# Chapter 13
Water

## Contents

# 13. Water

## 13.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) assesses the impact of the Templeogue / Rathfarnham to City Centre Core Bus Corridor Scheme (hereafter referred to as the Proposed Scheme), on the surface water environment during the Construction and Operational Phases. The following attributes of each surface waterbody (receptor) will be 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. This includes 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.

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's compliance with the Water Framework Directive (WFD) (Directive 2000/60/EC) requirements is provided in Appendix A13.1 WFD Assessment in Volume 4 of this EIAR; the status of WFD water bodies and protected areas within the Study Area are provided in Section 13.3.3 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 in Appendix A13.2 in Volume 4 of this EIAR. The results of this assessment have been summarised in Section 13.3.11 and Section 13.4.5.4 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 attained. 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 the 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 waterbodies within that area have been considered as receptors including those classified under 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 (hereafter referred to as the Water Framework Directive (WFD)). These include riverine, transitional waterbodies, lake (water) bodies and coastal waterbodies, and also non-WFD classified waterbodies. 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 15km (kilometres) west of the Proposed Scheme. This is a major public water supply abstraction point (approximately 195,000 $m^3$/day) (cubic meters 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 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. The Directive requires all water bodies (rivers, lakes, groundwater, transitional, coastal) to attain 'Good Water Status' (qualitative and quantitative) by 2027.

There are a number of 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 programme (i.e., length and / or nature of the works etc.) of a scheme / project 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 WFD Assessment; 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 13.6.1.

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 2017). 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 ensuring 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 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' waterbodies, 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 closed 31st 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.

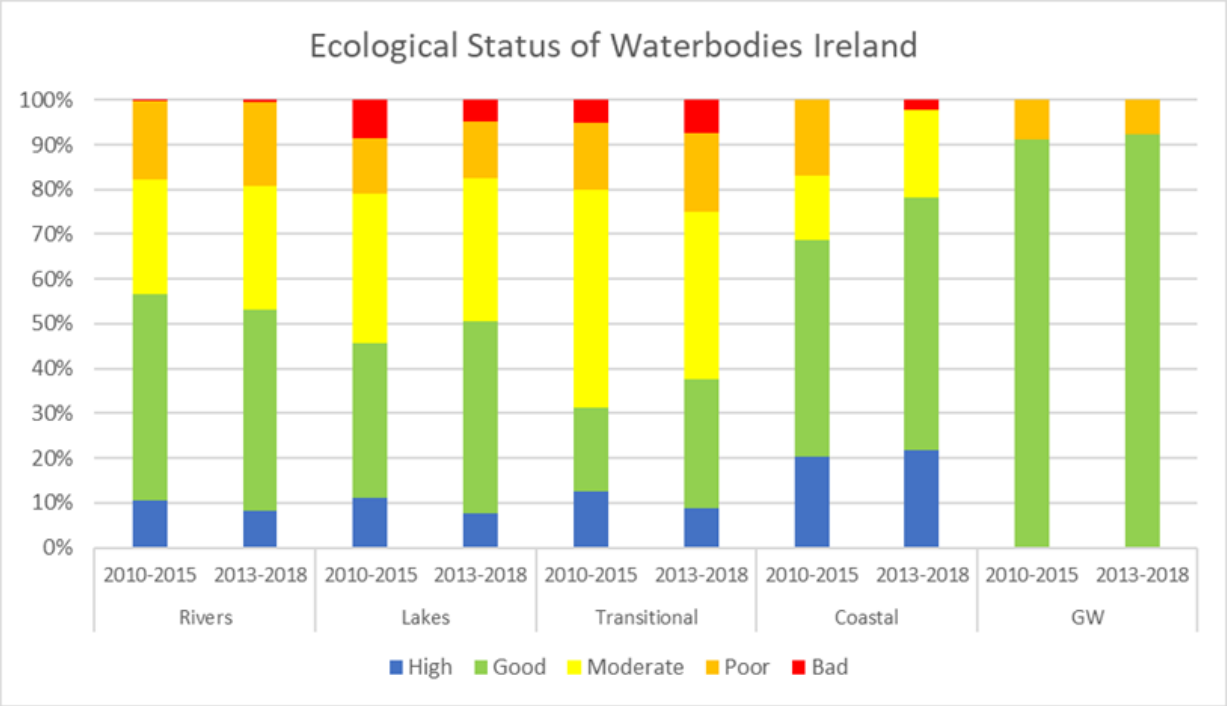


**Image 13.1 Ecological Status of Water bodies in Ireland**

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% of 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 following 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 (hereafter referred to as the EPA Guidelines) (EPA 2022);<br>• European Commission (EU) Environmental Impact Assessment of Projects. Guidance on the Preparation of the Environmental Impact Assessment Report (EU, 2017) |
| Water | • National Road Authority (NRA) Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes (NRA 2005)*;<br>• NRA 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 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 2020a);<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);<br>• Consultation Draft RBMP 2022-2027 (DHLGH 2021); 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 surveys and walkover assessments were carried out in March 2020 and August 2022. In March 2020, all watercourse crossings within the study area were visited to inform the determination of baseline conditions in order to identify the likely impacts of the Proposed Scheme. In August 2022, visual inspections were made at some crossing locations and areas identified as potentially high risk (e.g. locations of proposed construction compounds), see Figure 13.2 in Volume 3 of this EIAR. 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 reaching 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).

## 13.2.4 Appraisal Method for the Assessment of Impacts

### 13.2.4.1 General Approach

The following 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 the 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 3 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 19 (Material Assets) and Chapter 10 (Population).

The TII Assessment Guidelines (NRA 2009) 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 waterbodies, coastal waterbodies and lakes) as a result of the Proposed Scheme will be determined based on two parameters:

1. The sensitivity of the waterbody attributes (hydrology, water quality and geomorphology) to change; and
2. The magnitude of the impacts on waterbody 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 (Environment 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 waterbody which is protected by European Union (EU) legislation (e.g. a Designated European Sites (Special Areas of Conservation (SAC) and Special Protection Areas (SPA)) or 'Salmonid Waters'; and<br>• A waterbody 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 waterbody (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 waterbody ecosystem protected by national legislation (Natural Heritage Area (NHA) status);<br>• A waterbody 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 | • A WFD waterbody with High or Good Status;<br>• A Moderate WFD Status (2016 - 2021) waterbody with some hydrological connection (of <2km) to European Sites or protected |

| Sensitivity | Criteria | Typical Example |
|---|---|---|
| | or<br>high quality or value on a national scale | ecosystems of international status (SAC / SPA or Salmonid Waters) further downstream;<br>• WFD waterbody which has a direct hydrological connection to sites / ecosystems protected by national legislation (NHA status);<br>• A waterbody 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 waterbody with Moderate WFD Status (2016 - 2021);<br>• WFD waterbody with limited (>2km <5km) hydrological importance for sensitive or protected ecosystems (much further downstream);<br>• A waterbody 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 | • Waterbody with Bad to Poor WFD Status (2016 - 2021)<br>• A WFD water body with<br>• >5km hydrological connection to European Sites or national 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 2017):

- Nature of the impacts;
- Intensity and complexity of the impacts;
- Expected onset, duration, frequency and reversibility of the impacts;
- Cumulation of the impacts with other existing and / or approved project impacts; 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 |
|---|---|---|
| Large 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. |
| Moderate 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. |
| Small 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 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. |
| Small 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) |
| Moderate Beneficial | Results in moderate improvement of attribute quality | Contribution to improvement in water body WFD classification. |
| Large 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**

| Importance of Attribute | Magnitude of Impact | | | |
|---|---|---|---|---|
| | **Negligible** | **Small** | **Medium** | **Large** |
| Extremely High | Range Imperceptible/Not Significant/Slight | Significant | 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 Operation Phase Traffic Impact Assessment Method

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 to be 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 guidance document (TII 2015) 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 is 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 displace traffic would discharge to Catchment Maps (see Proposed Surface Water Drainage Works (BCIDD-ARP-DNG_ZZ-0016_XX_00-DR-CD-0001) in Volume 3 of this EIAR).

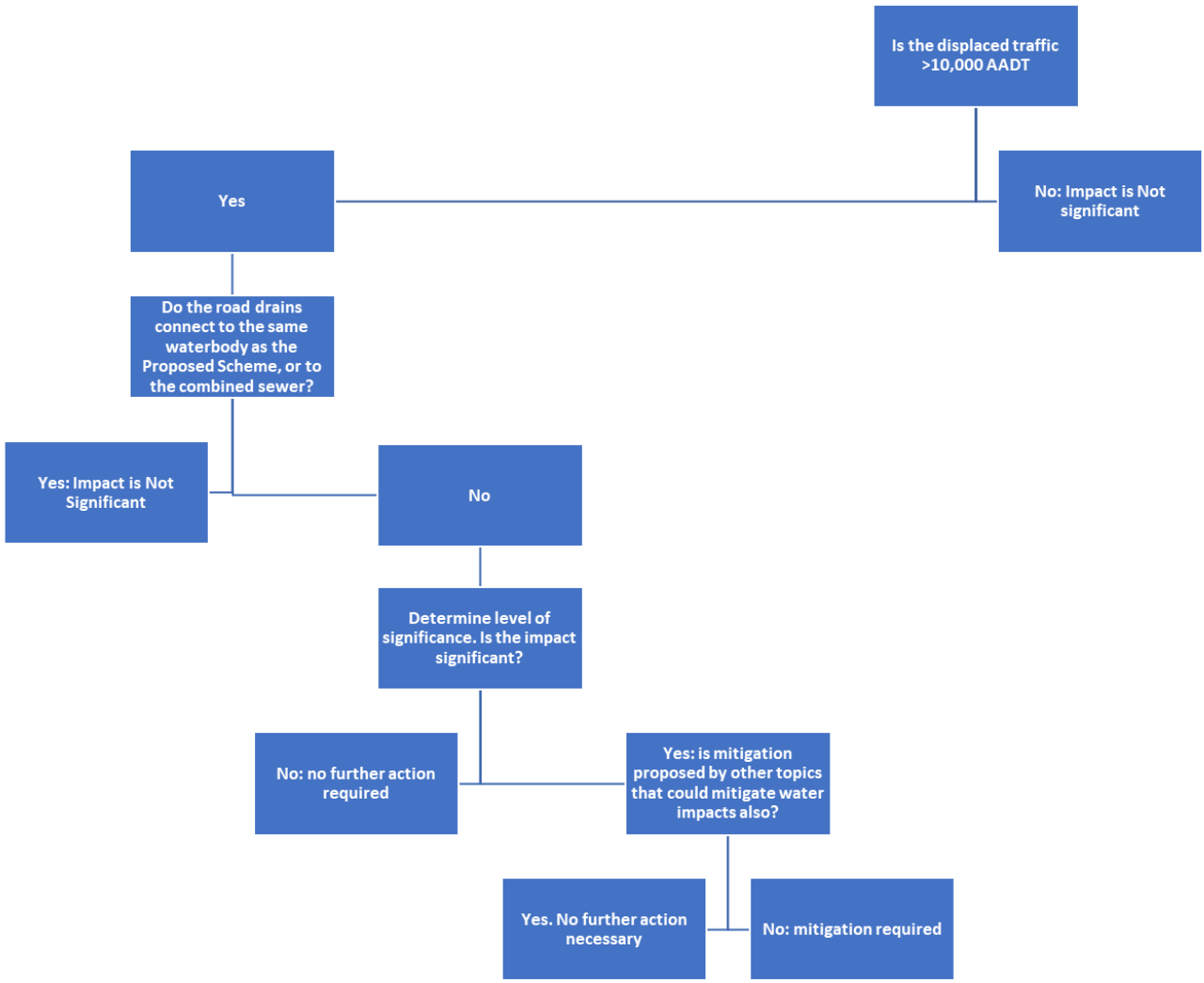


**Diagram 13.1: Traffic Assessment Decision Tree**

If, through the decision tree, it is determined that a new water body is potentially impacted upon, a qualitative assessment of the potential impact is carried out. For the sections of road being considered in this assessment, the use of the Highways England Water Risk Assessment Tool (HEWRAT) is generally not considered appropriate; and it is considered that it would be a disproportionate assessment for the scale of the Proposed Scheme, unless AADT is greater than 11,00 (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 is <100m, the magnitude is negligible;
- if AADT is <10,500, the magnitude is small;
- if AADT is >10,500 and <11,000, the magnitude is medium; and
- for AADT >11,000, the HEWRAT spreadsheet will be used to check for potential impacts from heavy metals and sediment.

## 13.3 Baseline Environment

### 13.3.1 Catchment Overview

The study area lies within Hydrometric Area (HA) 09 (Liffey and Dublin Bay) and is covered within the River Liffey catchment. 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, County Dublin, draining a total area of 1,616km$^2$. There are four main waterbodies within the study area in this catchment: the Liffey Estuary Upper, the Dodder_040, Dodder_050, Owenadoher_010 and the Grand Canal Main Line (Liffey and Dublin Bay (hereafter referred to as the Grand Canal) (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 Harold's Cross, Rathmines, Terenure, Templeogue and Rathfarnham. 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 majority of the population in the catchment is in this low-lying limestone area which is also 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 Q1 to Q5 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 waterbodies (HMWB) and artificial surface waterbodies (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.

Waterbodies and their associated segments, which are contained within the study area, included in this assessment are (refer to Figure 13.1 and Figure 13.2 in Volume 3 of this EIAR):

- Liffey Estuary Upper;
- Dodder_040
- Dodder_050
- Owenadoher_010; and
- Grand Canal (Grand Canal Main Line (Liffey and Dublin Bay)).

The WFD Status of the rivers and streams within the study area of the Proposed Scheme are detailed in Table 13.7. Further details of these are provided in Section 13.3.9.

**Table 13.7: Surface Water WFD Status.**

| Waterbody | WFD Sub-Catchment | WFD Waterbody Name | Heavily Modified? | Type | Status (2016 to 2021) | Key Pressures: Elements Causing or with Potential to Cause Less Than Good Status | Risk Categorisation |
|---|---|---|---|---|---|---|---|
| Liffey Estuary | N/A | Liffey Estuary Upper | No | Transitional | Good | Combined sewer overflows (CSOs) | Under Review |
| River Dodder | Dodder_SC_010 | Dodder_040 | Unknown | River | Moderate | Urban runoff | At Risk |
| River Dodder | Dodder_SC_010 | Dodder_050 | Unknown | River | Moderate | Urban runoff and combined sewer overflows (CSOs) | At Risk |
| Owenadoher River | Dodder_SC_010 | Owenadoher_010 | Unknown | River | Moderate | Urban runoff | Under Review |
| Grand Canal | N/A | Grand Canal Main Line (Liffey and Dublin Bay) | Yes - AWB | Canal | Good ecological Potential | N/A | Not at Risk |

### 13.3.4 Field Survey

The Proposed Scheme was surveyed in March 2020 and August 2022. The site surveyed along the Templeogue Section of the Proposed Scheme was located on the River Dodder (Dodder_040 and Dodder_050) and its tributaries (refer to Figure 13.2 in Volume 3 of this EIAR). This location is at the confluence between Terenure College Stream and the River Dodder. Weather conditions were recorded as light rainfall at the River Dodder site on the day of the survey.

The watercourses surveyed along the Rathfarnham Section of the Proposed Scheme were the River Dodder (Dodder_050) and the Grand Canal. Light rainfall was recorded at all sites visited along this section on the day of the surveys.

**Table 13.8: Survey Information for Sites along the Templeogue Section of the Proposed Scheme 2020**

| Survey Attribute | Survey Location 1 | Survey Location 2 | Survey Location 3 |
|---|---|---|---|
| Location | Bushy Park. End culvert. Confluence of Terenure College Stream with River Dodder | Under bridge – River Dodder | Grand Canal crossing at Rathmines |
| Visual Flow | Low level with low flow | Low – medium level. Medium flow | Altered. High water level |
| Visual Water Quality | Possible contaminated effluent observed | Discolouration. Some evidence of ragging. Active discharge of opaque SUDS with distinct plume, possible detergent type pollution | No indicator. Rubbish and collected vegetation pooled at lock and quay which is likely impacting water quality |
| Bed Observation | Small rocks, although a range of boulder sizes | Small pebbles and rocks. Coarse sediment | Not visible - presumed artificial |
| Bank Stability | Exposed bare ground with some ground ivy and standing trees | Stone wall. Medium sloped embankments / grass verge broken in places with ground ivy / standing trees / winter heliotrope | Low stone verges |
| Features | Waterfall and pond | None | Lock and quay |
| Modifications | End of culvert | None of significance | Canal / artificial waterbody |
| Runoff Pathway | N/A | Potential runoff directly from road and from sewer | Perpendicular to watercourse into kerb and gully |
| Runoff Risk | N/A | Medium to high from sewer | Low |
| Riparian Detail | High sloping banks. Immediate river edge is exposed. Some ground ivy. Winter heliotrope | Stone wall with ground ivy. Steep sloping bank on one side. Less steep on the other side. Standing trees and winter heliotrope. On east side, more complex and higher value – low hanging trees. Low sloping grass verges with patches of low growing vegetation | Minimal. Some grass verge and rush on eastern side. Winter heliotrope |
| Natural Barriers | None | Stone wall | Gated bridge |
| Discharges | Present – misconnection or possible cracked sewer line | None visible | Present but not active at time of field survey |
| Culverted | Partial | No | No |

**Table 13.9: Survey Information for Sites along the Rathfarnham Section of the Proposed Scheme 2022**

| Survey Attribute | Survey Location 1 | Survey Location 2 | Survey Location 3 | Survey Location 4 | Survey Location 5 | Survey Location 6 | Survey Location 7 |
|---|---|---|---|---|---|---|---|
| Location | Construction Compound at Spawell roundabout | Dodder_040 survey point 1 | Construction Compound TR3 at Dodder View Road | Owenadoher_010 survey point at Butterfield Avenue | Dodder_050 survey point 1, Rathfarnham Road | Construction Compound 2, at Terenure Rd | Construction Compound 4 along Military Road |
| Date | 30/08/2022 15:00 | 30/08/2022 14:30 | 30/08/2022 14:15 | 30/08/2022 14:00 | 30/08/2022 13:30 | 30/08/2022 13:00 | 30/08/2022 12:30 |
| Climate Observations | Sunny, clear skies | Sunny, clear skies | Sunny, clear skies | Sunny, clear skies | Sunny, clear skies | Sunny, clear skies | Sunny, clear skies |
| Waterbody Crossed | No | Yes | No | Yes | Yes | No | No |
| Construction Compound | Yes | No | Yes | No | No | Yes | Yes |
| Closest Waterbody | Dodder_040 | Dodder_040 | Dodder_040 | Owendoher_010 | Dodder_050 | Dodder_050 | Dodder_050 |
| Distance to Waterbody | c. 250m | Survey point located over the waterbody | c. 55m | Survey point located over waterbody. | Directly adjacent to survey point | c.800m | c.2000m |

| Survey Attribute | Survey Location 1 | Survey Location 2 | Survey Location 3 | Survey Location 4 | Survey Location 5 | Survey Location 6 | Survey Location 7 |
|---|---|---|---|---|---|---|---|
| River flow | N/A | Moderate | N/A | Medium-high | Low | N/A | N/A |
| Water Quality | N/A | Clear, no signs of contamination | N/A | Slightly discoloured, indicating contamination. No visible foam line. | Common outfall discharges to waterbody. There is a strong odour | N/A | N/A |
| Run-off pathway | N/A | Surface water drains | N/A | Possible pathway via surface water drains on roads and overflow from impermeable surface adjacent to the banks of the river | Potential pathway from surface water drains | N/A | N/A |
| Run-off risk | N/A | Moderate, potential for surface water overflow from impermeable surfaces | N/A | Moderate risk from roads and housing | Low | N/A | N/A |
| Riverbed observations | N/A | Sub-rounded cobbles are present along the river bed | N/A | Generally flat surface with medium-sized rounded cobbles | Gently sloping base with large angular boulders | N/A | N/A |
| Riverbank observations | N/A | Channelised banks with concrete. Some vegetation growth was noted | N/A | Banks are canalised, culverting is located underneath the bridge | Natural banks showing some evidence of undercutting on the western bank | N/A | N/A |
| Features | N/A | A stepped weir is present in the waterbody, along with culverting under the bridge. | N/A | A stepped weir is present | Common outfall is present, unclear where the discharge is from | N/A | N/A |
| Barriers | N/A | Metal barrier separating road waterbody. | N/A | Concrete wall separating road from waterbody | Stone banks separating road from river | N/A | N/A |
| Riparian Detail | N/A | Heavily vegetated banks | N/A | Heavily vegetated banks | Heavily vegetated banks, no sign of contamination | N/A | N/A |
| Comments | Several gullies are located along the road, unclear where these drain to. The car park is vegetated along the northern end. The car park is gently sloping. There is a concrete wall which is lightly vegetated separating the | Housing is located directly adjacent to the waterbody | Construction compound is currently located on grass verge adjacent to the Dodder_040. Several gullies are located along the Dodder View road. The topography is steeply | N/A | N/A - | There is a gently sloping gradient present towards the rain. Three manhole covers present. Surface water drains via gullies are equally spaced throughout | Topography is flat. One manhole cover is present. No gully drains were detected within the construction compound |

| Survey Attribute | Survey Location 1 | Survey Location 2 | Survey Location 3 | Survey Location 4 | Survey Location 5 | Survey Location 6 | Survey Location 7 |
|---|---|---|---|---|---|---|---|
| | road from the car park. | | sloping towards the Dodder_050 located 55m downgradient. | | | the carpark. It is unclear which water course they discharge to. | |

### 13.3.5 Designated Sites

The Designated Sites that have been summarised in this Section are located within the Liffey and Dublin Bay catchment. The assessment determined whether the following designated sites were present within the study area or hydrologically connected to the Proposed Scheme; SACs, Special Protection Areas (SPA), proposed Natural Heritage Areas (pNHAs), Natural Heritage Areas (NHAs), Nutrient Sensitive Areas, salmonid rivers, shellfish areas and marine bathing waters.

A review of the Natura 2000 network was conducted to determine those sites within the study area and / or hydrologically connected to the Proposed Scheme. A full assessment of designated European Sites, including hydrological links and water dependant species or habitats, is contained within Chapter 12 (Biodiversity) in Volume 2 of this EIAR and Figure 12.2 in Volume 3 of this EIAR. The following Natura 2000 sites were identified to be relevant to this assessment:

- South Dublin Bay SAC (site code: 000210) (approximately 4km from the Proposed Scheme at its closest point);
- North Dublin Bay SAC (site code: 000206) (approximately 3km from the Proposed Scheme at its closest point); and
- South Dublin Bay and River Tolka Estuary SPA (site code: 004024) (approximately 3km from the Proposed Scheme at its closest point).

The proposed Natural Heritage Areas (pNHAs) identified were:

- Dolphins, Dublin Docks pNHA (site code: 000201) (approximately 4km from the Proposed Scheme at its closest point);
- North Dublin Bay pNHA (site code: 000206) (approximately 3km from the Proposed Scheme at its closest point); and
- South Dublin Bay pNHA (site code: 000210) (approximately 4km from the Proposed Scheme at its closest point).

No other designations were identified within the study area during the desk study.

There is one designated Nutrient Sensitive Area (NSA) within the study area of the Proposed Scheme, this is the Liffey Estuary. It is designated as a NSA 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 are seven designated marine bathing waters downstream of the Proposed Scheme. The EPA published its Bathing Water Quality - A Report for the Year 2020 in May 2020 (EPA 2020b) and the website beaches.ie keeps this information regularly updated. The beaches and the most up to date assessment (checked June 2021) of their quality is provided below:

- Dollymount Strand – Poor Quality ((approximately 10km from Proposed Scheme at its nearest point);
- North Bull wall – Poor Quality (approximately 9km from Proposed Scheme at its nearest point);
- Half Moon Beach – Excellent quality (approximately11km from Proposed Scheme at its nearest point);

- Shelley Banks – Excellent Quality ((approximately 12km from Proposed Scheme at its nearest point)
- Sandymount Strand – Poor Quality (and was closed for the Summer 2021 bathing season) (approximately 13.5km from Proposed Scheme at its nearest point) ; and
- Merrion Strand – Poor Quality ((approximately 14.5km from Proposed Scheme at its nearest point)
- Seapoint – Excellent Quality (approximately 15km from Proposed Scheme at its nearest point)

### 13.3.6 Drinking Water Supply (Surface Water)

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

### 13.3.7 Known Pressures

The EPA online database (EPA 2020a) was reviewed to determine the presence of point source environmental pressures within the study area. The presence / absence of urban wastewater treatment plants (UWWTP) and associated storm water overflows SWOs and Industrial Emissions Licence (IEL) / Integrated Pollution Control (IPC) licensed sites were examined. There are no UWWTP or IE / IPC licensed in the study area of the Proposed Scheme.

There are 21 discharge locations within the study area.

### 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 nature of the drainage system and the level of treatment and attenuation provided currently. Based on this assessment, the existing road bridge network consists primarily of curb and gully, with no treatment or attenuation within the network. No SuDS were identified within the study area.

The 2019 WFD sub-catchment assessment (EPA 2019a) identifies that inefficient drainage system and issues with misconnections are priority issues within this catchment and study area. These issues remain ongoing and in July 2019 a network drainage collapse resulted in the draining of 700m of the Grand Canal.

**Table 13.10 Existing Drainage**

| Existing Catchment Reference | Existing Network Type | Proposed Scheme Section | Existing Outfalls (water body) |
|---|---|---|---|
| Catchment 1 | Surface Water (Storm) | Section 2 | Dodder_050 |
| Catchment 2 | Surface Water (Storm) | Section 2 | Owendoher_010 |
| Catchment 3 | Surface Water (Storm) | Section 2 | Dodder_050 |
| Catchment 4 | Surface Water (Storm) | Section 2 | Dodder_050 |
| Catchment 5 | Surface Water (Storm) & Combined | Section 3 | Ringsend |
| Catchment 6 | Combined | Section 3 | Ringsend |
| Catchment 7 | Combined | Section 3 | Ringsend |
| Catchment 8 | Combined | Section 3 | Ringsend |
| Catchment 9 | Combined | Section 3 | Ringsend |
| Catchment 10 | Combined | Section 4 | Ringsend |
| Catchment 11 | Combined | Section 4 | Ringsend |
| Catchment 12 | Combined | Section 4 | Ringsend |
| Catchment 13 | Surface Water (Storm) | Section 1 | Dodder_040 |
| Catchment 14 | Surface Water (Storm) | Section 1 | Dodder_040 |
| Catchment 15 | Surface Water (Storm) | Section 1 | Dodder_040 |
| Catchment 16 | Surface Water (Storm) | Section 1 | Dodder_040 |
| Catchment 17 | Foul & Combined | Section 3 | Ringsend |
| Catchment 18 | Surface Water (Storm) | Section 3 | Ringsend |

### 13.3.9 Surface Water Features

The five main waterbodies in the study area, Liffey Estuary Upper, Dodder_040, Dodder_050, Owenadoher_010 and the Grand Canal, are discussed in this Section. The River Dodder and the Grand Canal flow into the Liffey Estuary Upper before flowing into Dublin Bay (refer to Figure 13.2 ). Only the Dodder_040 and Dodder_050 are identified within the RBMP 2018 - 2021 as 'Priority Areas for Action' (DHPLG 2018). The desk study assessment did not identify any surface water features within the study area which are not classified as WFD waterbodies. The overarching hydromorphology of the study area was assessed during the field surveys. The study area includes highly modified planform waterbodies with walled or artificial riparian zones. Observations from the field survey also noted concerns around water quality related to discolouration and possible contaminated effluent, although the crossing locations on the Dodder_040 and Dodder_050 are considered to have high local amenity value due to the surrounding park areas. A summary of the baseline condition of each of these WFD waterbodies and their associated flood risk within the study area is detailed in the following sections.

**Table 13.11: Distance of the Waterbodies Within the Study Area to the Proposed Scheme and the Individual Sections of the Proposed Scheme**

| Waterbody | Nearest Scheme Section | Approx. Distance from Proposed Scheme (m) | Number of Crossings |
|---|---|---|---|
| Dodder_040 | Cypress road-Old Bridge Road | 0 | 0 |
| Dodder_050 | Rathdowne Road and Dodder Road Lower | 0 | 2 |
| Owenadoher_010 | Grange Road to Dodder View Road | 100 | 0 |
| Grand Canal | Charleville Road to Dame Street | 0 | 1 |
| Liffey Estuary Upper | Charleville Road to Dame Street | 200 | 0 |

#### 13.3.9.1 Dodder_040 and Dodder_050

The River Dodder has a total catchment area of 167.7km$^2$. It rises on the northern flanks of the Dublin Mountains, flowing 26km north through the Upper and Lower Glenasmole reservoirs and through South Dublin, before becoming tidal near Lansdowne Road and entering the River Liffey at Ringsend. The land surrounding the River Dodder consists of agricultural land in the upstream reaches and urban within the mid- to lower-stream extents.

The Dodder_040 is 24.25km long and consists of two main channels from Tallaght to Templeogue, and another tributary (through Tallaght) and two unnamed minor tributaries (both in Firhouse). The Dodder_050 segment is 29.62km long, rising at Three Rock Mountain and continuing north until it flows into the Liffey Estuary. The 2019 WFD sub-catchment assessment (EPA 2019) states that the catchment contributions for both segments are considered to be primarily urban.

The Dodder_040 will not be crossed by the Proposed Scheme but is in close in proximity (the red line boundary extends to a bridge which then crosses this water body) at Cypress Road where it becomes Old Bridge Road. The Dodder_050 will be crossed by the Proposed Scheme twice; at Rathdown Road and at Dodder Road Lower

The Dodder_040 has Moderate WFD Status and is At Risk of not achieving Good Status by 2027. The identified pressures on Dodder_040 are urban runoff and diffuse sources runoff. The WFD Status of Dodder_050 is Moderate and it is At Risk of not achieving Good Status by 2027. The Dodder_050 has a number of pressures such as urban wastewater, anthropogenic pressures, urban runoff and historically polluted sites.

In terms of assigning sensitivity, the Dodder_040 has Moderate WFD status, and at the closest point of the Proposed Scheme, the water body is more than 5km from a designated SAC. It would normally be assigned 'Medium sensitivity', however whilst not a designated salmonid river, salmonid species are noted by the IFI to be present. Therefore, it is assigned a High sensitivity.

In terms of assigning sensitivity to Dodder_050, the water body has Moderate WFD status. It has a direct connection to the Liffey Estuary Lower, which is a Nutrient Sensitive Area, however it is more than 5km from a designated SAC at the point at which the Proposed Scheme crosses it. However, whilst not a designated salmonid river, salmonid species are also present. Therefore, it is assigned a High sensitivity.

#### 13.3.9.2 Owendoher_010

Owenadoher_010 consists of branches which rise in the Glendoo and Kilakee Mountains and flow northwards through Whitechurch and Rathfarnham before converging at Willbrook and flowing into the Dodder_050. The waterbody has Moderate WFD Status and is At Risk of not achieving Good Status by 2027. The identified pressure is diffuse urban runoff.

In terms of assigning sensitivity, it is a Moderate status WFD, and would normally be assigned a sensitivity of Medium; however the potential presence of salmonid species of fish increases the sensitivity and it is therefore assigned a High sensitivity.

#### 13.3.9.3 Liffey Estuary Upper

The Liffey Estuary Upper is a transitional waterbody and is within the Liffey Nutrient Sensitive Area. It is located at the northern extent of the proposed Rathfarnham Section of the Proposed Scheme. The River Liffey is considerably constrained by quay walls through Dublin City Centre. Within the study area there are at least three river crossings including the Grattan Bridge, the Millennium Bridge, Ha'penny Bridge. There are a further two river crossings within 500m of the Proposed Scheme, these are the O'Connell Bridge and the O'Donovan Rossa Bridge. The Proposed Scheme will not cross Liffey Estuary Upper.

The Liffey Estuary Upper has a Good WFD Status and is 'At Risk' of not achieving Good Status by 2027, which means a deterioration in status is anticipated. The main risk is urban wastewater from Combined Sewer Overflows (CSOs) at Ringsend. CSOs can end up discharging raw sewage into watercourses during storm events. However, if sewers are under capacity, or if there is a blockage, the continuous operation of CSOs can occur. The key impacts are considered to be nutrient pollution and alterations to habitats due to morphological changes. There are no designated or protected sites along the watercourse that are within the study area, but it is upstream of Dublin Bay which is a Special Area of Conservation (SAC) and a Special Protection Area (SPA).

In terms of assigning sensitivity, Liffey Estuary Upper is Good status, it is also a Nutrient sensitive Area. It therefore is assigned Very High sensitivity.

#### 13.3.9.4 Grand Canal Main Line (Liffey and Dublin Bay)

The Grand Canal is an artificial waterbody, primarily used for recreation. 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 waterbody. The WFD also considers heavily modified waterbodies (HMWB) and artificial surface waterbodies (AWB) and requires them to achieve good ecological potential rather than Good Status. The land use associated with the canal, contained within the study area, is mostly urban / industrial. The Proposed Scheme will cross the Grand Canal approximately 1km north of Rathmines.

The water body has Good WFD status. It has a direct connection to the Liffey Estuary Lower, which is a Nutrient Sensitive Area. In addition, coarse fish species are also present (IFI Consultation response). Therefore it is assigned a High sensitivity.

## 13.3.10 Summary of Baseline Receptor Importance

**Table 13.12: Baseline Receptor Importance**

| Waterbody Section ID | Attributes | Indicator / Feature | Importance |
|---|---|---|---|
| Dodder_040 | River | Hydrological connection with Designated Nutrient Sensitive Area (Liffey Estuary)<br>Moderate WFD Status<br>Salmonids present | High |
| Dodder_050 | River | Direct hydrological connection with Designated Nutrient Sensitive Area (Liffey Estuary)<br>Moderate WFD Status<br>Salmonids present | High |
| Owenadoher_010 | River | Moderate WFD Status<br>Hydrological connection with Designated Nutrient Sensitive Area (Liffey Estuary) | High |
| Liffey Estuary Upper | Transitional waterbody | Designated Nutrient Sensitive Area | Very high |
| Grand Canal Main Line (Liffey and Dublin Bay) | AWB | Good Ecological Potential | High |

## 13.3.11 Flood Risk

Flood Risk is not considered as part of the impact assessment in this Chapter; a separate Site Specific Flood Risk Assessment (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.

An FRA has been prepared for the Proposed Scheme in accordance with 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). A copy of the FRA 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 Zones A and B.

### 13.3.11.1 Section 1

There are no recorded historic flood events along this section of the Proposed Scheme. Two historic flood events within a 1km proximity of the Proposed Scheme have been identified, however these are deemed low risk due to their location.

There is no risk of fluvial flooding to Section 1 of the Proposed Scheme in the present, or future climate change scenario.

The site is located approximately 10 km from the nearest coastal boundary and elevated high above sea level. There is therefore no risk of coastal flooding to the site in the present, or future climate change scenario.

The groundwater vulnerability varies along Section 1, with the majority lying in areas at low vulnerability, but with some areas at moderate or high. As most of the scheme is on existing roads with no known flooding specifically due to groundwater it is not expected that this risk will increase with the construction of the scheme.

The risk of pluvial flooding along the majority of the proposed route is medium, however this risk exists in the current scenario and will be reduced as a result of the Proposed Scheme.

### 13.3.11.2 Sections 2, 3 and 4

There are a number of historic flood events at different locations along or near to the Proposed Scheme. The Proposed Scheme is largely on existing roads and will result in minimal additional paved areas and will therefore not increase the risk of these events reoccurring compared to the current scenario.

Two areas in Rathfarnham are at medium (1 in 100 year) and high risk (1 in 100 year) of flooding from the River Dodder and Whitechurch stream respectively.

The areas consist of Area 1 on Rathfarnham Road near Dodder View Road which falls within flood zone B and Area 2 at Nutgrove Avenue falls within flood zone A. The rest of the route does not fall within any flood extents therefore is within Flood Zone C.

There is no risk of coastal flooding to the site in the present, or future climate change scenario.

The groundwater vulnerability varies along the Proposed Scheme, with many areas shown to be in areas of moderate groundwater vulnerability. Groundwater level measurements have shown the levels to be 2.13-3.15m bgl. As most of the scheme is on existing roads with no known flooding specifically due to groundwater it is not expected that this risk will increase with the construction of the scheme.

The risk of pluvial flooding along the majority of the proposed route is high, however this risk will be reduced as a result of the Proposed Scheme.

As areas of the scheme are identified as being within Flood Zone A and Flood Zone B a Justification Test is required. The Plan Making Justification Test and Development Management Justification have been assessed and passed, therefore further investigation of the flood risk in the form of a Stage 2 FRA is not required

## 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 are 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 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). A SuDS drainage design has been developed as a first preference and in accordance with the SuDS Management Train 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 generally consists of relocating existing gullies (where possible) to new locations.

In areas, where an increase in impermeable area is proposed, where possible attenuation will be provided in the form of SuDS such as permeable paving, bio retention areas, rain gardens, green roofs, filter drains (FD) and tree pits. As explained in the 'BusConnects Core Bus Corridor Drainage Design Basis' (NTA 2020), a hierarchical approach to select SuDS drainage solutions has been applied. If following the site selection process, the provision of SuDS is not possible, attenuation is provided in the shape of oversized pipes (OSP). 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 drainage design principles have informed the drainage design (see Chapter 4 Project Description and Appendix A4.1 in Volume 4 of this EIAR) which will ensure no net increase in the surface water flow discharged to these receptors.

The following drainage systems are proposed where new paved areas are proposed:

- Sealed Drainage (SD);
- SW/RG: Grass Surface water Channels, Swales and Bioretention/Rain Gardens (SW/RG);
- Filter Drains (FD);
- Tree Pits (TP);and
- Oversize Pipes (OSP).

Details of the existing impermeable areas and the proposed additional paved areas is provided in Table 13.13.

**Table 13.13 Additional Impermeable areas**

| Existing Catchment Reference (Refer to Table 9.2) | Approx. Impermeable Surface Area | | | Possible SuDS solution/ attenuation measure |
|---|---|---|---|---|
| | **Water Body** | **Existing ($m^2$)** | **Change ($m^2$)** | |
| Catchment 1 | Dodder_050 | 807 | 447 | RG |
| Catchment 1 | Dodder_050 | 1,593 | 181 | RG, FD |
| Catchment 1 | Dodder_050 | 1,533 | 291 | TP, FD, SD |
| Catchment 2 | Owendoher_010 | 879 | 904 | TP, FD, SD |
| Catchment 2 | Owendoher_010 | 588 | 464 | TP, FD, OSP |
| Catchment 2 | Owendoher_010 | 355 | 37 | FD, TP |
| Catchment 3 | Dodder_050 | 500 | 30 | FD, TP |
| Catchment 3 | Dodder_050 | 322 | 61 | FD |
| Catchment 4 | Dodder_050 | 203 | 97 | FD |
| Catchment 5 | Ringsend | 1,216 | 204 | TP, FD, SD, OSP |
| Catchment 7 | Ringsend | 1,533 | 317 | TP, FD, SD |
| Catchment 7 | Ringsend | 495 | 205 | FD, TP |
| Catchment 9 | Ringsend | 288 | 379 | TP, FD |
| Catchment 9 | Ringsend | 1,726 | 194 | TP, FD, SD |
| Catchment 13 | Dodder_040 | 483 | 174 | FD, SW |
| Catchment 13 | Dodder_040 | 292 | 192 | FD |
| Catchment 13 | Dodder_040 | 348 | 214 | FD, SW |
| Catchment 13 | Dodder_040 | 576 | 494 | FD, SW |
| Catchment 13 | Dodder_040 | 1,735 | 798 | AP, OGPR |
| Catchment 14 | Dodder_040 | 678 | 404 | FD |
| Catchment 14 | Dodder_040 | 1,759 | 386 | FD |
| Catchment 14 | Dodder_040 | 1,141 | 309 | FD, RG |
| Catchment 14 | Dodder_040 | 1,887 | 174 | FD, RG |
| Catchment 14 | Dodder_040 | 1,888 | 170 | FD, RG |
| Catchment 15 | Dodder_040 | 157 | 93 | RG |
| Catchment 15 | Dodder_040 | 1,660 | 265 | FD, RG |
| Catchment 17 | Ringsend | 178 | 42 | RG |
| Catchment 17 | Ringsend | 2,069 | 153 | OSP |
| Catchment 17 | Ringsend | 2,491 | 239 | RG, FD, OSP |
| Catchment 17 | Ringsend | 1908 | 282 | OSP |

The percentage increases in impermeable area for each water body catchment is provided in Table 13.14 along with the range of SuDS proposed.

**Table 13.14 Summary of Increased Impermeable areas per water body**

| Water body | Approx. Impermeable Surface Area | | | SuDS Measures Proposed |
|---|---|---|---|---|
| | Existing | Additional | %age change | |
| Dodder_040 | 12,604 | 3,673 | 29 | FD, RG, SW |
| Dodder_050 | 4,958 | 1,107 | 22 | TP, FD, SD, RG |
| Owendoher_010 | 1822 | 1405 | 77 | TP, FD, OSP, SD |
| Ringsend | 11,904 | 2,015 | 17 | TP, RG, FD, OSP |

#### 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.

### 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 road infrastructure, so infrastructure provision for buses, pedestrians and cyclists would remain the same.

The Baseline (Section 13.3) describes the existing pressures on the water bodies within the study area; these are identified and categorised under the River Basin Management Plan (RBMP) process under baseline conditions (i.e. what is there at present) and reported by the EPA. The RBMP categorises significant pressures impacting water bodies 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 on water bodies within the study area are Diffuse Urban runoff and Urban Wastewater.

Both Dodder_040 and Dodder_050 have pressures from urban runoff in relation to misconnections causing exceedances in EQS values since 2011. Further investigation is needed under the Local Authority Waters Programme (LAWPRO) to determine the nature and extent of impacts. Some work has been done removing a significant number of misconnections in the Dodder_040 catchment since the end of 2018 however further data is to be collected.

Dodder_050 and Liffey Estuary Upper are under pressure from Urban Wastewater and EQS exceedances have also been an issue, particularly in relation to phosphate, ammonia, and Dissolved Oxygen (DO). Storm water overflows (SWOs) have been identified as the significant pressure impacting the Dodder_050 and a load reduction analysis has been identified as an action to be undertaken by the Local Authority Waters Programme (LAWPRO) to determine the impact of the misconnections and also whether the Dodder Flood Project misconnection repairs have had a significant impact.

Discharges from Wastewater Treatment Plants (WwTPs) and agglomeration networks have been identified online (EPA 2021) as pressures to all water bodies within the study area. These include discharges from SWOs and Storm / Emergency Water Overflows.

The Urban Wastewater Treatment in 2019 report (EPA 2020d) recommends three actions for Irish Water:

- Identify and remedy the underlying causes for the delays in upgrading deficient treatment systems;
- Target resources to resolve environmental issues at the 113 priority areas and make sure each of these has an action programme and timeframe to improve treatment; and
- Accelerate the pace at which the overdue impact assessments on shellfish waters are carried out and use the findings to plan and implement improvement works.

The draft RBMP includes an action for Irish Water to continue investment in wastewater infrastructure with Irish Water investing in 83 WwTPs and 10 collection networks at an estimated cost of €1.022 billion, over the period 2020 to 2024. In addition, as part of Ireland's National Recovery and Resilience Plan 2021 (Government of Ireland 2021), Irish Water will be delivering its enhanced Ambition Programme, which aims to deliver 10 priority WwTP 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, 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 13.4.5.3 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 these 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, where relevant.

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 is estimated to be 24 months. The 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 the works they support.

Construction compounds will be at the following locations:

- TR1: Spawell Roundabout;
- TR2: Terenure Road North;
- TR3: Dodder View Road;
- TR4: Military Road,
- TR5: Richmond Street South; and
- TR6 Spawell Link Road.

Of these compound locations, only TR1, TR3 and TR6 have the potential for impacts on water bodies; TR2, TR4 and TR5 are in areas which drain to the combined sewer system.

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 construction related impacts which 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 waterbody 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; 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 water bodies with anthropogenic substances such oil, chemicals or concrete washings. This could occur as a result 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 water bodies or drains connected to the water bodies.
- Re-exposure of historically settled contaminants within or near to water bodies as a result of working within or in close proximity to the waterbody.

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

### 13.4.4.3 Assessment of Potential Impacts

Detailed assessment of the potential impacts on receptors is provided here and a summary table for all receptors provided in Table 13.15.

13.4.4.3.1 Liffey Estuary Upper

No surface water drains discharge to the Liffey Estuary Upper in this location. There is no possibility of overland flows; any silty water or accidental release of anthropogenic substances would be collected by the rainwater gullies which discharge into a combined sewer system here. There will be no impacts on this water body.

13.4.4.3.2 Dodder_040

The works associated with the proposed upgrade of Spawell junction within 100m of the Dodder_040 are not deep nor require extensive earthworks and do not involve the widening of any roads; there will be some loss of green space which will involve stripping of topsoil. This has the potential to impact upon the water body as a result of silty water runoff via surface water drains in the area. This has the potential to lead to short-term, adverse impacts of high magnitude, resulting in an impact of Slight significance.

The minor widening works from the M50 to Spawell Roundabout and Cypress Grove Junction to Rathdown Avenue are further than 100m from the waterbody. These works are not deep or require extensive earthworks and do not involve the widening of any roads; there will be some loss of green space which will involve stripping of topsoil. This has the potential to impact upon the water body as a result of silty water runoff via surface water drains in the area. This has the potential to lead to short term, adverse impacts of small magnitude, resulting in an impact of Slight significance.

The Construction Compound TR1 located at Spawell roundabout has the potential to result in impacts on the water body as a result of accidental spillages or runoff from stored materials and topsoil. The compound is proposed on a greenfield site with no existing surface water drains within the site. There is potential for overland flow of pollutants, however. Any surface water drains in the road next to this area drain into the Dodder_040. This has the potential to lead to short to medium term, adverse impacts of high magnitude leading to an impact of Significant to Moderate significance.

The Construction Compound TR6 located at Spawell Link Road to the west of the Dodder_040 has the potential to result in impacts on the water body due to accidental spillages or runoff from stored materials and topsoil. As for TR1, the compound is proposed on a greenfield site with no existing surface water drains within the site. There is potential for overland flow of pollutants, however. Any surface water drains in the road next to this area are likely to drain into the Dodder_040. This has the potential to result in short to medium term, adverse impacts of High magnitude leading to an impact of Significant to Moderate significance.

13.4.4.3.3 Dodder_050

The road widening and realignment of footpath and cycleways within the verges at Templeogue Road: Rathdown Avenue to Terenure Road North, and road widening, construction of new boundary wall and realignment of footpath and cycleways within the verges on Rathfarnham Road are more intrusive than those identified in Section

1.Potential impacts include silty water runoff, anthropogenic contaminants and disturbance to hydromorphological process in the receiving water. This has the potential to lead to short term, adverse impacts of medium magnitude leading to an impact of Moderate/Significant significance.

Construction Compound TR3 at Doffer View is within 50m of the Dodder_050 waterbody and the site is over 100m long. It is an existing greenfield site; therefore overland flows to surface water drains in the road separating the site from the water body are the only likely pathway. There is a short retaining wall around the site which may afford some protection, however the site slopes up behind this and so the protection will be limited. Potential impacts include silty water runoff during site preparation and accidental spillages of hydrocarbons or similar. These have the potential to lead to short to medium term, adverse impacts of medium magnitude leading to an impact of Moderate/Significant significance.

Road widening, construction of new boundary wall and realignment of footpath and cycleways at Grange Road to Main Street Junction and Main Street Junction to Dodder Park Road are proposed. This could impact the water body as a result of silty water runoff via surface water drains in the area. This has the potential to lead to short term, adverse impacts of small magnitude, resulting in an impact of Moderate significance.

13.4.4.3.4 Owendoher_010.

Widening and the new boundary wall at Grange Road to Dodder Park Road have the potential to impact upon the water body as a result of silty water runoff via surface water drains in the area. These works are not deep or require extensive earthworks and do not involve the widening of any roads. This has the potential to lead to short term, adverse impacts of small magnitude, resulting in an impact of Slight/Moderate significance.

13.4.4.3.5 Grand Canal Main Line (Liffey and Dublin Bay)

No surface water drains outfall to the Grand Canal in this location. There is potential for overland flows of silty water however works proposed are minor and not intrusive. This has the potential to lead to short term, adverse impacts of negligible magnitude, resulting in an impact of Imperceptible significance.

**Table 13.15:Summary of Predicted Construction Phase Impacts on Waterbodies within the Study Area**

| Waterbody Name | Project Activity | Predicted Impacts | | | |
|---|---|---|---|---|---|
| | | Description of Predicted Impacts | Sensitivity of Receptor | Magnitude of Impacts | Significance of Impacts |
| Dodder_040 | Widening and Junction Upgrade | Increased surface water runoff; Increased sediment in runoff; Anthropogenic sources (fuel etc.) | High | Small | Short-term, adverse Moderate/ Slight |
| Dodder_040 | Construction Compound TR1 | Increased surface water runoff; Increased sediment in runoff; Anthropogenic sources (fuel etc.) | High | Small | Short-term, Adverse Moderate/ Slight |
| Dodder_040 | Construction Compound TR6 | Increased surface water runoff; Increased sediment in runoff; Anthropogenic sources (fuel etc.) | High | Small | Short-term, Adverse Moderate/ Slight |
| Dodder_050 | Carriageway widening Rathdown Avenue to Terenure Junction | Increased surface water runoff; Increased sediment in runoff; Anthropogenic sources (fuel etc.) | High | Medium | Short-term, adverse Moderate/Significant |
| Dodder_050 | Construction Compound TR3 at Dodder Park | Increased surface water runoff; Increased sediment in runoff; Anthropogenic sources (fuel etc.) | High | Medium | Short-term, adverse |

| Waterbody Name | Project Activity | Predicted Impacts | | | |
|---|---|---|---|---|---|
| | | Description of Predicted Impacts | Sensitivity of Receptor | Magnitude of Impacts | Significance of Impacts |
| | | | | | Moderate/Significant |
| Owendoher_010 | Widening and new boundary wall Grange Road to Dodder Park Road | Increased surface water runoff; Increased sediment in runoff; Anthropogenic sources (fuel etc.) | Medium | Moderate | Short-term, adverse Moderate |
| Grand Canal Main Line (Liffey and Dublin Bay) | Minor alignment Rathgar Road to Cuffe Street | Increased surface water runoff; Increased sediment in runoff; Anthropogenic sources (fuel etc.) | High | Negligible | Short-term, adverse Imperceptible |
| Liffey Estuary Upper | Minor alignment works at Cuffe Street to Dame Street | Increased surface water runoff; Increased sediment in runoff; Anthropogenic sources (fuel etc.) | Very High | No impacts | No impacts |

## 13.4.5 Operational Phase

### 13.4.5.1 Overview of Predicted 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.

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 new routes of the Proposed Scheme; and
- Dispersal of traffic onto other the local road network 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 Predicted Impacts – Surface Water Runoff

Detailed assessments for each receptor are provided below, with a summary of impacts at Table 13.16.

13.4.5.2.1 Dodder_040

The impermeable area in the road corridor area draining to the Dodder_040 increases by 3,674m$^2$ which equates to 29% This increase in impermeable area will be attenuated using bio retention/rain garden areas, and filter drains. As a result, there will be no net increase in runoff to the water body. Some improvement in water quality may be observed as a result of the SuDS being employed. This has the potential to lead to permanent, beneficial impacts of negligible magnitude; resulting in an impact of Imperceptible significance.

13.4.5.2.2 Dodder_050

The impermeable area in the road corridor area draining to the Dodder_040 increases by 1,107m$^2$ which equates to 22%. This increase in impermeable area will be attenuated using tree pits and filter drains. As a result, there will be no net increase in runoff to the water body. Some improvement in water quality may be observed as a

result of the SuDS being employed. This has the potential to lead to permanent, beneficial impacts of negligible magnitude; resulting in an impact of Imperceptible significance.

13.4.5.2.3 Owendoher_010

The impermeable area in the road corridor area draining to the Dodder_040 increases by 1,405m$^2$ which equates to 77%. This increase in impermeable area will be attenuated using tree pits, oversized pipes and filter drains. As a result, there will be no net increase in runoff to the water body. Some improvement in water quality may be observed as a result of the SuDS being employed. This has the potential to lead to permanent, beneficial impacts of negligible magnitude; resulting in an impact of Imperceptible significance.

13.4.5.2.4 Grand Canal Main Line (Liffey and Dublin Bay)

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

13.4.5.2.5 Liffey Estuary Upper

There is no potential for significant impact on the Upper Liffey Estuary from the Proposed Scheme, as there is no direct hydrological connection to this waterbody and therefore no pathway for pollutants or increased surface water runoff.

**Table 13.16:Summary of Predicted Operational Phase Impacts on Waterbodies within the Study Area**

| Waterbody Name | Project Operation | Predicted Impacts | | | |
|---|---|---|---|---|---|
| | | Description of Predicted Impacts | Sensitivity of Receptor | Magnitude of Impacts | Significance of Impacts |
| Dodder_040 | Runoff to Dodder_040 | No increase in runoff.<br>Improvement in water quality | Medium | Negligible | Permanent beneficial Imperceptible |
| Dodder_050 | Runoff to Dodder_050 | No increase in runoff.<br>Improvement in water quality | High | Negligible | Permanent beneficial Imperceptible |
| Owendoher_010 | Runoff to Owendoher_010 | No increase in runoff.<br>Improvement in water quality | High | Negligible | Permanent beneficial Imperceptible |

### 13.4.5.3 Assessment of Predicted Impacts – Traffic

Traffic modelling (Chapter 6 (Traffic & Transport)) has been undertaken for two scenarios: Do Minimum and Do Something for 2028 and 2043. The review of changes in AADT provides a mechanism to understand if the Proposed Scheme could result in traffic redistribution onto the surrounding local road network. 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.

Where AADT is predicted to be greater than 10,000 in either 2028 and/or 2043, a further assessment was caried out to determine whether there may be a significant impact (see Table 13.17). All of the road sections where an increase above 10,000 AADT is predicted drain to the same surface water system as the existing. Therefore, there will be no significant impact associated with increased traffic on side roads.

**Table 13.17 Analysis of Road Sections >10,000 AADT**

| Road Name | A_B (GIS) | Length of Section (m) | 2028 Do Min | 2028 Do Sthg | % + | 2043 Do Min | 2043 Do Sthg | % + | Closest existing drainage route | Change in drainage from existing? | Sig Impact? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Harolds Cross Road St Clare's Convent School to Grand Canal | 8567_8267 | 55 | 9658 | 10482 | 9 | 9684 | 10448 | 8 | Combined Sewer | No | No |
| Harolds Cross Road Mount Drummond Avenue to Grand Canal | 8267_6306 | 175 | 9842 | 10651 | 8 | 9844 | 10576 | 7 | Combined Sewer | No | No |
| Harolds Cross Road Grand Canal to Mount Drummond Avenue | 6306_8267 | 175 | 10848 | 11339 | 5 | 10913 | 11343 | 4 | Combined Sewer | No | No |
| Ranelagh Road - Mount Pleasant Square | 11338_11201 | 81 | N/A | N/A | | 7865 | 10254 | 30 | Combined Sewer | No | No |
| Ranelagh Road - Temple Place to Mount Pleasant Square | 11239_11184 | 250 | 7016 | 10492 | 50 | 7095 | 10571 | 49 | Combined Sewer | No | No |
| Ranelagh Road - Cullenswood Road to Temple Place | 11250_11239 | 63 | 7164 | 10635 | 48 | 7250 | 10722 | 48 | Combined Sewer | No | No |
| Ranelagh Road - Elmpark Avenue to Beechwood Avenue Lower | 11261_11251 | 47 | 8874 | 10733 | 21 | 8571 | 10926 | 27 | Combined Sewer | No | No |
| Ranelagh Road - Ashfield Road to Beechwood Avenue Lower | 11233_11261 | 52 | 8898 | 11686 | 31 | 8594 | 11750 | 37 | Combined Sewer | No | No |
| Sandford Road - Eglinton Road to Belmont Avenue | 11317_11318 | 103 | 9937 | 11051 | 11 | 9840 | 10938 | 11 | Combined Sewer | No | No |
| Sandford Road - Norwood Park to Sandford Terrace | 11164_11318 | 302 | 9676 | 8292 | -14 | 9926 | 10995 | 11 | Combined Sewer | No | No |
| Sandford Road - Sandford Terrace to Norwood Park | 11318_11164 | 302 | 10040 | 10993 | 9 | 9470 | 8597 | -9 | Combined Sewer | No | No |
| Springfield Avenue | 8399_8386 | 165 | 6915 | 10613 | 53 | 6944 | 10575 | 52 | Combined Sewer | No | No |

| Road Name | A_B (GIS) | Length of Section (m) | 2028 Do Min | 2028 Do Sthg | % + | 2043 Do Min | 2043 Do Sthg | % + | Closest existing drainage route | Change in drainage from existing? | Sig Impact? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Springfield Avenue | 9144_8399 | 1090 | 6868 | 10563 | 54 | 6902 | 10530 | 53 | Combined Sewer | No | No |
| Milltown Road | 11316_11400 | 460 | 9312 | 10370 | 11 | 9239 | 10333 | 12 | Dodder_050 | No | No |

#### 13.4.5.4 Summary of Flood Risk Assessment

Only Section 1 has the potential for flood risk to or from the Proposed Scheme. Here, all new surface water sewers provided as part of the scheme shall be designed so that no flooding will occur for a return period up to 30 years. This is an improvement when compared to some of the existing historical drainage infrastructure to be replaced and will reduce the risk of pluvial flooding. Also, as part of the scheme new drainage infrastructure will be provided which will include new Sustainable (Urban) Drainage Systems (SuDS) such as rain gardens, swales and tree pits. These SuDS features will provide some surface water storage and thus reduce the risk of pluvial flooding.

The site is classified as Flood Zone C as per OPW Guidelines. A Justification Test for the development is therefore not required. It is considered that the proposal is in keeping with the principles of the Flood Risk Guidelines which seeks to locate development in appropriate locations.

##### 13.4.5.4.1 Section 1

All new surface water sewers provided as part of the scheme shall be designed so that no flooding will occur for a return period up to 30 years. This is an improvement when compared to some of the existing historical drainage infrastructure to be replaced and will reduce the risk of pluvial flooding. Also, as part of the scheme new drainage infrastructure will be provided which will include new Sustainable (Urban) Drainage Systems (SuDS) such as rain gardens, swales and tree pits. These SuDS features will provide some surface water storage and thus reduce the risk of pluvial flooding.

The site is classified as Flood Zone C as per OPW Guidelines. A Justification Test for the development is therefore not required. It is considered that the proposal is in keeping with the principles of the Flood Risk Guidelines which seeks to locate development in appropriate locations.

##### 13.4.5.4.2 Section 2, 3 and 4

As areas of the scheme are identified as being within Flood Zone A and Flood Zone B a Justification Test is required. The Plan Making Justification Test and Development Management Justification have been assessed and passed, therefore further investigation of the flood risk in the form of a Stage 2 FRA is not required.

## 13.5 Mitigation and Monitoring Measures

### 13.5.1 Introduction

This section sets out the measures envisaged to avoid, prevent or reduce any significant adverse effects on the environment and, where appropriate, identify any proposed monitoring of the efficacy 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), a draft of which is included as Appendix A5.1 in Volume 4 of this EIAR.

### 13.5.2 Construction Phase

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 of the control and management measures set out in the SWMP will be implemented. This includes measures relating to:

- Construction Compound 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 (if necessary); and
- monitoring.

#### 13.5.2.1 Specific Mitigation Measures

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

For Construction Compound TR3 at Dodder View Road located in close proximity to the Dodder_050 there are potential impacts from contaminated surface water runoff during the set up and operation of the compound. Silt curtains/ bunding or infiltration trenches will be installed by the appointed contractor on the boundary inside the retaining wall, and higher than it, to prevent any silty water or spillages from reaching the water body. Fuels will be stored as far away as possible from the road to minimise the chances of an overland flow of spillages, especially via access and egress routes. All other high risk activities or storage of materials will be located at the southern boundary of the site.

For Construction Compound TR6 at Spawell Link Road silt curtains or soil 'bunds' (as is used for the existing compound) will be installed and maintained. Fuel and other materials will be stored at the southern boundary of the site.

### 13.5.3 Operational Phase

Mitigation for the Operational Phase has been built into the design of the Proposed Scheme. No additional mitigation is required.

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

## 13.6 Residual Impacts

### 13.6.1 Construction Phase

Following implementation of the mitigation measures outlined in Section 13.5 and the draft SWMP, there are no significant impacts predicted on any of the receptors in this study area. See Table 13.18.

**Table 13.18 Residual Impacts Construction Phase**

| Waterbody Name | Project Activity | Predicted Impacts | | |
|---|---|---|---|---|
| | | Description of Predicted Impacts | Significance of Impacts | Post Mitigation Significance of Impacts |
| Dodder_040 | Widening and Junction Upgrade | Increased surface water runoff; Increased sediment in runoff; Anthropogenic sources (fuel etc.) | Short-term, adverse Slight | Imperceptible Short term Adverse |
| Dodder_040 | Construction Compound TR1 | Increased surface water runoff; Increased sediment in runoff; Anthropogenic sources (fuel etc.) | Short-term, Slight adverse Slight | Imperceptible Short term Adverse |
| Dodder_050 | Carriageway widening Rathdown Avenue to Terenure Junction | Increased surface water runoff; Increased sediment in runoff; Anthropogenic sources (fuel etc.) | Short-term, adverse Moderate/Significant | Imperceptible Short term Adverse |
| Dodder_050 | Construction Compound TR3 at Dodder Park | Increased surface water runoff; Increased sediment in runoff; Anthropogenic sources (fuel etc.) | Short-term, adverse Moderate/Significant | Imperceptible Short term Adverse |
| Owendoher_010 | Widening and new boundary wall Grange Road to Dodder Park Road | Increased surface water runoff; Increased sediment in runoff; Anthropogenic sources (fuel etc.) | Short-term, adverse Moderate | Imperceptible Short term Adverse |
| Grand Canal Main Line (Liffey and Dublin Bay) | Minor alignment Rathgar Road to Cuffe Street | Increased surface water runoff; Increased sediment in runoff; Anthropogenic sources (fuel etc.) | Short-term, adverse Imperceptible | Imperceptible Short term Adverse |
| Liffey Estuary Upper | Minor alignment works at Cuffe Street to Dame Street | Increased surface water runoff; Increased sediment in runoff; Anthropogenic sources (fuel etc.) | No impacts | Imperceptible Short term Adverse |

### 13.6.2 Operational Phase

As no mitigation is required, residual impacts are as set out in Section 13.4.5. No significant impacts are anticipated for any other water body in the study area. See Table 13.19.

**Table 13.19 Residual Impacts Operational Phase**

| Waterbody Name | Project Operation | Predicted Impacts | | |
|---|---|---|---|---|
| | | Description of Predicted Impacts | Significance of Impacts | Post mitigation significance |
| Dodder_040 | Runoff to Dodder_040 | No increase in runoff. Improvement in water quality | Permanent beneficial Imperceptible | Permanent beneficial Imperceptible |
| Dodder_050 | Runoff to Dodder_050 | No increase in runoff. Improvement in water quality | Permanent beneficial Imperceptible | Permanent beneficial Imperceptible |
| Owendoher_010 | Runoff to Owendoher_010 | No increase in runoff. Improvement in water quality | Permanent beneficial Imperceptible | Permanent beneficial Imperceptible |
| All water bodies | Traffic increases on side roads | No significant impacts predicted | No significant impacts | No significant impacts |

### 13.6.3 Summary of WFD Assessment

The full WFD Assessment is provided in Appendix A13.1 in Volume 4 of this EIAR. A summary is provided here for ease of reference.

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 GES or cause a deterioration of the overall GEP of any of the water bodies that are in scope (Table 13.20).

**Table 13.20: Compliance of the Proposed Scheme with the Environmental Objectives of the WFD**

| Environmental Objective | Proposed Scheme | Compliance with the WFD Directive |
|---|---|---|
| No changes affecting high status sites | No waterbodies identified as high status | Yes |
| No changes that will cause failure to meet surface water GES or GEP or result in a deterioration of surface water GES or GEP | 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 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; indirect impacts have also been assessed. The assessment concludes that the Proposed Scheme will not compromise the achievement of the objectives of the WFD for any water body. 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. There are European designated sites in the vicinity of the Proposed Scheme which have been assessed and are presented in the Natura Impact Statement (NIS). The NIS is a standalone document included in the planning application for the Proposed Scheme. It concludes that the Proposed Scheme will not lead to a deterioration in the features of any designated site. The Proposed Scheme is not considered to be a risk to designated habitats and therefore is compliant with the Habitats Directive.

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 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 as there are not any within two kilometres of the Proposed Scheme. It is therefore compliant with the Bathing Water Directive.

#### 13.6.3.1 Conclusion

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

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

Taking into consideration the impacts of the Proposed Scheme on the biological, physico-chemical and hydromorphological quality elements, it is concluded that following the implementation of design and mitigation measures, it is concluded that it will not compromise progress towards achieving GES or GEP or cause a deterioration of the overall status of the water bodies that are in scope. It will not compromise the qualifying features of protected areas and is compliant with other relevant Directives. It can therefore be concluded that the Proposed Scheme is fully complaint with WFD and therefore does not require assessment under Article 4.7 of the WFD.

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