWD are

classified as excellent, good, sufficient or poor according to the levels of certain types of bacteria (*intestinal enterococci and Escherichia coli*) in samples obtained during the bathing season (May to September). The Proposed Scheme will not impact any designated bathing waters. It is therefore compliant with the Bathing Water Directive.

#### 13.6.3.2 Conclusion

Considering all requirements for compliance with the WFD, the Proposed Scheme will not cause a deterioration in status in any water body, not prevent it from achieving GES or GEP. There are no cumulative impacts with other schemes; and it complies with other environmental legislation.

It can be concluded that the Proposed Scheme complies with all requirements of the WFD.

## 13.7 References

DEHLG and OPW (2009). Planning System and Flood Risk Management Guidelines for Planning Authorities.

DHPLG (2018). River Basin Management Plan 2018 – 2021.

DHLGH (2021). Draft River Basin Management Plan for Ireland. 2022-2027. September 2021.

Dublin Bay Biosphere (2020). Dublin Bay Biosphere. A special place for people and nature [Online] Available from www.dublinbaybiosphere.ie/about/

Environment Agency. Water Framework Directive assessment: Estuarine and Coastal waters' 2016 'Clearing Waters for All' (updated 2017)

EPA (2022). Guidelines on the Information to be Contained in Environmental Impact Assessment Reports. May 2022.

EPA (2018). Liffey Catchment Assessment 2010 – 2015 (HA 09)

EPA (2022). EPAMaps [Online] Available from gis.epa.ie/EPAMaps/

EPA (2022). Data [Online] Available from www.catchments.ie/data/

EPA (2020c). EPA River Quality Surveys: Biological.

EPA (2020d). [Online] Available from www.beaches.ie

ERBD (2009). Eastern River Basin District River Basin Management Plan 2009 – 2015

NPWS (2020). National Parks and Wildlife Service, Protected Sites in Ireland [Online] Available from www.npws.ie/protected-sites

NRA (2005). Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes.

NRA (2009). Guidelines for Assessment of Ecological Impacts of National Road Schemes.

OPW (2020). National Flood Hazard Mapping [Online] Available from www.floodmaps.ie/

TII (2015). Road Drainage and the Water Environment

Directives and Legislation

Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption

Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy

Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks

Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds

Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014, amending Directive 2011/92/EU of the European Parliament and the Council of 13 December 2011 on the assessment of the impacts of certain public and private projects on the environment

Number 21 of 1990 - Local Government (Water Pollution) (Amendment) Act, 1990

S.I. No. 108/1978 - Local Government (Water Pollution) Regulations, 1978

S.I. No. 122/2010 - European Communities (Assessment and Management of Flood Risks) Regulations 2010;

S.I. No. 122/2014 - European Union (Drinking Water) Regulations 2014;

S.I. No. 268/2006 - European Communities (Quality of Shellfish Waters) Regulations 2006

S.I. No. 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations 2009

S.I. No. 278/2007 - European Communities (Drinking Water) (No. 2) Regulations 2007

S.I. No. 293/1988 - European Communities (Quality of Salmonid Waters) Regulations, 1988

S.I. No. 296/2018 - European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018

S.I. No. 350/2014 - European Union (Water Policy) Regulations 2014

S.I. No. 351/2011 - Bathing Water Quality (Amendment) Regulations 2011

S.I. No. 477/2011 - European Communities (Birds and Natural Habitats) Regulations 2011

S.I. No. 495/2015 - European Communities (Assessment and Management of Flood Risks) (Amendment) Regulations 2015

S.I. No. 722/2003 – European Communities (Water Policy) Regulations 2003

S.I. No. 81/1988 - European Communities (Quality of Water Intended for Human Consumption) Regulations 1988;

S.I. No. 9/2010 - European Communities Environmental Objectives (Groundwater) Regulations 2010

S.I. No. 92/2020 - Planning and Development Act 2000 (Exempted Development) (No. 2) Regulations 2020

The Local Government (Water Pollution) Act, 1977 (Number 1 of 1977)